Stampriet Aquifer Uranium Mining Committee (SAUMC)

Date: 24 January 2022

Open letter to the Editor of The Namibian

In the Namibian of 13th December 2021, page 12, you published a letter entitled "Uranium mining brings sustainable benefits" from Mr Andrey Shutov, President of Uranium One, the Russian state-owned uranium exploration, mining and processing agency. He promoted the process of in-situ leach mining of uranium (ISL).

To the uninitiated this sounds all so rosy. Unfortunately, the information he provides is woefully incomplete and, as such, is also totally misleading. The article withholds vital information that highlights the immense risks associated with ISL mining of uranium. This letter is to inform your readers of these risks.

Contrary to the claims in the article, ISL uranium mining may severely jeopardi**s**e Namibia's biggest and most valuable underground drinking water resource which is absolutely critical to the whole community that farms in the arid Kalahari of south-eastern Namibia and relies totally on this resource for its livelihood and economy.

The uranium deposits that Headspring Investments (Pty) Ltd is interested in, occur in underground aquifer sandstone layers containing high-quality **drinking** water in what we call the Stampriet Artesian Basin (SAB) or Stampriet Transboundary Aquifer System (STAS). The STAS covers 87 000 km^2 and extends into Botswana and South Africa where the same aquifer sandstones are pumped. The water in the main sandstone layers (six in total) is artesian to subartesian and is the lifeblood of the farming communities living in the entire region. There is no permanent surface water. There are no alternative water sources in this vast area of the arid Kalahari and it is only the STAS aquifer that makes it possible for people to live there permanently.

Several detailed publications by the International Atomic Energy Agency (IAEA) provide specifications of the process of in-situ leach (ISL) mining of uranium and the challenges associated therewith. The uranium orebodies always occur in the water-bearing aquifer sandstones. ISL involves drilling patterns of thousands of boreholes (e.g. Bulgaria 14 000) into the uranium orebody. This pattern, with a borehole spacing of 20-30 m, is significantly denser than that for oil and gas fracking. Such patterns consist of injection and abstraction boreholes - normally one abstraction borehole centred between four, five or six injection boreholes.

Sulphuric acid is pumped into the ore via the injection boreholes. The acid dissolves not only the radioactive uranium, but also radioactive decay products of the uranium and many associated toxic heavy metals associated with the uranium. The acid releases these elements from solid rock into the surrounding groundwater. The acidified groundwater/uranium solution is then pumped back up to a surface via the abstraction boreholes to a processing plant that removes the uranium. The rest of the solution, still containing the other waste radioactive elements and heavy metals, is acidified even further and reinjected into the groundwater and ore to continue the leaching process. Such recycling can be repeated up to 100 times or more and can continue for up to five years.

Because the same solution is recycled again and again, the concentration of the toxic heavy metals and the radionuclides builds up continuously. Furthermore, 1-3 % of the dissolved uranium remains in recycled solution and is not removed by the surface processing plant.

The concentration of the dissolved uranium in the acid solution underground can be as high as 600 grams per ton of the solution. This is more than 20 000 times higher than the safe limit of uranium in drinking water determined by the World Health Organisation (0.03 grams per ton of water). The IAEA publications also indicate that 2-4 % of the solution with the dissolved uranium, heavy metals and radionuclides escapes into the underground aquifers, before being pumped to surface. Leakage also occurs when borehole casings break, perforated casings break, pumps break down, surface pipes break or the processing plant breaks down. Such processing plants handle millions of cubic metres of uranium- and heavy metal-bearing solution a year and use thousands of tons of reagents.

In the STAS, the groundwater in the aquifer sandstones flows naturally in a southerly direction. Although only a few metres per year, this rate of flow is greatly enhanced in coarse-grained layers in the sandstones and by hard pumping of the large number of irrigation projects downstream of mineralised area. These projects account for about 90 % of the total water usage in the basin. Pump tests have shown that the porosity of the STAS sandstone aquifers is so high locally that during pumping at a rate of 45,000 litres per hour over several days the drawdown of the water table was only 3 m. The number of observation points are limited in the STAS and local flow velocities are unknown. The low flow rate mentioned in Mr Shutov's letter applies to the entire aquifer on a regional scale which may not be valid for the proposed mine area.

The water in sandstones mined by this method in many other parts of the world, such as in Kazakhstan and Australia, is so saline that it even is unsuitable for livestock. The water in the STAS is **top quality drinking water**. In the USA, acid ISL is not permitted in drinking water that is used by others or that could be used by others in the future because of the risks associated with acid leaching.

Authors of the IAEA publications repeatedly point out that monitoring boreholes must be drilled into aquifers above and below the mined aquifer and even into the mined aquifer downstream of the mining area in order to detect cross-contamination or downstream contamination by escaping mining fluids. It is impossible to prevent this cross contamination in the STAS because the sandstone aquifers are in contact with each other in many places (see Miller, 2008, the Geology of Namibia, Vol. 3). Many large faults are also conduits for leaking solutions.

Radioactivity cannot be seen, smelt, tasted or felt. It, and toxic levels of heavy metals, affect the lungs, liver, kidneys, the central nervous system, other vital organs, and cause cancer. These health risks should be avoided in their totality.

Headspring Investments (Pty) Ltd holds eight Exclusive Prospecting Licences (EPLs) in the STAS and is is believed to be the expertise behind many others held by Namibians or Namibian firms. These licences are for various mineral commodities, but all include nuclear fuel, despite nuclear fuel being a controlled commodity to which there are special requirements in the Minerals (Prospecting and Mining) Act 33 of 1992. In total, all these licences cover a swath of more than 50 km wide and 500 km long. The EPLs amount to 3.72 million hectares in area, equivalent to 43 % of the Namibian sector of the STAS.

Namibians should be under no illusions. There can be no guarantee by anyone that ISL uranium mining on the STAS will not cause radioactive contamination of our biggest underground reservoir of high-quality drinking water. If this project goes ahead, it would ultimately result in tens of thousands

of leaching boreholes, each one posing a risk of toxic radioactive and heavy metal contamination to the STAS groundwater.

Contaminated water can be treated as long as the aquifer is confined but it is highly complicated and extremely expensive (Königstein, East Germany, 30 years and Euros 6.5 Billion). For contaminating solutions lost into laterally extensive sheet sandstones such as those of the STAS, recovery and treatment is impossible.

In the end, Kalahari communities could become displaced citizens in their own country for generations to come. Nuclear and heavy metal contamination of the aquifer would be an environmental, social and economic disaster and its long-term consequences could be borne by Namibians alone.

The problem is underground where nobody can see it. It will contaminate the only reliable source of drinking water in the arid Kalahari of south-eastern Namibia and the lifeblood of farming, people and animals.

Groundwater in the STAS is its MOST valuable commodity.

It must be protected for present and future generations and for the safe continuation of livelihoods and farming commerce in this region.

Sincerely,

Stampriet Aquifer Uranium Mining Committee