

**BEFORE THE QUEENSTOWN LAKES  
DISTRICT COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991 (the "Act")

**AND**

**IN THE MATTER** of the Queenstown Lakes District Proposed District Plan

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**EVIDENCE OF GARY GRAY  
17 JUNE 2016**

New Zealand Tungsten Mining (#519/#1287)

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## 1. Introduction

### 1.1 Qualifications and Experience

1.2 My name is Gary Roger Gray, and I am a Director of New Zealand Tungsten Mining Ltd (NZTM).

1.3 My qualifications and experiences are detailed in my evidence in chief for Topic 02, dated 21 April 2016.

## 2. Scope of Evidence

2.1 This evidence addresses Chapter 26 Heritage of the Proposed District Plan ("**PDP**") on behalf of New Zealand Tungsten Mining Limited (NZTM).

2.2 In preparing this evidence I have reviewed the following relevant material;

- (i) PDP Heritage Chapter 26, and section 42A report Rural Appendix 1 revised chapter
- (ii) Statement of Evidence of Richard John Knott on behalf of Queenstown Lakes District Council dated 02 June 2016.

## 3. Executive Summary

3.1 NZTM holds exploration and prospecting permits for tungsten, gold and other minerals that together cover the majority of Glenorchy Heritage Landscape (GHL).

3.2 My evidence in chief dated 21 April 2016 in respect of the Rural Chapter 21 provides an executive summary of the relevance of Tungsten mining within the District, and in particular as relevant to NZTM operations.

3.3 For the benefit of the Commissioners who were not present in the Rural Chapter hearings, I summarise the key points of that evidence below and refer the commissioners to read my evidence in chief.

3.4 Since the 1800's mining activity has contributed significantly to the growth and development of the Queenstown Lakes District and in particular has led to the establishment of the GHL.

- 3.5 Tungsten is a critical element that is in short supply in the western world, and the Glenorchy scheelite deposits have the potential to contain significant amounts of tungsten and NZTM is actively exploring with the aim of resuming mining within the GHL.
- 3.6 The most likely future mining method will be small scale underground mining - in a manner similar to that which was done historically.
- 3.7 Modern mine management and mining methods will allow existing heritage and environmental values to be protected and even enhanced.
- 3.8 Mining activities can contribute to heritage by improving the amenity value and safety of existing heritage sites, providing safe access for visitors to underground workings, and provide such things as a visitors centre to educate and inform people of the heritage values of the GHL.
- 3.9 To enable future generations to benefit from the mineral resource assets and heritage values within the GHL the District Plan does need to recognise the importance of future mining within the GHL and that this future mining is part of the natural long term cycle involved for mining projects.
- 3.10 The District Plan needs also to ensure that mining and mining related activities such as exploration are assessed and treated according to the facts, their actual effects, and that benefits that can accrue from mining are appropriately considered.

#### **4. History of the Glenorchy Heritage Landscape and NZTM's Activities in the Area**

- 4.1 I refer again, and rely upon my evidence in chief dated 21 April 2016. That evidence provides an explanation of NZTM's activities in the District, the positive effects of mining, the mitigation of the effects of mining, the necessity for mining, and the mining life cycle.
- 4.2 I will in the course of this evidence repeat some aspects of my previous evidence as they relate to the Glenorchy Heritage Landscape (GHL) where necessary.
- 4.3 Scheelite is a mineral that contains tungsten and the Glenorchy Heritage Landscape potentially contains some of the best scheelite resources in the world.

- 4.4 Scheelite mining within the Glenorchy Heritage Landscape has occurred periodically since the late 1800's, with mining mainly occurring during the World Wars and the Korean War.
- 4.5 Underground mining at the GHG last occurred in the 1970's, and the most recent surface mining was in the early 1980's. Exploration and drilling continued until 1988, before NZTM began operating in the area.
- 4.6 In 2001 NZTM was formed by me and another mining engineer who had worked at the Glenorchy scheelite mines in the 1970's, and an exploration permit was obtained from the New Zealand government to explore for scheelite and gold over what is now the Glenorchy Heritage Landscape.
- 4.7 In addition NZTM hold a mineral prospecting permit that combined with the exploration permit covers the vast majority of the GHG's area.
- 4.8 To date NZTM have undertaken geological mapping and sampling within the GHG, and in the near future intend to undertake exploration drilling pursuant to its permits.
- 4.9 NZTM's intention is to continue the scheelite mining legacy in the area by re-opening these old mines or establishing new mines, and operate them using modern methods to extract scheelite.
- 4.10 Mining will be undertaken in a way that protects historic features and provides enhanced public access to experience heritage that includes modern day mining methods.

## 5. **What is the Glenorchy Heritage Landscape**

- 5.1 To me it is important to understand what the Glenorchy Heritage Landscape represents as it is more than just a collection of old things.
- 5.2 In the context of the PDP it is an area of land that has been used for, and modified by, past mining activities that have occurred periodically over approximately 130 years, with the majority of mining production occurring since the start of the second world war and up to the 1980's.
- 5.3 There is a range of heritage features within the GHG, some in the form of historic mine entrances with no public access located on private land, old but more recent miners huts located on Department of Conservation land, and number of roads, tracks, mine entrances, mine structures and

remnants of mining activities, many of which have been developed since the second world war and are no older than the 1960's or 1970's.

- 5.4 Just as important as the physical signs of past mining are the mining activities that have occurred and the people who were involved.
- 5.5 In the QLD, and in particular around Glenorchy township, there are many living people who either worked in these mines or have a close multi-generational family connection to people who mined there. There are many families in Glenorchy that have been there for four generations and scheelite mining is part of the community. A number of miners who have worked in mines within the GHL are still living in Glenorchy.
- 5.6 During communications with NZTM, Glenorchy locals have expressed their favour for scheelite mining to continue, and in particular to provide an ongoing culture of scheelite mining that will continue the legacy of those miners from years gone by.

## 6. **Mining's Contribution to Heritage**

- 6.1 There are many examples within the District of modern-day and innovative uses of historic heritage that illustrate the ability to co-exist and enhance it. Examples that come to mind are the use of the historic Kawarau Bridge for bungee jumping, the old main road providing access to Chard Farm Vineyard and the historic cottage at Peregrine Vineyard – in fact much of central Queenstown township utilises and co-exists with historic buildings.
- 6.2 Large amounts of the District's heritage, and a reasonable amount of tourist attractions, are historic mining sites.
- 6.3 Mining, perhaps like virtually no other industry, interacts with heritage on a regular and ongoing basis. The long life cycles of mining also makes miners very aware that they are creating future heritage.
- 6.4 In fact many modern-day mines come about through the work of previous generations of miners and geologists. The best place to start a new mine is often next to an old one, and the engagement of heritage experts and archaeologists to evaluate sites and historical records is common, and often leads to an increased understanding of history and heritage.

- 6.5 A recent example of mining contributing to the increase in historical understanding occurred in West Australia, where an archaeological survey conducted by the mining company Rio Tinto in advance of mining. The survey discovered a cave containing 40,000 year old artefacts that suggest Aboriginal peoples may have occupied the area some 20,000 years earlier than previously thought. Without the mining company undertaking the archaeological survey this discovery may well never have been made. The mine plan has now been altered to avoid this important site.
- 6.6 Mine sites, both operating and past, also provide popular visitor attractions. NZTM expect to provide and leave an example of a safe and accessible underground mine for visitor
- 6.7 Planning of a mine provides consideration for when the mine is in operation, and also for the end use of the site after mining - this is a part of every mine plan. It includes considerations of the natural environment such as establishing appropriate final landforms and restoring vegetation, and also access for activities such as recreation and tourism
- 6.8 Future mining within the GHM will make on-going contributions to the heritage values within the GHM and provide new and enhanced visitor experiences as they relate to the appreciation of mining and mining heritage.

## **7. Mining Cycles and Heritage Development**

- 7.1 Mining occurs in cycles in response to the changing market demands for raw materials. These cycles are measured in years - sometimes 5 years, sometimes 50 years and over time these cycles can contribute to a layering of history.
- 7.2 An example is the Hemerdon tungsten mine in the UK that has just reopened to become Britain's first metal mine in over 40 years, providing employment for about 200 people.
- 7.3 At the Hemerdon mine, Wolf Minerals has spent over £1 million since 2008 funding archaeological excavations and surveys to explore and understand the surrounding historic landscape. Examples of finds are pottery and stone tools dating to around 2200 BC. More information can be found on the Wolf Minerals website:

<http://www.wolfminerals.com.au/irm/content/archaeology.aspx?RID=328>

7.4 These cycles of mining are also evident as the periodic resurgence of scheelite mining and associated creation of heritage within the GHL. I refer to Section 8 of my evidence in chief dated 21 April 2016 in respect of the Rural Chapter 21 for more discussion of this topic.

## 8. **Description of Potential Future Mining Activities at the GHL**

8.1 Future mining by NZTM within the GHL is expected to use underground mining methods similar to those undertaken historically but using modern technology and the actual mining will create no effects above ground

8.2 Within the GHL scheelite occurs within narrow veins or “reefs” that are typically up to 2m thick. The scale of underground mining will be limited in size by the size of these scheelite bearing reefs . Figure 1 below shows a quartz/scheelite reef in the underground State Mine within the GHL. This is a similar scale as that expected to be undertaken.



**Figure 1 – Scheelite bearing reef in the State Mine within the GHL**

8.3 Modern mining methods and technologies allow focussed and highly planned mining operations ensuring that physical effects of mining on the environment will be minimal, limited and temporary.

- 8.4 Above ground facilities can be visually screened so that they are not intrusive when in use, and after mining they can be removed as required.
- 8.5 During mining, the main activity above ground will occur on roads where mined rock is carried away from the mine. When being used, these roads will be visually screened as much as possible using such methods as earth bunds and planting to make them visually not intrusive. After mining, roads will be rehabilitated, and if necessary, to the point that that no evidence of them remains. These roads will however provide valuable access for visitors to the GHL.
- 8.6 Underground mine entrances will be only small, probably 3m x 3m (with a maximum size of 5m x 5m) and they will be sealed at the end of mine life.
- 8.7 NZTM anticipate providing at least limited access to both new and old mines so that visitors can experience the old and modern mining heritage. There are many options available for the visual appearance of portals after mining. For example they could be created in a style reminiscent of the “Hobbit” such as in Figure 2 below, or the Mines of Moria from the Lord of the Rings to be in keeping with the films that have been made in the area..



**Figure 2 –Potential “Hobbit” style mine entrance**

- 8.8 The processing of rock to recover scheelite initially requires crushing of the rock, after which the high density of scheelite allows it to be concentrated and recovered in a manner very similar used to recover alluvial gold.



- 8.9 Modern scheelite recovery methods are also very similar to those used historically within the GHL, and modern operations will provide a comparison with historic methods.
- 8.10 Storage of rock not containing scheelite after processing can be underground in the mines, or as sculptured engineered landforms that conform with the environment. If possible they will be used as an aggregate/sand/brick component reducing quarrying needs in the District.

## 9. **Potential Effects and Contributions of Future Exploration and Mining at the GHL**

- 9.1 It is fully expected that future mining within the GHL will have to be undertaken in a manner that protects existing historic features and provides for the addition of modern mining examples.
- 9.2 To determine the potential effects that could be caused on heritage values by exploration and mining NZTM commissioned New Zealand Heritage Properties (NZHP) in 2015 to undertake a Heritage survey of the exploration permit area. Subsequently an assessment of potential effects of exploration drilling was produced along with a strategy to manage and avoid effects on heritage values.
- 9.3 Just as heritage is ongoing, these strategies will evolve and change over time to protect, contribute to, and enhance heritage values.
- 9.4 Undertaking exploration drilling was considered an appropriate activity within the heritage landscape by NZHP, and the effects on heritage sites were assessed to be minor, and a resource consent application is currently being processed by QLDC for exploration drilling inside the Glenorchy Heritage Landscape.
- 9.5 When exploration drilling is undertaken, known heritage features will be avoided and drilling will be guided by a heritage expert on site to ensure there is no disturbance occurs to heritage features that may be encountered.
- 9.6 Future mining can also contribute to making safe existing mine entrances so that visitors to the GHL are not in danger, An example of a current mine entrance that could be secured and made safe is shown below in Figure 3.



**Figure 3 – Existing mine entrance that can be made safe,**

- 9.7 Anticipated contributions by NZTM to provide an enhanced visitor experience of mining heritage in the GHL include:
- (a) Establish a visitor centre to educate visitors regarding the heritage of the GHL and keep it alive. This can explain the realities of mining, and pay tribute to the old time miners that did it hard.
  - (b) Assist with the restoration of the historic battery so that it can operate for visitors to see how rock is processed and scheelite is recovered and enable comparison with modern methods.
  - (c) Establish a tourist mine depicting old and new methods in a safe environment where visitors can observed and interact with the

mining environment. At the moment this is no safe way to do this and there is no amenity value in the old workings.

- 9.8 A good example of an operating tourist mine in New Zealand is the “Denniston Experience”, at Denniston on the West Coast. This includes a rail journey, audio, visuals and holograms to provide interaction with the visitors to understand the experience of the historic miners. The GHL is a prime opportunity to provide a similar experience. The visual impression of scheelite glowing purple under Ultraviolet light is quite attractive, much more so than black coal as shown in Figure 4 below.

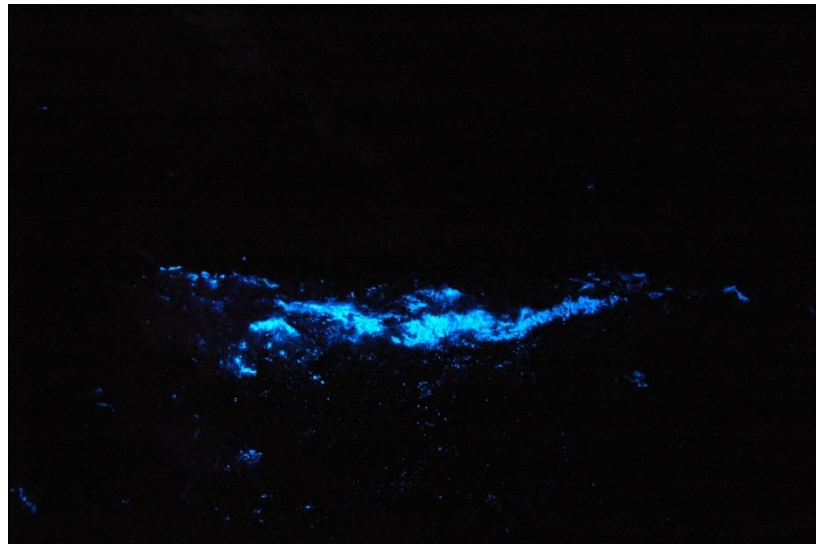


Figure 4 – Scheelite glowing under ultraviolet light

## 10. Conclusion

- 10.1 Since the 1800's mining has contributed significantly to the growth and development of the Queenstown Lakes District. Old mining sites now provide the district with a wealth of heritage and the Glenorchy scheelite deposits have the potential to contain significant amounts of tungsten.
- 10.2 Modern day mining can work hand in hand with heritage to protect and preserve it as well as enable current use and enjoyment.
- 10.3 Modern day mining methods and attitudes have also come a long way and mining will not have a large negative impact on heritage. Heritage protection and enhancement is considered as part of the mine planning process. Modern mining methods are also more able to minimise the adverse effects of mining.

- 10.4 NZTM has objectives broader than just extracting minerals from within the GHZ in that NZTM wants to protect and enhance the ability for people to experience and understand the mining heritage within the GHZ.
- 10.5 To enable future generations to benefit from the mineral resource assets contained within the district, the district plan needs to recognise the importance of mining to the district and accommodate the long term cycles involved for mining projects.
- 10.6 I therefore consider that the PDP should take guidance from examples elsewhere, both in New Zealand and overseas, and provide for future mining within the GHZ in a way that allows modern mining and also enhances the existing heritage values.

**17 June 2016**

**Gary Gray**