

# Field Report

**McGill Student Chapter of the Society of Economic Geologists**

**Earth and Planetary Sciences, McGill University**

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Figure 1. Group photo at the base of Ol doinyo Lengai

This year, our student chapter visited Tanzania for two weeks, exploring the various ore deposits, geology and national parks. Over the course of the trip, we visited several gold mines, a nickel laterite deposit, a diamond mine and world-famous tanzanite deposits.

Starting on the eastern coast of Tanzania in Dar es Salaam, 9 McGill graduate students and 2 Canadian industry geologists arrived in Dar es Salaam. We were greeted by an excited group of Tanzanian geology students and Professor Ronald Massawa at the University of Dar es Salaam's Geology Department. After introductions and a few presentations about the geology of Tanzania, we were off. With 9 McGill students, 2 Canadian industry geologist eight graduate students from the University of Dar es Salaam, Professor Ronald, two industry geologists from Acacia Mining and three drivers we all managed to fit into three vehicles.

The first two days were spent driving across the country, much of the ore geology on our itinerary was in the western and northern parts of the country. We stopped at the Geological Survey of Tanzania to visit their specular rock and mineral exhibit plus a local artisanal gold mine. Driven by sheer willpower, local miners have come together to mine shallow gold-quartz-vein mineralisation.



Figure 2. The first group photo of the 2019 SEG McGill-UDSM group. Photo taken outside the Geological Survey of Tanzania's rock and mineral museum

Our first mine visit was the Williamson Diamond Mine in Mwadui. This visit had great historical significance as the deposit was discovered by a McGill alumnus – Dr John Williamson in 1940. It has had continuous operation since making it one of the oldest operating diamond mines in the world. Furthermore, with 146 square kilometres of kimberlite pipe at surface level, it is the largest diamond-bearing volcanic pipe in the world. The Williamson Diamond mine is a low-grade high tonnage operation, typically producing 6 carats per hundred tons of ore. However significantly larger diamonds have been procured from the mine – including the Williamson pink diamond at 54.5 carats which was presented to then-Princess Elizabeth and Prince Phillip upon their wedding in 1947. A 388-carat diamond was discovered in 1990.



**Figure 3. View of open pit mining at the Williams diamond mine**

The next few days were spent visiting different gold deposits in the area. The Geita Gold mine, operated by AngloGold Ashanti, represent a classic Archean mesothermal orebody hosted in banded iron formation (BIF). Gold-bearing fluids travelled along a contact between BIF and diorites. Currently a well established open-pit operation, we visited their mining and

processes districts.

The North Mara goldfield is composed of the Buzwagi and Bulyanhulu gold mines. Buzwagi is a low-grade shear hosted quartz vein deposit hosted in porphyritic granite whereas Bulyanhulu mines narrow veins of gold-silver-copper mineralisation. In some cases, secondary processes have created veins of gold.



**Figure 4. Visible gold in diamond drill core at North Mara Gold Mine**

For some in our chapter, this was their first time going underground. Underground visits are critical experience for new geologists, and the mine provided a complete safety induction. Students got to experience riding in a shaft elevator and were able to practice mapping an underground face. The mining district that connects Geita and North Mara is like the geology of the Abitibi greenstone terranes in Canada. Given many students obtain employment in the Abitibi, this experience provides students additional insight into this style of gold deposit formation.

Departing the gold region, we travelled inland towards the Dutwa Region, where we visited a nickel-laterite deposit in the exploration stage. This was an excellent opportunity to see the starting stages of the mining cycle. Geologists provided a detailed presentation on the lithology and controls of mineralisation. We had the chance to see a complete section in

diamond core. A vigorous debate broke out between industry and academic groups on the nature of secondary Ni-enrichment and the potential for granitic fluids to be involved in the



Figure 5. Students inspecting drill core from the Dutwa Nickel Laterite Deposit

formation of the deposit.

Next on our trip was to visit Ol donyo Lengai, the only natrocarbonatite volcano on the planet, we also visited the Serengeti National Park, the Ngorongoro Crater and Lake Natron. The collaboration between industry and universities allowed us to sleep in the Serengeti National Park for a fraction of the typical cost. Seeing the sunrise over the Serengeti Plains, with giraffe, hyena and lions roaming is part of what makes SEG trips an unforgettable experience.

On our way back to Dar es Salaam, we visited the Tanzanite Mines at Merelani Hills. This is a rare opportunity. Tanzanite is only found in this small region near Mount Kilimanjaro. After being shown the evaluation process by a local gemologist, we were taken underground. Nearly 1.1km underground and hosted in graphite schist it was a hot and dirty yet a truly rewarding experience.



Figure 6. SEG President Kyle Henderson and Erin Gibbons with Tazanite miners 1.1 km underground at Merelani Hills Tazanite Mine

This trip would not be possible without the local professors and geologist, willingly to take the time to help plan and execute the journey. These trips offer students the opportunity to visit and experience different cultures and see spectacular geology. This trip provided students with the opportunity to see various stages of the mining cycle, the exploration stages right through to development and processing. Our SEG chapter has a broad diversity of student backgrounds, and for some it was their first time experiencing a mine and the geology of economic deposits. It provided critical experience in viewing/logging diamond drill core, open pit mining processing, exploration strategies and underground workings.

Funding for this trip is from multiple sources. Including Society of Economic Geology (SEG), Prospectors and Developers Association of Canada (PDAC), Earth and Planetary Science Department McGill University, industry participation and alumni donations.

Thank you for the continuous support of our student chapter.

Yours,

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