DERBYSHIRE AND DERBY MINERALS LOCAL PLAN

Towards a Minerals Local Plan:

Spring 2018 Consultation

Background Paper
Vein Minerals

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DERBYSHIRE County Council

Derby City Council

Contents

1 Introduction and Background

What are Vein Minerals?

1.1 In geological terms a vein mineral is a distinct sheet-like body of crystallised minerals within a host rock. In simple terms, veins are narrow bands of one type of rock/mineral set inside a wider band of the main type of rock found in the area. Veins are formed when mineral constituents carried by an aqueous solution within the rock mass are deposited through precipitation.

1.2 Veins are classically thought of as being the result of growth on the walls of planar fractures in rocks, with the crystal growth occurring in the walls of the cavity, and the crystal protruding into the open space. This is certainly the method for some veins, however, it is rare in geology for significant open spaces to remain open in large volumes of rock, thus there are two main mechanisms considered likely for the cause of the formation of veins. These are open-space filling and crack-seal growth.

1.3 The shape of vein fissures may be straight, with few side passages and such examples are usually found in joined granite, or other rock with high structural integrity. Such fissures are often narrow with respect to their vertical and horizontal extents. Other veins can be in the form of interlacing fissures and are often found in less competent rocks, like schist or slate, which are easily fractured.

1.4 The mineral veins with which we are most familiar are those of quartz and carbonate of lime, which are often observed to form lenticular masses of limited extent, traversing both hypogene strata and fossiliferous rocks.

Why are they Important?

1.5 Veins are of prime importance to mineral deposits, because they are the source of mineralisation, either in or proximal to the veins. Gold is an important and highly valued example. Other vein minerals are important for the many industrial uses that can be made of them. The uses and availability of those

vein minerals found in the Minerals Local Plan area (that is the geographical area of Derbyshire outside the Peak District National Park area covered by the mineral planning authorities of Derbyshire County Council and Derbyshire City Council) are addressed in more detail below. In order to provide a comprehensive picture of the overall vein mineral industry in Derbyshire, references are also included about the availability and uses of vein minerals which are found in the part of the County that is administered by the Peak District National Park authority.

1.6 Mineralised veins running through the Carboniferous Limestone of Derbyshire have been of economic importance for centuries. Historically, lead was the major vein mineral worked, but in recent years the primary interest has been in fluorspar. The presence of a number of other vein minerals is a common feature of the limestone deposits in Derbyshire. Barytes is also often obtained from fluorspar workings, in varying proportions, as a secondary material. A lead ore (Galena) may also be present in these deposits and was sometimes used as a by-product. Calcite (calcium carbonate) is a common rock forming mineral and is the principal constituent of all limestones, including chalk, which consists largely of the fossil remains of marine organisms.

1.7 Within Derbyshire, the majority of vein mineral deposits occur within the Peak District National Park area. In the Plan area, the vein mineral deposits lie within the areas of high landscape value bordering the National Park (as classified by the 'Landscape Character of Derbyshire' publication), limited mainly to a line along the eastern edge of the Carboniferous Limestone around Matlock, Wirksworth and Brassington.

1.8 Mining activity has declined substantially over the last two decades but the presence of further resources with potential commercial value means that vein minerals continue to be an important issue for the new Minerals Local Plan.

2 Vein Minerals Found in Derbyshire

2.1 There are many vein minerals found in the geographical area of Derbyshire but this section focuses on those that have been worked in the area and which are still present in quantities within the Plan area and which could generate further commercial interest during the period of the Minerals Local Plan.

Fluorspar

2.2 Fluorspar is the commercial name for the mineral fluorite. It is the only UK source of fluorine, which is a mineral of national importance. The primary economic source of fluorspar is in vein deposits. These are minerals infilling cracks in the rock mass produced as a result of volcanic activity.

2.3 Fluorspar occurs in only two places in the UK; the Northern and Southern Pennines. The Southern Pennines is the main resource area where the ore deposits are found mainly in the Peak District National Park. Fluorspar production in the Northern Pennines has been at a much lower level and extraction in this area ceased in 1999 following the closure of mines around Durham.

2.4 Fluorspar is graded according to quality and specification into acid grade, ceramic grade and metallurgical grade. Metallurgical grade fluorspar is used extensively in the steel industry, but the introduction of new production technology combined with the decline of the British steel industry has reduced the demand from this sector. Worldwide demand however, continues to grow as aluminium and steel production expands outside Britain. Acid grade Fluorspar is used mainly as a raw material in chemical applications to produce aerosols, refrigerants and air conditioning components and in the smelting of aluminium. Growth in demand for fluoropolymers for use in the production of Teflon continues and also for solar panels and Li ion batteries.

Barytes

2.5 Barytes (also known as barite) is a naturally occurring barium sulphate mineral. It is usually white in colour but can vary with the presence of impurities. A fibrous variety known as cawk (cauk or calk) is found in parts of Derbyshire.

2.6 Barytes is the main industrial source of barium, although the use of barium metal is minor and barytes is mainly used as an industrial mineral. Due to its relatively high density it is used mainly in the offshore oil and gas industries as a weighting agent in drilling fluid. These industries account for about 80% of worldwide production. It is also used as a filler material (about 10% of production) in the manufacture of linoleum, oilcloth, paper and textile manufacturing, rubber, and plastics. Prime white, a bleached baryte, is used as a pigment in white paint. The remaining 10% is used as barium chemicals (electronics, TV screens, glass, ceramics and medical applications).

2.7 The British Geological Survey reports that in England, barytes is now only produced as a by-product of fluorspar mining and processing, although it is still produced separately in Scotland. Most of the barytes used in the UK since 1990 has been obtained from imported sources. The largest international producer of barytes is China with an output of approximately 4 million tonnes per annum.

2.8 Sources of both Barytes and Fluorspar are very limited in the UK. The main commercially exploited deposits have been in Derbyshire and Durham, associated with extensive lead-zinc mineralisation in the Carboniferous Limestone.

Calcite

2.9 Crystalline calcite is a common component of many vein minerals. It is associated with those veins carrying fluorspar-baryte-lead mineralisation that occur in limestones of Carboniferous age, particularly in those in the Peak District of Derbyshire. Where these minerals are worked, the calcite has often been treated as a waste. However, in some veins, calcite is present almost to

the exclusion of other minerals. These have been exploited in their own right to form a small extractive industry quite separate from the large-scale limestone industry and distinct from the other local vein mineral industries.

2.10 The main commercial use of calcite has been Vein calcite, or calcspar and 'Derbyshire Spar' as it is locally known. It has its own distinctive character with an off-white/cream colour and a sparkling surface produced by reflections on the cleavage surfaces of the coarsely crystalline calcite. It is used to supply a small decorative market in the UK for building finishes, incorporation into reconstituted stone, terrazzo tiles, drive surfacing etc.

2.11 The Peak District was traditionally the most important source of vein calcite for the UK market with production starting in the 19th century, and was the sole source of supply from the 1980s. Limited extraction continued in the Peak District (north of Bradwell village) until relatively recently, however, this has now ceased (source: Conversations with Minerals Planning Officers, Peak District National Park Planning Authority, January 2010).

2.12 Resources are largely confined to the Peak District around Castleton and Bradwell, but permitted reserves are very limited.

3 National Planning Policy

3.1 Although vein minerals are a specialised sector of the overall minerals industry there is no national policy dedicated specifically to the working of vein minerals. All mineral policy and guidance is now contained in the National Planning Policy Framework and the National Planning Practice Guidance which replaced earlier Mineral Planning Guidance notes and Mineral Planning Statements.

National Planning Policy Framework (NPPF)

3.2 In general terms, the NPPF states that, 'Minerals are essential to support sustainable economic growth and our quality of life. It is therefore important that there is a sufficient supply of material to provide the infrastructure, buildings,

energy and goods that the country needs. However, since minerals are a finite natural resource and can only be worked where they are found, it is important to make best use of them to secure their long-term conservation'.

3.3 The NPPF policy states that when preparing local plans, local planning authorities should identify and include policies for the extraction of mineral resources of local and national importance in their area. Vein minerals are a resource of national importance. It also states that local plans should set out environmental criteria, in line with policies in the Framework, against which planning applications will be assessed, so as to ensure that permitted operations do not have unacceptable adverse impacts on the natural and historic environment and other aspects.

3.4 With regard to the determination of planning applications, the NPPF states that local planning authorities should give great weight to the benefits of mineral extraction, including benefits to the economy, and, as far as practical, provide for the maintenance of landbanks of non-energy minerals from outside areas of particular merit such as National Parks. This is of particular relevance to the issue of vein mineral extraction in the Derbyshire area where the situation is affected by the scale and availability of vein mineral reserves with the benefit of planning permission for extraction from sites in the Peak District National Park area.

National Planning Practice Guidance

3.5 The National Planning Practice Guidance (NPPG) was published in March 2014 and contains revised and updated planning policy and practice guidance on a wide range of planning issues, including planning for the extraction of minerals. It acknowledges that minerals are a finite resource with restricted availability, such that locations where they are economically viable and where extraction would be environmentally acceptable may be limited. It also repeats the statement in the NPPF that minerals make an essential contribution to the country's prosperity and quality of life.

3.6 The NPPG states that mineral planning authorities should plan for the steady and adequate supply of minerals by one of three ways. In order of priority these are; designating specific sites where viable resources are known to exist, designating preferred areas (areas of known resources where planning permission might reasonably be anticipated), or designating areas of search for areas where knowledge of mineral resources may be less certain but within which planning permission may be granted. The last two options are not expected of National Park authorities. It also states that mineral planning authorities should recognise that there are marked differences in geology, physical and chemical properties, markets and supply and demand between different industrial minerals, which can have different implications for their extraction.

4 Local Planning Policy

4.1 There are two local plans governing the extraction of minerals in Derbyshire; the adopted Derby and Derbyshire Minerals Local Plan and the corresponding plan prepared by the Peak District National Park Authority for that part of the County within the national park area (Peak District National Park Local Core Strategy Development Plan Document, 2011).

Derby and Derbyshire Minerals Local Plan, 2000

4.2 The current minerals local plan was prepared and adopted at a time when vein mineral mining activity was still present in the Plan area, although by then the industry had declined to a small number of sites and with limited output. It was produced under the advice of the former Mineral Planning Guidance Note 1 which recognised the comparatively high level of demand for vein minerals (at the time) but also acknowledged the limited occurrence of these minerals. The local plan acknowledged that, within Derbyshire as a whole, the majority of vein mineral deposits were to be found within the Peak National Park or other areas of high landscape value bordering the National Park and therefore the national importance of these deposits had to be balanced against the environmental effect of working in such sensitive locations.

4.3 The Plan was based on the expectation that demand in the UK would not rise significantly over the Plan period and, due to limited occurrence elsewhere, Derbyshire would be expected to contribute towards meeting the national demand. As a result of the variable nature of the deposits and limited information about their commercial viability, it was not possible to identify and allocate specific sites for future working.

4.4 Because vein minerals occur in association with limestone, extraction can necessitate the removal of the host limestone. In some cases this has been regarded as a by-product with a commercial use and value. In recognition of the sensitivity of the locations where vein minerals were found, the Plan sought to control the volume of host limestone extracted alongside the vein mineral.

4.5 The relevant policy in the adopted Derby and Derbyshire Minerals Local Plan is Policy MP33; Vein Minerals, which states that:
'proposals for the working and processing of vein minerals will be permitted only where:

- the duration and scale of operations is limited to the minimum necessary to meet a proven need for the vein mineral
- the development can be carried out in an environmentally acceptable way and the least damaging means of production are employed
- the proposals are designed to avoid damage in the form of subsidence or landslips, and
- the waste disposal arrangements are acceptable particularly in relation to slurry from processing plants'.

5 Production and Demand

National and Worldwide Situation

5.1 Information about the production of vein minerals in the United Kingdom is limited with the most recent and accurate figures relating to the production of acid-grade fluorspar and barytes. Significant production of flourspar mineral began at the beginning of the 20th Century, where demand largely derived from

its use in steelmaking. Production increased in line with the rising demand for fluorine-bearing chemicals, which are ultimately derived from fluorspar. The peak in fluorspar production was 235,000 tonnes achieved in 1975, but output has declined progressively since the mid-1980s, due largely to the decline in demand by indigenous chemical and steel industries. Approximately 61,000 tonnes of acid-grade fluorspar was produced in England in 2005, falling to just under 37,000 tonnes by 2008 and 24,000 tonnes by 2014.

5.2 Internationally, the main fluorspar producing countries are China, Mexico, Mongolia and South Africa. World production was 9.3 million tonnes in 2011, falling to 6.4 million tonnes in 2015 with China currently producing about 59% of the total. Prior to the mid-1980s the UK was a net exporter of fluorspar but has subsequently become a net importer as indigenous supplies became less competitive. In 2010 imports of acid-grade fluorspar were restricted to Spain because of the elevated levels of heavy metals and phosphorous from other sources. Imports of metallurgical fluorspar are chiefly from Mexico and China.

5.3 The production of barytes has been linked closely to the oil and gas industry and world-wide production increased rapidly from the 1950s and 1960s. Latest available figures indicate world production of 9.3 million tonnes in 2011, falling steadily to 7.9 million tonnes in 2015. Although barytes is not uncommon in the UK, economic deposits are rare and the mineral has been extracted from only a few localities. Following the cessation of working in Wales, Shropshire, South Devon and the intermittent working in the Pennines, the major UK source has been the Foss mine near Aberfeldy in Scotland which opened in 1984 with a capacity of about 50,000 tonnes per year. Despite the decline in the oil and gas industry, demand in the UK outstrips supply and we are no longer self-sufficient in barytes, as indicated by the import of 89,500 tonnes of the mineral in 2010. The latest production figures indicate that 44,000 tonnes were produced in the UK in 2014.

5.4 Domestic sourcing of vein minerals is now a key issue. In 2008, the European Union declared fluorspar as one of the 14 endangered strategic minerals. A reappraisal is due shortly but it is expected that it will remain on the list.

Fluorspar is included on the list as it is regarded as a critical mineral and one where there are uncertainties about the security of long-term supplies. China is the major producer but there are concerns that it may seek to retain domestic production purely for added-value use in China and therefore restricting future exports. Barytes was in the original EU top 30 critical list and the correlation of sourcing with fluorspar is such that concerns also remain for this mineral.

Production in Derbyshire (Plan area and Peak District National Park)

5.5 The declining level of production noted in the adopted Derby and Derbyshire Minerals Local Plan has continued and the only remaining extraction and processing activity in Derbyshire is now in the Peak District National Park area, which has also experienced a significant fall in production levels.

5.6 In recent years, fluorspar operations in the Peak District have largely been focused on the sites operated by British Fluorspar Ltd., who operate the country's only processing plant at Cavendish Mill near Stoney Middleton. The future of this operation has been in doubt on several occasions. In 1999 Laporte Minerals (owner at the time) announced the closure of their fluorspar operations in the Peak District, but it was subsequently acquired in 1999 by Glebe Mines Ltd. INEOS Fluor (a UK chemical manufacturer) took control of the business in 2007.

5.7 Extraction and processing then ceased in 2010, but once again following the purchase of the business by British Fluorspar Ltd in 2012, extraction and continued trading under the new owner, INEOS, a UK-based chemical manufacturer. The new owner then ceased operations in 2010, but once again following the purchase of the business by British Flourspar Ltd, extraction recommenced at the Bow Rake/High Rake site on Longstone Edge. The company has also invested in the refurbishment of the Cavendish Mill processing plant.

5.8 Surface mining of fluorspar by BFL ceased in autumn 2017. All fluorspar is now produced from the underground mine at Milldam Mine near Great Hucklow for

which the Peak District National Park Authority granted planning permission in 2015 to extend the life of operations to 2028 providing access to estimated reserves of 2.4 million tonnes of ore. The permission also allows the output rate to increase from 60,000 tonnes per year to 150,000 tonnes. In addition, Furness Bros. have been extracting and processing metallurgical spar on behalf of High Peak Spar Ltd at Smalldale Head Quarry.

6 Current Permissions

The Plan area of Derbyshire

6.1 Whilst it is known that further resources of vein minerals are present in the Plan area it is not possible to quantify the scale of the overall resource, the volume of potentially economic reserves or even the volume of vein minerals with outstanding planning permissions, as often the main permission relates to limestone extraction where vein mineral extraction is stated as an ancillary operation and where the volume of the vein mineral was not quantified.

6.2 There are currently no active fluorspar operations in the Plan area. Potentially economic reserves with the benefit of planning permission remain in Ball Eye Quarry, Cromford, although the working of the veins is restricted by the terms of the main mineral planning permission which is for limestone extraction and requires that any vein mineral extraction follows the limestone faces. The level of extraction at this quarry has been limited in recent years although the site owner has stated that the site is rich in fluorspar. No drilling has been undertaken to confirm the extent of the resource.

6.3 There are also some dormant vein mineral extraction sites at Ashover, Brassington, Matlock, and some other areas where the planning permissions have been revoked, i.e. Cromford and Milltown. Some areas of historical extraction have been worked out, yet are still covered by extant planning consents and some vein mineral deposits may simply be uneconomic to extract. Given the uncertainty surrounding these potential resources and the uncertainty over their future planning status, these sites have not been considered in the overall picture of supply.

6.4 A small amount of vein mineral (mainly barytes) is supplied from Slinter Top Quarry, Cromford in Derbyshire. This amounts to approximately 20 tonnes a month.

Peak District National Park

6.5 The Peak District National Park is now the focal point of the fluorspar-barytes-lead vein mineral industry in the UK, being the sole location for current working.

6.6 The largest permitted reserves are those which are accessible via the Milldam Mine at Great Hucklow. Vein reserves below Hucklow Edge, Bretton Edge and Eyam Edge are estimated to be more than 2 million tonnes. There are permitted reserves of at least half a million tonnes of fluorspar at Watersaw Mine (currently mothballed), the underground mine on Longstone Edge where the current planning permission permits working until 2015.

7 Planning Issues

7.1 The winning and working of all minerals raises significant social, economic and environmental issues due to the profound changes to the land caused by the extraction operations. The issues which are of particular relevance to the extraction of vein minerals in Derbyshire and the Peak District National Park are addressed below.

Location of Extraction Sites

7.2 Minerals can only be obtained from locations where they are to be found and this is of particular significance to the choice of sites for vein mineral extraction as they are a scare resource and the options are very limited. The review above indicates that the most commercially viable reserves and resources are located in the Peak District National Park or in areas of high landscape value immediately adjacent. This raises potential policy conflicts for both Derbyshire County and Derby City Councils and the Peak Park authority in terms of protecting such areas from intrusive development that could adversely affect

their intrinsic character. This issue, however, has to be set against other considerations. Vein minerals are an important national resource with many essential industrial uses and environmental protection policies need to be balanced against the national need for the mineral.

7.3 The Peak District National Park area also contains the majority of reserves which benefit from current planning permissions. Currently available information also suggests it contains the majority of the remaining resource which is likely to prove commercially viable. The presence of the processing facility at Stoney Middleton in the Peak Park (recently refurbished) combined with the high cost of transporting unprocessed vein minerals is another factor that could influence the commercial choice of future extraction sites.

Method of Extraction

7.4 The two main methods of extraction are by underground mining or surface extraction and the choice depends on the location of the vein within the host rock. Surface mining of vein minerals normally involves the extraction of quantities of the host rock to enable suitable access to the identified reserve. One of the main issues to be addressed in the consideration of such proposals is the ratio of host rock to vein mineral. High ratios will involve a greater level of surface disruption which in turn could result in an increased scale of economic, social and environmental impacts. At high ratios the development effectively functions as, and has the visual characteristics of, a traditional limestone quarry, and in such cases the need for the vein mineral may need to be significant to offset the impacts of extraction. There are however, considerable variations in the way vein minerals feature within host rock and it is very difficult to prescribe thresholds for these ratios.

Landscape and Visual Impact

7.5 The potential adverse impacts on the landscape and visual amenity of an area is an important issue for all mineral extraction operations but is of greater significance for vein minerals due to the sensitivity of the locations where most

of the resource is located; these being areas of high landscape value within, adjacent to or close to the Peak Park. These issues could be partially addressed by the use of the most appropriate method of extraction (underground rather than surface mining), the duration of permitted operations and the form of restoration.

Transportation

7.6 Transport of vein mineral ore in the Plan area and the Peak District National Park is via road. There are no rail facilities within, between or outside relevant sites serving this industry. In view of the limited scale of the local vein mineral industry, combined with uncertainty over its future and the availability of imports, it is unlikely that operators will invest in rail freight facilities.

7.7 Due to the cost of transportation there has tended to be a close link between the extraction site and the processing facility although the processed mineral is transported over much greater distances.

Restoration

7.8 Most of the vein mineral extraction operations in the Plan area and the Peak Park area of Derbyshire have been on small sites, and usually with a short operational life compared with other hard rock quarries. Vein mineral, as the name implies, was found in narrow lines and often at shallow depths of up to 100 metres. At some sites extraction of the veins created channels where the surrounding land was often undisturbed, apart from some storage of the ancillary materials taken out to allow access to the vein mineral. This should have minimised and simplified the restoration works, enabling the land to be assimilated readily into the landscape and returned to previous uses. Many of these sites however, were worked before the introduction of the planning system and there are many examples of sites to the north of Buxton where minimal restoration took place and the surface remains very uneven. Some of the more recently worked sites have been based on old planning permissions from the 1950s and 60s and were not subject to conditions requiring the higher

levels of restoration as would be imposed on modern permissions. There are also sites where the vein mineral extraction is an ancillary activity to the main limestone quarry and these sites are being restored on a progressive basis as part of the overall quarry restoration programme. The working of vein minerals by underground methods has largely been confined to the Peak District National Park area.

7.9 It is now likely that all future vein mineral operations will be subject to the same restoration requirements as for other mineral working, where progressive restoration will be an important requirement carried out to current standards and to secure appropriate after-uses.

Demand and Supply

7.10 The demand for vein minerals is related to the economic circumstances of several large industries and it is difficult to predict how they will perform in the forthcoming years. The supply of vein minerals from indigenous, local sources is also subject to competition from imported sources and the choice of supply will be determined by the type and quality of the mineral and the price differential from the alternative suppliers.

7.11 Although the scale of vein mineral working is very small compared to other minerals, the industry is one of economic significance due to the integral part the minerals play in support of other nationally important industries. This is demonstrated in the review above of the many important uses which are made of vein minerals. The vein mineral operations in the Peak District National Park area also contribute to the vitality of the local economy.

Social Issues

7.12 Vein mineral extraction can impact on the communities who live and work close to the operational sites. Impacts can be direct and physical, such as the loss of local facilities, including footpaths and recreational areas or the loss of the ability to visit and enjoy an area of countryside. Other impacts can be ones

perceived by local communities which affect the quality of life and their living experience. The perception of these impacts may be greater where the community has experienced the effects of other mineral developments in the past. In contrast, the jobs provided by the vein mineral industry is a direct benefit to the local community.

8 Summary

8.1 Vein minerals are required by many industries and form an essential component of many products. Historically, the demand was met by indigenous sources from within the UK but in recent years these supplies have declined with demand increasingly being met by imported supplies. The remaining reserves which are known to be commercially viable are concentrated in a few locations of the country. In the case of the Plan area and the Derbyshire part of the Peak District, these locations tend to be areas of very high landscape value where the respective areas are normally protected from otherwise inappropriate development which could adversely affect their special character.

8.2 Proposals for future vein mineral extraction must therefore be considered taking account of the particular economic need for the mineral, the social and environmental impact of extraction and the availability of alternative sources. In this respect there is a recognised national need for fluorspar and the County of Derbyshire is an important source for this mineral.

8.3 The demand for vein minerals has fluctuated considerably over time in tune with the performance of the main industrial users. It is very difficult to predict how these industries will perform in the future and from where they will seek to obtain their supplies. This uncertainty, combined with other factors, increases the difficulty of formulating a future strategy for vein mineral production in the respective parts of Derbyshire and the Peak District.

8.4 The existence of commercially viable reserves with the benefit of extant planning permissions and the presence of a major processing facility within the

Peak Park are likely to be significant factors influencing the choice of site over the Plan period.

8.5 The method of extraction and the ratio of host rock to vein mineral are also significant elements in the determination of the acceptability of individual proposals, but in view of the variation in geological conditions it is likely that this issue will have to be addressed on a case by case basis.

9 Future Policy

9.1 Due to the limited availability of vein minerals throughout the country, it seems likely that at some stage during the Plan period the area will be expected to contribute towards meeting the national demand. As discussed above, the international market for vein minerals fluctuates widely which makes production very difficult to plan for. In addition, the variable nature and quality of the deposit makes it difficult to assess the extent of remaining vein mineral resources. These factors make it very difficult to propose specific site allocations. In light of these considerations, the continuation of the criteria based policy approach in the new Minerals Local Plan would appear to be the most pragmatic solution for the determination of any future proposals for vein mineral working.

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