EXPLORATION LICENCE 38/1997
ABERFOYLE HILL
N.E. TASMANIA

FINAL REPORT ON EXPLORATION
MARCH 1998 TO MARCH 2003

For
Mineral Holdings Australia Pty Ltd
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ABSTRACT

This final report summarizes the work carried out during 1998 to 2003 on EL 38/97 at Aberfoyle Hill as part of the Ringarooma Alluvial Project of Mineral Holdings Australia Pty Ltd.

The work was directed at the evaluation of the tin–bearing placers contained within the EL and their relationship to the extensive alluvial tin deposits of the Great Northern Plains and offshore Ringarooma Bay and towards the search for bentonitic clay deposits reported from the area.

Bulk testing was carried out of insitu alluvial wash in several accessible faces in the old Aberfoyle workings to quantify the tin grades and the accessory minerals such as the titanium minerals, zircon, gold, sapphire and the tantalates.

The resources of alluvial tin and sapphire wash identified within the EL area are part an indicated, 1.52M cu m of wash within a larger 3.82M cu m lower grade resource in the unmined Wanex area of the Macgregor Lead. A new interpretation of the Aberfoyle Lead offers a possible 1.3M cu m of wash located in the palaeochannel running from the old mine workings to connect with the resource blocks of the Great Northern Plains. The old Dry Gut Mine on the western side of the Ringarooma River has a possible 100,000 cu m of wash contained in the channel trending easterly into the Aberfoyle Lead.

A ten hole drill program has identified in the Dry Gut area an indicated, 200,00 cu m of smectite clays within an inferred, 1.5M cu m of mixed clays.

Both the clay and tin resources require further evaluation and marketing prior to development. On the basis of the resources discovered and evaluated, Mineral Holdings has applied for a retention licence of 4 sq km as flow on title from EL 38/97.

These alluvial resources are an integral part of the Ringarooma Project of Mineral Holdings which seeks to explore and develop the heavy minerals and sapphire placer deposits of the Ringarooma River Basin particularly the Great Northern Plains and offshore. The project which has the potential to yield a resource base of up to 100,000 tonnes of cassiterite concentrates is currently optioned to Mining and Marine International Pty Ltd.

EL 38/97- Aberfoyle Hill, NE Tasmania – Final Report- March 2003

1.0 Introduction

EL 38/97 was granted to Mineral Holdings Australia Pty Ltd on 6th March 1998 for a maximum of 5 years over an area of 4 sq km at Aberfoyle Hill, near Gladstone, NE Tasmania. The EL is adjacent and to the south of RLs 8715 and 8723 held by the same company covering the Fosters Marshes alluvial tin resources and otherwise is completely surrounded on all sides by EL 32/2001 covering the remainder of the Great Northern Plains also in the name of Mineral Holdings (Plan 1).

The first target was bentonitic clays suitable as a pelletising agent for Savage River iron ore as well as a wide range of other industrial uses.

The main targets now are the heavy mineral placers exposed in the old alluvial tin workings as an integral part of the consolidated Ringarooma Alluvial Tin Project being run by Mineral Holdings over the Great Northern Plains and offshore Ringarooma Bay. The regional geology and the generalized envelope of the alluvial tin mineralisation are depicted in Plan 2.

The Project is currently optioned to Mining and Marine Pty Ltd of Hobart.

2.0 Previous Exploration by Mineral Holdings

Exploration and results during the tenure of the licence by Mineral Holdings are described in the four annual reports to 1999 through 2002 (see references).

Initial exploration by drilling, during the first two years, led to the discovery of a clay deposit averaging 6m thick under a sandy overburden 1-2m thick on the western side of the Ringarooma River, adjacent to the old Dry Gut alluvial tin workings.

In the third year of the licence, the focus of investigation was shifted to the evaluation of the sapphire content of the alluvials of the Great Northern Plains. Prior to drilling, a scout program was carried out on the more accessible alluvials exposed in the old working faces at MacGregors, Aberfoyle and Dry Gut alluvial tin mines.

The samples of wash were hand dug, sieved, handpicked and assayed to record their values of tin, sapphire and gold. Aberfoyle Central (four samples) gave the best values of 1800g/BCM tin and 110g/BCM sapphire in one sample at the Boomerang face and 140g/BCM tin and 1.6g/BCM sapphire in one sample at the northern Sea Shell face. Aberfoyle East (two samples) gave 252g/BCM tin in one sample and 5.5g/BCM sapphire in the other. Dry Gut and Delta (to the NW) showed some interest with 430g/BCM tin and minor sapphire at 0.54g/BCM in a composite of three samples in the former and best value of 1028g/BCM tin and 8.8g/BCM sapphire of 3 samples in the latter.

In the fourth year, based on these promising results and as part of a larger program on the Great Northern Plains, four pits were dug by excavator in the old workings of the Aberfoyle alluvial tin mine and three bulk samples of basal, gravel wash in the 1-2 cu m range were extracted and processed through a mobile treatment plant.

The resulting concentrates and screen products were hand picked and assayed for heavy minerals and sapphires and the results calculated back to give grades in the alluvial wash.

The two successful pits ABE 3 and 4, at Aberfoyle Central and East respectively, have SnO_2 grades in the range 100-130, TiO_2 24-29, ZrO_2 9-11 and sapphire up to 3.3 g/LCM. Tantalum and niobium pentoxides are in the range 0.35-0.55g/LCM with the Nb/Ta ratio being about 2 or 3 to 1.

No resource figures of wash have been measured at Aberfoyle due to lack of drilling but some potential exists for reasonable volumes in association with the surrounding alluvial mines such as Taylors, MacGregors and Beltz as well as the Wanex area.

Following reports from an industry source that rare earths adsorbed on clays could be a potential exploration target as there was some production from these in China, it was decided to do a preliminary scan of rare earth contents in the Aberfoyle Hill clay deposit outlined by Mineral Holdings in previous exploration on this licence.

Four samples of clay from the deposit were selected as follows- three montmorillonites derived from Jurassic dolerite and one kaolinite from Mathinna metasediment.

The rare earths determined were the light earths-lanthanum, cerium, praseodymium , neodymium, samarium and europium and the heavy earths- gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium and lutetium.

The most common rare earths in the samples are cerium, neodymium and lanthanum. Collectively, the rare earths range from 53 to 205ppm in the samples, well below the 2000ppm -2% required for commercial deposits of this nature.

The clays in the deposit at Aberfoyle Hill have combined rare earth values up to about 200ppm but fall well short of the concentrations required for commercial extraction by one or two orders of magnitude.

No field activities were carried out in the last year of the licence. Costs continued to be accrued for final magnetic separation and analysis. The emphasis was on the collation of previous drill data and resource summaries and their incorporation into the heavy mineral resource inventory for the Great Northern Plains. These were used in the promotional documents for the Ringarooma Alluvial Project which led to the joint venture initially with Cedwin Pty Ltd and now Mining and Marine International Pty Ltd.

3.0 Inventory of Resources

3.1 Clay Resources

Exploration at the Dry Gut Prospect by Mineral Holdings Australia Pty Ltd consisted of a program of 10 drill holes ranging from 100 to 250m apart with a combined extent of 76m which confirmed a clay deposit over an area of 0.25 sq km (Plan 5).

The clay has a range of colours (brown, grey, blue, green, white, black and red) and textures (waxy, plastic and sticky) and the deposit is from 0.75 to +10.5m thick, averaging 6m under a sandy overburden from 1 to 2m thick. This gives an inferred, geological, in situ resource of 1.5 million cubic metres (cu m) or 2.8 million tonnes of mixed clays (assuming an SG factor of 1.86).

The thickest section of clay is on a 20m high ridge intersected by holes 5 and 6 each of which shows a 10m thickness of a consistent plastic to sticky clay in grey, yellow and brown colours. The area enclosed by the 20m contour is about 100m by 200m and taking a 10m thickness gives 200,00 cu m or 372,000 tonnes as an indicated resource. At an annual production rate of 15,000 tonnes, the deposit would yield about 25 years supply.

The ridge runs off this licence to the west and if the clay proves to be marketable, then the area to the west within EL 32/2001 should be secured for additional potential resources. The overburden is commonly 1-2m thick of fine-grained, grey sand passing into brown, sandy clay or “coffee rock”. The more homogeneous clays commonly overlie and are derived from the dolerite bedrock apart from the southern section of variable clays which overlie a mixed bedrock of granite and metasediment.

Identification of the clays reveals that the northern group are mainly smectite whereas in the south kaolinite is more common although impure. Industrial testing by Australian Bulk Minerals showed that the clays would not be suitable as a pelletising agent. Percentage Water Adsorption (PWA) values were in the range 100- 300 where 600- 800 would be required to rival Wyoming bentonite. Tests by Sud-Chemie A.G. of Germany confirm the low adsorption and swelling volume features and infer that the clay is a low swelling smectite such as beidellite and /or nontronite rather than montmorillonite as was suggested by the CSIRO test which gave Fe, Mg and Ca rather than Na in the chemistry.

Beidelite and nontronite are widely found in soils derived from the weathering of basic rocks such as the Jurassic dolerite in this case. Fuller’s Earth in Europe comes from this source and provides encouragement that higher adsorptive clays may still be found at Aberfoyle Hill.

The kaolinite clays are too impure to be considered as an exploration target.

Further technical studies of the clays in the deposit are required to determine the full range of properties leading to the identification of market possibilities. The extraction of rare earths is not considered viable at this stage.

3.2 Tin Resources

The proposed RL straddles an area of alluvial tin resources ranging from drilled, unmined resources (Wanex area), through residual resources in the old alluvial workings (Aberfoyle, MacGregors and Dry Gut) to areas which have occasional good values in drill holes widely apart, or areas where the old drilling has been ineffective or too shallow and coverage has been patchy and non-systematic and sometimes absent and where interpretations suggest the presence of untested palaeochannels or leads (the Aberfoyle Lead running to the NW).

3.2.1 Wanex Area

Modern drilling by Portland Holdings Pty Ltd (1969, poorly recorded) and particularly West Australian Nickel Exploration Co (Wanex, 1972-73) over the former mining lease CML 42M/76 established, using 250 holes, a proven reserve of 1.53M cu m grading 133g/cu m tin metal. Part of this indicated resource (JORC, 1999) is contained in the NE quadrant of the RL area (Plan 3).

The drilling also showed a 200m wide palaeochannel (Nye's MacGregor Lead) tending NW through the MacGregor workings towards the Fosters Marshes area. Many of these holes were unbottomed and only drilled to the reachable depth of the Dorset Dredge (15-18m). The immediate intention was to prove enough resources to allow the Dorset Dredge to work through from MacGregors Lagoon northwest to the Braithwaites Resources drilled by the Mines Dept in 1967 on the Great Northern Plains.

This resource was subsequently reassessed by Santos during their drilling campaign in the Fosters Marshes area to the north as proven, in situ reserves of 3.82M cu m at 106g/cu m SnO_2 within which there is a probable, recoverable high grade zone of 1.52M cu m at 139g/cu m SnO_2 (Hellyer, 1983).

In the western angle of the CML, the Wanex drilling was stopped well before the Aberfoyle Hill and here and in most of the NW quadrant of the RL area there has been no drilling. Yet on the edge of this zone, rich values in sporadic drill holes nearly reach 200g Sn/cu m and require to be evaluated by more modern drilling for additional resources (Plan 3).

Also on Plan 3 is the interpreted Aberfoyle Lead arising from Nye's 1932 work which cuts NW across the RL and joins the residual resources at Aberfoyle Mine with the unmined resource blocks of the Delta zone of the Great Northern Plains (Kinnane, 2001). This structure remains to be evaluated and could increase the possible resource figures substantially.

3.2.2 Residual Resources

Historically, the larger alluvial mines at Aberfoyle and MacGregors which were worked in the period 1880 to 1916 and the smaller ones along the terraces of the Ringarooma River (such as Taylors, Canary, Roy, Richardsons and Black Duck) were

closed not because of depletion of resources but rather loss of adequate water head from the Mt Cameron water race and inability to remove sluiced tails because of falling basement (Nye, 1932).

Residual alluvial resources at Aberfoyle Mine in the SE quadrant of the RL area are not as yet defined due to lack of drilling but potential exists for reasonable volumes in association with the residuals in the adjacent alluvial mines at MacGregors, Beltz, Taylors and Delta which together with Wanex area have been assessed as potentially containing about 2,500 tonnes of tin concentrates (Kinnane, 2001). The present outlines of these mine workings have been plotted on Plan 3 from interpretation of modern air photos.

A rough chart (Plan 4) from the above publication Nye (1932) shows a compilation of historic workings of the larger alluvial mines and the sporadic exploration drilling covering the SE part of the RL area. In addition, Nye has interpreted possible deep leads or depositional channels in or near the old mines controlling the alluvial tin resources. The two marked on the chart are the MacGregor Lead (also called the Deep Creek Lead) and the Aberfoyle Lead. Production records from the mines are not continuous but as an example at Aberfoyle 129.3 tons of tin concentrates were produced from 1906-1916.

In a subsequent report (1970), Nye predicted the meeting of a number of parallel leads flowing NW into the Fosters Marshes area –the Scotia (or Scoloch) Lead, an unnamed lead 1km to the SW, the McGregor Lead passing through the NW corner of the RL area and the Aberfoyle Lead either joining the McGregor Lead or running parallel to it in the RL area. This is summarised on regional Plan 2 and Plan 3 shows the last mentioned leads and their possible connection with the resource blocks to the north subsequently established by Santos on the Fosters Marshes area of the Great Northern Plain.

From past production, the potential residual resources at Aberfoyle have been assessed as at least the same again giving a volume of 650,000 cu m at an average grade of 200g/cu m of SnO2 (the average from the Great Northern Plains) yielding 130 tonnes of tin concentrates. These are assigned to the lead running north from the Aberfoyle mine. A similar volume of wash can be assigned to the proposed extension of the palaeochannel running NW to join up with the resource blocks in the Delta zone (Plan 3).

3.2.3 Recent Testing

To test the value of the residual wash, a limited bulk-testing program of 4 pits was carried out in year 4 in the RL area by Mineral Holdings in the Aberfoyle workings using an excavator and mobile jig plant following a survey that revealed that shallow ground was present at the Sea Shell Face and at Aberfoyle East and deeper ground at the Boomerang Face. The work has shown that, in two of these pits, basal alluvial wash of reasonable grade can be accessed in the former work faces. As well as arriving at the tin grade, the processing has allowed estimation of the accessory minerals – ilmenite/rutile, zircon, gold and sapphire. (Duncan et al, 2002).

The two successful pits ABE 3 and 4, at Aberfoyle Central and East respectively, have SnO_2 grades in the range 100-130, TiO_2 24-29, ZrO_2 9-11 and sapphire up to 3.3 g/LCM. Tantalum and niobium pentoxides are in the range 0.35-0.55g/LCM with the Nb/Ta ratio being about 2 or 3 to 1.

The bulk values are lower than the Great Northern Plain resource values as deduced from the drilling, the latter having an average grade of about 200g/cu m SnO_2. The lower accessory mineral grades may be due to excessive ragging of the jig bed by steel nut-punchings on the mobile plant which was optimised for cassiterite recovery causing loss of the lighter minerals zircon, rutile and ilmenite as well as sapphire.

3.2.4 Dry Gut Area

The Dry Gut former alluvial tin workings are on the western side of the Ringarooma River in the SW quadrant of the RL area adjacent to the clay deposit. The area was not bulk sampled due to time constraints but hand samples of a 0.5m thick, coarse wash layer gave 430g tin metal/BCM and the cassiterite was seen to be coarse from a pan concentrate. The wash is also sapphire- and gold –bearing with 0.54g/BCM and 0.018g/BCM respectively. The old workings are littered with silcrete boulders indicating a high-energy environment of deposition and the basement is altered dolerite.

The production history is incomplete but about 3 tons of high quality (+74% Sn) tin concentrates were produced in the 1960s by K. Richardson (pers. com.) by hydraulic sluicing using pumped water from lagoons by the river. Earlier production is thought to approach 2 tons and there is a possibility of much earlier production by the Chinese.

Coarse black cassiterite is mentioned as well as brown, finer-grained cassiterite. Residual ground, some of it shallow and rich, is reported along the ridge and the slopes down to the Ringarooma River (Plan 5). Possible resources are of the order of 100,000 cu m at 200g/cu m SnO_2.

3.2.5 Delta Area

The Delta tin deposit is 1km to the north also on the western side and overlooking the Ringarooma River. It is just outside the NW quadrant of the RL area but contained in EL 32/2001 also held by Mineral Holdings. The main workings consist of a narrow, irregular open cut running east west for 198m into the terrace at about 4-6m above the flood plain of the Ringarooma River (Leaman, 1974). In the floor of the workings, silcrete boulders approach 1m across on a basement of dolerite. The mine operated form 1934 to 1938 and produced 16.3 tons of tin concentrates by sluicing.

Unspecified residual resources are evident at Delta. Some mineralisation has been intersected NE of the old workings and to the west by Utah Development where it is patchy and low grade. The resource potential in the Delta –Dugarde area has been given as 4M cu m at 120g/cu m SnO_2 (Santos) and at Delta the prospectivity has been assessed as 1.5M cu m at 130g/cu m SnO_2.

Both the Dry Gut and the Delta deposits, which are aligned east west, may have been channels feeding into the adjacent, interpreted Aberfoyle Lead.

4.0 Resource Summary

The resources estimates in the proposed RL area are summarised in the following way-

NE quadrant

- part of indicated resource 1,520,000 cu m at 139g/cu m SnO2 within 3.82M cu m at 106g/cu m SnO2 (Hellyer, 1983),

- the controlling structure is the MacGregor Lead heading into Braithwaites Resource on Gt Northern Plains,

- unspecified potential in west with good tin intersections in sporadic drill holes on edge of Aberfoyle Lead.

SE quadrant

- possible resources of order of 650,000 cu m at 200g/cu m SnO2 as residual resources north of the Aberfoyle workings (this study, from Nye, 1932)

- controlling structure is the Aberfoyle Lead running north from the mine workings.

SW quadrant

- possible resources 100,000 cu m at 200g/cu m SnO2 as Dry Gut residual resources (this study, from pers. com. K Richardson),

- interpreted feeder channel running easterly into the Aberfoyle Lead,

- inferred resources of 1.5M cu m of mixed clays containing the most part of 200,000 cu m as an indicated resource of smectite clay (this study),

- residual clay deposit overlying and derived from dolerite.

NW quadrant

- possible resources of order of 650,000 cu m at 200g/cu m SnO2 (this study, from Nye ,1932),

- controlling structure is the Aberfoyle Lead running NW towards the Delta resource block on the Gt Northern Plains,

- small part of Dry Gut alluvial tin resource,

- small part of the indicated smectite clay resources (this study).

5.0 Conclusions

5.1 Exploration carried out by Mineral Holdings over the period 1998 to 2003 has discovered a clay deposit and evaluated alluvial tin resources within EL 38/97, Aberfoyle Hill.

5.2 The resources of alluvial tin (SnO_2) wash are-

Wanex area	Part of an indicated, 1.52M cu m within a larger (3.82M cu m) lower grade resource
Aberfoyle area	Possible, 1.3M cu m contained in the interpreted Aberfoyle Lead or palaeochannel running from the Aberfoyle workings to the Delta resource block
Dry Gut area	Possible, 100,000 cu m contained in a possible channel feeding easterly into the Aberfoyle Lead

5.3 The clay resources are-

Dry Gut area	Indicated, 200,000 cu m of smectite clays within an
	Inferred, 1.5M cu m of mixed clays

5.4 On the basis of the resources discovered and evaluated, Mineral Holdings Australia Pty Ltd applied for a retention licence of 4 sq km on 6th March 2003. Both the clay and tin resources need further evaluation and marketing prior to development.

5.5 The alluvial resources are an integral part of the Ringarooma Project of Mineral Holdings which seeks to explore and develop the heavy minerals and sapphire placer deposits of the Ringarooma River Basin particularly the Great Northern Plains and offshore. The project which has the potential to yield a resource base of up to 100,000 tonnes of cassiterite concentrates (Kinnane, 2001) is currently optioned to Mining and Marine International Pty Ltd.

6.0 Environment

During the fieldwork, only existing tracks were used for access. As the main access track to the MacGregors area was becoming overgrown particularly in the northern section, marginal vegetation was trimmed using a grader.

Following the extraction of the wash samples, the pits were backfilled immediately with the excavator, the ground compacted and recontoured with the topsoil replaced where present. Where the topsoil was absent or skeletal in the previously mined areas, the disturbed pit areas were covered with vegetation slash to reduce the visible effect and to promote natural reseeding.

7.0 Expenditure

Expenditure carried out by Mineral Holdings during the five-year life of the licence stands at $71,311 including an estimate of $3,000 for the final March quarter.

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KEYWORDS

Aberfoyle, MacGregors, Taylors, Wanex, Dry Gut, Delta, Great Northern Plains, Heavy Minerals, Cassiterite, Sapphire, Clay, Rare Earths.