Annual Report for EL 35/2010 (Tonganah)
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Fore note

The 2015 annual report for this Exploration Licence nominated in the 'Proposed work for the next twelve months' section that no traditional exploration activity would be undertaken but liaison with consultants would continue aiming at finding suitable processing options.
This is exactly what has occurred albeit with little result.

The sections titled 'Introduction', 'Statement of exploration philosophy and objectives', 'Site review', 'Contact with others' and 'Discussion' have been retained unchanged as they are still relevant and allow this report to exist as a 'stand alone' document.

Introduction
Duggans P/L is involved in exploration activities within Tasmania for high grade silica and other non-metallics.
EL 35/2010 was taken up to investigate the potential for a high grade silica resource contained within the tailings derived from previous mining for kaolin.
While this was the primary objective, the tailings are also being evaluated as a potential raw material in the production of porcelain/ceramics and for use as a supplementary cementiceous material, (SCM), in the cement/concrete construction industry.
Over time the potential of this project has been re-evaluated and the EL area has been extended to encompass other known deposits of kaolinite in the immediate vicinity with a view to extending reserves available and therefore the life of any downstream processing operation. A regional review of potential kaolinite resources has also been undertaken.

During the past year the emphasis has been largely on looking at processing options to produce both metakaolin and a high grade silica product suitable for glass production or potentially solar panel production.

Statement of exploration philosophy and objectives
This EL was originally taken up to investigate potential uses for tailings from previous mining and processing of kaolinite. The conventional exploration activities associated with a greenfield site are therefore not entirely applicable.
The 'ore bodies' are defined either as tailings or as unmined decomposed granite. The nature of the materials of interest are known and most of the 'exploration' activity will focus on more accurately defining the minerals present as well as their proportions and processing techniques to provide products of best value.

Two grades of tailings have been identified;
Coarse tailings consisting of silica crystals nominally 2 to 6mm in size and
Fine tailings consisting of -2mm material.
Both of these grades contain remnant kaolin and feldspar. The coarse tailings have been dumped as dry stockpiles while the fine tailings are contained within a bunded pond structure having been pumped into it as a slurry.

Several, previously evaluated, small bodies of decomposed granite, (satellite ore bodies) have now been included within the extended EL to ensure continuity of supply.

Any subsequent mining activity of the tailings will not conform to conventional operations as it will be confined to the tailings dump areas and importantly, in the case of the fine tailings, will be conducted within an already bunded area which will prevent escape of kaolin rich run off to the wider environment.
Future mining of the 'satellite ore bodies' will be subject to normal surface mining protocols and environmental controls.

Site review

The site, (EL35/2010, encompassing 10 square kilometers) originally defined as; "the operational area, both mining and processing, occupied in the past by Associated Pulp and Paper Mills Limited (APPM) in the extraction and processing of kaolin for use as a paper filler", has been extended, (EL 13/2013), to take in areas of interest to the north and east containing known deposits of kaolin evaluated for kaolin suitable for paper filler but not mined by previous operators.
The EL now has an area of 26 square kilometres and was consolidated under EL 35/2010 with effect from 20 June 2014.
A review of the new site area included familiarisation with the previously tested areas as well as identification of further potential areas of investigation adjacent to these where previous work was curtailed due to low reflectance material.
Further field reconnaissance of these areas over the past 12 months has been carried out to estimate potential reserves.

Work carried out

Traditional exploration activity has been limited to a further review of pre-existing map and bore log data and field work to familiarise Duggans P/L with the locations of identified bodies of unmined weathered granite and to ensure these are still in-situ. This work also served to confirm areas to be relinquished as part of this annual return.

All other work undertaken in the past 12 months has related to processing options and considerations related to marketing, in particular Duggans P/L has monitored with great interest work being undertaken to simplify and reduce the cost of calcination of kaolin. A process of a commercial in confidence calcining method is being seriously trialled.

The market for meta-kaolin is very soft at the moment which somewhat reduces the urgency and the funding of research work.

Discussion

To revisit the aims of the project; it was envisaged that a dry grinding process after separation of free silica from the kaolin would produce a suitably fine product for the next step, (calcining at 600 to 800 degrees C), to produce Metakaolin or feedstock for

"Calix". The silica rich component would then be upgraded to very high grade and sold into the glass, (or preferably the solar panel), production market.
(Note: literature research has identified a new way to make solar panels by electro chemical means under research by the Cambridge University. (Search ffc 'Cambridge process')
Now it is recognised that to achieve these aims while maintaining a relatively simple processing circuit and thereby minimising cost, is more difficult than first thought. Issues that have to be considered or overcome are listed as follows:

Production
Metakaolin production

Separation of kaolin from quartz and remnant feldspar, - to what degree can fine grained silica and feldspar be left in the kaolin without causing detriment to the reactivity of the calcined product ?
Delamination of the kaolinite plate stacks is a necessary process and the best way of doing this for the Tonganah material is yet to be decided.
The original aim of producing Metakaolin from the Tonganah raw material in a completely dry process now seems unlikely so a costly drying phase will be needed prior to calcining.
The cost of production must be minimised because it is believed that pricing of the finished product should not exceed that of Portland cement.
Method of calcining has not been explored at this stage. There is potential to 'flash' calcine rather than the conventional kiln process.
Testing of performance of the metakaolin produced requires making multiple standard concrete test cylinders for strength testing at various set time intervals up to and exceeding 28 days. This makes the testing regime a very long process.

High grade silica production

Production of a silica concentrate from the Tonganah raw material is relatively straight forward but remnant feldspar particles remain in the concentrate and are difficult to remove. Gravity separation techniques are not applicable due to the almost identical specific gravities. Avoidance of methods employing caustic reagents such as hydrofluoric acid is considered desirable.

Marketing
Metakaolin
The cement and concrete industry has now reached a degree of maturity whereby engineers specify certain additives in a concrete mix design to enhance certain properties of the finished concrete. (See 'Benefits of Metakaolin addition' Appendix 'C').
Metakaolin could replace up to 20% of cementiceous material in a mix design and therefore its use would be resisted by the major Portland cement producers.

Once a production process is developed that produces a consistent Metakaolin product from the Tonganah raw material then that product must be accredited and accepted into the market place.

High grade silica

The demand for very high grade silica is increasing, especially for production of solar panels and various qualities of glass. The value and saleability of silica as a raw material is dependent on purity and it becomes of high value at a purity of 99.99% silica, (the starting point for the 'Cambridge process').

The potential for a silicon production facility in Tasmania utilising the 'Cambridge Process' was realised and presentations to politicians undertaken to advise of the inaccessibility of a prime exploration area for high grade silica due to it being 'locked up' because of unwarranted extensions to the World Heritage Area. The potential for the Tonganah silica concentrate to be utilised as the raw material for the Cambridge Process was also explained at these presentations. (See 'Discussion sheet for silicon in Tasmania' appendix 'D')

Contact with others

Liaison with 'Calix' has continued.
Discussions with David Chadwick, (consulting industrial chemist with expertise in processing of fine particulate materials), have been initiated with the aim of formulating a scope of work to progress the project.
Discussions with Chris Browne, (consultant process engineer), have been initiated.
Discussions with Talal Hassan, (CEO Tas Quarries), have been initiated.
Individual presentations to State Resources Minister Paul Harriss and Senator Richard Colbeck have taken place.

Summary of work completed

Review of potential reserves within the extended EL
Liaison with 'Calix Limited'
Liaison with potential consultants
Laboratory work to evaluate particle sizing influence
Monitoring and liaison with consultants regarding emerging calcining technology

Environmental considerations

No environmental impacts were created in the past year.

Conclusions

Duggans P/L is of the opinion that sufficient work has been done by others in the past to identify, delineate and qualify reserves of raw material. Additionally the two types of tailings from previous operations which will form part of the feedstock to the proposed processing plant are known and contained in readily accessible areas. Duggans P/L therefore believe that no further exploration work of a traditional exploration nature is needed on the exploration licence prior to moving into a production mode.

The project continues to show promise for the development of two new industries in Tasmania.
A silicon production facility with potential for downstream production of solar panels, or, failing this, the sale of high grade silica into the glass manufacturing industry.
A metakaolin production facility to provide a much needed supplementary cementiceous material.
As indicated in the previous annual report, the project's scope is such that the resources of Duggans Pty Ltd are insufficient to facilitate meaningful progression and a significant partner is required.
The project continues to be hampered by the lack of a suitable larger business partner interested in pursuing these aims.

Proposed work for the next 12 months

Continue liaison with suitably qualified consultants to design a production facility to produce high grade silica and metakaolin from the available Tonganah raw materials.