

## **Oxford & Bristol SEG Northern Sweden Field Trip, 23<sup>rd</sup> – 30<sup>th</sup> June 2019**

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In June 2019, 3 members of Oxford SEG student chapter (Ed Baker, Finlay Goodwin and Isabel Carter) joined 8 members of Bristol SEG on a field trip to Northern Sweden, along with Dr Matthew Field, Bristol SEG's industry sponsor. The trip was kindly supported by SEG, Wood plc, Boliden AB and LKAB

Northern Sweden was chosen as the destination for the field trip thanks to its reputation for historical and active mining operations, in both the Skellefte VMS district as well as the Norrbotten Ore Province. Over the course of the trip, we visited active mining and exploration sites in both of the aforementioned districts including Renstrom and Kangberg VMS mines, Aitik open-pit Cu-Au-Ag Porphyry mine and LKAB's underground Kiruna iron ore mine. Students on the trip had the opportunity to meet geologists working in industry and gain field experience in a mature mining province.

### **Sunday**

After a very early departure from Gatwick and a stop-over in Stockholm the group arrived in Lulea. After a short drive, we arrived at our accommodation for the first night, which were some rustic wooden cottages in Rengard.

### **Monday**

Our first day was in the Skellefte District, where the group split into two and visited Boliden's Kangberg (VMS/high sulphidation Au-Te) and Renström (VMS-type Zn-Au-Ag-Cu-Pb) mines. For a few of the students this was their first experience of a deep underground mine, and it was possible to experience the process of blast hole drilling, thanks to our mine geologist guides Luc Collin and Anne Brandt Virnes (Renström) and Roger Backman (Kankberg). Our tour continued later that day to Boliden's exploration office, where we met geologist Jonas Lasskogen, who gave us a presentation on the geology of the Skellefte VMS district before giving us a tour of Boliden's brand-new core shed at the office site.

### **Tuesday**

On Tuesday we met with Jonas Lasskogen once more, this time joined by exploration geologist Lorna Bell. The Boliden geologists took us up into the nearby hills to show us how to interpret the VMS-related geology of the area, and how prospectivity of an area is assessed by interpolating observations from outcrop to outcrop. During our outing we had the privilege of seeing a moose in the wild, as well as puncturing a tire – which gave us an excuse to break out the car jack and give our spare tire a run.

Returning to the Boliden office at around 3pm, we began our long journey north to the Aitik Mine.

### **Wednesday**

On Wednesday we covered many miles, crossing into the arctic circle on our way to the huge open-pit Aitik Cu-Au-Ag Mine. Upon our arrival we were greeted by Björn Jonsson and mine geologist Peter Karlsson, who proceeded to give us a tour around the mine, where there was the opportunity to collect a few beautiful samples of chalcopyrite from the pit. This was followed by a visit to the mine core shed where Peter introduced us to techniques in core logging. We also visited the mine's mechanical workshop and climbed onto one of the huge mining trucks used by Boliden at the Aitik mine. On Wednesday evening we travelled northwest to LKAB's company hotel in Kiruna, which would be our final mine visit

### **Thursday**

On Thursday morning we met with a group of LKAB geologists and geophysicists led by Laura Lauri, who took us into the field to explore the magnetite-haematite-apatite mineralisation styles seen at LKAB's former exploration targets and former mines in the area. We spent the remainder of the day at various field localities, enjoying a barbeque lunch that was generously provided by LKAB's geologists.

### **Friday**

On Friday we visited LKAB's enormous, well-established Kiruna iron ore mine. After suiting up in PPE we headed down into the mine, where we were joined by tour guide Marina Källvik and mine geologist Henrikki Rutanen. As the mine has been operating for a very long time, certain levels of the mine have been stabilised and repurposed for a number of functions, including a mine museum and an underground cinema. Although the exact petrogenesis of the deposit is still under debate, the currently leading hypothesis suggests that it formed by intrusion of a large Fe- and P-dominated magma body. During our time in Kiruna we visited the mine's underground core storage facility, familiarising ourselves with the mineralisation styles seen at the mine.

### **Saturday**

After our final night spent in a log cabin outside Kiruna, we spent the majority of Saturday travelling south Luleå. During the course of our drive, we encountered a large herd of reindeer and made a lunchtime stopover at Storforsen, one of the largest river rapids in Europe. Our final night in Sweden was spent in a local sports bar, where we watched the semi-final of the women's football world cup before heading to bed early in anticipation of the early start the next day.

Our trip to Sweden was thoroughly enjoyable and was a great opportunity to visit some of Europe's well known mining districts while meeting the industry professionals that operate within them.

