

Memorandum

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Date: February 20, 2018
Re: Potash Mining Environmental and Human Impacts

Purpose

The purpose of this memorandum is to detail the environmental and human impacts of Potash mining in order to provide full information to the Mura communities near Autazes. Currently, the Mura leadership is developing a free, prior and informed consent (FPIC) protocol toward engaging in an FPIC process with Brazil Potash, a potash mining company intending to scale up operations on Mura lands.

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I. Introduction

A. Global Potash Deposits

Scarcely spread over only a handful of geographical regions, the largest recoverable potash reserves are concentrated in the Northern Hemisphere. The province of Saskatchewan, Canada is home to almost 10 billion tons of recoverable potash¹ deposits, accounting for approximately 60 percent of global potash reserves.² During the Second World War exploration for gas and oil intensified and the discovery of the first potash deposits occurred in 1943 from an exploratory oil well in southern Saskatchewan. Exploration was expanded over the next few years and mining operations began in the 1960s.³ Today, Nutrien⁴ and Mosaic⁵ operate several potash mines in the Saskatchewan area.

Russia and Belarus have the next largest potash reserves globally. In Russia, the two existing potash mining companies, Uralkali and Silvinit, concentrate their operations on a large deposit in the Urals, which they have mined since 1931.⁶ The Belarusian deposits near Minsk have been mined for potash crude salts by the local company Belaruskali since the beginning of the 1960s.

Germany's potash deposits are the fourth largest in the world.⁷ The USA (Mosaic and Intrepid), England (Cleveland Potash), Spain (Iberpotash) and Brazil (Vale) mine other solid potash reserves across the globe.⁸

The limited geographic distribution of potash deposits, together with large capital investment costs and long time to develop a mine, create significant entry barriers and make the potash

¹The term “potash” comes from the pioneer practice of extracting potassium carbonate (K₂CO₃) by leaching wood ashes and evaporating the solution in large iron pots. Today, potash refers to potassium compounds and potassium-bearing materials, the most common being potassium chloride (KCl) Potassium is the seventh most abundant element in the earth's crust, and is a major plant and crop nutrient, along with nitrogen and phosphate. About 95 per cent of world potash consumption is used in fertilizers, with small amounts used in manufacturing soaps, glass, ceramics, chemical dyes, drugs, synthetic rubber, de-icing agents, water softeners and explosives. Source: <http://www.thecanadianencyclopedia.ca/en/article/potash/>.

² Source: <https://www.k-plus-s.com/en/wissen/rohstoffe/>.

³ Rod McEachern, William Wist, Jay H. Lehr, Water Softening with Potassium Chloride: Process, Health, and Environmental Benefits, p. 2.

⁴ <https://www.nutrien.com/>. The Potash Corporation of Saskatchewan, also known as PotashCorp, was a Canadian corporation based in Saskatoon, Saskatchewan. The company merged with Calgary-based Agrium to form Nutrien, in a transaction that closed on January 1, 2018. Source: <http://www.cbc.ca/news/business/potash-agrium-nutrien-merger-1.4469690>.

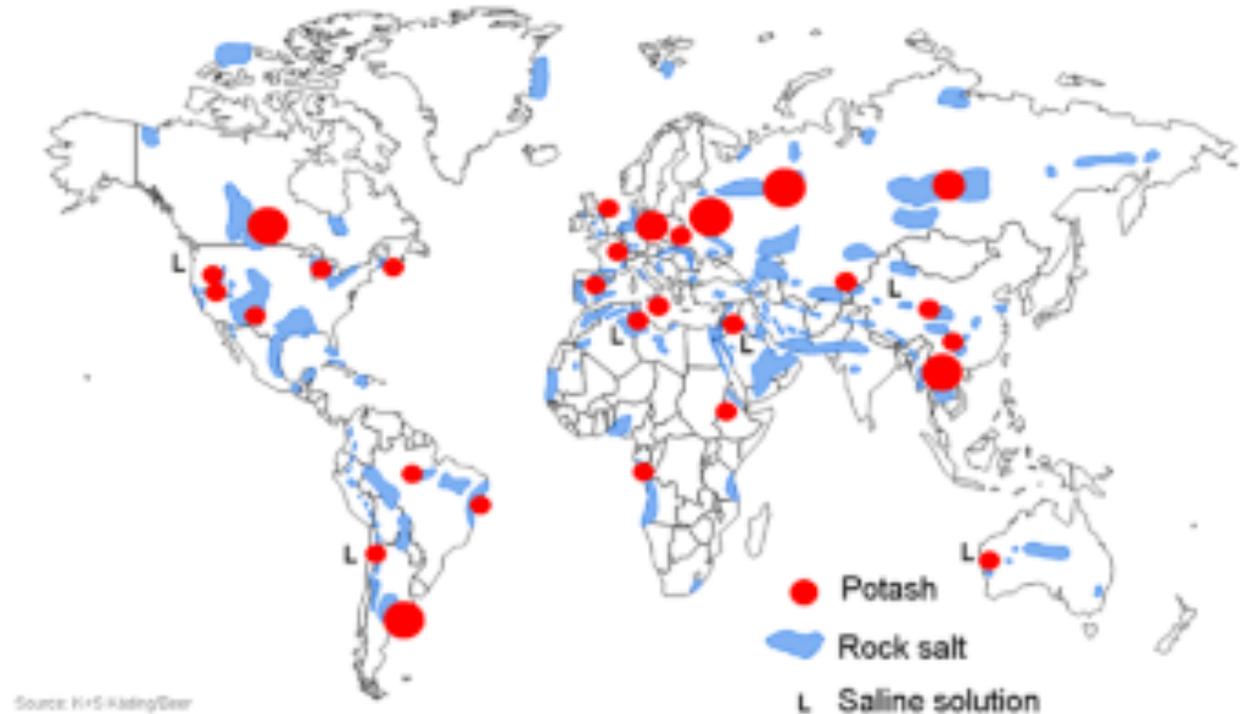
⁵ <http://www.mosaicco.com/>

⁶ Source: <https://www.k-plus-s.com/en/wissen/rohstoffe/>.

⁷ Source: <https://www.k-plus-s.com/en/wissen/rohstoffe/>.

⁸ Source: <https://www.k-plus-s.com/en/wissen/rohstoffe/>.

market an oligopoly.⁹ The seven largest companies produce around 80 percent of the world's potash.¹⁰



Source: <https://www.k-plus-s.com/en/wissen/rohstoffe/>.

B. Brazil Potash Corporation's Mining Methods

Today, natural potash deposits all over the world are still predominantly extracted in solid form by conventional underground mining, which normally requires a minimum of five to seven years for construction.¹¹ Within the Central Amazon Basin under study (the Autazes area), a sylvinite deposit has developed, which is *Lower Permian* in age.¹²

According to Brazil Potash, the total thickness of the sylvinite-bearing¹³ horizons¹⁴ ranges between 1.0 m and 4.0 m, with an average KCI grade of 31.5%.¹⁵ In particular, Brazil Potash's

⁹ Yves Jégourel, *Potash: a typical price war*, Policy Brief 16/09 – March 2016.

¹⁰ Source: www.k-plus-s.com/en/pdf/2016/2016_01_Compodium.pdf.

¹¹ Cocker, Mark D., Greta J. Orris and Wynn J., Geological Survey assessment of global potash production and resources- A significant advancement for global development and a sustainable future, in Wessel, G.R. and Greenberg J.K. eds., *Geoscience for the public good, and global development: Toward a sustainable future*, Geological Society of America, Special Paper 520, p. 6.

¹² The Permian period lasted from 299 to 251 million years ago and was the last period of the Paleozoic Era. Source: <http://www.ucmp.berkeley.edu/permian/permian.php>.

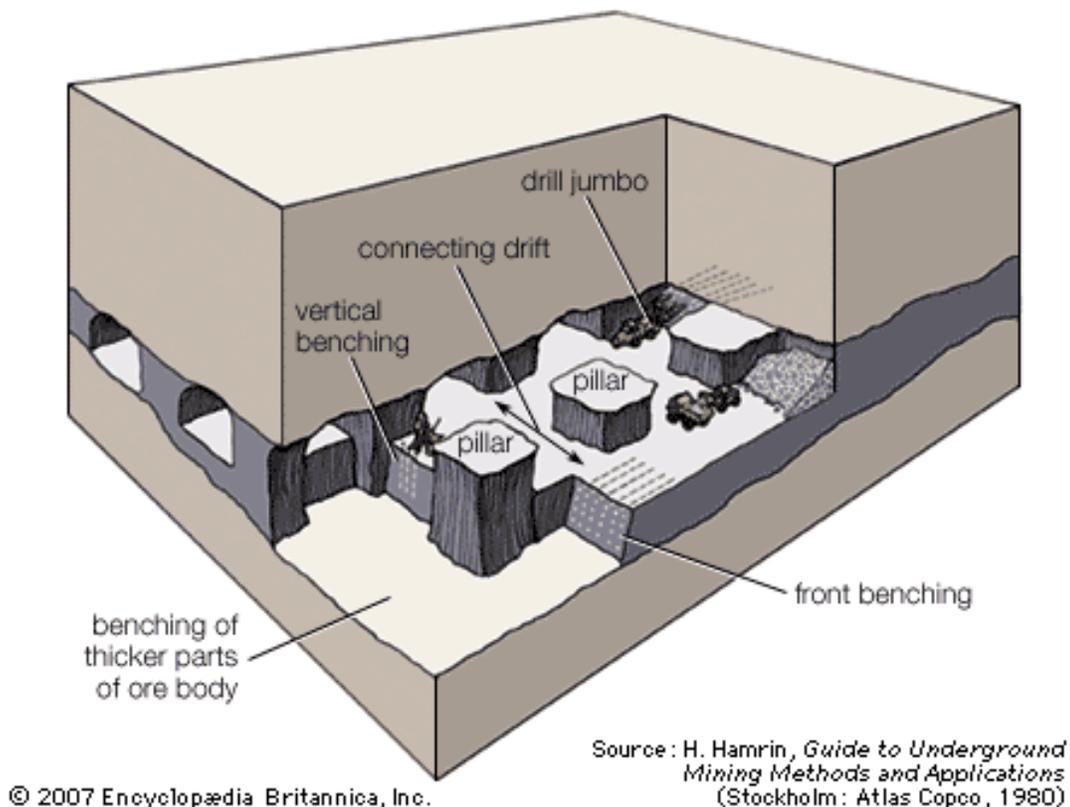
¹³ Sylvinite is a sedimentary rock made of a mechanical mixture of the minerals sylvite (KCl, or potassium chloride) and halite (NaCl, or sodium chloride). Potash, Mineral Planning Factsheet, British Geological Survey, 2011 (Retrieved 8 February 2017).

¹⁴ A soil horizon is a layer parallel to the soil surface, whose physical characteristics differ from the layers above and beneath. The large Amazonas Basin of Brazil is known to contain sylvinite-bearing evaporate deposits of Permian age. Jessica Elzea Kogel, *Industrial Mineral and Rocks: Commodities, Markets, and Uses*, p. 731.

¹⁵ KCI grade is the percentage of sylvite presence in the rocks to be extracted.

plan is to mine Run of Mine (ROM) ore¹⁶ using the most common and conventional “room and pillar” method.¹⁷ (See Diagram 1, *infra.*)

Diagram 1: Room-and-pillar mining of a horizontal ore body.



This system is generally used in mining coal, iron and base metal ores, particularly when found as *manto*, or blanket, deposits, stone and aggregates, talc, soda ash and potash.¹⁸

In this system, the mining operation drives a series of parallel drifts, with connections made between these drifts at regular intervals.¹⁹ When the distance between connecting drifts is the same as that between the parallel drifts, then a checkerboard pattern of rooms and pillars is

¹⁶An ore is an occurrence of rock or sediment that contains sufficient minerals with economically important elements that can be extracted from the deposit, through mining. The run of mine (ROM) ore refers to ore in its natural, unprocessed state just as it is when blasted. Guilbert, John M. and Charles F. Park, Jr., *The Geology of Ore Deposits*, W. H. Freeman, 1986, p. 1.

¹⁷ Source: <https://www.brazilpotash.com/project/>.

¹⁸ William A. Hustrulid, Richard Bullock, *Underground Mining Methods: Engineering Fundamentals and International Case Studies*, Society of Mining, Metallurgy and Exploration, 2001, p. 493.

¹⁹ William A. Hustrulid, Richard Bullock, *Underground Mining Methods: Engineering Fundamentals and International Case Studies*, Society of Mining, Metallurgy and Exploration, 2001, p. 493.

created.²⁰ The pillars of ore are left to support the overlying rock, but in some mines, after mining has reached the deposit's boundary, the company may remove some or all of the pillars.²¹

II. General Risk Assessment

Potash mines are relatively free of underground mining hazards due to the non-gassy salt deposits in which the ore body is located.²² Nevertheless, accidents involving mining machines, fire or gas are occurring in potash mines globally and may result in human losses and temporary mine closures. (*See Case Studies #1, #2 and #3, infra.*)

The largest risk factor for potash mines is water from underground sources, which may flood the mine. Potash mines around the world, for example, experience uncontrolled brine inflow.²³ Efforts to stop the leakage can disturb regular mining operations, temporarily decreasing mining production capacity.²⁴ Failure to block the inflow may result in mine flooding, which may then result in permanent mine closures.²⁵ Furthermore, flooding of a shallow potash mine with thick deposits (typical for Perm regions) may result in opening of a sinkhole making the mine recovery nearly impossible.²⁶ (*See Case Study #1, infra.*) Potash mining accident causes include: mine stopes—the open underground spaces left after extracting minerals—collapses, floods followed often by earthquakes, poisonous gas leaks, or equipment misuse or malfunction.

In cases of natural disasters, two occur most commonly: water inflows and earthquakes. Although natural disasters can result in the far-reaching negative consequences, studies report that these events are quite rare in practice.²⁷ Accidents are more common and may take the form of fires or gas leaks inside the mine, and work accidents. Mine collapses can occur from both natural causes as earthquakes and human negligence (*See Case Study #1, infra.*) Notably, however, in recent years, mine safety has improved. Thus, injuries or deaths related to accidents are relatively few.²⁸

²⁰ William A. Hustrulid, Richard Bullock, *Underground Mining Methods: Engineering Fundamentals and International Case Studies*, Society of Mining, Metallurgy and Exploration, 2001, p. 493.

²¹ George B. Clark, John L. Mero, William A. Hustrulid, *Mining*, Encyclopaedia Britannica, Inc., April 25, 2017, available at <https://www.britannica.com/technology/mining>.

²² William A. Hustrulid, Richard Bullock, *Underground Mining Methods: Engineering Fundamentals and International Case Studies*, Society for Mining, Metallurgy and Exploration, 2001.

²³ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 24.

²⁴ Oskar Kowalewski, Piotr Śpiewanowski, *Stock market response to potash mines disasters*, IÉSEG School of Management and LEM CNRS, France & Institute of Economics of the Polish Academy of Science, Poland, 2017, p. 8.

²⁵ Oskar Kowalewski, Piotr Śpiewanowski, *Stock market response to potash mines disasters*, IÉSEG School of Management and LEM CNRS, France & Institute of Economics of the Polish Academy of Science, Poland, 2017, p. 8.

²⁶ Whyatt, Jeff, Floyd Varley, *Catastrophic Failures of Underground Evaporite Mines, Proceedings of the 27th International Conference on Ground Control in Mining*, 2001.

²⁷ Oskar Kowalewski, Piotr Śpiewanowski, *Stock market response to potash mines disasters*, IÉSEG School of Management and LEM CNRS, France & Institute of Economics of the Polish Academy of Science, Poland, 2017, p. 8.

²⁸ Oskar Kowalewski, Piotr Śpiewanowski, *Stock market response to potash mines disasters*, IÉSEG School of Management and LEM CNRS, France & Institute of Economics of the Polish Academy of Science, Poland, 2017, p. 8.

A. Environmental Impacts

Potash mining industry activities can result in a wide variety of adverse environmental effects. “Typically, these impacts are quite localized and, in most cases, confined to the mine site.²⁹ At a specific site, the type and extent of environmental effects may depend on factors such as:

- The characteristics of the ore and overburden³⁰;
- The surface land profile (*i.e.* wetlands, plains, hills, mountains);
- The local climate; and
- The surrounding ecosystem.

However, of greater importance in the likelihood of environmental disaster’s occurrence also may be:

- The mining methods and equipment;
- The beneficiation³¹ and concentration³² processes;
- The waste disposal methods;
- The scale of the operations; and
- The sites’ locations to existing population centers and infrastructure.”³³

Therefore, according to the major activities associated with the mining lifecycle—exploration, construction, extraction, beneficiation and waste disposal—the environmental aspects pertain to water, air, land and waste.

The first activity with potential environmental impacts is exploration. “These impacts are largely related to land disturbances from the clearing of vegetation, or the construction of camps, access roads, drilling sites and sumps for drilling fluids and fines. Noise and vibration from seismic surveys and drilling operations may also be of concern.”³⁴

1. Water

The two main problems with mining effects on water are: (1) water *consumption*, and (2) water *contamination*.

²⁹ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.14.

³⁰ In mining, “overburden” is the material that lies above an area that lends itself to economical exploitation. More specifically, overburden rock is that series of mostly sedimentary rock that overlies the rock. Thickness of the overburden rock is a by-product of the fundamental forces and processes that control the structural development of the sedimentary basin in which the overburden rock is found. David Deming, *Overburden Rock, Temperature, and Heat Flow: Chapter 9: Part II. Essential Elements* in *The Petroleum System -From source to trap*, 1994.

³¹ In the mining industry or extractive metallurgy, beneficiation is any process that improves (benefits) the economic value of the ore by removing the gangue minerals, which results in a higher-grade product (concentrate) and a waste stream (tailings). Source: <https://www.azomining.com/Article.aspx?ArticleID=1106>.

³² Concentration means the increase of the percentage of the valuable mineral in the concentrate. Cite?

³³ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.14.

³⁴ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.16.

Large volumes of water are typically required by *extraction* and *beneficiation* activities. In particular, during *extraction*, “water inflow is a common problem where open pits and underground openings intersect with aquifers.”³⁵ Generally, mining companies pump water from the excavations or from nearby wells to maintain a dry, safe and efficient operating environment for the equipment.³⁶ This water use may lead to the lowering of the surrounding water table and the depletion of nearby surface water.

“Beneficiation” operations also generally consume large quantities of fresh water for processes such as “washing”³⁷ and “flotation.”³⁸ Companies source water from nearby surface and ground water supplies. This water sourcing and use may lead to a fall in the level of the water table, affecting the surrounding ecosystem and potentially resulting in competition with other users.³⁹ Utilizing dry beneficiation processes reduces water consumption, but can create additional dust problems. (For more consequences of dust, *see* Section 2, “Air.”)

“Water quality can be affected by the release of slurry brines and other contaminants into ‘process water.’”⁴⁰ Specifically, excavation activities may contaminate surface water through:
-the erosion of small particles called “fines”⁴¹ from disturbed ground such as “open-cut workings,” “overburden dumps,”⁴² “spoil piles”⁴³ and waste disposal facilities;
-the release or leakage of salt from brines and potash ore, which can contaminate surface or ground waters;⁴⁴
-the weathering of overburden contaminants, susceptible to leaching.⁴⁵

³⁵ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.19.

³⁶ This process is called “Dewatering”. United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.56.

³⁷ “Washing” is the removal of unwanted impurities from a mixture, leaving the product in the original solution. Source: <http://www.umich.edu/~chemh215/W13HTML/SSG5/ssg5.4/washing.html>.

³⁸ “In ore beneficiation, flotation is a process in which valuable minerals are separated from worthless material or other valuable minerals by inducing them to gather in and on the surface of a froth layer” Source: <http://www.cpchem.com/bl/specchem/en-us/Pages/IntroductiontoMineralProcessing.aspx>. United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.25.

³⁹United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.25.

⁴⁰ “Process water” is the water used in the chemical extraction of metals and commonly contains process chemicals. Source: <http://www.miningfacts.org/Environment/What-are-the-water-quality-concerns-at-mines-/>.

⁴¹ “Fines” are very small particles found in mining. Source: Oxford Dictionary.

⁴² “The Overburden of waste and uneconomic mineralized rock is required to be removed to mine the useful mineral resource in a surface mining operation. In this process a dump is formed by casting the waste material and dumping it in nearby area. The dump so formed is known as mine waste dump.” Source: <https://www.iitbhu.ac.in/faculty/min/rajesh-rai/NMEICT-Slope/Pdf/12%20Mine%20Waste%20dumps%20and%20tailing%20dams.pdf>.

⁴³ “Spoil piles are excavated materials consisting of topsoil or subsoils that have been removed and temporarily stored during the construction activity.” https://www.michigan.gov/documents/deq/deq-wb-nps-sp_250905_7.pdf.

⁴⁴ This type of leakage creates liquid wastes. United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.33.

⁴⁵ Coming from overburden and processing wastes, this leaching can be toxic. United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.2. For more information on this point: United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.15.

“Contaminants might include clay fines, chemical reagents, sulfates, salt and magnesium chloride.”⁴⁶ (For more information on salinization’s effects, *see* Section 4, “Waste.”) Also, “fines generated from heavy vehicle traffic on unsealed roadways and from stockpile areas may also contaminate rain, or “run-off” water.”⁴⁷ The problem is that, while roads can seriously impact water quality, “water pollution from mine waste, rock and tailings (a slurry of ground up waste ore and processing chemicals)” often must be managed for decades, if not centuries, after closure.⁴⁸

2. Air

“Effects on air quality tend to be of a localized nature and are largely related to the generation and emission of dust particulates by blasting, excavation and equipment movement or exhaust gases and particulates from engine.”⁴⁹ Thus, dust is a common problem throughout all mining activities. Companies generate dust from “traffic on unsealed roadways, during loading and unloading operations, at conveyor transfer points and during the stacking of stockpiles and reclamation operations.”⁵⁰

Dry processing operations may generate other significant quantities of dust during operations such as “crushing, grinding, compaction and drying.”⁵¹ “Exhaust emissions from vehicle engines, electrical power generation and product dryers may contain greenhouse gases such as carbon dioxide (CO₂) and other gases such as nitrogen oxide (NO_x).”⁵²

3. Land

Companies can disturb the land surface and sub-surface by activities, such as: extracting ore; depositing “overburden;” disposing of beneficiation wastes; “surface subsidence.”⁵³ “These activities can result in wide ranging impacts on the land, geological structure, topsoil, aquifers and surface drainage systems. Additionally, removing vegetation may affect the hydrological cycle, wildlife habitat and biodiversity of the area.”⁵⁴

⁴⁶ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.33.

⁴⁷ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.24.

⁴⁸ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 6.

⁴⁹ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p.21.

⁵⁰ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 22-23.

⁵¹ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 25.

⁵² United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 26.

⁵³ Surface subsidence in mining can be defined as “movement of the ground surface as a result of readjustments of the overburden due to collapse or failure of underground mine workings. Surface subsidence features usually take the form of either sinkholes or troughs.” Source: <http://www.dep.state.pa.us/msi/technicalguidetoms.html>. United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 15.

⁵⁴ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 15.

The major issue for underground mining methods⁵⁵ is “surface subsidence.” This effect is induced by removing extensive flat-lying ore deposits, followed by subsequent collapse of overlying rock during excavation and extraction activities.⁵⁶ Some minor environmental effects, instead, may be associated with the disposal of rock removed to access the ore body. In some instances, surface subsidence induced by underground mining may alter river and stream drainage patterns and may disrupt overlying aquifers.⁵⁷ “The degree of subsidence depends on several factors, such as: ore body thickness and geometry; overlying rock thickness, and; the amount of ore recovered.”⁵⁸ Where subsidence occurs, there is potential for damage to overlying buildings or infrastructure.⁵⁹

In addition, “solar evaporation ponds used to extract potash from surface brine deposits usually cover a wide area of land.”⁶⁰ Therefore, the precipitation and build-up of salt in the ponds over time can present salination issues. (Again, please *see* Section 4, “Waste.”) Also, at the final mining stages, the construction and operation of surface waste storage facilities typically disturbs a significant area of land.⁶¹

Finally, land can take years to recover from atmospheric deposition of smelter emissions.

Case Study #1 – Solikamsk and Berezniki Potash Mine Collapses, Russia – 1995 – 2007 – 2008 – 2010 – 2011 – 2015.

Solikamsk 2 is a Potash Mine in the Upper Kama district – a Perm region - of western Ural, Russia, owned by Uralkali,⁶² one of the world’s largest potash producers and exporters. In November 2014, the most recent example of an evaporite-related ground collapse appeared to the east of the Solikamsk-2 potash production site. This latest collapse is just one of a series of sinkholes that already resulted from mining in this region of Russia (Berezniki and Solikamsk).⁶³

The first major sinkhole occurred at the Berezniki potash mine-3 in 1986. It was later flooded

⁵⁵ Conventional mechanized underground mining operations are the most widely used method for the extraction of potash ore. Brazil Potash’s plan is to “mine 8.5 Mtpy of ROM ore using conventional room and pillar methods” which - as explained in Introduction - are typical underground mining systems.

Underground mining methods are used to source potash ore from deeply buried marine evaporate potash deposits.
⁵⁶ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 17.

⁵⁷ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 18.

⁵⁸ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 18.

⁵⁹ To avoid safety risks and property damage, close coordination, communication and a well-defined system for reporting, repairing damage or compensation is therefore required between the company, relevant government bodies and communities.

⁶⁰ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 19.

⁶¹ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 27.

⁶² <http://www.uralkali.com/>.

⁶³ Jeff Whyatt, Floyd Varley, *Catastrophic Failures of Underground Evaporite Mines*, NIOSH - Spokane Research Laboratory Spokane, WA, July 2008.

and now is 210 x 110 meters in size.

On January 5, 1995 another collapse resulted in a 4.7 magnitude seismic event on the Richter scale, with an associated initial 4.5 meters of surface subsidence.⁶⁴ Underground, the mine roof collapsed over an area measuring 600 x 600 meters. The event released an estimated 900,000 cubic meters of gases (a mix of methane, hydrogen, carbon dioxide, carbon monoxide and other gases). These gas releases led to gas explosions the following day. At that time Sylvinite (potash) was extracted from two to three beds with 10 to 16 meters of total extraction height in the collapse area. ***The mine used a panel system of rooms-and-pillars under 200 to 400 meters of overburden.*** Collapse cavities typically reach the surface some years after extraction operations below the collapse have ceased. This event occurred only 15 years after mining began, and 7 years after mining was completed.⁶⁵

From 1993 to 2005, seismologists recorded hundreds of earthquakes in the Berezniki-Solikamsk region with magnitudes varying from 2 to 5. These earthquakes were caused by collapsing underground tunnels of potash mines, mined out over the 70 continuous years of production. In October 2006, in order to prevent catastrophic outcomes of a sudden brine influx into the mine's underground workings, Uralkali flooded the Berezniki potash mine-1. After that, three major sinkholes occurred in the region above the flooded workings.⁶⁶

On July 28, 2007, a large sinkhole appeared on the surface above closed Berezniki mine-1, caused by sudden infiltration of groundwater into underground tunnels. With an initial size of 50 x 70 meters and 15 meters deep in July 2007, the sinkhole expanded to 437 x 323 meters with a 100 meters-deep crater by November 2008.

On November 25, 2010, a boxcar sank into a sinkhole at the Berezniki railway station. Later on, this sinkhole has been expanded and flooded, and the government permanently closed the railway station.

In December 2011, a new sinkhole occurred near the Berezniki mine's administrative building, while in September 2012, a truck with a driver fell into a hole during sinkhole backfilling activities. The truck driver died in the accident. The sinkhole flooded and measures 132 x 137 meters.

Because of the continuous surface subsidence processes, approximately 1200 people were forcibly displaced from their apartments and houses. Alexander Baryakh, General Director of the Mining Institute of the Urals Branch of the Russian Academy of Science said: "The site where the inflow of brine has been detected completely overlaps with the site of the incident

⁶⁴ Malovichko, A., D. Shulakov, R. Dyaguilev, R. Sabirov and B. Ahmetov, *Comprehensive Monitoring of the Large Mine-Collapse at the Upper Kama Potash Deposit in Western Ural*, in *Rockbursts and Seismicity in Mines – RaSiM5*, South African Institute of Mining and Metallurgy, 2001, pp. 309-312.

⁶⁵ Malovichko, A.A., R.H. Sabirov, and B. Sh. Akhmetov, *Ten Years of Seismic Monitoring in Mines of the Verkhnekamskoye Potash Deposit*, in *Controlling Seismic Risk: Proceedings of the Sixth International Symposium on Rockbursts and Seismicity in Mines (RaSim 6)*, 9-11 March 2005, Australia, pp. 367-372.

⁶⁶ John Warren, Solikamsk sinkhole and potash ore, available at: <http://www.saltworkconsultants.com/blog/solikamsk-2-collapse-and-depth-to-ore-zones>.

which happened at Silvinit Solikamsk-2 on 5 January 1995. This enables us to conclude that the 1995 accident and its consequences are directly linked to the accident on 18 November 2014.”⁶⁷

All mines in Solikamsk-basin benefit from low production costs, related to shallow ore depth. According to experts, the collapsed sinkholes are classic examples of what can happen if any salt or potash mine operates at a depth that is shallow enough to intersect the overlying zone of active phreatic water cross flow.⁶⁸



Berezniki-3 sinkhole in 1986.

⁶⁷ Source: <http://www.dailymail.co.uk/news/article-2842997/Giant-130ft-wide-sinkhole-appears-near-Russian-flooding-forcing-thousands-miners-stay-homes.html>.

⁶⁸ The phreatic surface is the water that naturally flows through an earthen dam. Huang Y.H, Phreatic Surfaces. In: Stability Analysis of Earth Slopes. Springer, Boston, MA, 1983 available at https://link.springer.com/chapter/10.1007/978-1-4684-6602-7_4. John Warren, Solikamsk sinkhole and potash ore, available at: <http://www.saltworkconsultants.com/blog/solikamsk-2-collapse-and-depth-to-ore-zones>.



Second major sinkhole at Berezniki in July, 2007.



Sinkhole accident at Berezniki railway station, in November 2010.



Solikamsk-2 sinkhole in November 2014.

Pictures can be accessed at:

<http://www.dailymail.co.uk/news/article-2842997/Giant-130ft-wide-sinkhole-appears-near-Russian-flooding-forcing-thousands-miners-stay-homes.html>.

<http://www.mining.com/more-insane-pictures-of-russian-potash-mine-disaster-43899/>.

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- Source: <http://www.dailymail.co.uk/news/article-2842997/Giant-130ft-wide-sinkhole-appears-near-Russian-flooding-forcing-thousands-miners-stay-homes.html>.
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4. Waste

As with other mining activities, potash extraction generates large quantities of waste. In particular during potash beneficiation activities, “the volume and type of generated wastes will depend on the ore characteristics (ore grade, constituent minerals, and contaminants), in addition to the specific beneficiation process employed.”⁶⁹ These wastes are mainly sodium chloride (NaCl), which are often stored in open locations near the mines, resulting in artificial mountains called “mine tailings.”⁷⁰ Although companies have implemented management measures, such as brine collectors, the salts from the tailings are still dissolved by rain and humidity,⁷¹ and these salts often leak from the collecting and retention infrastructures.⁷² Thus, “large quantities of these salts end up in streams and rivers around the potash mining areas.”⁷³ Since river organisms are adapted to freshwater, the increase in the salt concentration caused by potash mining wastes

⁶⁹ “The beneficiation of potash produces wastes such as: 1) Tailings consisting largely of impure salt (NaCl) with smaller amounts of other minerals such as anhydrite; 2) Slimes consisting of insoluble fines such as clay and dolomite; 3) Brines containing salt or magnesium chloride.” United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 24.

⁷⁰ Gorostiza Langa, S., *Potash extraction and historical environmental conflict in the Bages region (Spain)*, 2014, available at https://rua.ua.es/dspace/bitstream/10045/38419/3/Investigaciones_Geograficas_61_01.pdf.

⁷¹ Canedo Argüelles, M., Grantham, T.E., Perre e, I., Rieradevall, M., Cespedes-Sanchez, R., Prat, N., *Response of stream invertebrates to short-term salinization: a mesocosm approach*, *Environmental Pollution* n. 166, 2012, pp. 144-151.

⁷² Gorostiza Langa, S., *Potash extraction and historical environmental conflict in the Bages region (Spain)*, 2014, available at https://rua.ua.es/dspace/bitstream/10045/38419/3/Investigaciones_Geograficas_61_01.pdf.

⁷³ Miguel Canedo-Argüelles, Sandra Brucet, Sergi Carrasco, Núria Flor-Arnau, Marc Ordeix, Sergio Ponsa, Eckhard Coring, *Effects of potash mining on river ecosystems: An experimental study*, *Environmental Pollution* n. 224, 2017, p. 760.

has the potential to significantly alter the rivers' ecosystems.⁷⁴ Overall, studies suggest that “potash mining has the potential to significantly alter biological communities of surrounding rivers and streams.”⁷⁵ Changes in salt concentrations can rapidly increase bacteria concentrations and ultimately alter the invertebrate community composition.⁷⁶ As a result, exposure to elevated contaminant levels adversely affects aquatic wildlife.⁷⁷

Also, “sedimentation can damage or destroy fish habitats, reduce the numbers of organisms and bury aquatic vegetation on which fish feed.”⁷⁸ Further, sedimentation can clog and damage fish gills and ultimately destroy spawning areas.⁷⁹

Companies can employ a wide range of waste disposal methods—some of which are extremely detrimental for the environment—including: discharging liquid wastes, such as brines, tailings, effluents, or clay fines, to rivers and oceans;⁸⁰ stacking wastes, such as sand tailings and salt tailings, in piles; retaining wastes, such as brines, sand tailings, magnetite tailings, clays and process water, in dams or ponds for storage, settling and clarification; backfilling solid and liquid wastes into mined-out underground openings; and injecting brines into deep wells⁸¹.

Case Study #2 – Samarco Mineração S.A Fundão tailings dam disaster, Brazil - 2015.

Some of the worst mining disasters do not happen in mines. After companies extract minerals from mines, waste materials, including sand, rock and chemicals, remain. These tailings are permanently stored in dams constructed of earth, rock-fill or concrete. But the dams can fail from chemical erosion caused by the tailings, or from disasters like floods and earthquakes⁸². For this reason, the United Nations Environmental Programme (UNEP) released a Report in November, documenting for the first time the widespread destruction that these dam failures cause.⁸³

In southeast Brazil, the mineral-rich area known as the Iron Quadrangle (located in Minas Gerais

⁷⁴ Miguel Canedo-Argüelles, Kefford, B.J., Piscart, C., Prat, N., Schafer, R.B., Schulz, C.J., *Salinisation of rivers: an urgent ecological issue*, Environmental Pollution n. 173, 2013, pp. 157-167.

⁷⁵ Miguel Canedo-Argüelles, Sandra Brucet, Sergi Carrasco, Núria Flor-Arnau, Marc Ordeix, Sergio Ponsa, Eckhard Coring, *Effects of potash mining on river ecosystems: An experimental study*, Environmental Pollution n. 224, 2017, p. 768.

⁷⁶ Miguel Canedo-Argüelles, Sandra Brucet, Sergi Carrasco, Núria Flor-Arnau, Marc Ordeix, Sergio Ponsa, Eckhard Coring, *Effects of potash mining on river ecosystems: An experimental study*, Environmental Pollution n. 224, 2017, p. 768.

⁷⁷ Miguel Canedo-Argüelles, Sandra Brucet, Sergi Carrasco, Núria Flor-Arnau, Marc Ordeix, Sergio Ponsa, Eckhard Coring, *Effects of potash mining on river ecosystems: An experimental study*, Environmental Pollution n. 224, 2017, p. 768.

⁷⁸ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 6.

⁷⁹ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 6.

⁸⁰ This may be accompanied by treatment to remove contaminants.

⁸¹ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 28.

⁸² Jose Olivares, *U.N. Body Alarmed Over Mining Waste Disasters*, December 2, 2017, available at: <https://www.npr.org/sections/goatsandsoda/2017/12/02/565681233/u-n-body-alarmed-over-mining-waste-disasters>.

⁸³ Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017.

state) hosts more than 300 mines—including gold, topaz, niobium, manganese, diamond and other ores and gems—in operation.⁸⁴ Mining activity dates back to the Eighteenth Century and has shaped both the environment and urban development. “Among these mines is the Germano mine, close to the city of Mariana, which is operated by Samarco – a joint venture between Vale SA and BHP Billiton, two of the largest mining companies in the world.”⁸⁵ In 2014, it produced just over 23 million tons of iron ore pellets and, in the process, it generated almost 20 million tons of tailings.⁸⁶

“On November 5, 2015, the mine’s Fundão dam breached, releasing an estimated 33 million cubic meters of mine waste.”⁸⁷ The tailings slurry flowed down the valley as mudflow and inundated parts of the village of Bento Rodrigues, approximately 8 km from the dam site. Nineteen people were killed, including fourteen workers at the dam site, and five village residents. The mud and debris continued to move downstream for 650 km along the Rio Doce River, reaching the Atlantic coast seventeen days later.⁸⁸

The investigation to determine the cause of the dam failure identified a number of issues that cumulatively led to the disaster: inappropriate dam construction procedures; improper maintenance of drainage structures; and inadequate monitoring.⁸⁹ “The final government report (GFT 2015)⁹⁰ listed 36 factors that contributed to the dam failure and noted that the mining company did not have an emergency plan, or even warning lights and sirens that could be activated to alert employees or villages in the event of a disaster.”⁹¹ Brazilian authorities charged 22 individuals after the incident.⁹² The Brazilian government has also suspended Samarco’s environmental and operation licenses.⁹³

⁸⁴ These activities produce more than 17 per cent of the state’s revenue. Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017, p. 17.

⁸⁵ Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017, p. 17.

⁸⁶ Samarco, *Annual Sustainability Report 2014*, available at <http://www.samarco.com/wp-content/uploads/2015/11/Annual-Sustainability-Report-20141.pdf>.

⁸⁷ Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017, p. 17.

⁸⁸ *Ibid.* at 37, p.17.

⁸⁹ “Prior to the collapse there had been several incidents that necessitated alterations to the original dam design. These changes established the conditions for failure by creating drainage problems that resulted in large volumes of saturated sand adjacent to the dam wall. Immediately prior to the collapse, three small earthquakes exacerbated the structural weakness of the sand, initiating the ow slide.” *See also* Morgenstern, N.R., Vick, S.G., Viotti, C.B. and Watts, B.D, *Fundão Tailings Dam Review Panel. Report on the Immediate Causes of the Failure of the Fundão Dam*, 2016.

⁹⁰ GFT, *Avaliação dos efeitos e desdobramentos do rompimento da Barragem de Fundão em Mariana-MG*, 2015.

⁹¹ Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017, p. 17.

⁹² I. Wood, *Samarco Update*, BHP Billiton, January 2017 available at http://www.bhp.com/-/media/documents/media/reports-and-presentations/2017/170131_samarcouupdate.pdf.

⁹³ Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017, p. 17.

“A compensation agreement was reached in March 2016 between the relevant Brazilian authorities and the mining companies.”⁹⁴ On May 3, 2016, prosecutors filed a \$44 billion USD (155 billion Reais)⁹⁵ civil lawsuit in Brazil for cleanup and restoration costs. On March 17, 2017, a judge suspended the lawsuit as part of a settlement agreement between the government and the companies.⁹⁶

As for the criminal side, on October 20, 2016, Brazilian federal prosecutors filed homicide charges against twenty-one people, including top executives of BHP Billiton, Vale and Samarco, for the nineteen deaths resulting from the dam collapse. In July 2017, however, the federal court suspended the criminal case.⁹⁷



Source: http://www.telegraph.co.uk/content/dam/business/2016/03/11/Bento-Rodrigues_trans_NvBQzQNjv4BqQbIAlMgBBjstqL9vckGEIp4gz3qz54_bsJIilxgiIC0.jpg?imwidth=450.

⁹⁴ Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017, p. 17.

⁹⁵ Source: <https://www.bloomberg.com/news/articles/2016-05-03/vale-bhp-s-samarco-faces-new-civil-suit-worth-43-billion>.

⁹⁶ Source: <https://business-humanrights.org/en/bhp-billiton-vale-lawsuit-re-dam-collapse-in-brazil>. See also <https://www.bloomberg.com/news/articles/2017-11-16/bhp-vale-mine-prosecutors-seek-suspension-of-53-billion-suits>.

⁹⁷ Source: <https://business-humanrights.org/en/bhp-billiton-vale-lawsuit-re-dam-collapse-in-brazil>.



Source: <https://dgrnewsservice.org/wp-content/uploads/sites/18/2015/11/crimedavale3.jpg>.



Source: <https://amp.businessinsider.com/images/572993b152bcd023008c09b8-750-562.jpg>.

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- Roche, C., Thygesen, K., Baker, E., *Mine Tailings Storage: Safety Is No Accident*, A UNEP Rapid Response Assessment, United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2017.
- Jose Olivares, *U.N. Body Alarmed Over Mining Waste Disasters*, December 2, 2017, available at: <https://www.npr.org/sections/goatsandsoda/2017/12/02/565681233/u-n-body-alarmed-over-mining-waste-disasters>.
- Samarco, *Annual Sustainability Report 2014*, available at <http://www.samarco.com/wp-content/uploads/2015/11/Annual-Sustainability-Report-20141.pdf>.
- Morgenstern, N.R., Vick, S.G., Viotti, C.B. and Watts, B.D, *Fundão Tailings Dam Review Panel. Report on the Immediate Causes of the Failure of the Fundão Dam*, 2016.
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- I. Wood, *Samarco Update*, BHP Billiton, January 2017 available at http://www.bhp.com/-/media/documents/media/reports-and-presentations/2017/170131_samarcouupdate.pdf
- Source: <https://business-humanrights.org/en/bhp-billiton-vale-lawsuit-re-dam-collapse-in-brazil>.

5. Other impacts

Extraction activities cause a variety of other impacts, including noise and vibration, due to blasting and the operation of equipment.⁹⁸ Heavy vehicles and equipment use can also generate significant noise, affecting the well being of neighboring communities.⁹⁹ Mining can affect local biodiversity and deteriorate the landscape “due to the excavation of large pits, dumping of overburden into spoil piles, and constructing elevated overburden dumps.”¹⁰⁰

Although the mining industry claims that mining is a temporary land use, this claim is extremely misleading. While the mines themselves may only operate for a short period of time, “the impacts from these developments on water, soil, wildlife and communities can persist for decades and centuries”¹⁰¹ to come.¹⁰² This is especially true for impacts on water.¹⁰³

⁹⁸ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 15.

⁹⁹ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 34.

¹⁰⁰ United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 22.

¹⁰¹ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 3.

¹⁰² See also Environmental Mining Council of BC, *More Precious than Gold... Mineral Development and the Protection of Biological Diversity in Canada*, World Wildlife Fund Canada, May, 1998, p.11.

¹⁰³ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 3.

Case Study #3 – Gas Explosion and Pollution Due to Mining Company Sintoukola Potash (ELM) in Conkouati-Douli, Republic of Congo – 2015.

The Conkouati-Douli National Park (CDNP) is one of the most ecologically diverse places in the Republic of Congo and the only protected area in the country that includes coastal, marine and terrestrial ecosystems.¹⁰⁴ Approximately 7,000 people live in about 28 villages in and around the protected area. Coastal people are mainly fishers and traders that settled in the area centuries ago, whereas people from villages along the forest road are from various forest ethnic origins and also include indigenous communities. Conkouati's area comprises ancestral village sites, sacred sites and historical cemeteries, which is of significant importance to communities living in the park.¹⁰⁵ “In Conkouati-Douli villages, social facilities are either absent, remote, costly or of poor quality. Public services such as education, healthcare, sanitation and water supply are rudimentary and exposure to diseases is a serious challenge in the region.”¹⁰⁶ Accommodation and living conditions are very basic: villages often do not have access to electricity and general infrastructures are poor.¹⁰⁷

CDNP also host oil concessions and mining permits.¹⁰⁸ According to Wildlife Conservation Society (WCS)—an NGO intervening in that protected area—“Sintoukola Potash S.A. of the Australian group Elemental Minerals Limited (ELM) was awarded a mineral exploration permit through Presidential Decree in 2009 for a period of three years (renewable twice)¹⁰⁹ and a mining license for the Kola deposit per Presidential Decree in 2013.”¹¹⁰

CDNP covers approximately 55% of the Sintoukola permit area according to a consultancy report mandated by the company and has presumably had regular consultation meetings in recent years with all stakeholders in the national park, including local communities and WCS.¹¹¹ A major part of the Sintoukola permit is contained within the eco-development and buffer zones of CDNP (“[...] with full authorization from the Minister of Environment and in

¹⁰⁴ Source: http://www.mappingforrights.org/Democratic_Republic_of_Congo.

¹⁰⁵ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 24.

¹⁰⁶ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 24.

¹⁰⁷ Source: http://www.mappingforrights.org/Democratic_Republic_of_Congo.

¹⁰⁸ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 24.

¹⁰⁹ Presidential Decree No. 2009-237 dated August 13, 2009, published in the Congolese Official Gazette No. 35 on September 27, 2009.

¹¹⁰ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, pp. 24.

¹¹¹ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 24.

consultation with the NGO and government representative responsible for managing the CDNP.”).¹¹² “While mining and forestry are allowed in eco-development zones, however, Sintoukola’s license—which in part overlaps with the buffer zone (...)—is in contradiction with Article 5 of CDNP’s creation decree,”¹¹³ clearly stating that no permit of any kind will be authorized in the buffer zone. Also, at least two villages—Ngoumbi and Koutou—are located within the limits of the mining permit.¹¹⁴

Moreover, a 2012 technical report by consulting company ELM on the Sintoukola Potash Project “stressed the challenges in dealing with local and indigenous communities in Conkouati’s area, notably in terms of: managing expectations (for example, of potential employment and development); addressing marginalization of some ethnic groups; ensuring that more consistent, regular and accurate information is provided to communities to ensure trust; and implementing a grievance mechanism to answer – even retrospectively – issues raised by communities.”¹¹⁵ To date, populations of some villages, particularly in CDNP, have deplored that different kinds of economic activities, such as seismic testing or storage of building materials, take place on unoccupied pieces of lands (which customarily belong to the community) without any consultation processes.¹¹⁶

Sintoukola Potash completed two phases of exploration in the area by 2012, including 2D seismic and drilling. Sources report that: “ten families from Koutou have seen their lands expropriated due to Sintoukola Potash’s establishment in the area.”¹¹⁷ Also, communities have accused the company of other serious incidents, such as gas pollution.

The company’s exploration activities have been carried out since 2009, though the production’s launch has been repeatedly postponed over the years.¹¹⁸ Recently, “an article

¹¹² Report prepared by SRK Consulting for ELM, 2012, p. 45.

¹¹³ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 40. *Décret de classement n° 99 – 136 Bis du 14 août 1999 portant sur la création du Parc National de Conkouati-Douli*, signed by the President of the Republic and the Minister of Water and Forests.

¹¹⁴ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 40.

¹¹⁵ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 41.

¹¹⁶ A Ngoumbi landowner complained that in addition to not having been consulted, the company did not allow communities to take advantage of its amenities. He said: “they build prefabricated amenities and when they leave the area upon completion of their work, they destroy the camp instead of letting the community benefit from this infrastructure”. Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 41.

¹¹⁷ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 41.

¹¹⁸ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Conkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 43.

from Ecofin Agency mentioned the company's announcement to build all its infrastructure and plants by mid-2017, effectively starting production as of 2018 for a period of 25 years."¹¹⁹

But, in 2015, one of these prospecting activities in eco-development and buffer zones of CDNP resulted in a gas explosion. Subsequently, people from Koutou and other neighboring villages had to be evacuated and relocated for several weeks before they could return to their own area. During this period of absence, houses were reportedly vandalized, and animals ate and destroyed their crops. Upon their return, Sitoukola Potash set up an evaluation committee in which the representatives of each village concerned were represented. The industry has also "temporarily stopped its exploration activities in the territories concerned" by the accident.¹²⁰

To date, Sitoukola Potash has not compensated victims. Moreover, some community youth who had been hired as workers said that they were still waiting for the company to pay them their wages. Currently, there is a persistent gas smell around villages, and grass tends to be dry or dead around the drills.¹²¹ The community members deplore the fact that they were never consulted about the company's establishment on their lands.¹²²

Sintoukola-related evictions show "how communities are often caught in the middle of several developments taking place on their lands, further weakening their rights and land security."¹²³ Additionally, "in most cases where protected areas and extractive industries coincide, communities' lands and resources are rarely more secure"¹²⁴, despite the apparent existence of agreements and cooperation with local organizations and institutions.

Sources:

- Source: http://www.mappingforrights.org/Democratic_Republic_of_Congo
- Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Konkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017.
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- Report prepared by SRK Consulting for ELM, 2012.

¹¹⁹ Source: <https://www.agenceecofin.com/potasse/0302-35599-congo-sintoukola-potash-accelere-le-processus-d-exploitation-de-la-potasse-de-kouilou>. Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Konkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 43.

¹²⁰ As already said, the plant was located according to an authorization given by the State. However, this was in violation of Article 5 of CDNP's creation decree, which clearly states that no permit of any kind will be authorized in the buffer zone. Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Konkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 43.

¹²¹ Observatoire Congolais des Droits de l' Homme (OCDH), *Rapport annuel sur les droits humains en République du Congo*, February 2016, p. 52.

¹²² Observatoire Congolais des Droits de l' Homme (OCDH), *Rapport annuel sur les droits humains en République du Congo*, February 2016, p. 52.

¹²³ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Konkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 42.

¹²⁴ Inès Ayari, Simon Counsell, *The Rainforest Foundation UK: The Human Cost of Conservation in Republic of Congo, Konkouati-Douli And Nouabalé- Ndoki National Parks and Their Impact on The Rights And Livelihoods Of Forest Communities*, December 2017, p. 42.

- *Décret de classement n° 99 – 136 Bis du 14 août 1999 portant sur la création du Parc National de Conkouati-Douli*, signed by the President of the Republic and the Minister of Water and Forests.
- Source: <https://www.agenceecofin.com/potasse/0302-35599-congo-sintoukola-potash-accelere-le-processus-d-exploitation-de-la-potasse-de-kouilou>.

To summarize, major potential environmental effects that may occur during potash mining activities¹²⁵ are listed below:

1) **Mine Development Phase**

Exploration, assessment, planning and construction:

- Land surface disturbance
- Air emissions
- Water contamination
- Noise and vibration

2) **Extraction Phase**

Overburden removal or ore body access and ore extraction:

- Land surface disturbance
- Water contamination
- Water table lowering
- Air emissions
- Topsoil degradation
- Vegetation and wildlife disruption
- Noise and vibration

3) **Ore Handling and Transport Phase**

Storage and reclamation:

- Air emissions
- Water contamination
- Noise

4) **Beneficiation (Refining) Phase**

Size reduction (crushing, grinding, screens, cyclones); separation, concentration and

¹²⁵ This table can be accessed at <http://nextyearcountrynews.blogspot.com/2011/03/environmental-impacts-of-potash-mining.html>.

contaminant removal; drying, compaction, granulation, etc.:

- Waste generation
- Water consumption
- Water contamination
- Air emissions, including CO₂
- Noise and vibration

5) **Waste Disposal Phase**

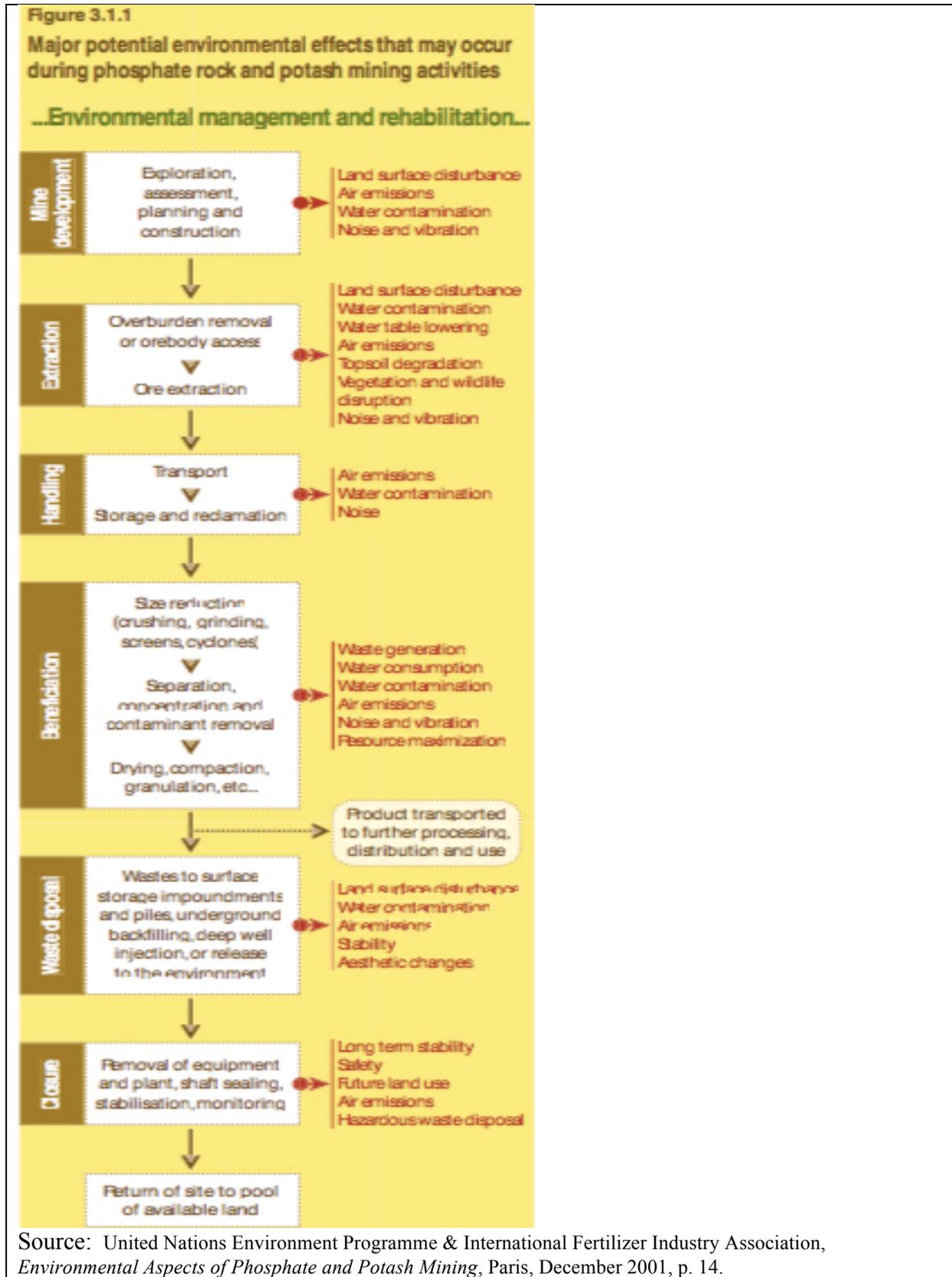
Wastes to surface, storage impoundments and piles, underground backfilling, deep well injection, or release to the environment:

- Land surface disturbance
- Water contamination
- Air emissions
- Aesthetic changes
- Waste

6) **Closure Phase (Decommissioning)**

Removal of equipment and plant, shaft sealing, stabilization, and monitoring:

- Long term stability issues
- Safety issues
- Future land use issues
- Air emissions
- Hazardous waste disposal



Source: United Nations Environment Programme & International Fertilizer Industry Association, *Environmental Aspects of Phosphate and Potash Mining*, Paris, December 2001, p. 14.

III. Human Impacts

Communities must assess carefully the balance between positive and negative impacts of mining development in light of past performance and future promises of the company and industry involved.

A. Employment

The most obvious positive impact of a mining development is that nearby communities may derive economic benefit. While it is true, however, that mines create employment opportunities, some considerations include:

1. Economic benefits related to mining often are short term. Indeed, minerals are non-renewable resources: when an ore body is depleted, the mine shuts down. Thus, mines can “never be a permanent answer to a community’s economic woes.”¹²⁶
2. Mining companies and governments often offer promises of jobs and training programs as part of an agreement with impacted or potentially impacted communities. Many mining jobs, however, “require highly skilled or specially trained employees, and if members of nearby communities do not have the required skills, the work force must come from outside the region.”¹²⁷
3. Another issue related to employment is that, even if jobs are available, the work might not be agreeable to members of the community. Indeed, the types jobs required in the mining sector can be regarded as unattractive for many reasons, including scheduling, discrimination and working conditions.¹²⁸
4. Furthermore, “the reality is that global industry prices are the major determinant of whether or not mines continue operating.”¹²⁹ Often, due to low ore prices, mines temporarily cease operating and lay off their workers. Thus, “mining operations do not necessarily provide long-term economic stability”¹³⁰ for individual workers or the community. In this regard, the global potash mining industry received a boost in confidence this year when market prices for the mineral began rising after a decade-long

¹²⁶ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 11.

¹²⁷ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 11.

¹²⁸ Susan Wismer, *The Nasty Game: how environmental assessment is failing aboriginal communities in Canada’s north*, in *Alternatives*, 22 n.4, October-November, 1996, p. 12 : “The nature of the work, its scheduling into shifts that are often at least two weeks in length, the distance of mine sites from home communities, and the need for a consistent and reliable workforce that does not take time off on a seasonal basis, creates a situation in which the benefits of employment in the mines are often offset by the costs of social and family disruption and loss of opportunities to participate adequately in community life.”

¹²⁹ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 11.

¹³⁰ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 11.

downward trend, according to a recent report from Bloomberg.¹³¹ World demand for potash is expected to grow from 34.9 million tons in 2014 to 38.7 tons in 2018, according to a forecast by the UN Food and Agriculture Organization.¹³²

5. In terms of more general social impacts, the level of financial investment surrounding the mine project will cause further socioeconomic changes in the region concerned. These changes may affect patterns of employment, migration, housing, transportation, private investment and tourism.

B. Health

Working in a mine causes a range of physical and mental health problems, including cancer and sexually transmitted diseases, among others. The probability of developing cancer increases the longer a person works at a mine, if a person has worked in more than one mine (*i.e.*, where different ores are mined), and if the worker smokes.¹³³ Findings from experimental and epidemiological studies suggest that in several occupations (*e.g.*, truck drivers and railway workers), the risk of lung cancer increases with duration of employment, and exposure to diesel exhaust provides the most likely explanation for these elevations of risk. Experts investigated the association between lung cancer mortality and exposure to diesel exhaust in cohort studies involving potash miners, followed for several years.¹³⁴ Exposure to exhaust from diesel combustion is in fact one of the major health risks underground.¹³⁵ Many potash miners' deaths have been recorded, and the main causes reported were: lung cancer; bladder cancer; diseases of the nervous system, circulatory system, respiratory system; and digestive system; injuries; and poisonings.¹³⁶

Known carcinogens encountered at a general mine sites include: radiation, arsenic, nickel, sulfuric acid mist (in the milling process), and asbestos. Suspected carcinogens, such as oil mist and diesel fumes from mining equipment, also exist at mine sites.¹³⁷ In particular, in potash mines, research has shown that exposure levels for respirable dust, inhalable dust¹³⁸, diesel

¹³¹ Source: <https://www.bloomberg.com/news/articles/2017-07-27/potash-corp-profit-beats-estimates-as-fertilizer-demand-recover>.

¹³² Food and Agriculture Organization Of The United Nations, *World fertilizer trends and outlook to 2018*, Rome, 2015, available at <http://www.fao.org/3/a-i4324e.pdf>.

¹³³ Canadian Occupational Safety, Panel makes connection between hard-rock mining and cancer, v.32, n. 4, 1994, p. 8.

¹³⁴ Säverin, R., Bräunlich, A., Dahmann, D., Enderlein, G. and Heuchert, G., *Diesel exhaust and lung cancer mortality in potash mining*, in *American Journal of Industrial Medicine*, n. 36, 1999, 415–422.

¹³⁵ Säverin, R., Bräunlich, A., Dahmann, D., Enderlein, G. and Heuchert, G., *Diesel exhaust and lung cancer mortality in potash mining*, in *American Journal of Industrial Medicine*, n. 36, 1999, 415–422. See for more information: MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 18.

¹³⁶ Säverin, R., Bräunlich, A., Dahmann, D., Enderlein, G. and Heuchert, G., *Diesel exhaust and lung cancer mortality in potash mining*, in *American Journal of Industrial Medicine*, n. 36, 1999, p. 419.

¹³⁷ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 20.

¹³⁸ “Inhalable dust is the fraction of airborne material which enters the nose and mouth during breathing and is therefore liable to deposition anywhere in the respiratory tract. (...) respiratory dust is that fraction that penetrates to the deep lung where gas exchange takes place” Source:

particulate matter (“elemental carbon”), nitrogen monoxide, nitrogen dioxide and carbon monoxide have been determined as very high for all of the components, and especially in the production range.¹³⁹ A differentiation for a single especially relevant component is not possible, as they are thoroughly correlated in all workplaces.¹⁴⁰ The research studies report that: “campaigns have been performed under conditions considered representative for the industry and state-of-the-art exposure control in underground mining.”¹⁴¹

In addition to physical ailments related to mining, there are also mental health effects. A report written in 1988 documents the impact of “fly-in mining” (*i.e.*, where workers are flown into remote areas to work and live for specified lengths of time) on a miner’s physical and mental health. The author concluded that the separation from family and friends and the inability to get away from the work site combine to create stress that can be hazardous and dangerous as it might lead to psychological depression and suicide.¹⁴²

Also, an Ad Hoc Committee on Aboriginal Women and Mining “has outlined a number of concerns related to potential impacts that mining developments may have on women. Their concerns include possible disruption of marriage and family life, increased responsibilities for women in the home, violence against women, sexual harassment in the workplace, and lack of job opportunities. (...) A professor at Memorial University in Newfoundland has found that for married workers, long absences from home can contribute to marriage breakdowns and disrupt family life. If male partners are employed at mines that require them to be away from home for weeks or months at a time, the primary responsibility for managing the household (provision and preparation of food, subsistence harvesting, care of clothing, house-work, maintenance of household accounts, childcare) will fall to women.”¹⁴³ The resulting stress on families often leads to domestic violence and marital breakups and can potentially affect women’s participation in community life.

Mining operations also pose significant indirect health risks: the prevalence of sexually transmitted diseases; the loss of croplands; and the depletion of water resources, which can lead to decreased food supply, malnutrition, and a greater risk of infectious diseases. More specifically, “[m]any of the social problems are caused by the sudden influx of people from other areas or countries to operate the mine. When the companies bring hundreds of single men into local communities, it gives rise to bars, brothels, alcoholism, prostitution,¹⁴⁴ and an upsurge in

https://www.ohlearning.com/Files/Extracted_Files/53/KA09%20v2-0%2022Oct10%20W201%20Section%206%20day%202%20Measurement.ppt.

¹³⁹ Dahmann, D., Monz, C. & Sönksen, *Exposure assessment in German potash mining, International Archives of Occupational and Environmental Health*, 2007, p. 106.

¹⁴⁰ Dahmann, D., Monz, C. & Sönksen, *Exposure assessment in German potash mining, International Archives of Occupational and Environmental Health*, 2007, p. 106.

¹⁴¹ Dahmann, D., Monz, C. & Sönksen, *Exposure assessment in German potash mining, International Archives of Occupational and Environmental Health*, 2007, p. 107.

¹⁴² Keith Storey & Mark Shrimpton, “Fly-In” *Mining and Northern Development Policy: The Impacts of Long-Distance Commuting in the Canadian Mining Sector*, Impact Assessment, 6 n. 2, pp. 127-136

¹⁴³ MiningWatch Canada, *Mining in Remote Areas - Issues and Impacts*, Environmental Mining Council of British Columbia, May, 2001, p. 14-15.

¹⁴⁴ Through prostitution, men sometimes can bring home sexually transmitted diseases. Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 10.

sexually transmitted diseases. An increase in crime is almost unavoidable, including assaults, robberies, and rape. The community's social fabric breaks down."¹⁴⁵

The health effects can continue long after the end of mining operations since it can affect the access to food and water, as specified below.

C. Access to Food and Water

The movement of communities to accommodate industrial-scale mining operations and the denial of access to sites traditionally used for subsistence farming can have an adverse impact on people's livelihoods and their access to food and water.¹⁴⁶ This is a particular issue for rural communities as they often rely on subsistence farming and need adequate land and water to produce the food on which families and livelihoods depend.¹⁴⁷

In addition, when hazardous chemicals leak into rivers, groundwater and soil, the spills can have severe effects on local communities, aquatic species and livestock.¹⁴⁸ Mining operations can therefore have a detrimental impact on access to water, either by affecting the water supply to local communities or by polluting local rivers. Where pollution of the local rivers, groundwater and soil affects aquatic species and livestock, this can also reduce access to food. (*See Case Study #3, supra.*)

Large-scale mining requires enormous amounts of water and often depletes, diverts, or poisons water supplies in the area, undermining livestock grazing and farming,¹⁴⁹ which can be detrimental for the access to food and clean water. In the last few years, numerous severe conflicts over access to drinking and irrigation water have occurred.¹⁵⁰ Heavy metals transported through rivers and underground water sources can poison drinking water, crops, seafood and fishing, not only in the immediate area, but also hundreds of kilometers away.¹⁵¹

¹⁴⁵ Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 9.

¹⁴⁶ UN Committee on Economic, Social and Cultural Rights, General Comment n. 15, paras 1 and 6: "General Comment No. 12 (1999): The right to adequate food (art. 11)", UN Doc E/C.12/1999/5, May, 12, 1999, paras. 1 and 4

¹⁴⁷ Amnesty International, "*The Rights to Work and to an Adequate Standard of Living*", *Mining and human rights in Senegal. Closing the gaps in protection*, May 2014, p. 30. See also <https://www.worldwildlife.org/places/amazon>.

¹⁴⁸ Amnesty International, *Injustice Incorporated: Corporate Abuses and the Human Right to Remedy* (2014), Amnesty International Index: POL 30/001/2014, pp. 65-79.

¹⁴⁹ The Amazon communities do not cultivate fruits and vegetables to any large degree, instead they rely on hunting and gathering. "Considering the forests' plentiful wildlife, (...) everything from fish, birds, wild boars, even insects and bugs are at hunters' disposal." As for fish, the paiche, the pirarucu, the tambaqui, the jaraqui and the surubim the main source of protein in the Amazonian diet. As for meat, "In Brazil, maniçoba, is a dish made from the leaves of the manioc plant (which need to be simmered for seven days to remove poisonous hydrocyanic acid) combined with various pieces of bacon, sausage and other types of salted pork. Perhaps the most famous dish of the Brazilian Amazon is the distinctive pato no tucupi (duck served in exotic-tasting tucupi sauce)". Source: <https://www.rainforestcruises.com/jungle-blog/what-do-people-eat-in-the-amazon>.

¹⁵⁰ For more information in mining impacts and successful resistances, see Appendix C, Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 44.

¹⁵¹ Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 9.

D. Access to Land and Land Conflicts

While governments can acquire land for “public purposes” and evict people, under international human rights law states must follow due process safeguards, consult all affected people and give affected people an opportunity to suggest alternatives to evictions, provide resettlement (adequate alternative housing and/or land if agricultural land is acquired), compensation and legal remedies¹⁵². Failure to comply with these safeguards can result in forced evictions.¹⁹ The UN Committee on Economic, Social and Cultural Rights (CESCR) defines a forced eviction as “the permanent or temporary removal against their will of individuals, families and/or communities from the homes and/or land which they occupy, without the provision of, and access to, appropriate forms of legal or other protection.”¹⁵³

Under international human rights law, evictions may be carried out only as a last resort, once all other feasible alternatives to eviction have been explored and appropriate procedural protections are in place, such as free, prior and informed consent (FPIC) protocols and consultations with affected communities. Governments must also ensure that no one is rendered homeless or vulnerable to the violation of other human rights as a consequence of eviction.

As explained, *supra*, industrial mining operations require an extensive amount of land and resources. As such, rural communities living on land subject to mining permits or concessions have no security of tenure and are vulnerable to forced eviction from their land to accommodate industrial mining operations. For indigenous people, who are deeply connected to their land, the move can spell the death of their cultures. And the companies or government are sometimes unable or unwilling to complete the relocation, leaving many people homeless.

Also, “[I]and trafficking may occur when an extractive company offers to buy land in order to obtain access to its concessions, or as a strategy to win over potential opponents. This also leads to the disintegration of communities, because once their land is sold, the former owners usually leave the area.”¹⁵⁴

E. Community divisions, social conflict and human rights violations

Communities, including indigenous communities, usually have ways of coping with social or natural disturbances or stress. These coping mechanisms include: group solidarity, trust in one’s leaders and neighbors, unwritten social rules, strong family ties, cultural identity, and strong,

¹⁵² UN Committee on Economic, Social and Cultural Rights: “General Comment 4: The right to adequate housing (Art. 11 (1) of the Covenant)” (13 December 1991) UN Doc E/1992/23; “General Comment 7: The right to adequate housing (art. 11.1 of the Covenant): forced evictions” (20 May 1997) UN Doc E/1998/22, annex IV (CESCR, General Comment 7), each available at:

tbinternet.ohchr.org/_layouts/treatybodyexternal/TBSearch.aspx?TreatyID=9&DocTypeID=11.

¹⁵³ UN Committee on Economic, Social and Cultural Rights, General Comment n. 7: *The right to adequate housing* (Article 11.1 of the Covenant on Economic, Social and Cultural Rights) - forced evictions, (Sixteenth session, 20 May 1997), UN Doc. E/1998/22, Annex IV, para. 3.

¹⁵⁴ Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 9.

committed leaders able to guide the community.¹⁵⁵ Companies, however, may try deliberately to weaken a community and its ability to organize effectively against them.¹⁵⁶ A company “may attempt to create divisions by spreading false information about the project, buying off certain community members with gifts and well-paid special jobs, discrediting the leaders or organizations that question the mining project, or co-opting and or intimidating leaders into supporting the project.”¹⁵⁷

If companies face stiff community opposition, they may resort to “underhanded measures, such as paying local people to falsely accuse resistance leaders of committing crimes.”¹⁵⁸ (For alleged accusations of forced labor, killings and other abuses, *see* Case Studies #4, #5, and #6.) Companies may employ thugs or paramilitary forces to intimidate, threaten, injure or even kill people. The fact that a company is owned partly or wholly by the state can also be a potential dangerous factor when the government’s structures are corrupted or fail in democratic legitimacy. These states might use its security apparatus and military army against the population regardless of whether or not the project is state-supported. (For state-owned companies’ human rights violations, *see* Case Study #4.) (For local opposition and protest repression, *see* Case Study #7.)

Case Study #4 – Risks and allegations of forced labor as part of the Colluli Mining Share Potash Project (co-owned by Danakali Ltd. and Eritrean National Mining Company ENMCO).*

By law, all Eritreans must spend 18 months in national service, usually, though not always, performing military duties.¹⁵⁹ In fact, the government has made national service an indefinite way of life for many Eritreans, forcing them to serve as conscripts for years at a time and without limit. According to Human Rights Watch, the national service scheme as implemented by the Eritrean government amounts to “forced labor” and, because of the large scale of people involved and the indefinite periods, a “gross human rights violation.”¹⁶⁰

The government assigns national service conscripts to jobs across every sector of the economy, not only military service. They work as skilled professionals, civil servants, and manual laborers. “Some national service conscripts are assigned to state-owned construction companies who exercise a complete monopoly in the field and international mining firms operating in the country face intense government pressure to engage these contractors to

¹⁵⁵ Carlos Zorrilla et al., *Protecting Your Community Against Mining Companies and Other Extractive Industries, A guide for Community Organizers*, 2009, p. 5.

¹⁵⁶ Carlos Zorrilla et al., *Protecting Your Community Against Mining Companies and Other Extractive Industries, A guide for Community Organizers*, 2009, p. 5.

¹⁵⁷ Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 9.

¹⁵⁸ Carlos Zorrilla, *Protecting your community from mining and other extractive operations, A Guide for Resistance*, 2nd edition, 2016, March 17, 2017, p. 9.

¹⁵⁹ Proclamation on National Service, No. 82/1995, October 23, 1995, <http://www.unhcr.org/refworld/docid/3dd8d3af4.html>.

¹⁶⁰ Human Rights Watch, *Service for Life: State Repression and Indefinite Conscriptation in Eritrea*, April 16, 2009, <http://www.hrw.org/reports/2009/04/16/service-life-0>.

develop some of their project infrastructure. If they do so, they run the risk of at least indirect involvement in the use and harsh mistreatment of forced laborers.”¹⁶¹

As Eritrea possesses significant mineral resource deposits, including gold, silver, copper, zinc, and potash, the government has shown strong support to the development of mining to provide an important economic boost. For this reason, the government has various ownership interests in different mining projects through the Eritrean National Mining Company (ENAMCO). For instance, the Colluli potash project is a 50-50 joint venture between Danakali Ltd. and the government-owned ENAMCO.¹⁶²

The first commercial-scale mining project began in 2011 with Bisha mine, a joint venture between a small Canadian firm called Nevsun Resources and ENAMCO. The first operating modern mine in Eritrea, Bisha mine specializes its extractive activities in gold, silver, copper and zinc. In 2012, Bisha mine has been faced allegations from Human Rights Watch¹⁶³ that the company used poorly paid workers who were on national service during construction. In particular, Nevsun failed to identify human rights risks prior to their work. At the government’s insistence, the Bisha project engaged Segen Construction Company as a local contractor, despite evidence that the company regularly exploits conscript workers the government assigns to them.¹⁶⁴

“Nevsun’s experiences in Eritrea underscore how serious the human rights risks are facing investors in Eritrea’s mining sector—especially if not addressed prior to project development through effective due diligence.”¹⁶⁵ Second, international mining firms may find it impossible to influence the behavior of powerful state-controlled local contractors once they have been engaged without jeopardizing their projects. Consequently, it may be impossible to develop mining projects in Eritrea or similar locations without becoming complicit in criminal activity and serious human rights abuses.¹⁶⁶

* *This case is ongoing.*

Sources:

- Human Rights Watch, *Service for Life: State Repression and Indefinite Conscripted Labor in Eritrea*, April 16, 2009, <http://www.hrw.org/reports/2009/04/16/service-life-0>.
- Proclamation on National Service, No. 82/1995, October 23, 1995, <http://www.unhcr.org/refworld/docid/3dd8d3af4.html>.
- Human Rights Watch, *Hear No Evil - Forced Labor and Corporate Responsibility in Eritrea’s Mining*

¹⁶¹ Human Rights Watch, *Hear No Evil - Forced Labor and Corporate Responsibility in Eritrea’s Mining Sector, Case Study: Nevsun Resources in Eritrea*, 2013, p. 1.

¹⁶² Source: <http://www.mining-technology.com/news/newscolluli-mining-share-company-signs-mining-agreement-for-colluli-potash-project-5730128/>.

¹⁶³ Human Rights Watch, *Hear No Evil - Forced Labor and Corporate Responsibility in Eritrea’s Mining Sector, Case Study: Nevsun Resources in Eritrea*, 2013.

¹⁶⁴ Human Rights Watch, *Hear No Evil - Forced Labor and Corporate Responsibility in Eritrea’s Mining Sector, Case Study: Nevsun Resources in Eritrea*, 2013, p. 2.

¹⁶⁵ Human Rights Watch, *Hear No Evil - Forced Labor and Corporate Responsibility in Eritrea’s Mining Sector, Case Study: Nevsun Resources in Eritrea*, 2013, p. 25.

¹⁶⁶ Human Rights Watch, *Hear No Evil - Forced Labor and Corporate Responsibility in Eritrea’s Mining Sector, Case Study: Nevsun Resources in Eritrea*, 2013, p. 25.

Sector, Case Study: Newsun Resources in Eritrea, 2013.

- Source: <http://www.mining-technology.com/news/newscolluli-mining-share-company-signs-mining-agreement-for-colluli-potash-project-5730128/>.

Case Study #5 – Crimes and Abuses at Myanmar Copper Mine – 2015.

After a one-year investigation, Amnesty International issued a report documenting human rights abuses—including forced evictions, substantial environmental and social impacts, as well as the repression of protestants—at the Monywa copper mine project in Myanmar.¹⁶⁷ Approximately 25,000 people in 26 villages live within 5 km of the mines. The majority of these villages depend on agriculture for their livelihoods.¹⁶⁸

Forced evictions

In order to make way for the mine, the government forcibly evicted thousands of people, depriving them of their main source of livelihood, after nationalizing their lands in 1996 and 1997. “The government used colonial era land laws and provisions of Myanmar’s Code of Criminal Procedure¹⁶⁹ to push people off of the lands they farmed and evict entire villages with no compensation, consultation or legal remedies.”¹⁷⁰ Many of the evicted people had no choice but to work as manual laborers on others’ farms for survival. Additional forced evictions were carried out for the Letpadaung mine between 2011 and 2014. In this case, the government deliberately misled people, telling villagers that machines would be taken through their farms and they would be given compensation for damage to crops. No mention was made of land acquisition or evictions. Amnesty reports that “the villagers only realized what was happening when, in 2011, Myanmar Wanbao began construction on part of their farmland. Again, the government used provisions in the criminal code to restrict access to farmlands. Although Myanmar Wanbao offered some additional compensation, the company has not addressed the loss of livelihoods, which is a long-term problem. Moreover, thousands more people are at risk of forced evictions as Wanbao continues to develop the Letpadaung mine”¹⁷¹, without minimizing risk of forced displacement.¹⁷²

¹⁶⁷ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015.

¹⁶⁸ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 5.

¹⁶⁹ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 17.

¹⁷⁰ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 5.

¹⁷¹ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 5.

¹⁷² Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 32.

Environmental impacts

A sulfuric acid factory 200 meters from Kankone village supplies most of the sulfuric acid needed for the S&K mine. Villagers report that they suffer respiratory, skin and eye problems that they believe are caused by the factory. They also described damage to crops in fields adjacent to the factory.¹⁷³ The company, UMEHL, set up the factory in 2007 without obtaining permission from the Ministry of Industry and operated without permits until July 2013 when the Ministry gave permission for the factory to continue production.¹⁷⁴

In 1995 and 1996, ME1 discharged hazardous copper tailings from the S&K mining operations over more than 150 acres of land and into the Chindwin River. According to environmental and health experts, the waste poses significant health risks, particularly for the artisanal miners who are handling it.¹⁷⁵

In 2012, the foundation of a waste dump at another mine collapsed following an earthquake. “Despite the obvious risks to people living nearby, the government has not monitored the effects of these environmental incidents,”¹⁷⁶ nor has the state shared information with local communities.¹⁷⁷

Violence against Protestors

Communities have protested the forced evictions and loss of livelihoods caused by the Letpadaung mine. Police have used excessive force on peaceful protestors,¹⁷⁸ who have suffered serious injuries and death. On the night of November 29, 2012, police threw “fire bombs,” later identified as white phosphorus incendiary munitions, at a crowd of protestors. More than 100 people were injured, some suffering horrific burns and lifelong disabilities. On December 22, 2014, the police shot and killed one villager.¹⁷⁹

Sources:

- Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015.

¹⁷³ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 74.

¹⁷⁴ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 77.

¹⁷⁵ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 6.

¹⁷⁶ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 6.

¹⁷⁷ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 77.

¹⁷⁸ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 6.

¹⁷⁹ Amnesty International, *Open for Business? Corporate Crime and Abuses at Myanmar Copper Mine*, ASA 16/003/2015, February 2015, p. 6.

Case Study #6 – Mining in Guatemala

Industrial-scale mining of metals in Guatemala is predominantly based in rural areas.¹⁸⁰ Thus, mining has a disproportionate impact on indigenous peoples and their lands. These communities have suffered discrimination historically and continue to live in extreme poverty with limited access to education, health and other basic services. Indigenous peoples have often borne the brunt of Guatemala's extreme inequality in the distribution of land and ineffective mechanisms for addressing land disputes.¹⁸¹ Indigenous peoples also have suffered the worst excesses of the internal armed conflict, which ended in 1996 and claimed the lives of over 200,000 people.¹⁸² Today, they remain economically and socially marginalized.

“Since the end of the internal conflict, successive governments have proposed economic development plans with a particular focus on the extraction of mineral resources,”¹⁸³ including gold, silver and nickel. Mining, therefore, has boomed in the last decade.

The establishment of mining projects has been marked by dispute and conflict. Protests, injuries and deaths have occurred in various sites and affected anti- and pro-mining groups, as well as police and mining company security personnel.¹⁸⁴ As stated by the UN Special Rapporteur on the Rights of Indigenous peoples, in 2011 the presence of large-scale mining has “generated a highly unstable atmosphere of social conflict which is having a serious impact on the rights of the indigenous people and threatening the country's governance and economic development”.¹⁸⁵

The Marlin Mine – Gold Mining

A Canadian company, Goldcorp Inc., operates through its subsidiary the gold mine “Marlin I,” located in San Miguel Ixtahuacán and Sipacapa. This area—150 km west of Guatemala City—is home to approximately 52,000 people, the majority of whom are Mayan indigenous peoples. The main livelihood in the area is subsistence agriculture.¹⁸⁶

The Marlin I mine has been the subject of community protests since its inception. Both protestors and police have been injured during protest actions. Community members and local

¹⁸⁰ The World Bank, *Increasing Rural Incomes in Guatemala*, April 2006, “80 percent of Guatemala's indigenous peoples live in rural areas, where they account for 52 percent of the rural population, so they are particularly affected by rural poverty.”

¹⁸¹ Amnesty International, *Guatemala: Land of injustice?*, AMR 34/003/2006, 28 March 2006.

¹⁸² Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 3.

¹⁸³ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 7.

¹⁸⁴ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 7.

¹⁸⁵ Report of the Special Rapporteur on the situation of human rights and fundamental freedoms of indigenous people, James Anaya, Observations on the situation of the rights of the indigenous people of Guatemala with relation to the extraction projects, and other types of projects, in their traditional territories, 7 June 2011, A/HRC/18/35/Add.3, available at http://unsr.jamesanaya.org/docs/special/2011-special-guatemala-a-hrc-18-35-add3_en.pdf, p. 1.

¹⁸⁶ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 9.

NGOs describe the root causes of the protest as “a lack of consultation before the mine began operating, disagreements over land acquisition and the failure of the company to address risks associated with the mine.”¹⁸⁷ The ways in which security forces have dealt with protests and the attacks on anti-mining activists exacerbate community tensions. “Local communities have raised further concerns about negative impacts, including pollution and damage to houses caused by vibrations from mining processes.”¹⁸⁸

Most recently, in 2011, the UN Special Rapporteur on the Rights of Indigenous peoples concluded that there had been no free, prior and informed consultation or consent in the case of the Marlin mine which conformed to applicable international standards such the UN Declaration on the Rights of Indigenous Peoples.¹⁸⁹

In response, Goldcorp stated that, following the 2010 Human Rights Impact Assessment, the company had undertaken a number of initiatives to improve relations with the communities. The company also noted that: “studies into alleged negative impacts on housing and water quality have demonstrated that the company’s activity is not resulting in damage to houses or water.”¹⁹⁰

Activists who oppose the Marlin mine have been threatened, and some have even been killed. For example, in January 2005, Raúl Castro Bocel was fatally shot when police and soldiers broke up a protest against the transportation of heavy equipment to the mine site.¹⁹¹ On July 7, 2010, two unknown assailants shot Diodora Hernández, a local activist who opposed the mine because of concerns about environmental impacts, in her home.¹⁹²

To date, the company continues to face opposition, including to new exploration work. Goldcorp, however, denies such tensions, stating that “. . . opposition groups, many of them made up of people from outside the area continue to successfully disseminate misinformation campaigns that ultimately create security risk for local residents of San Miguel Ixtahuacán and Sipacapa.”¹⁹³

¹⁸⁷ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 9.

¹⁸⁸ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 10.

¹⁸⁹ Report of the Special Rapporteur on the situation of human rights and fundamental freedoms of indigenous people, James Anaya, Addendum, Observations on the situation of the rights of the indigenous people of Guatemala with relation to the extraction projects, and other types of projects, in their traditional territories, 7 June 2011, A/HRC/18/35/Add.3 http://unsr.jamesanaya.org/docs/special/2011-special-guatemala-a-hrc-18-35-add3_en.pdf paragraph 29, page 31.

¹⁹⁰ Goldcorp letter to Amnesty International, dated 1 September 2014. Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 11.

¹⁹¹ On Common Ground Consultants Inc., ‘Human Rights Assessment of Goldcorp’s Marlin Mine’, May 2010, p. 164.

¹⁹² Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 11-12.

¹⁹³ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 12.

El Estor – Nickel Mining

In August 1965, Guatemala granted Exmibal a 40-year concession to operate a nickel mine site at El Estor, in the department of Izabal, a region predominantly inhabited by Maya-Q'eqchi indigenous community.¹⁹⁴

The UN-sponsored Commission for Historical Clarification frequently mentions El Estor in its report as a mine “where massacres, enforced disappearances, sexual violence and other human rights violations occurred during the conflict.”¹⁹⁵ Specifically, with regard to the mine site, the Commission found that Exmibal personnel and equipment had been used in committing human rights violations.¹⁹⁶

The mine ceased production in 1980 until 2004 when Exmibal was granted a new mining licence for the area. In the same year, the company was acquired by Canada-based Skye Resources and subsequently renamed *Compañía Guatemalteca de Niquel* (CGN). In September 2011, CGN was acquired by Solway Investment Group Limited, which currently owns 98.2 percent, with the Guatemalan government owning the remaining 1.8 percent.¹⁹⁷

According to members of the Indigenous Maya-Q'eqchi community, the heart of the current dispute between the community and the companies is a disagreement over ownership of the land on which the mine is located. A number of Maya Q'eqchi families claim ownership of their ancestral lands. The Indigenous community also asserts that: “CGN’s claim to the land is illegitimate because ownership is based on titles awarded to it by the military government in 1965 at a time when local Indigenous people were being massacred and driven off their lands in the context of the internal armed conflict.”^{198 199}

Since 2006 there have been incidents of violence and allegations of serious human rights violations linked to the mine and the efforts by Indigenous people to reclaim their traditional lands.²⁰⁰ Some of these cases have been the subject of investigations in Guatemala and legal action in Canada. For its part, “Solway Investments stated that no evidence exists that the land was traditional land, but also stated that the company relied on the permits and other documentation”²⁰¹ the government gave them.²⁰²

¹⁹⁴ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 18.

¹⁹⁵ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 18.

¹⁹⁶ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 18.

¹⁹⁷ Compañía Guatemalteca de Níquel, ‘Solway Group nalizes purchase of Fenix Project’, 27 September 2011.

¹⁹⁸ *Choc v HudBay Minerals Inc.*, 2013 ONSC 1414, 22 July 2013, para. 11.

¹⁹⁹ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 19.

²⁰⁰ See *Choc v HudBay Minerals Inc.*, 2013 ONSC 1414, 22 July 2013.

²⁰¹ Amnesty international, *Guatemala: mining in Guatemala: rights at risk*, AMR 34/002/2014, September 2014, p. 20.

²⁰² Letter to Amnesty International from Solway Group, 3 September 2014.

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Case Study #7 – Potash Mining Projects and Protests in Thailand*

High-quality potash deposits have been discovered in Udon Thani Thailand since 1981 and have been described as a world-class potash resource due to the high-grade and shallow depth of the ore.²⁰³ Asia Pacific Potash Corporation (APPC), 90 percent owned by Asia Pacific Resources Ltd (APR) based in Vancouver Canada and 10 percent owned by the Thai Government, began to acquire land and begin to work toward acquiring a mining concession in Udon Thani province.²⁰⁴

Soon thereafter, “community members and human rights defenders began raising questions about the environmental and health impacts of any potential mining project.”²⁰⁵ Significant opposition began to grow over time when local communities feared widespread subsidence, salt contamination of agricultural land and groundwater contamination. People fear negative the impacts on their children and grandchildren, as well as the destruction of their agricultural based livelihoods.²⁰⁶

Since the first protests in 1993, local opposition to the mine has gained considerable momentum. “The villagers traveled to Bangkok to submit petitions to the Canadian Embassy requesting that the Canadian company be instructed to follow the same social and environmental standards as required in Canada.”²⁰⁷ Reports stated that, while the protests remained peaceful, the government officials and local district heads threatened several local

²⁰³ Asia Pacific Potash Corporation, *Final Report of Environmental Impact Assessment for the Somboon Potash Mine. Main Report*, Prepared by Team Consulting Engineering and Management Co., Ltd, February 2001.

²⁰⁴ Source: <https://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=9608790>.

²⁰⁵ Source: <https://asianhrds.forum-asia.org/?events=thailand-environmental-hrds-under-surveillance>.

²⁰⁶ Catherine Coumans. *Backgrounder: Potash mining in northeast Thailand*, MiningWatch Canada, September 24, 2002, available at: <https://miningwatch.ca/blog/2002/9/17/backgrounder-asia-pacific-resources-thailand>.

²⁰⁷ *Health Impact Assessment in Thailand: A Step Towards Healthier Decision-Making Process*, The 24th Annual Conference of the International Association for Impact Assessment, Vancouver, 24-30 April, 2004, p. 3-4

community members. The company returned, gathering support for the mine from other villages, several local influential businessmen and pro-potash mining groups, who then set up movements for the mine. As a result, the communities became divided.

“The company did not pay compensation for damages (*i.e.* salinity of agricultural soils, caused by the exploration activities). Now, community members do not believe the company will solve any problems that will occur as a result of mining activities.”²⁰⁸

Further, the company did not engage in public consultation and participation. During exploration stage, neither company nor government informed villagers about drilling activities nor gave information about the type of mine to be built. The companies only talked about how rich people would become and about increased job opportunities.

A report on the Roles of Health Impact Assessment and Potash Mining Project in Thailand stated:

“In response to the complete lack of public consultation about the basic project plans, local communities concerned about potential social environmental impacts of the potash mine have established Udon Thani Environmental Conservation Group in 2001. The group has since worked to disseminate information about the project to the surrounding villages. The villagers have then been informed about the project and its potential impacts.

Other public sectors gradually participated in the movements. National environmental groups, media, academicians, research institutes, independent senators and members of the Human Rights Commission then paid more attention to the problem and provided some support. The villagers therefore have greater access to technical documents related to the project plans.”²⁰⁹

Protesters and allies organized a number of seminars, meetings and public hearings. The group has submitted letters to related government officials and the prime minister. The Minister of Natural Resources and Environment also set up a six-member committee of environmental experts and government officials to re-evaluate the Environmental Impact Assessment report.²¹⁰

In the latest period of struggle, across the northeast, local groups are organizing against potash mining projects, including the provinces of Nakhon Ratchasima, Chaiyaphum, Udon Thani and Sakon Nakhon. Indeed, “international mining companies have increased efforts to push into the northeast, which is believed to host the world’s third largest, unexploited potash reserves.”²¹¹ As a result of the strong local opposition, potash reserves in the country have remained largely unexploited to date.

In April 2012, a joint committee was set up between the Department of Primary Industry and Mining (DPIM) and the Conservation Group in order to investigate the social and

²⁰⁸ *Health Impact Assessment in Thailand: A Step Towards Healthier Decision-Making Process*, The 24th Annual Conference of the International Association for Impact Assessment, Vancouver, 24-30 April, 2004, p. 3-4.

²⁰⁹ *Health Impact Assessment in Thailand: A Step Towards Healthier Decision-Making Process*, The 24th Annual Conference of the International Association for Impact Assessment, Vancouver, 24-30 April, 2004, p. 3-5.

²¹⁰ Ranjana Wangvipula. *Panel to review steps to control adverse impacts*, Bangkok Post, March 17, 2003.

²¹¹ The largest known potash reserves are located in Canada and Russia. Source: <https://isaanrecord.com/2017/11/14/new-push-potash-mining-hits-opposition-isaan/>.

environmental effects of the potash mining project. “On January 29, 2015, the DPIM issued an order to halt the joint committee’s work with Udon Thani Environmental Conservation Group. This decision removes the community’s ability to participate in decisions that will affect their environment, health, and livelihoods.”²¹²

Moreover, increased military presence in the community and ongoing surveillance following the termination of the work of the joint committee, and the Conservation Group’s concerns is a clear instance of intimidation designed to ensure that members of the Group do not protest the termination.²¹³

As Southeast Asia’s growing demand in potassium-based fertilizers is expected to continue this year,²¹⁴ the government sees Thailand as geographically well positioned to become a major exporter of potash fertilizer in the region.²¹⁵ In August 2017, the military government amended mining legislation. The new law makes it easier to grant mining licenses to companies by speeding up the approval process from 5 years to 60 days.²¹⁶

Meanwhile, “the National Human Rights Commission has received several complaints about intimidation of anti-mining activist by authorities in the district.”²¹⁷ In 2016, two other environmental activists were charged for the same offence, as reported by Prachatai.²¹⁸ In March 2017, an environmental activist in the district was charged with violating the Public Assembly Act for participating in an anti-mining meeting.²¹⁹ The conflict is still ongoing.

* *This case is ongoing.*

Sources:

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²¹² Thailand: Environmental HRDs under surveillance, March 5, 2015 available at <https://asianhrds.forum-asia.org/?events=thailand-environmental-hrds-under-surveillance>.

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²¹⁴ Source: <https://marketrealist.com/2017/10/potash-demand-grow-key-regions-will-impact-prices>.

²¹⁵ Source: <http://www.industry.go.th/industry/index.php/en/center1-3/item/10660-potash-minerals>.

²¹⁶ Source: <https://isaanrecord.com/2017/11/14/new-push-potash-mining-hits-opposition-isaan/>.

²¹⁷ Source: <https://isaanrecord.com/2017/11/14/new-push-potash-mining-hits-opposition-isaan/>.

²¹⁸ Source: <https://prachatai.com/english/node/7038>.

²¹⁹ Source: <https://isaanrecord.com/2017/11/14/new-push-potash-mining-hits-opposition-isaan/>.

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IV. Conclusion

A first overview of the potash extraction industry in the world has allowed us to grasp the economic interests that big companies are increasingly developing in mineral deposits of developing countries which have been not yet exploited, *e.g.* the Amazon basin. Subsequently, this Memorandum describes the extractive features that Brazil Potash Corp. intends to use in its mining project. This narrative allowed us to create possible analogies with other mineral deposits, existing mines and cases of environmental and human impact occurred in the world. Then, we propose a detailed analysis of the environmental risks that a potash mine can cause, focusing on water, air, land, waste and other impacts.

Furthermore, this Memorandum concentrates on the human impacts that a potassium mining industry can have for the indigenous community, in particular in terms of employment, health, access to food and water, access to land and land conflicts, community divisions and social conflict. The last section's case studies highlight the intersection between environmental disasters and human rights violations that have occurred in other parts of the world. More specifically, we report on cases in which potash companies or similar mining companies intervene in developing regions inhabited by indigenous communities, similar to the Mura communities near Autazes.