

CURRENT DEVELOPMENTS IN UK MINING PROJECTS

C P Broadbent¹⁾ and C A Blackmore¹⁾

¹⁾Wardell Armstrong International Ltd, 46 Chancery Lane, London WC2A 1JE,
UK

1 Introduction

In October 2017 The Mining Technology Division (MTD) of the IOM3 organised a highly successful conference “Current Developments in the UK Mining Industry”. The aims and objectives of the conference was to define the then current state of the UK Mining Industry¹. This conference was a great success and, with the exception of a presentation on Wolf Minerals Ltd, Hemerdon Project, gave the definitive status of most major UK Mining Projects. This paper provides an update of many of these projects. Although the last UK deep pit coal mine, Kellingley Colliery, North Yorkshire closed in December 2015² and was capped off in March 2016.

The UK still has large reserves of available fossil fuels and many types of industrial minerals and metals are found in the diverse geology of the UK. Presently there are a number of major initiatives active making 2018, despite events at Hemerdon, one of the most active years in recent times for “new” UK mining ventures. The locations of the projects covered in this paper are shown in Figure 1.



1	Sirius Minerals Plc
2	British Fluorspar Limited
3	West Cumbria Mining
4	Cornish Lithium Limited
5	South Crofty – Strongbow Exploration
6	Cornwall Resources Limited – Redmoor Project
7	Dalradian Gold Limited – Curraghinalt Project
8	Scotgold Resources – Cononish Mine
9	Anglesea Mining Plc – Parys Mountain
10	Wolf Minerals Limited - Drakelands Mine

Figure 1: Location of the projects covered in this paper

¹ Current Developments – The UK Mining Industry – Presentations at MTD Conference, London 4-5 October 2017

² Dodgson, L. 2016 Kellingley: the death of deep-pit coal mining in the UK. Mining Technology.com. 1 May 2016

2 Sirius Minerals Plc, 1)

Located near Whitby, North Yorkshire the state of the art Woodsmith Mine will target extraction of polyhalite - an evaporite mineral with the formula $K_2Ca_2Mg(SO_4)_4 \cdot 2H_2O$. The project area contains a JORC resource of 2.66 billion tonnes. The largest, highest grade of polyhalite to be found anywhere in the World.

Tunneling began on 4th December 2018, a most appropriate date (St Barbara's day the patron saint of miners and tunnellers), on the 23-mile underground tunnel that will transport polyhalite from the mine to a port at Wilton International in Teeside. From this port facility polyhalite will be distributed around the World. Chris Fraser CEO of Sirius Minerals was quoted as saying "the start of tunnelling marks another major milestone for this World class project". The project remains on track to deliver the first Polyhalite in 2021.

Currently there are up to 800 people working on the project and it is expected that around 1,700 will have worked on the construction of the project by the time it is built.

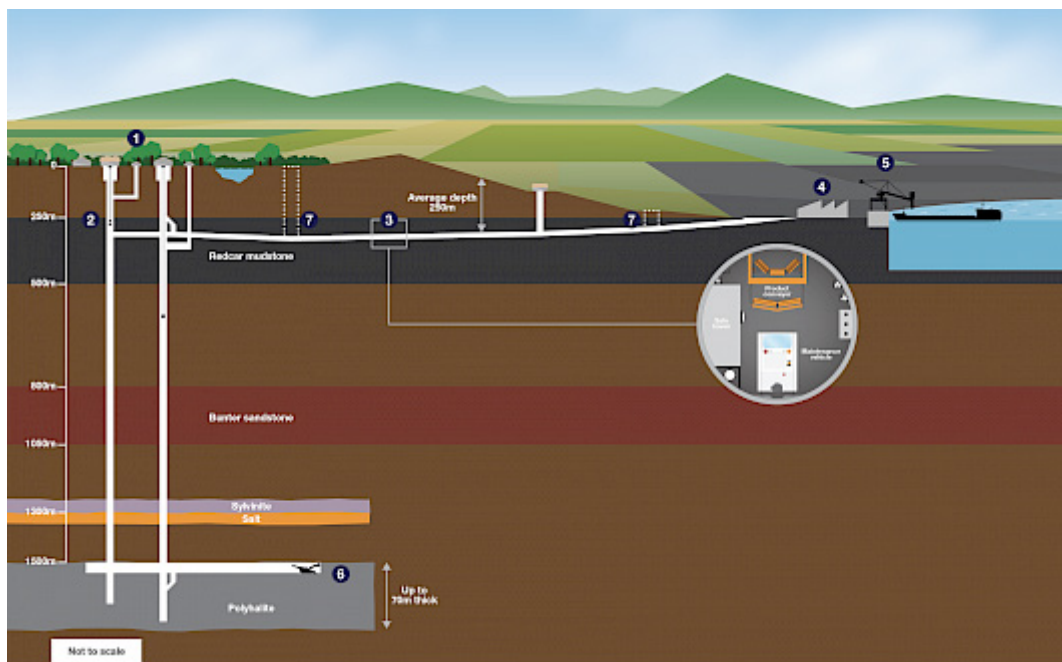


Figure 2: Sirius Minerals. Major Project Infrastructure from Sirius Minerals Website³

³ Siriusminerals.com – Project Overview December 2018

3 British Fluorspar Ltd, 2)

British Fluorspar Ltd (BFL) is a supplier of Acid Grade fluorspar to the chemical industry based at Cavendish Mill, Stoney Middleton, Derbyshire, UK where the mineral processing facilities, drying plant and mine offices are located. Production comes from the Milldam underground mine extending along the vein system under Great Hucklow and Eyam. Until recently mine production was supplemented by production from Quarries located at Longstone Edge and Tearsall. All the BFL operations are located within a 15-mile radius of Cavendish Mill and are all found within the UK Peak District National Park.

BFL produces up to 65,000 tpa acid grade fluorspar (calcium fluoride) as well as up to 10,000 tpa barytes (barium sulphate) up to 1,200 lead (as galena, lead sulphide concentrate) and aggregates (100,000 tpa construction aggregates and 25000 tpa silica sand).

In late 2018 BFL announced⁴ that it was to open a second underground mine adjacent to the Cavendish Mill mineral processing facility using underground mining methods and dewatering of tailings waste would mean that all waste material not appropriate for sale as engineering aggregates can be disposed of as underground back fill material. Hence traditional TMF facilities are not required going forward and planning permission for a new TMF is not required. Given the location of the project, within a National Park, planning permission for a new TMF would have been, at best time consuming and costly and, at worse, impossible to achieve.

Fluorspar prices rose steadily during 2018 with a general shortage of acid grade fluorspar projects. Hence, the current planning to open a second underground mine is of significance in a European context (fluorspar is one of the 27 commodities designated as critical – so called CRMs – by the EU in 2017).

4 West Cumbria Mining, 3)

There are few proposals for new coal projects within EU 28. However, coking coal (metallurgical coal) remains on the EU CRM list, with the UK and European steel making market currently importing around 4.5M tpa.

Since 2014 West Cumbria Mining (WCM) has undertaken a programme of coal exploration, both onshore and off the coast of Whitehaven on the Northwest coast of England confirming a resource of mine around 1 billion tonnes of high quality coking coal with plans to mine ca 2 million tpa of hard to semi-soft coking coal. Current proposals would create a mine with 500 full time employees. The planning application for the new mine (Woodhouse mine) was submitted to the local council in May 2017. Originally determination was anticipated in the autumn of 2018 but additional information requests, mainly on environmental impacts, has meant that determination is now expected in early 2019.

⁴ Robinson, P – Private Communication, December 2018

It is anticipated that > £200 Million will be required to bring the mine into production. Access to the underground mine, most of which will be offshore, will be gained by the existing drift portals of Sand with Antydrite mine and the mine infrastructure will be located on the former Marchon Industrial Site near Woodhouse, Whitehaven. All coal mined will be brought to a processing plant via the existing drifts and, once processed, will be transported to a rail loading facility via underground conveyer. All coal will be delivered by rail to the Redcar Bulk Terminal located at the East Coast of England in Teeside for export.

5 Cornish Lithium Ltd, 4)

The existence of brines rich in lithium in hot springs in Cornwall has been known for a long time and was reported by Miller⁵ as long ago as 1864. Cornish Lithium has successfully secured rights to extract lithium from brine over an area of approximately 300km² in Cornwall. The company believes that the presence of lithium bearing brines in the county represents a commercial opportunity to produce lithium using advanced extraction techniques without the use of solar evaporation suitable for conversion to lithium carbonate or lithium hydroxide. This would be used in lithium ion batteries in the rapidly expanding electric vehicle market.

During 2018 Cornish Lithium focussed efforts on the assimilation of historical data, creation of three dimensional geological models to inform subsequent drilling programmes and assessment of the potential of Cornwall to produce lithium mineral concentrates from hard rock sources within Cornwall⁶. 2019 is expected to see the company drill exploratory boreholes and to investigate further suitable extraction techniques for lithium.

6 South Crofty Tin Project: Strongbow Exploration Inc, 5)

Tin mining in Cornwall dates back to at least 2300 BC. The first documented tin production at South Crofty was in 1597 and the mine has been worked intermittently since then with the last closure in 1998 coming after a period of depressed tin prices. Production of tin between 1700 and 1998 totalled over 450,000t tin.

In March 2016 Strongbow Exploration Inc (Strongbow) acquired a 100% interest in the companies that owned South Crofty. In February 2017 Strongbow published a NI43-101 Preliminary Economic Assessment that reported over 2.5 Million tonnes of mineralised ore at an average grade of 1.55% tin equivalent.

The South Crofty Project is fully permitted, having obtained their mining licence for underground works valid until 2071. There is also an extant planning permission to construct a new processing plant and a Permit from the UK Environment Agency to dewater the mine.

⁵ Miller, WA, 1864

⁶ Wrathall, J. 2018. Cornish Lithium: Exploration for a new metal in an old mining region in Flexible and Mobile Mineral Processing in the 21st Century – the FAME Closure Conference 5-6 December 2018, London, UK

Strongbow is focussed currently on completing a listing on AIM and the completion of the dewatering plant. On December 21st, 2018 Strongbow reported that Cornwall Council voted unanimously in favour of a proposed £1 million investment in the project which, if successful would create over 300 jobs and have a significant impact in an area of high deprivation.

The company hope to commence dewatering operations in 2019. Although it is not considered economically viable to recover lithium from the water currently flooding the mine it is interesting to note historical reports of elevated levels of lithium (>200ppm) at high temperature (>55°C) in mine ingress water on one of the joint sets in the mine. Cornish Lithium has the rights to extract lithium from this brine. Should South Crofty re-open this water would have to be intercepted to allow mining and would have to be treated prior to discharge. The potential for tin (and other metal extraction) combined with lithium recovery from the associated brine would appear to represent a win-win situation.

7 Cornwall Resources Ltd: Redmoor Project, 6)

This late stage exploration project is located in eastern Cornwall, south-west England. It has been the subject of extensive historic mining from Roman Times to 1943 on lodes for lead, silver, tin, copper and tungsten. More recently it has been the focus of modern exploration for a large underground (polymetallic) mine.

Modern exploration work was initiated by South West Minerals in the 1980's and identified the presence of sheeted vein style mineralisation. More recently, Cornwall Resources Ltd has digitised historical data and undertaken new drilling campaigns in 2017 and 2018. This has resulted in the postulation of a significant high-grade inferred Resource of >4.5Mt with a metal content of 1% tin equivalence. In addition, a major exploration target was identified.

Following the conclusion of the 2018 drilling, geological re-interpretation and resource estimation is underway. In December 2018, Brett Grist, Exploration Manager Cornwall Resources Ltd, announced the commencement of metallurgical testwork⁷ at the nearby mineral processing labs of Wardell Armstrong International Ltd. It is hoped that this will feed into a PFS which is anticipated to be published in 2019.

8 Dalradian Gold Limited: Curraghinalt Project, 7)

The Curraghinalt Project is a late stage, pre-development gold exploration project located approximately 115km west of Belfast in the counties of Londonderry and Tyrone, Northern Ireland.

Dalradian Gold Ltd, a Canadian junior mining company submitted an extensive Planning Application to the Department for infrastructure of Northern Ireland in November 2017

⁷ Grist, B. 2018. Redmoor, Cornwall: an evolving story of European Mining – past, present and future. In Flexible and Mobile Mineral Processing in the 21st Century. The FAME Closure Conference, London, UK, Dec 5-6 2018 pp 161 - 169

following a positive Feasibility Study prepared by SRK on the deposit. An updated Technical Report and revised Mineral Resource estimate was published in June 2018⁸.

On June 21st, 2018 it was announced that the major shareholders in Dalradian Gold Ltd, the owners of the Curraghinalt Project were taking the business private with Orion Mine Finance, a New York based private equity group acquiring 80% of the company shares. Orion had originally invested \$50M (Canada) in November 2017 and paid a further \$54M Canadian in June 2018 for 80% of the Project.

SRK (Canada) Inc published a revised Resource Estimate in May 2018 compliant with NI-43-101 indicating at a cut off grade of 5.0glt Au and a gold price of US\$1,200/t, a measured and indicated Resource of 6.35 Million Tonnes at an average grade of >15glt Au with over 3 million contained ounces of gold.

9 Scotgold Resources Ltd – Cononish Mine, 8)

Cononish Mine is located in the same geological structure as the Curraghinalt project Pre-development project is located in the north-western extremity of the Loch Lomand and Trossachs National Park, about 90km northwest of Glasgow, Scotland.

The mineral resource estimate, compliant with JORC 2012 was prepared and released by CSA Global (UK) Ltd in 2015 and confirms a total mineral resource (Measured and indicated plus inferred in-situ) estimate of 617k tonnes averaging >13g/t Au with 266Koz of gold with an appreciable silver credit.

On 22nd October 2018 Scotgold Resources announced regulatory progress on its planning application for a mine at Cononish (Tyndrum). The company is currently working to successfully discharge all outstanding conditions and is confident that commercial mining will soon be possible: Mining equipment begun arriving on site in November 2018. Commercial mining is anticipated in 2019.

10 Anglesey Mining Plc – Parys Mountain Project, Anglesey, Wales, 9)

Parys Mountain, in Anglesey, North Wales has been worked for copper since pre-historic times. On 26th November 2018 Anglesey Mining Plc (Anglesey) reported agreement with mine constructor QME to undertake an Optimisation Study for the Parys Mountain Mine Project. In July 2017 Micon International Ltd and Fairport Engineering published a scoping study envisaging a mining rate of 10,000 tonnes per day producing an average annual output of

⁸ Levangthong, O. Chartier, D, Machua, D and Freudgmann, S 2018. Technical Report for the Curraghinalt Gold Project, Northern Ireland Report prepared by SRK Consulting (Canada) Inc on behalf of Dalradian Resources Inc and submitted June 22nd, 2018.

14,000 tonnes zinc concentrate at 57% Zn, 7,200t of lead concentrate at 52% Pb and 4,000t copper concentrate at 25% Cu, over an initial mine life of 8 years.

Under the 2018 agreement with QME a revised mine model will be evaluated incorporating some of the 4.1 Million tonnes of inferred material reported in the 2017 Scoping Study. QME will investigate alternative approaches to accessing the ore bodies, early de-watering rehabilitation and recommissioning of the Morris Shaft which could provide early access to the higher-grade Engine Zone resources. It is envisaged that these optimisation studies will be completed by mid-2019 and subject to financing being available would form the basis for commissioning of a Preliminary Feasibility Study to lead to an overall project financing package. Mining is considered feasible, 2 years after provision of the financing package.

11 Wolf Minerals Limited – Drakelands Mine, Devon, 10)

Wolf Minerals Ltd listed on ASX in February 2017 and later that year acquired the Hemerdon Project, to develop and operate a “low cost”, large scale open pit tungsten and tin mine. The Hemerdon deposit is one of the largest tungsten and tin deposits in the World, rated by the British Geological Survey as the World’s 4th largest tungsten deposit.

Wolf Minerals’s Drakelands Mine near Plymouth, Devon, UK was the first British Metal Mine to go into production (2015) in decades. Despite significant problems Drakelands Mine was a resource based and World Class mine infrastructure which was beset by problems from the outset. Initially the initial operations material with different physical properties (and mineralogical textures) to the material used in the BFS to design the mineral processing plant. This was compounded by a dramatic fall in the price of tungsten meant that the mine in Devon lost over £100 Million in the three years it was open. Wolf Minerals (UK) Ltd finally went into administration on October 10th, 2018 sending home the 250 mining jobs. Wolf Minerals appointed Ferrier Hodgson as voluntary administrator are actively seeking new owners. At the end of November 2018, it was announced that Pala Investments – owned by a Russian billionaire oligarch – Vladimir Lorich – was interested in the re-opening Drakelands Mine and had deposited around US \$ 17.8 Million into safekeeping ready for use at the Mine. It is understood that at least two other parties have expressed interest.

12 Conclusions

In total it has been estimated that there are over 2000 active mines, quarries, aggregate and off-shore drilling sites on the continental land mass of the UK. This paper offers a snap-shot of the current status of a number of internationally significant hard-rock mining projects in the UK and provides an update of the many of these projects reported at the 2017 IOM3 MTD conference.

Until October 2018 the flagship metal mining project in the UK was Drakelands Mine operated by Wolf Minerals. Despite this venture entering into administration the outlook for the UK mining sector remains healthy despite the challenges posed by the current prices for commodities (see Table 1 below).

Table 1: Current (2018) selected Commodities Prices		
Mineral	Price Change Jan. to Dec. 2018	Notes
Copper	-16%	Extra demand predicted from E.V. Sales?
Lead	-19%	China dominates production but major end use traditional automobile batteries is under threat
Tin	-2%	Used in electronics but LME Trading near minimum
Lithium Carbonate	US\$ 15,000/t ¹⁾	US\$ 24,750 in August 2018 – Lithium construct expected on LME in 2019/20

Notes¹⁾ Spot price for battery grade lithium carbonate – not currently traded on LME

2019 will be an important year for the UK mining sector. Will a buyer be found for Drakelands? Will Scotgold start commercial production and will Dalradian Gold Limited be granted a consent to use sodium cyanide? These are just a few of the many issues facing UK mining that will be resolved during 2019.