

DIRTY

PRECIOUS METALS



*Dumping European toxic waste
in Tsumeb, Namibia*

Dirty Precious Metals

Report from a fact finding mission on the Dundee Precious Metals
smelter facility in Tsumeb, Namibia
January 2016

Contents

The Global Capitals and the Multinational Extractivism	4
Background to DPM operations.....	5
Meeting (or rather not meeting) the Namibian authorities.....	9
The arsenic issue as the big white elephant in the room.....	10
The missing tonnage of arsenic	16
Cases from the past where the words did not match the reality.....	17
Export Processing Zone (EPZ).....	18
Last but Not Least!.....	19
Sollutions And Roles:.....	21
Global view on the industry:	23
Human stories behind the Tsumeb smelter	24
Annex 1 – Arsenic and arsenic trioxide: the king of poisons and the poison of kings	25
Peruvian copper.....	27
Tsumeb smelter products / Source: DPM /.....	27

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The Global Capitals and the Multinational Extractivism

Dundee Corp (USA) owner of Dundee Precious Metals (Canada - Listed on Toronto Stock Exchange)

One of the other big sources of concentrates is Colquijirca Mine in Pasco Province, Peru owned by Buenaventura 25-30 000 tons per year - the valuable in this concentrate is mostly the silver content)

Chelopech Mine - Bulgarian (production of copper concentrate - which is actually complex ore concentrate containing number of rare earth and above all GOLD, roughly 100 000 tons of concentrate per year)

DPM Bulgaria is registered in The Netherlands

DPM working exclusively with Louis Dreyfus Commodities, Switzerland - buyer of all the Bulgarian concentrate, sourcing more dirty concentrate for the smelter in Namibia from around the world

Another 70 000 + tons come from other sources including local sources from Namibia and neighboring countries or from the global markets

Tsumeb Smelter - Namibia (owned by DPM - processes dirty copper concentrates from Chelopech mine, Bulgaria, Colquijirca mine, Peru and from other sources around the world; Situated in Export Processing Zone = 0 corporate tax to Namibia)

Some of the main products of the smelter in Tsumeb:

- **Black copper** that is nearly pure copper but containing all the gold, silver and other rare earths that are marketable for Louis Dreyfus; It is clean from the arsenic and can be sold for further processing to many places

- **Arsenic trioxide** - Byproduct of the smelting of dirty concentrates - our calculations show that DPM produces more than 10 000 tons of the toxic material; The biggest part of it is left in a designated dumpside in Tsumeb as

inhouse dust that contains it is stored in sugar bags, 4200 tons is the refined arsenic trioxide most which gets marketed in Malaysia and South Africa for treatment of wood and pesticide in agriculture which is also a bad practise

- **Sulphur Acid** - an acid plant was installed to utilize the sulphuric gases that were previously vented and causing environmental and health damage to the Tsumeb regions; Sulphuric acid is sold to the uranium mines in Namibia;

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The subject of this report is not a usual environmental laggard. Here we take a closer look at the activities of a mining company considered to be an environmental and social champion by the European Bank for Reconstruction and Development (EBRD). Dundee Precious Metals (DPM) is a Canadian registered international mining company, listed on the stock exchange of Toronto, with operations in Bulgaria (Chelopech mine), Armenia (Kapan mine) and Namibia (Tsumeb Smelter). The company currently has plans for new mines in Bulgaria and Serbia.

Background to DPM operations

During the totalitarian regime in Bulgaria the Chelopech mine was a state owned enterprise. The product, in the form of copper concentrate, was treated at the Pirdop smelter together with concentrates from other nearby mines - Elacite and Asarel. Following a major accident with the smelter tailing pond in 1988, the Bulgarian government decided to stop the processing of the Chelopech concentrate in Pirdop due to its high arsenic content. The ban was regulated with a Council of Ministers decree in April 1, 1990. Following privatisation, DPM acquired the mine in 2003 and since then has overseen continuously increasing production from 900 tons

of ore in 2008 to more than 2 million tons in 2014. The Krumovgrad project (also in Bulgaria) was announced in 2005, with an environmental impact assessment (EIA) for ore processing and metal extraction involving the cyanide leaching method. Strong opposition from local communities and environmental NGOs resulted in a delay and significant changes to the project, reducing the scale of the mine, improving the tailings facility and bringing about the elimination of the cyanide technology. As of now the project has acquired most of the necessary national licenses, but operations have not yet started.

The Namibia Custom Smelter (NCS or the Tsumeb smelter) is a major commercial smelter located in Tsumeb, in the north central part of Namibia. The smelter has been in operation since the 1960s. It is primarily used for the processing of copper and is one of the few smelters in the world suitable for the treatment of complex arsenic and lead bearing concentrates. Tsumeb smelter in Namibia was acquired by DPM in 2010 from Weatherly Mining International. Louis Dreyfus Commodities Metals Suisse SA has exclusive rights to purchase the Chelopech concentrate for toll processing through the smelter and an exclusive arrangement to further supply concentrate feed for toll processing at the smelter through to and including 2020.



The Bulgarian partners of CEE Bankwatch Network have, for ten years, monitored some of DPM's projects. Together with other local Bulgarian activists we have been commenting on or directly opposing many of the company's activities in Bulgaria and Armenia, starting with the first investment proposal in 2005 for a greenfield open pit gold mine project in Krumovgrad, Bulgaria. We followed this with opposition to an investment proposal in 2008 for a cyanide leaching technology for gold extraction in the Chelopech mine in Bulgaria. A number of environmental issues were part of our focus throughout this period, including the former bad state of the tailings dam and the transport of concentrate from Chelopech mine which was causing pollution and dust at the Zlatitsa railway station. We also had the chance to check the conditions around the zinc and silver mine in Kapan, Armenia and we became familiar with certain social issues related to all of these projects. There was much attention given to the green-

field gold mine at Krumovgrad in Bulgaria. Through pressure exercised by civil society and the common sense of DPM management, this project was reduced significantly in scale and thus too its environmental impact. Following protests a change of the initially envisaged technology was introduced. The cyanide leaching plans were given up, preventing the import, use and dumping of hundreds of tonnes of cyanide in Bulgaria. In the case of Chelopech, apart from giving up the cyanide leaching, the extracted concentrate is now loaded on rail within the premises of the company instead of polluting the environs of Zlatitsa train station as in the early years of operations. All these problems were overcome in a process that can be described as many and varied – sometimes in an atmosphere of cooperation and dialogue; at other times we witnessed total denial and a hostile attitude from the company. The latter were cases when progress was achieved thanks to pressure and persistence from civil society activists.



View to the Ground level of the Chelopech mine in Bulgaria and the tailing ponds of the mine



A question mark

In our understanding of sustainable management of the environment and responsibility in the entire chain of production, after the acquisition of the Tsumeb smelter and the widely spread advertising about the planned improvements, we decided to take a closer look at this project, particularly as the annual reports of the company state that most of the modifications to the facility have already been fulfilled. In 2010, DPM closed the deal for the Tsumeb smelter, paying about \$3.5m (N\$33m) for an ageing and run-down smelter, surrounded by millions of tons of mining waste. **More importantly, the deal came with a so-called 'grandfather clause' endorsed by Namibia's Environmental Commissioner, Teofilus Nghitila: DPM would not be held responsible for any environmental problems caused prior to the date of purchase.'**

The following main observations and, in some cases, comparison with the company's behaviour in Bulgaria comes as result of our trip to Namibia between 10th and 21st August 2015.

1: Lack of sufficient information about the smelter in Tsumeb

"Our dealing with employees, governments, stakeholders and communities are open, honest and transparent. We set and uphold the highest ethical standards and business practices." DPM Sustainability report 2014. Perhaps the most astonishing fact identified months before and during the mission is the lack of any meaningful information about the project in Tsumeb, although transparency is stated as one of the core values in the DPM last sustainability report. We faced complete secrecy, escalating to paranoid behaviour when we appeared at the smelter gates.

1. The company's website shows different technical and non-technical documents on the projects in Chelopech and Krumovgrad. However, at the Tsumeb section, a very modest one page of information about the country and the smelter's history is published. More interesting is the fact that in the beginning of 2015 the technical description of the different facilities was listed, though surprisingly disappeared soon after we first shared with the management of DPM our interest to see the smelter in person.



2. At a meeting in January with Mr Nikolay Hristov, the Senior Vice President for sustainable business development, we requested information about the EIA documentation. Such information was promised but never disclosed. The second attempt to request it was via e-mail in March – addressed again to Mr. Hristov and also Mr. Hans Nolte – Vice President and General Manager of DPM Tsumeb. A third e-mail and request for a meeting was sent in July. As a response it was explained that a new website was being prepared and the head office in Toronto "... is busy to update it" for the release of such documents. The meeting with Mr Nolte that we requested was initially kindly turned down, with the explanation that the management in Tsumeb was very busy and was unable to meet us before August 15th. We suggested to reschedule our travel and arrive on August 17th and then we were informed that access to outsiders in the smelter is not allowed until further authorisation.

¹The following main observations and, in some cases, comparison with the company's behaviour in Bulgaria comes as result of our trip to Namibia between 10th and 21st August 2015.

We tried also to look for any documentation at the DPM Information Center in Tsumeb, yet as the person in charge was absent we could not access any documents. We were provided with abundant information about the funding of local projects around the community. The projects are worth about 4 m NAD (approximately EUR 350 000 which DPM is distributing through the Community Trust Fund.

From the Information Center we were directed to two relevant environmental experts in the smelter and this seemed like our last chance to meet someone from the smelter even though a site tour would not be possible. We arrived at the smelter front office and requested a meeting with staff of the environmental department. Instead the chief of security was called.

He explained again that it was not possible to meet Mr Nolte and that most of the environmental people in the smelter were not present but that he would make an attempt to arrange a meeting with the Public Relations Department. After a quarter of an hour we were invited in and instead of being lead to the Public Relations desk we were brought into the room of the security. The door was closed, the Chief Security officer stood behind his desk while a second security person stood to block the exit of the room. The Chief Security officer explained that after many phone calls to all the people in charge in Tsumeb, Bulgaria and Canada he had to inform us that "...they know us very well", that we cannot come to the smelter without an appointment.

It was then explained to us that no meeting would be happening and that he had received instructions to escort us out of the smelter area. He also asked us whether we realised that currently we were on the territory of the smelter and asked us if we have been photographing around, and if he could check our footage. We denied access to our footage and then we were escorted to our car and left to leave. This bitter welcome to the smelter was far from the claimed "...open, honest and transparent..." way of dealing with stakeholders.

In further correspondence from October 2015 we were accused by the company of behaving rudely with the security personnel, while it should be visible from the videotapes that

both sides were having a rather diplomatic conversation. We clearly pointed out that it was not our intention to enter the smelter and have a tour, but to meet someone who could show us documents and speak with us.

Furthermore, the next day after the attempted visit to the smelter site, our host at the organisation Earthlife received an anonymous email explaining that Bankwatch has twisted the facts related to Dundee Precious Metals operations in the past and that Earthlife Namibia should be careful about cooperating with Bankwatch as this may hurt the reputation of Earthlife. The letter ended with a melodramatic explanation about why the author has to remain anonymous. Of course such a letter could be sent by anyone, including people who want to turn civil activist against DPM yet strange letters are not unusual when activists investigate DPM operations.

This email, as well as the comments on our visit by Nikolay Hristov, are published in the Annexes at the end of this report.

A decade of experience with DMP shows that the company is very open and proactive to maintain dialogue with NGOs for example when it is opting for a loan from EBRD for example and is required to have proper public hearings and demonstrate dialogue with civil society. The company is also very open and discursive about what it considers to be its good deeds and initiatives. It is quite different, however, when efforts at dialogue touch on substantial issues such as social justice, tax issues, the byproducts of DPM's operations, the lifecycle of products and byproducts, and the value chain.

Generally this is not surprising behaviour for a mining company – they don't appreciate proper control because the nature of the business is such that any mining operation is difficult, if not almost impossible, to comply with modern environmental and social standards. This is of course no reason to give up demands for mining companies to constantly improve their standards. Moreover, it is urgent that governments and societies reconsider how much mining we actually need – the focus has to shift towards resource efficiency rather than constant over-exploitation of new raw resources.



Meeting (or rather not meeting) the Namibian authorities

A very different question and the subject of major concern for society as a whole is why public authorities have the same reflex to hide and protect information connected to mining and processing operations from the public who pays their salaries.

As stated in the Environmental Management Act 7/2007 of the Republic of Namibia in Art. 17 (g) and (h), the Environmental Commissioner should maintain a register of the undertaken Environmental Assessments and the issued Environmental Clearance Certificates and "a copy of the record must be made available for public inspection at the office of the Environmental Commissioner during office hours" Art. 38 (3).

We were very disappointed that neither CEE Bankwatch Network before and during the visit in Namibia, nor our Namibian colleagues of Earthlife Namibia and the Legal Assistance Center were able to exercise their legal rights despite numerous attempts to contact the Environmental Commissioner office, namely:

- Official e-mail request for a meeting and access to information sent on 24.03.2015 to the e-mail addresses of Environmental Commissioner, Deputy Environmental Commissioner and Deputy Director of the Environmental assessment department listed at the webpage of the Ministry of Environment and Tourism, followed by attempts for phone communication;

- Second e-mail request on 30.07.2015 followed by attempts at phone communication;
- Three requests for a meeting and access to information to the Secretary of the Environmental Commissioner and mobile phone communication on 11, 12 and 13.08.2015.
- Official e-mail request for a meeting and access to information sent on 16.08.2015, followed by attempts at mobile phone communication.

We have experienced many times the same administrative obstacles with the Bulgarian authorities regarding mining projects, including DPM projects. In Bulgaria the issue was partially overcome by the obligation to publicise EIA decisions online. Sometimes the responsible authorities hold up the public release of certain EIA decisions just to reduce the period for Court appeal, which generally is 14 days after issuing the document, in this way impeding the public's right to justice. Still we are fighting to impose the obligation to publish online the entire EIA documentation during the consultation process and keep it public after that. DPM has adopted this good practice with the Krumovgrad project, which is why it is disappointing to see a regression in the company's standards regarding the project in Tsumeb.

The arsenic issue as the big white elephant in the room

Owing to the current lack of technical documentation and information on the smelter operations and technologies it is impossible to correctly assess the environmental and health impacts of the Tsumeb operations. We have had to add pieces to the puzzle through a check of some older documents and compare with new findings from our trip.

Usually copper ore deposits are associated with high arsenic content. The Chelopech ore has one of the highest levels of arsenic content compared to other copper deposits worldwide. This high content of arsenic and the associated difficulties of the environmental management of this chemical element have led to the strict prohibition of this product being further treated in Bulgaria **after a severe environmental accident at the tailings dam of the copper smelter of Pirdop in 1988.**

The estimations from the Chelopech EIA documentation from 2008 show 5-6% of arsenic content at the complex copper concentrate. The same document evaluates the total reserve of arsenic at the deposit to be 99 446 t. (the estimations were made in 2005). It is described that only 0.05% of the arsenic is left in the tailings of Chelopech (or about 50 t.) which means that already for years and for years to come around 100 000 tonnes of arsenic are and will be extracted, processed, stored and/or released in some form elsewhere around the world by the final year of the mine which is projected to be 2025.

Currently half of the processed copper concentrate in Tsumeb comes from Chelopech, the other half (so called third party concentrate) comes from other sources and one of them is the Peruvian mining company El Brocal whose concentrate contains even more arsenic than the Chelopech concentrate.

According to a presentation dating from 2011 ("Cleaning the Air - Health And Environmental Management Improvements in the Tsumeb Smelter", 12.09.2011, by Hans Nolte), the arsenic content in the copper concentrate processed in Tsumeb smelter is as high as 5.2%. The arsenic content in the Peruvian concentrate is stated to be 7.2%.

As an explanation of the arsenic facility, before

this information vanished from the company's website, we were able to read the following:

"Arsenic Plant Concentrates and other secondary material processed at the Tsumeb Smelter are traditionally relatively high in arsenic. The arsenic passes through the smelter and is captured from the off-gases in the baghouses. Baghouse dusts with high arsenic levels are used as feedstock into the arsenic plant. Baghouse dusts that cannot be processed in the arsenic plant will be disposed of in the waste disposal site. The arsenic plant is used to produce arsenic trioxide from dusts recovered during the smelting process. Four single hearth Godfrey roasters are used to convert the material into arsenic trioxide, which is sold for the manufacture of pesticides and wood treatment."

As reported in New African Magazine in January 2014:
"Following the US ban on arsenic in treating wood in 2003, the market for arsenic has shrunk. DPM is thus stuck with excess production. According to the company's public relations officer, Jim Kastelic, DPM still supplies clients in Italy and Malaysia, "but the market isn't huge," he said. As a result, DPM is now forced to store excess arsenic production on-site in a specially-prepared pit, along with other hazardous materials coming from the demolition of the former copper baghouse and packed in large plastic bags normally used for the transportation of sugar. "A government-approved storage site," Kastelic assured this writer. The new pit, lined with five-centimetre-thick non-permeable liner, is however now much closer and situated higher to the actual town. Although hidden behind the small ridge behind Tsumeb, it is clearly visible with GoogleEarth maps. A closer inspection revealed that many bags, their plastic already ravaged by Namibia's relentless sun, have already started splitting open.

It is however a major improvement on the previous method of disposal: an open pit that in

90 years of mining became a small hill that sifted its noxious contents over a radius of up to 6km with every stir of the wind. On bad days, everyone has a little cough, and one's nostrils sting when passing downwind from the plant.

And then there is what DPM calls "a nuisance factor" in a pamphlet in its press kit: the venting of excess sulphuric gases in the early evenings, clearly visible as a cloud against the lights of the now-heavily guarded premises where the wearing of full PPE (personal protective equipment) gear is obligatory."²

Also, in the 2014 DPM Sustainability Report (p.63) it is stated: "After the copper concentrate has been smelted, the extracted arsenic is classified as hazardous waste", and (p.61) "A by-product of extracting arsenic from concentrate is arsenic trioxide which is produced and sold by Tsumeb to customers in Malaysia and South Africa."

Arsenic and the majority of its chemical products are not harmless. According to EU Regulation, diarsenic trioxide is a category 1 carcinogen and Substance of Very High Concern (SVHC) "that may have serious and often irreversible effects on human health and the environment"³. Being an amphoteric oxide the arsenic dioxide dissolves readily in alkaline solutions and less so in acids. The arsenic trioxide is readily absorbed by the digestive system: toxic effects are also well known upon inhalation or upon skin contact. Elimination

is rapid at first by excretion in the urine, but a certain amount (30-40% in the case of repeated exposure) is incorporated into the bones, muscles, skin, hair and nails (all tissues rich in keratin) and eliminated over a period of weeks or months. More on the health effects of arsenic can be found at the end of this report. DPM started the export of the Chelopech concentrate and processing thereof at the Tsumeb smelter in 2007 when the facility was still owned by Weatherly Mining International. Somewhere around 2008 the smelter was working mostly with the Bulgarian concentrate as the local mines were more or less liquidated. Local experts explained to us that the smelter is designed to work with concentrate with arsenic levels between 2.5 and 3%. This was achieved through blending the local concentrates that were high in arsenic (the mines Knusib Springs and Tsumeb west mine 8% arsenic) with concentrate low in arsenic from the Kombat mine (0.39 % of arsenic). The imported concentrate nearly triples those levels and once the switch was done to the processing of higher arsenic containing concentrate, complaints from workers started pouring in. Especially in 2010, widespread and serious health complaints from workers in the smelter started. The issue was reported widely in the national media⁴ and the scandal has grown to the point where the government has had to intercede.

The basic reaction of the authorities was to

² <http://newafricanmagazine.com/tsumeb-is-dancing-with-wolves-namibia/#sthash.08qwXovb.dpuf>

³ http://echa.europa.eu/documents/10162/13640/draft_axiv_bd_diarsenic_trioxide_20100701_en.pdf

⁴ <http://www.thevillager.com.na/articles/93/-Tsumeb-copper-miners--suffer-from-arsenic--effects/>



require the **reduction by half of the quantities of the processed concentrate by the smelter until improvements were in place** (the production curtailment was lifted by the Namibian government in December 2013). A health study was conducted by the National Institute for Occupational Health of South Africa supported by the Namibian Ministry of Environment and Tourism. The samples for the study were taken in March and July 2013 and the evaluation shows clearly high levels of arsenic in the blood and the urine of the workers. The conclusions are: "Urinary arsenic levels were high showing widespread excessive absorption of arsenic. This problem is known to the NCS (Namibian Custom Smelter) management, workers and occupational health service providers".

Another question mark hangs over the doubling of the smelter capacity: When the restriction on the quantities of the processed concentrate ended in December 2013, the capacity of the plant was increased from 100-130,000 tons of concentrate per year to 240,000 tons. It is forecasted that this increase will soon reach 260,000 tons per year (although DPM has achieved only up to 200,000 tonnes of actual processing of concentrates so far). How the government permitted this increase without all the environmental improvements, considering that this can only lead to increased levels of pollution, remains a mystery to us. During our visit in Tsumeb we conducted several interviews with ex-workers affected by the arsenic absorption and local activists campaigning for adequate health monitoring and proper compensations. During the interviews various evidence of illnesses and deaths caused by arsenic were shared with us. These people are still looking for legal assistance which is crucial for the achievement of their goals. Meanwhile, in 2010, DPM acquired 100% of NCS and started a programme for technological improvement of the facility including the introduction of proper individual protection measures of the workers through personnel protective equipment.

Despite these positive developments, serious questions still remain unanswered:

1. Denial of social responsibility from Weatherly and DPM regarding the affected workers – some of those people died and many others still need systematic medical treatment. According to the ex-workers we

interviewed, no financial compensation has been granted to those people who sacrificed their health without being informed about the high risks they took while working for the smelter and especially after the introduction of the new concentrate with high arsenic content. The lack of proper financial compensation made receiving systematic medical treatment impossible. Workers claimed that health checks were done every two months during the time of the Ongopolo complex (the larger complex of mines and the smelter that existed before Weatherly took over). Now health checks are done every six months and workers do not have access to their actual results when they want them – especially the urine tests. They only get the oral opinion of the doctor that everything is OK. This issue was risen before us by workers who quit or were dismissed from the smelter in 2012 and 2013. Not disclosing actual results with the workers is against the law.

2. It is not clear what will be the positive effect of the undertaken measures. We don't know the effect of the individual protection measures since the company does not publish regular studies about the arsenic levels in the urine of workers. Nor do we know the effect of the technological upgrades of the facility since there is no public access to the Environmental Assessment of those improvements nor the Environmental Management Plan. We don't even know if such documents exist. The advertising of a "Fugitive Emissions Project"⁵ states that: "As a result of the FEP upgrades we have seen meaningful reductions in both inhalable arsenic levels and arsenic in urine averages across the workforce. Average levels of these metrics are well within either relevant Namibian or international guidelines." Furthermore: "Completing an engineering hazardous waste disposal site for the safe disposal of baghouse dust and other waste from the acid plant."

We are highly sceptical about such PR tricks and statements as arsenic, a category one carcinogen, does not have "relevant levels" or "international guidelines" on it. The guidelines of World Health Organisation or the European Commission provide information about arsenic levels in air, water, food or soil under different circumstances and what is recommended for different exposures, but there are no safe levels of arsenic ex-

posure and the conclusions are very clear: "When assuming a linear dose-response relationship, a safe level for inhalation exposure cannot be recommended."⁶ Furthermore, "A safe level of arsenic in air cannot be established," and "No new tolerable intake level could be established."⁷ However, as well described in these guidelines, people working in or living around smelters, pesticides fabrics or wood treatment fabrics are the most affected and at the highest health risk. Numbers have to be disclosed and further in depth analysis and tests of the population have to be performed to present the real picture.

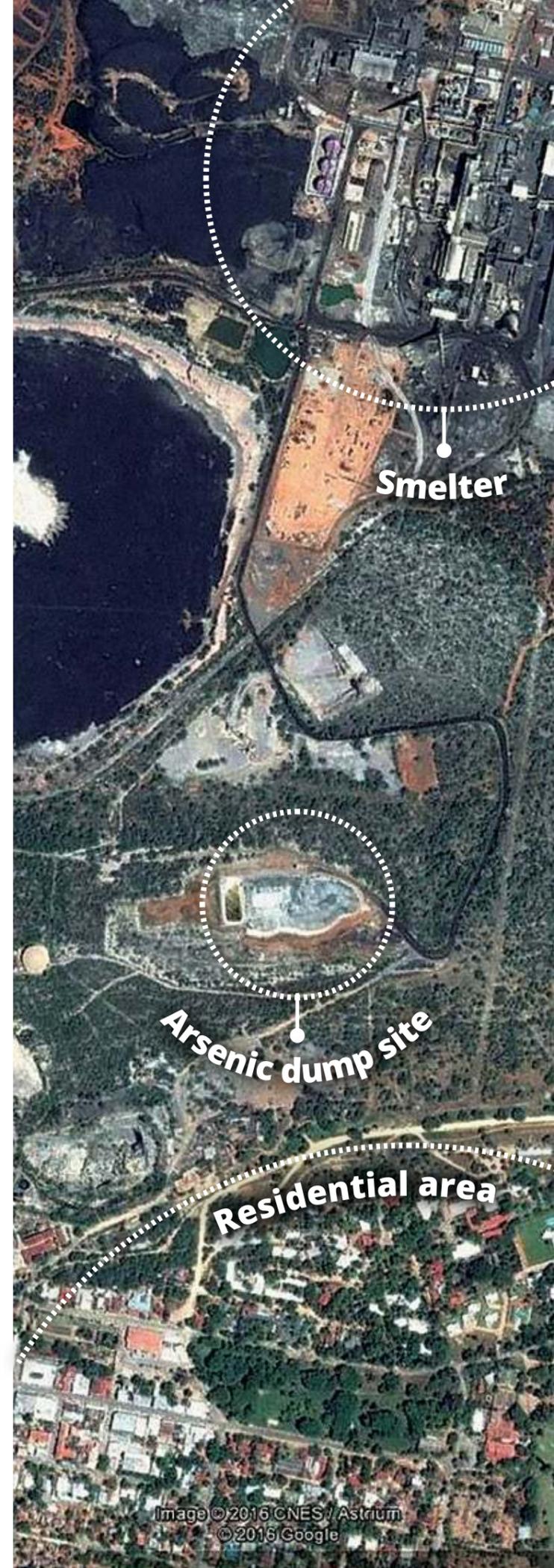
3. Even if these measures result in better health and environmental conditions by reducing the level of pollution, we don't know the final assessment since the capacity of the smelter has increased almost threefold to 198,000 tons of concentrate in 2014, thus inducing much bigger quantities of harmful substances.

We have already shared our very raw report with the EBRD – one of the creditors of DPM. The EBRD claims its new loans for Dundee explicitly exclude the Tsumeb smelter.

Yet normally the EBRD claims they help provide improvements in the environmental standards of those companies which are their customers? Why does the EBRD keep a strict ring-fencing for a revolving credit to DPM? The short reply we received from the EBRD is that it is satisfied with the fact that the levels of arsenic in the urine of the workers has been dropping lately. This is not an appropriate answer – there should be a figure describing the drop, from one figure to the latest figure, and a comparison with the pre-Dundee and the pre-Chelophech ore situation. If a company takes over in a bad situation, makes it worse and then manages to get back to the bad situation, to claim this was an improvement is simply not acceptable.

Special attention is required for the issue of the arsenic dumping onsite.

The capacity of the arsenic plant is much smaller than the incoming quantities. Many applications of arsenic related to wood treatment and agriculture are currently in a global phase out process due to rising health concerns about the arsenic compounds used in those industries.



⁶ http://www.euro.who.int/_data/assets/pdf_file/0005/74732/E71922.pdf?ua=1
⁷ <http://www.who.int/ipcs/features/arsenic.pdf?ua=1>

The dumpsite for the hazardous material (called, in a milder manner, "baghouse dusts" by the company) is filled at accelerated rates. The dumpsite - from what was visible from some distance - has a membrane insulation of the ground but no cover above. The former workers explained how the arsenic dust is filled in nylon bags which probably are collected in the bigger bags visible in the picture. The bigger bags are not made of special material - they all have the label "Hullets - White Sugar" and we learned that they are obtained from a local warehouse. With great certainty we would allege that this is not a proper toxic waste disposal site, neither could it be a long term solution for the disposal of arsenic. There have been far too many cases of companies which simply desert a location leaving their toxic waste behind, so the Namibian government should not accept promises for a solution in the distant future. A stricter and public arsenic management plan has to be introduced. Further information is needed as to why the bags are buried in ash from the

processing of the smelter and how this fits the future plan to clean up the place. Part of the arsenic is left at the ordinary tailings dam where it is "suppressed" by NaCl (salt) irrigation. We have to relate that the arsenic trioxide is not the only product of the fabric, but also the crude arsenic is a direct result of the smelting process being released into the working environment. Apart from the environmental and health issues caused by the arsenic dump, this activity also directly breaches the Constitution of the Republic of Namibia, Art. 95 on promotion of the welfare of the people through "...in particular, the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste at Namibian territory". Furthermore, a very pressing concern is the simple fact that even this dumpsite is running out of capacity. This is visible from the following pictures - the dump site at the beginning of 2012, then in 2013, and now in 2015:



2011 - construction



2012



2013



2015



Walvis Bay Harbour City

Coal

Copper Concentrate

Our question to DPM is simple: what is next? How does the company plan to treat the arsenic once the space in the current dumpsite is exhausted. Considering the pace at which this site has been filled up, we would think the capacity will be fully utilized in less than one year's time. If the DPM plans to turn Tsumeb Smelter into the preferred global plant for the treatment of complex concentrates, what is its long term strategy to treat such hazardous byproducts?

Storage and transportation of the concentrate

Another questionable issue is the storage of the complex concentrate. The company reports proudly the covered warehouses on Burgas port as an example of environmental responsibility, yet the same concentrate is stored in the Walvis Bay port in an open air warehouse - the Walvis Bay Bulk Terminal. The concentrate is placed right next to coal piles which security staff at the port said are also destined to go to the smelter in Tsumeb. During our visit in August we witnessed piles of concentrate exposed to the ocean winds. The workers were loading the concentrate and the coal onto rail wagons and trucks without wearing respirators or any other specific individual protection gear. White piles were stored nearby and we were told that this was actually sea salt for export and for consumption. The bulk terminal is just a few hundred metres away from a residential area.



Bay workers loading coal

The missing tonnage of arsenic

In 2014 DPM processed 101,000 tons of copper concentrate from the Chelopech mine and 97,000 tons of concentrate from other sources. The processing of roughly 100,000 tons of copper concentrate coming from the Chelopech mine and containing 5.2% of arsenic means 5,200 tons of crude arsenic per year. If this quantity oxidizes fully (in the furnaces, along with the other ores) to arsenic trioxide, the output mass of that by-product would be approximately 30% larger. This means that the Bulgarian concentrate alone might result in quantities of arsenic trioxide of up to 6,800 tons per year.

The concentrate that comes from Peru is even dirtier – with arsenic content of 7.2%. If Tsumeb processes 25,000 tons from the Peruvian copper a year this is 1,800 tons of crude arsenic or over 2,300 tons of arsenic trioxide if this quantity is fully oxidized. This would make 9,100 tons of the highly toxic substance. This already does not match the recent statement made by DPM in the Namibian press⁸ where they claim that they produce 4,200 tons of arsenic trioxide per year, out of which

3,200 is exported to Malaysia and 600 tons go to South Africa. We believe this is purely a PR statement which takes into account only the refined arsenic trioxide produced in the arsenic plant of the Tsumeb smelter, which is what the company considers a “marketable product”. The rest is mixed within the so-called in-house dust or is emitted from the smelter as fugitive emissions.

Our calculation takes into account only the concentrate coming from Bulgaria and from Peru – an estimated 125,000 tons of concentrate altogether. Whatever other concentrate is sourced, and no matter where it comes from to feed the annual processing of 200,000 tons of concentrate for the smelter in Tsumeb, the remaining 70-75,000 tons can only further aggravate this number.

Cadmium
Twenty tons of cadmium are a byproduct from the Chelopech mine. It is not clearly stated in the reports what is happening with this byproduct and how it is managed.

⁸ Namibia: We Spent N\$5 Billion to Improve Enviro Controls – Dundee, New Era, 25 November 2015, <http://allafrica.com/stories/201511251776.html>

10 000+

tons is the quantity of arsenic trioxide produced according to the calculations of Bankwatch annually

4200

tons is the quantity of arsenic trioxide produced in the smelter annually according to DPM

3800

tons is the arsenic trioxide marketed to Malaysia and South Africa annually according to the statements of DPM

Cases from the past where the words did not match the reality

During many years of work on and with DPM, we have noticed a number of significant mismatches between the statements of the company in the media and the reality in documents.

For example, we made a number of objections when high level officials of the company stated in the media that the cyanide leaching facility in Chelopech “will not have any harmful emissions”. A more detailed look at the EIA or the IPPC documentation revealed that there will be emissions of hydrogen cyanide – a poisonous compound, and a chemical weapon with a grave record in the past (it was used in the German extermination camps during World War II under the name Zyklon B). Indeed the projected emissions were not huge quantities, but the company could not claim that there are no harmful emissions.

We faced a similar situation in Tsumeb with the local newspaper “Etosha” from July with the headline ‘Arsenic plant – GO’. The article is about the sulphuric acid plant which does not solve or impact the arsenic management issue. Whether this is journalistic misinterpretation or misleading information coming from the PR department of the company, it is apparent that the locals are being left behind a curtain of disinformation and the highly uncertain assumption that the solution is just around the corner. The company’s strategy for public consultations is being conducted in what we consider to be an extremely manipulative manner. When the company needs NGOs to expose high standards on transparency and open communication, as was the recent case of the public consultations on the application for a new loan to the EBRD regarding the Krumovgrad project, they are very willing to spread and share documents, to refer to CEE Bankwatch member groups in Bulgaria – Za Zemiata and CEIE – as interested parties, to invite us for meetings when polished presentations are held and present the results in front of the bank.

Yet we encounter the opposite behavior in oth-

er situations as with our input and request on the Krumovgrad EIA procedure⁹, or the request for information about the Tsumeb projects – our recommendations are rejected as irrelevant, we are not an interested party on the smelter project and we are not given access to any documents.

Statements such as the following show clearly that the Krumovgrad EIA report and the granted national environmental permit were not in line with international good standards and one of the main reasons is the reluctance of the company to apply our recommendation provided during the official public consultation procedure.

“The European Bank for Reconstruction and Development (“EBRD”) acts as environmental agent with respect to the Company’s RCF. According to the EBRD’s Environmental and Social Policy (2008), and its associated Performance Requirements (“PRs”), a project of this type and scale requires a full Environmental and Social Impact Assessment (“ESIA”). The project underwent a national environmental impact assessment (“EIA”) in 2010 and an environmental permit No. 18-8, 11/2011 was issued and entered to force in March 2013. Following an independent review of the EIA reports, the EBRD required a number of supplementary environmental and social studies and documents to meet the EBRD PRs and international good practices.”¹⁰

This enduring behaviour shows that the company does know about standards on public information and consultation and uses them when it is beneficial, but is not willing to adjust projects in line with civil society requests.

⁹ Link to Krumovgrad article

¹⁰ Page 53 of 2014 DPM Annual report



Export Processing Zone (EPZ)

In 1995, the Government of the Republic of Namibia adopted the Export Processing Zones (EPZ) Act (Act No. 9 of 1995) as a legal framework for promoting export-led industrialisation of the extremely primary sector-driven national economy. EPZ enterprises are exempted from:

Corporate income tax;
Duties and value-added tax (VAT) on machinery, equipment and raw materials imported into Namibia for manufacturing purposes.

The only taxes payable are the individual income taxes on employees' income as well as the 10% withholding tax (non-resident shareholders) on declared dividends. In addition, EPZ enterprises are allowed to hold foreign currency accounts at commercial banks in order to repatriate their capital and profits.

The Tsumeb smelter operates as an EPZ enterprise, as defined by Namibia's EPZ Act, and therefore does not pay corporation tax in Namibia.

Legal issues related to tax are increasingly being discussed and different measures to overcome tax injustice are being undertaken globally. Faced with the pressures of globalised capital movements and loudly voiced threats from corporations that they will relocate unless given concessions on 'light-touch' regulation and lower taxes, governments around the world have responded by engaging in tax competition to attract and retain investment capital. Some states with limited economic options have made tax competition a central part of their development strategy. This inevitably undermines the growth prospects of other countries, as investments are attracted away from them, and has stimulated a race to the bottom.

Proponents of tax competition have never answered the crucial question of how far it should be allowed to go before it compromises the functioning of a viable and equitable tax regime. Taken to its logical extreme, unregulated tax competition will inevitably lead to a race to the bottom, meaning that governments will be forced to cut tax rates on corporate profits to zero and subsidise those companies choosing to invest in their countries.

This is already happening in some countries. The implications of this for tax regimes and democratic forms of government around the world are dire. Indeed, this is one of the biggest threats to freedom the world may now face. The problems that capital flight, tax avoidance and tax competition pose for poorer countries have been exacerbated by what appears to have been a failure on the part of multilateral institutions to protect the tax regimes of developing countries when promoting trade liberalisation policies.

Faced with dramatic falls in their tax incomes, governments have responded by raising VAT rates and generally shifting the tax burden onto poorer and middle income households. The process has accelerated since 2008, with disturbing implications for inequality and social stability.

According to the Economic Policy Institute in its book *Rethinking Growth Strategies*, "If countries are to benefit from globalisation, governments must regain the capacity to tax their citizens as well as businesses operating within their borders, and to use the revenues to finance infrastructure, essential public services and necessary wealth redistribution."

Last but Not Least!

Comparing the company's behaviour in terms of the transparency and cooperation experienced in Bulgaria, in Namibia we have thus far seen a drastic decline in corporate standards. This is probably partially due to the lack of systematic public monitoring from genuine NGOs. Certainly the low institutional control over the company's operations is contributing to the problem generally. Namibia is a young democracy, governance is suffering from a lack of proper standards and laws that are not yet in place and in cases there are evidences for the presence of double standards in relation to extractive industries and other industrial projects which is still to be properly tackled.

DPM might not disclose fully the amount of arsenic trioxide produced in the smelter annually. However the very simple math behind our calculations shows it is very likely that there is much more left behind compared to the officially stated by the company spokesperson Alina Garisses.

The health tests of current and former workers in the smelter from 2012 tested over 1700 people. Since basic urine tests don't distinguish

between toxic and non-toxic forms of arsenic, the report notes that 50 µg/g should not be used as a threshold without more detailed tests, but that values above 100 µg/g "generally indicate excessive absorption of inorganic [i.e. toxic] arsenic (but may be explained by organic [non-toxic] arsenic [...])."

Whichever one of these levels is being consulted, the Tsumeb smelter workers average arsenic concentration was by far higher than any level that could be deemed safe. 1082 DPM employees at the time, urinary arsenic levels of above 300 µg/g were measured in all sections of the smelter except the Slagmill. 69% of the people tested exceeded the level of 100 µg/g. The most affected 3.5% of cases even reached levels between 507 and 1357 µg/g. As a reference value for over-exposure the report uses the Biological Exposure Indices (BEI) set by different institutions. A BEI is a reference for recommended concentrations of hazardous substances. As the report notes, the South African BEI (defined by the Department of Labour) lies at 50 µg/g. Most other industrial standards are significantly lower.

... Pictures from the Namibian press from 2012 spreading the word of the whistle blowers in Tsumeb



In the Republikein newspaper, DPM claimed in early December that the exposure to inhalable arsenic has been reduced by half in 2014. These claims have so far not been substantiated with publicly available documents, let alone with results from new health tests. But even if such reductions were achieved and effective, almost one third of the workforce would still be above the critical level of 100 µg/g. [1]

The 2013 preliminary health report states several times that more detailed analysis will be presented in a final report. If DPM's claims about its success in reducing arsenic pollution are supported by this report, why is it not being made public? Does such a report exist at all? The people in Tsumeb that we interviewed during our visit had not seen or heard of it.

The company has failed in its social responsibility to seriously affected workers and refused proper financial compensation which would allow appropriate medical treatment for these people. The proper care of affected workers is required by law even when health conditions are inherited from work for previous operators – a change of ownership cannot be used as an excuse to deny workers proper treatment for conditions which are derived from the hazardous environment in the smelter. It is disappointing that instead the company prefers to disburse money to the community through its Community Trust which, as such instruments in Chelopech, Krumovgrad and Tsumeb at the national level have shown, are tools to gain some public sympathy and exercise economic influence over local authorities, small businesses.

European Bank For Reconstructions and Development has failed to consider the life-cycle of the raw material produced by Dundee Precious Metals. "Environmental Impact Assessments (EIAs) have been completed by DPM as required by Namibian legislation for a number of infrastructure upgrades including the acid plant and the waste water treatment plant. These have followed the EIA process as required in Namibia, which includes public participation. A new site-wide EIA will be undertaken this year and will also be subject to public consultation and authority review. All completed EIAs are lodged with the Ministry of Environmental Affairs and Tourism. We understand that the EIAs can be requested from this authority." The way we understand this response of EBRD means there are environmental impact assessments only on certain

parts and upgrades of the smelter – namely acid plant and the waste water treatment plant – but we get no clarity whether there are documents tackling the sensitive topic on arsenic. Moreover there seems to be no overall environmental impact assessment of a smelter which is functioning at more than doubled capacity in the last 6 years and processing more than twice dirtier copper concentrates compared to the past. We remind that it is a standard to make a new environmental impact assessment when big changes are introduced and doubling the capacity with all the required upgrades is undoubtedly a serious change.



... Pictures of workers from the Tsumeb Smelter with severe skin rashes and the prescribed medical treatment

Solutions And Roles:

Considering the specific case of Tsumeb we recommend the different stakeholders to undertake actions in the name of the public health and the sound environmental future of Tsumeb and the region.

Dundee Precious Metals should:

Disclose all available environmental documentation on the smelter in Tsumeb

Disclose the real quantity of arsenic trioxide left on spot in Tsumeb

Consider the long term management of the quantities of arsenic trioxide produce, the lifespan of the dump-site, cases of severe disaster (include unusual climate events that happen much more often nowadays with the climate change compared to the usual consideration of the engineers of such facilities)

Consider disaster management plan in case of emergency related to the dump-site and other severe event that might affect Tsumeb and the region

Agree with the government what would be required and whose responsibility it would be to maintain the dump-site in case of change of ownership of the smelter or failure of DMP in Namibia or globally

Accelerate and tighten the standards on the loading and unloading at Walvis Bay bulk terminal

Namibian Government

Transparency is issue Number One that deserve change in the attitude of the Namibian Government. Secrecy when it comes to public health is unacceptable. We have been very disappointed that the Government does not follow the legislation in the country on what should be public domain. Bankwatch is ready to take the issue of non-disclosure to court.

The government of Namibia has to quickly and urgently reconsider the Export Processing Zone regime of the smelter in Tsumeb. Namibia is the country where the biggest environmental heritage of the processing of the poisonous copper concentrates is happening and in the same time it seems that the country is getting the lowest share. The bet on public health and the environment is too high with all the quantities of arsenic trioxide left behind so the Republic of Namibia should not accept peanuts for this sacrifice.

The smelter is accumulating high environmen-

tal and health price from the moment of its launch in the 70s. It is unrealistic to think that the smelter will be there forever to provide the daily bread in Tsumeb and the region. The government has to assist the local community in their search of economic alternatives. A programme for diversification of the local economy of Tsumeb and the region should be at place including micro-grant schemes, start-up schemes for the take off of small business initiatives and cooperatives, education, trainings and skill-sharing in the fields of entrepreneurship and business management, local economy, business cooperation between small scale businesses.

The Government has to intensify the control over the freight procedures and practices of Dundee Precious Metals – this includes the loading and unloading of concentrates and coal at Walvis Bay bulk terminal and the road and rail transportation of concentrate, coal and processing by products from the smelter.

Municipality of Tsumeb

Consider and introduce to the local community emergency plan in case of unexpected disaster related to release of arsenic trioxide from the dump-site; Assess the potential impact on underground waters as the hydrological and geological structure of the region is very complex and connected through underground complex of long cavers;

The Municipality of Tsumeb has to broaden the involvement of the local community into the issues related to the control over the following of environmental, social and health standards by the operator of the smelter. Currently the

municipality has no influence and power to exercise any control over the doings of the smelter and the municipal experts admit that "it is all in the hands of the central government" - this power balance have to change in favor of the municipality and the citizens of Tsumeb

The municipality together with the citizens of Tsumeb have to develop and maintain their own environmental monitoring on the main pollutants related to the operations of the Tsumeb smelter. The laboratory should be manipulation proven and open for control from the active citizens of Tsumeb.

EBRD

The role of European bank Of Reconstruction and Development is to put is softly – crucial. First of all EBRD is responsible for the mess caused in Tsumeb and should demand mitigation measures for the long term management of the pollutants produced due to the support for the operations of the Bulgarian mine.

EBRD has to demand transparency from DPM and disclosure of the relevant environmental documentation. If there is lack of certain documents and overall EIA of the increased capacity and pollution from the smelter EBRD is in the best position as EU public institution to demand the deficiencies to be compensated in a timely manner;

If there is evidence that DPM have downgraded the quantities of arsenic trioxide dumped

on Namibian territory or if the the deficiencies are too big and there is no way the long term management of the pollution is not possible, or the conclusion is that just the business od DPM cannot be sustainable and is not sustainable by definition, then EBRD should reconsider their credit facility. EBRD should already reconsider any funding for the development of greenfield projects by DPM such as the project in Krumovgrad.

EBRD should reconsider funding for greenfield mining and progress to totally avoid supporting of greenfield mining. We would say this change should have been introduced with the last changes of the EBRD investment policy – but the best moment is the next planned changes and the sooner the better

Citizens of Tsumeb and NGOs in Namibia

Should demand rights to more active involvement from their municipality and should unite and work together so that they are not the lonely victims of the most important economic player in the region

Look for ways to diversify the local economy through community initiatives so that DPM is no longer the main source of money for the city – such as cooperatives, craftworks

Consider their own emergency plan for arsenic disaster especially if DPM, the Government of

the municipality do not take action on that.

People and NGOs should never swallow the cases of deteriorated health due to the work of the smelter – check and cross-check with independent doctors, if necessary seek for the help of legal assistance from Namibian or international NGOs

Cross check and demand regular access to information from the Namibian Government on the above-listed issues



Global view on the industry:

We need a solution – a profound change in the way extractivism is making business and in the way we as mankind produce and consume resources. There has to be more serious set of international framework and practices tackling the endless growth and expansion appetite of the extractive industries.

Our pledge to the investors: Do not invest in gold and other precious metals, divest or in certain cases remain cautious investor. Most of the mined gold rests in treasuries – this accounts for up to 70% of the mined gold. It is just an investment a commodity which many people consider a safe thing to put their money into but gold has been considered a new investment bubble by many economists in the recent years. Rising the prices of gold due to high demand also makes feasible to use more complex and risky mining techniques or serves as an incentive for profit driven companies to do their best to put the dirt of gold mining under the carpet. Nowadays gold doesn't get sifted by hand in the rivers as in the past. Companies are often lucky to get 5 g of gold per ton of rock. It is estimated that on average 520 000 t of rock have to be crushed to extract a ton of gold. In comparison a ton of steel is produced from 10 t of iron ore. It is true that we use gold and other rare earths in electronics and all those technologies have become an integral part of our lives but is recycled most of the gold and resources can be retrieved from the e-waste of the electronics. Counting on resource efficiency more than on extractivism is a bright vision for the future but it requires tackling serious challenges which have created social collisions in the past. The modern economy counts on surpluses and constant supply of raw material to the markets. If the extraction of raw materials stops this will make the materials finite to the economy, it will also open the possibility for investors to buy large quantities in order to speculate and rise the prices tremendously. Closing this loopholes globally has been a challenge in many other areas. Considering that putting extractive industries on halt means introducing of planned economy to certain areas of the economic life. And the past and the present are full of examples of wanna-be-socialist government

that fail painfully with such task ending with the introduction of hateful regimes and even more severe double standards and even worse social and environmental disasters. This is the reason why such ideas have to be considered very carefully. As a minimum though the full social and environmental price of extractive and processing projects should be completely disclosed to the local communities and local communities should be empowered and their right to fight-back and reject such projects on their territory should be respected.

International Financial Institutions such as EBRD have to consider and accept change in their investment policy. They have to consider the entire life-cycle of materials that are extracted and processed and drift away from investments in greenfield mining and other investments that serve greenfield mining projects such as processing plants. The entire public portfolios have to be focused on support of game changing projects – exclusively sustainable business which includes resource efficiency, transition to renewable energy and sustainable farming.

Consumers should have the right to know what stands behind the products they buy – labeling products that come from recycled sources or indicating what is left behind the contents of a product is important and should become standard practice. The practice of labelling energy class of consumer products proved very successful in Europe and should be translated to other fields of our consumption of resources. After all consumers have the right to know what results in their consumption and consumers choice has always been the biggest game changer. consumers choice has always been the biggest game changer.

Human stories behind the Tsumeb smelter

Meet **Oscar Kakungha** - He is a 34 years old man who used to work for DPM in Tsumeb until 2nd March 2015 (suspended from the smelter already in October 2014). According to his story the problems in the smelter started back around 2008 with the first material [concentrate] coming from the mine in Chelopech, Bulgaria. Initially the material was blended with the local extracted ore from Otjihase mine, Tsumeb west mine, Kombat mine and Tchudi mine. When the Chelopech concentrate was initially introduced the treat was not immediately felt as the material was blended with the local concentrate. The former owner of the mining complex and the smelter, Weatherly International, closed the mines with the onset of the financial crisis. In 2010 DPM took over the smelter. The problems with the working conditions in the plant became severe. The Mineworkers Union of Namibia (MUN) was afraid to voice concerns and Oscar suspects they never reported the issues to the government. In 2012 Oscar was elected as secretary of the local branch of MUN. He insisted on an inspection from the Headquarters of MUN – they came and went back with no follow up. Oscar alerted SWAPO Youth League and the Namibian Union of Workers. The pressure on the government increased and a health check was organised and included 1722 current and



former employees of the smelter. DPM strictly prohibits cell phones and cameras on the territory of their operations. Oscar took footage of DPM's arsenic dump-site and used this to signal to the government the arsenic problem which was piling up in Tsumeb. The government did not respond to Oscar, instead he was suspended as an employee of the smelter in October 2014 and fired in March 2015. He remains unemployed to date.

Johannes Amutenya is now 30 years old. He used to work in the Tsumeb smelter for a relatively short time. When DPM took over the smelter the issues with the newly introduced concentrates became severe. The health tests that used to be done every two months before were now scheduled only twice a year. Johannes was not allowed to have his actual health results – the doctor was ensuring him that everything was OK. Johannes decided to have an independent health check with a doctor from South Africa. When he got his tests done with an x-ray of the lungs, the doctor pointed to a shadow on the x-ray picture and told him, "You are too young to kill yourself with that job." Johannes quit in 2011.



Annex 1 – Arsenic and arsenic trioxide: the king of poisons and the poison of kings

What people in Tsumeb should know about arsenic trioxide

Please, check whether there are plans in the municipality in case of accident related to spill of arsenic trioxide powder and contamination of ground waters. These plans should be public and people should be aware of the danger, the risk and how they are supposed to react in case of emergency to protect themselves and the others. Be aware it is not enough if the municipality of the company answer that there are plans – they need to be public and definitely not kept secret if they are requested by the citizens. Workers should always ask about the actual medical data – especially related to the arsenic levels in urine. No such data should be kept hidden from workers.

<http://www.atsdr.cdc.gov/csem/csem.asp?csem=1&po=12>

The fatal human dose for ingested arsenic trioxide is 70 to 180 milligrams (mg) or about 600 micrograms per kilograms (kg)/day [ATSDR 2007]. This means that one gram of arsenic trioxide may kill between 6 and 14 people. A ton of the compound is enough to kill 6 to 14 million people. Even an average of that is roughly the Bulgarian and the Namibian population combined. If the initial data that before the changes in the ownership the smelter produced 300 tons of arsenic trioxide per month and the smelter now uses twice as dirty concentrate and has more than doubled the production capacity then the amount is monstrous – more than 1000 tons per month.

http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC33821

People in Tsumeb should be aware of the symptoms of poisoning with arsenical compounds:

- Garlic odour of breath and faeces, metallic taste in mouth.
- Adverse GI effects predominate with vomiting, abdominal pain and rice-water or bloody diarrhea. GI effects may also include inflammation, vesicle formation and eventual sloughing of the mucosa in the mouth, pharynx and esophagus.
- Central nervous system effects are common: headache, dizziness, drowsiness and confusion.
- Symptoms may progress to include muscle weakness and spasms, hypothermia, lethargy, delirium, coma and convulsions. Chronic exposure to inorganic arsenic compounds may lead to:
- Muscle weakness, fatigue, anorexia, weight loss.
- Hyperpigmentation (spots on the skin), hyperkeratosis (top layer of the skin dies out and peels, skin rash)
- Peripheral neuropathy (weakness, numbness and pain, usually in your hands and feet but also affect other areas of the body.)

- Paresthesia (feeling of numbness, tingling, burning in different parts of the body such fingers, hands, toes, or feet)
- Paresis (partial motor paralysis)
- Ataxia (lack of voluntary coordination of muscle movements that includes gait abnormality. It is implying dysfunction of the parts of the nervous system that coordinate movement).
- Inability to coordinate voluntary muscular movements.
- Subcutaneous edema in face, eyelids, and ankles (abnormally large fluid volume resulting in mild to severe swelling in these parts of the body).
- Stomatitis (inflamed and sore mouth which can lead to disruption of a person's ability to eat, talk, and sleep)
- White striations across the nails (called Mees lines) and sometimes loss of nails or hair.
- Liver problems resulting in hepatomegaly (is swelling of the liver beyond its normal size.), icterus (a yellowish pigmentation of the skin and the whites of the eyes by high blood bilirubin levels.), cirrhosis (a condition in which the liver does not function properly due to long-term damage).
- Renal toxicity leading to oliguria (low output

of urine), proteinuria (excess of serum proteins in the urine - the urine becomes foamy), pneumaturia (air bubbles in the urine), and hematuria (blood in the urine). All those might be a sign for a kidney stone or a tumor in the urinary tract.

- Heart problems - EKG abnormalities (irregular heart beat - arrhythmia) and peripheral vascular disease (PVD - circulation disorders that affect blood vessels distant from the heart - veins and arteries that supply the arms, legs, and organs located below your stomach)
- Hematologic abnormalities (disorders which primarily affect the blood).
- Cardiovascular effects include shock, cyanosis (appearance of a blue or purple coloration of the skin or mucous membranes due to the tissues near the skin surface having low oxygen saturation).

- Injury to blood-forming tissues may cause anemia (decrease in the amount of red blood cells (RBCs) or hemoglobin in the blood which results lowered ability of the blood to carry oxygen where the feeling of fatigue comes from as a symptom), leucopenia (decrease in the number of white blood cells (leukocytes) found in the blood, which places individuals at increased risk of different kinds of infections as the body has lowered ability to confront the microbes that enter it) and thrombocytopenia (relative decrease of thrombocytes - the blood cells that help the injurees to stop bleeding and close).
- Cancer - arsenic exposure causes cancer. Cancer rates have to be followed in the region of exposure to check whether the rate is higher compared to the national average

Peruvian copper

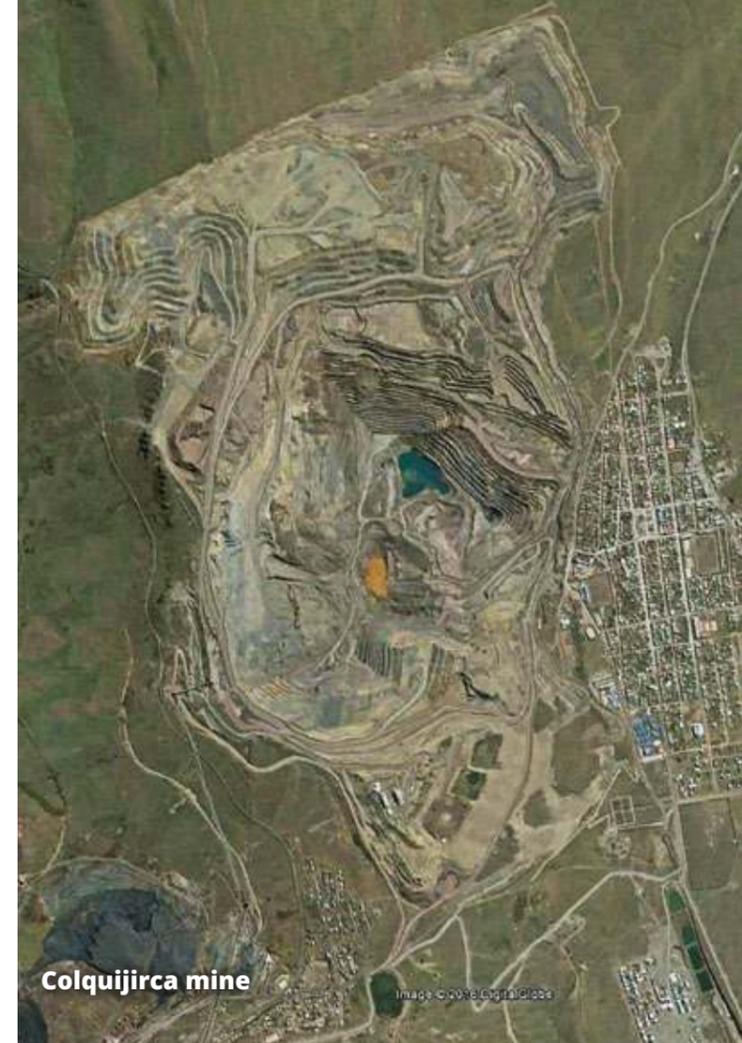
The copper that feeds into the smelter of Tsumeb seems to be the second biggest source of business for the smelter. Dirtier than the Bulgarian copper concentrate it also attracted our attention.

The Peruvian copper smelted at Tsumeb comes from a deposit operated by Sociedad Minera El Brocal S.A.A.

Sociedad Minera El Brocal S.A.A. is a subsidiary of Minas Buenaventura¹¹ public limited company incorporated in Peru.

El Brocal company operates the Colquijirca mine which consists of three polymetallic deposits:
 the Tajo Norte deposit, which contains zinc, silver and lead ore;
 the Marcapunta deposit, which contains an auriferous mineralization in breccia oxides, a nonarsenic copper chalcocite mineralization, and an arsenic copper enargite mineralization as a continuation of the mineralized mantles of the Marcapunta Norte;
 and the San Gregorio deposit, which contains zinc.

Source: El Brocal's 2014 Annual report¹²



Colquijirca mine

Tsumeb smelter products / Source: DPM /

DPMT contracted 300,000 tons of complex copper concentrates with third party suppliers, via LDC, in 2014. The third party concentrates will be delivered to Namibia alongside Chelopech copper concentrates for smelting at the Tsumeb facility.

Currently, half of the smelter's business comes from Dundee's Chelopech mine in Bulgaria. Additional business is solicited from Peru, Greece, Russia, Poland and various African countries, such as Botswana and the Democratic Republic of Congo.

Final product from smelting:

1. Blister copper (partly purified porous copper with a blistered surface formed during smelting), some sources say that blister copper is nearly pure containing between 98.5 and 99.5 percent copper and up to 0.8 percent oxygen.¹³
2. Arsenic trioxide (As₂O₃)

¹¹ <http://www.buenaventura.com/> Buenaventura is Peru's largest publicly-traded precious metals company and a major holder of mining rights in Peru. The company is engaged in the mining, processing, development and exploration of gold, silver and other metals via wholly-owned mines, as well as through its participation in joint exploration projects. Buenaventura is the operator of several mines in Peru. Wholly owned: Orcopampa, Uchucchacua, Julcani, Mallay y Breapampa. Controlling interest: La Zanja, Tantauatay y El Brocal. Buenaventura has minority interests in other mining companies: Yanacocha (43.65%), one of the most important gold mines in Latin America, in partnership with Newmont Mining. Cerro Verde (19.6%), an important Peruvian copper producer operated by Freeport McMoran. The company has been listed on the Lima Stock Exchange since 1971, and on the New York Stock Exchange since 1996. Buenaventura is an open stock company incorporated under the laws of Peru, and was originally established in 1953 as a company (sociedad anónima).

¹² See: http://www.bvl.com.pe/inf_corporativa61700_QJJPQ0FMQzE.html

¹³ See: <https://www.britannica.com/technology/blister-copper>

NOTE! PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!		General First Aid: IN ALL CASES CONSULT A DOCTOR!
Route of Exposure	Symptoms	First Aid
Inhalation	Burning sensation. Cough. Dizziness. Headache. Shortness of breath. Sore throat. Weakness. Chest pain. Symptoms may be delayed (see Notes). (See Ingestion).	Fresh air rest. Refer for medical attention.
Skin	Dry skin. Redness. Skin burns. Pain. Blisters.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
Eyes	Redness. Pain. Severe deep burns. Conjunctivitis.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible) then take to a doctor.
Ingestion	Abdominal cramps. Abdominal pain. Burning sensation. Diarrhoea. Nausea. Vomiting. Muscular cramps. Shock. Death.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Rest. Refer for medical attention.
Notes for ICSC Information	Physical properties depend on crystalline form of the substance. Depending on the degree of exposure periodic medical examination is indicated. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. The symptoms of acute poisoning appear ½ to 1 hour after the exposure but may be delayed many hours. No odour warning if toxic concentrations are present. Do NOT take working clothes home. The recommendations on this Card also apply to inorganic trivalent arsenic compounds (arsenites).	

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CEE Bankwatch Network, Earthlife Namibia and
Za Zemiata – Friends Of The Earth Bulgaria, 2016

