EL 13/2015 “Frankland River”
Annual Report on Exploration
Nov. 2019 to Nov. 2020
- Zebs Minerals Pty Ltd

Grant MacDonald (B.Sc. Hons.), M.A.I.G.
on behalf of
Zebs Minerals Pty Ltd
15 Anglesea St
Wivenhoe, Tasmania 7320

Abstract

Work on EL 13/2015 “Frankland River” during the reporting year has focused on further appraisal of previous exploration data.

That work has led to a prioritisation of work on certain parts of the tenement and a decision to relinquish some areas determined to have a lower prospectivity.

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1.0 Introduction

1.1 Exploration Rationale

Zebs Minerals Pty Ltd is exploring the Balfour Copper Belt for copper, gold and tin as well as any other commodities of value.

1.2 Location and access

EL 13/2015 “Frankland River” lies in Tasmania’s west coast south of Smithton in the Balfour area.

Access to the tenement is via the Bass Highway to Smithton from Burnie and then on to Balfour via the Western Explorer Highway and the Balfour track. Access within the tenement is very difficult with no vehicular tracks.

1.3 Land status and usage

All of the land within the licence is owned by the crown.

The majority of the licence area is part of the Arthur-Pieman Conservation area with the Donaldson River Nature Recreation Reserve running down the eastern side of the tenement.

1.4 Tenure

The tenement, EL 13/2015 was granted to Zebs Minerals Pty Ltd on 15th November 2016 for a period of five years and applies to all Category 1 minerals. The licence originally covered an area of 247.5 square kilometres**.**

A decision has been made to relinquish an area of 64 km2 and retain the remaining 183.5 km2 as shown on figure 1.2.

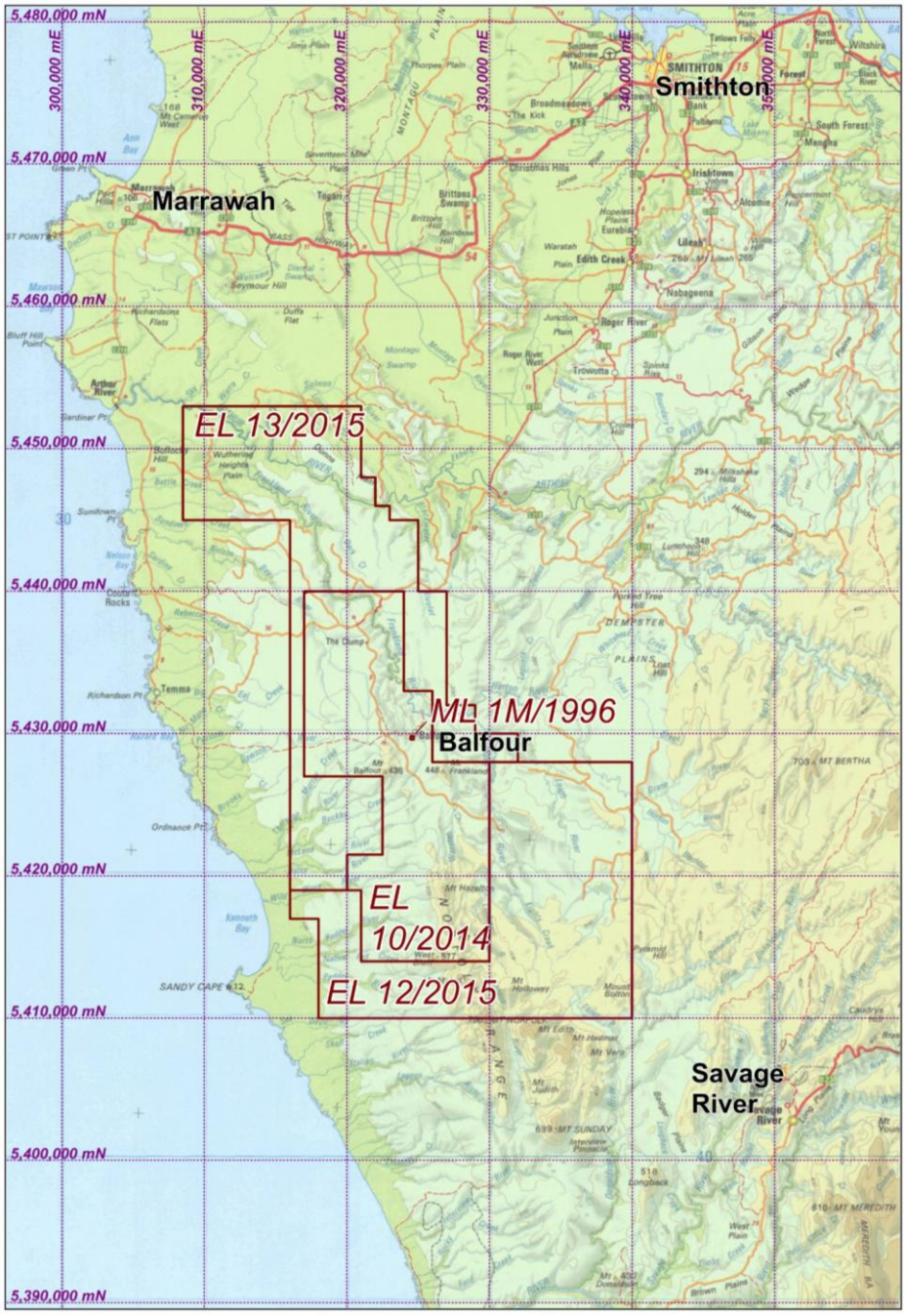

figure 1.1: Location of EL 13/2015 "Frankland River".

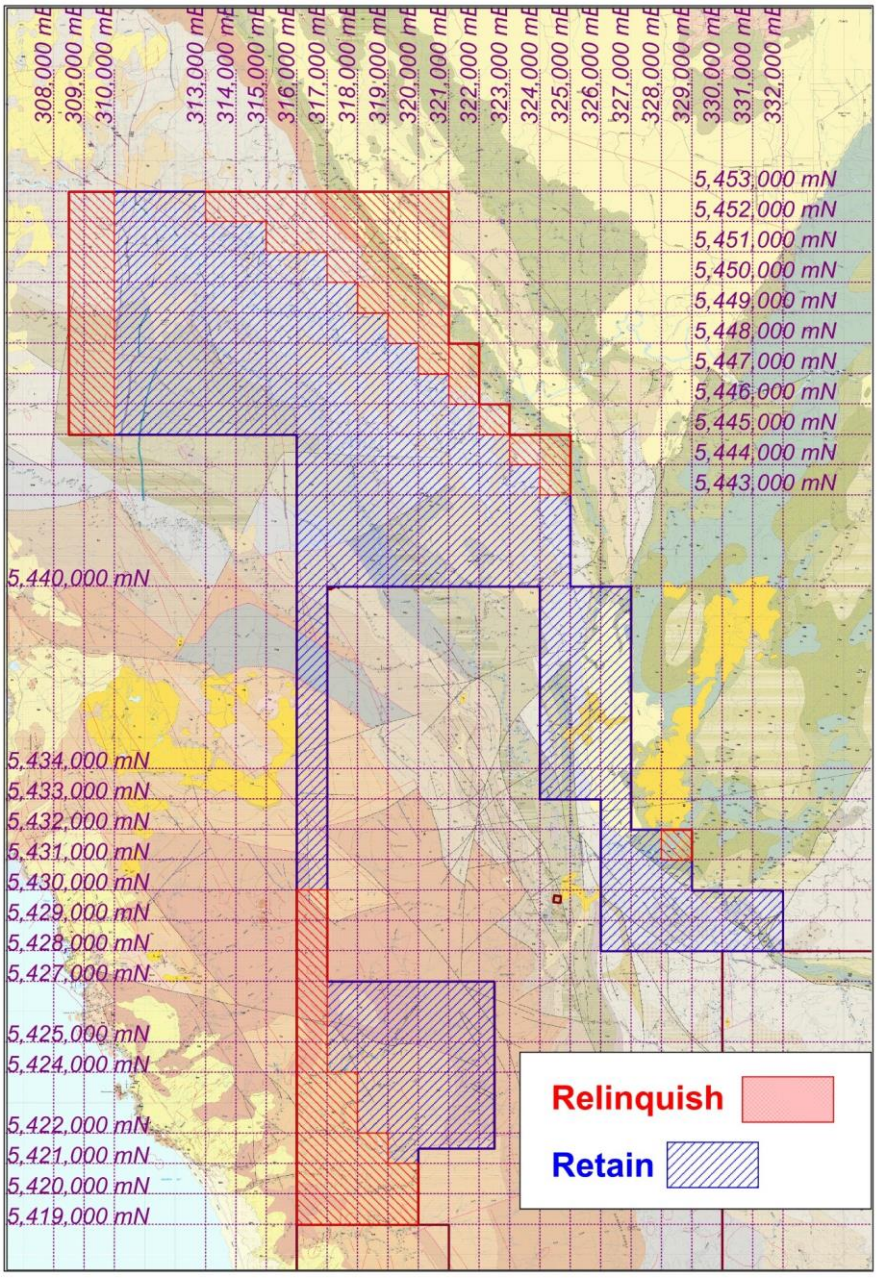

figure 1.2: Areas of EL 13/2015 for relinquishment (red hatch) and retention.

1.5 Geology

The geology of EL 13/2015 consists of early Neoproterozoic-late Mesoproterozoic metasediments (and dolerite dykes) of the Rocky Cape Group, with a thin fault bound wedge of the disconformably/unconformably overlying Cryogenian Togari Group near to the northern boundary of the licence). In the southwest of the licence elevated aeolian sands and dunes obscure the underlying Proterozoic rocks. The Proterozoic geology is summarised neatly in figure 1.3.

Structurally the folded Proterozoic rocks are folded are transected by north-northwest trending west-southwest dipping faults which have been shown in a number of instances to be east verging thrusts. The fault which hosts the copper mineralisation at Balfour (on EL 10/2014) is an example of such a thrust.

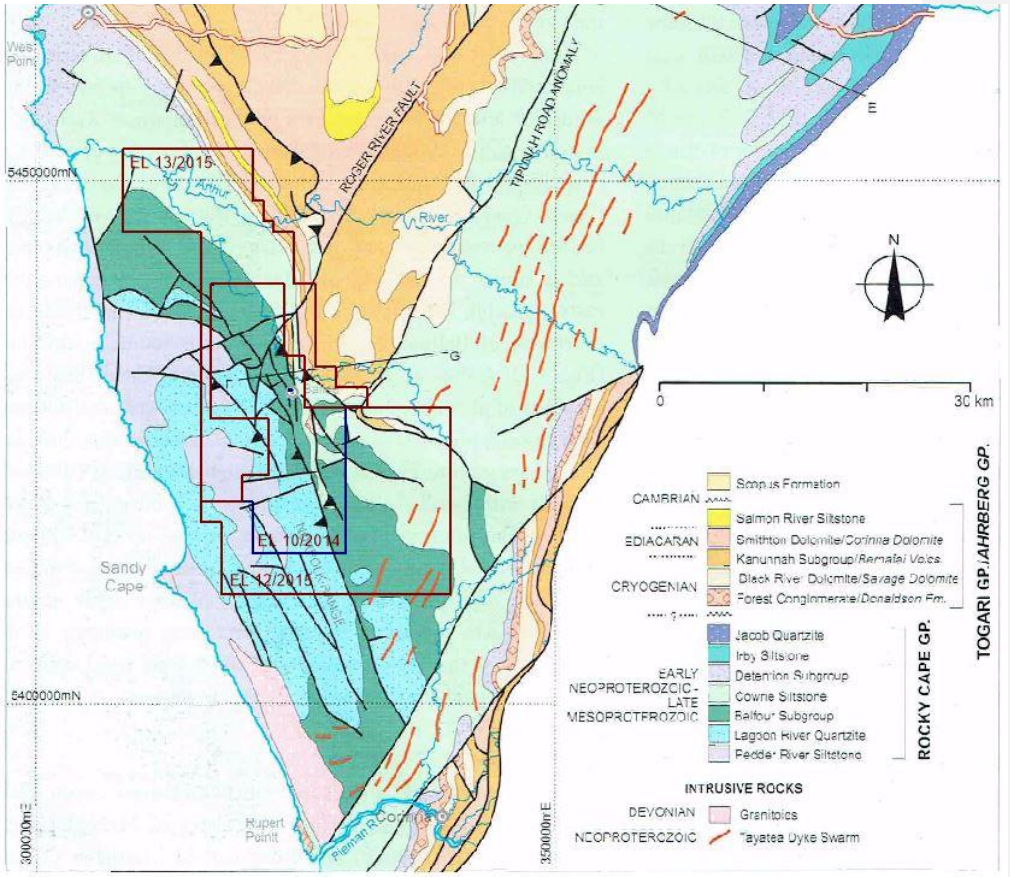

figure 1.3: Geology of EL 13/2015 (as originally granted) and associated Zeb's Minerals Pty Ltd tenements (geology after figure 3.8 in Calver et. al. 2014).

The Rocky Cape Group is a sequence of moderately folded silty to sandy shelf facies metasediments, intruded in part by north-northeast trending dolerite dykes.

The Togari Group is a sequence of shelf facies clastics and carbonates with intercalated rift tholeiites which unconformably or disconformably overlies the Rocky Cape Group.

The stratigraphy of both of these Groups is illustrated in figures 1.4 and 1.5.

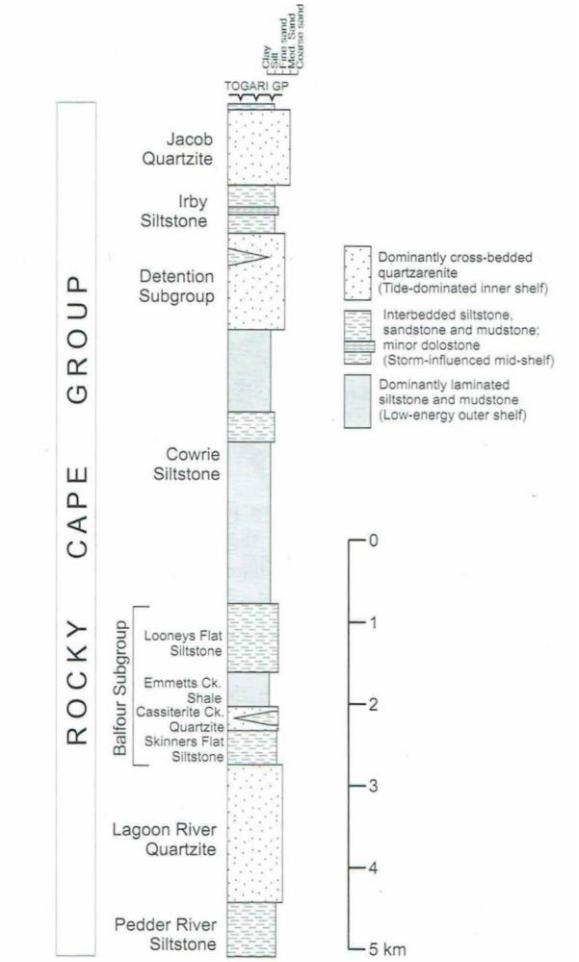

figure 1.4: Rocky Cape Group stratigraphic column (after figure 3.7 in Calver et. al. 2014)

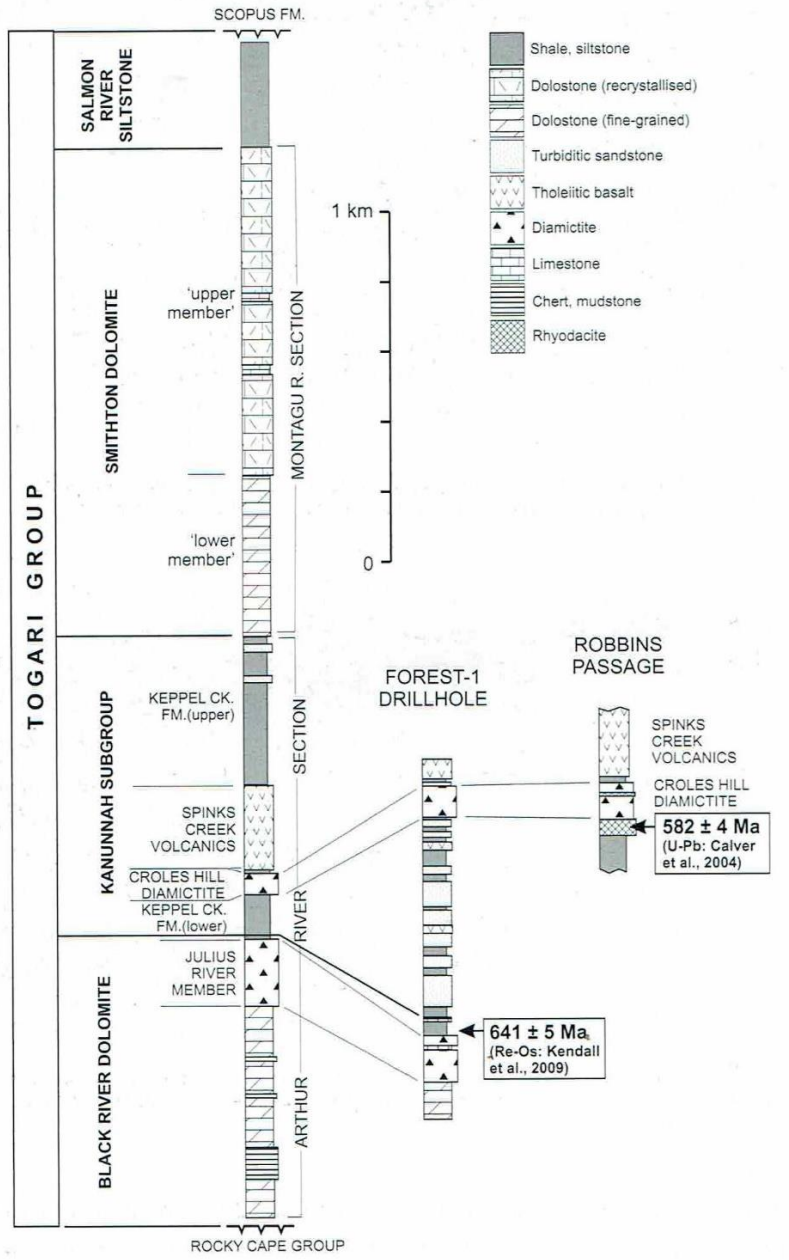

figure 1.5: Togari Group stratigraphic column (after figure 3.29 in Calver et. al. 2014). Note significantly different vertical scale to figure 1.4. The Togari Group is of the order of 3km thick whilst the Rocky Cape Group is of the order of 10km thick.

Gravity data shows that the Middle Devonian Interview River Granite, which outcrops to the southwest of the tenements, also underlies the Balfour area to a depth <1km (as modelled).

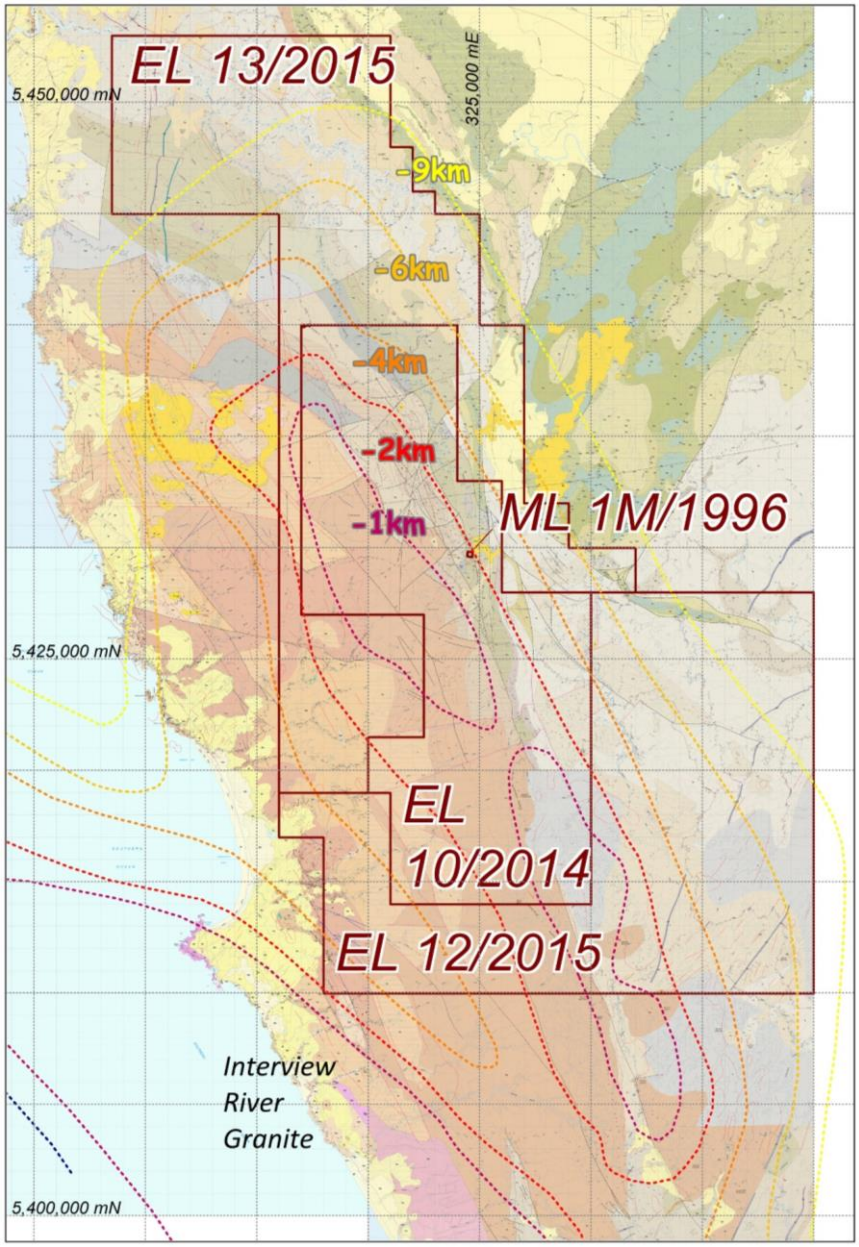

figure 1.6: Mineral Resources Tasmania 1:25,000 sheet series geology with modelled granite depth contours after Everard et. al. 2007.

In the northern part of EL 13/2015 the basement geology is obscured by a veneer of Tertiary gravels, whilst in the easternmost part of the tenement (southeast of the Roger River Fault) the basement is obscured by Quaternary alluvium and a small inlier of Tertiary basalt.

Taheri and Bottrill (2005), citing Reed in Everard *et. al.* (2002) summarise the structural history of the Balfour region as follows. "Two early phases of syndepositional extension were followed by at least four compressional phases of deformation within the area. The first two phase of deformation (D1, D2) are possibly of Cambrian age whereas D3 and D4 are considered to be Devonian in age. D3 is the main deformation phase and is characterised mainly by northwest-trending folding, some cleavage development and major northeast-directed low and high angle thrusts, one of which hosts the copper mineralisation at Murrays Reward mine along the copper belt. East of Balfour east-northeast to northeast trending strike slip faults pre-date late northwest-trending reverse faults. One of these faults hosts vein style Sn-W mineralisation at Specimen Hill."

The Interview River Granite has intruded in the Middle Devonian and likely syn-D3.

For a much more comprehensive understanding of the current understanding of the geology of the region refer to Everard *et. al.* (2007) with Taheri and Bottrill (2005) providing additional information regarding the copper and tin mineralisation in the region.

2.0 Summary of Previous Work

2.1 Prior to Current Tenement

The early history of exploration can be seen in old workings on the eastern side of the Balfour copper trend.

At the time of Ward's visit in 1911 the extent of small lease holdings in the immediate Balfour area was as shown in the following figure.

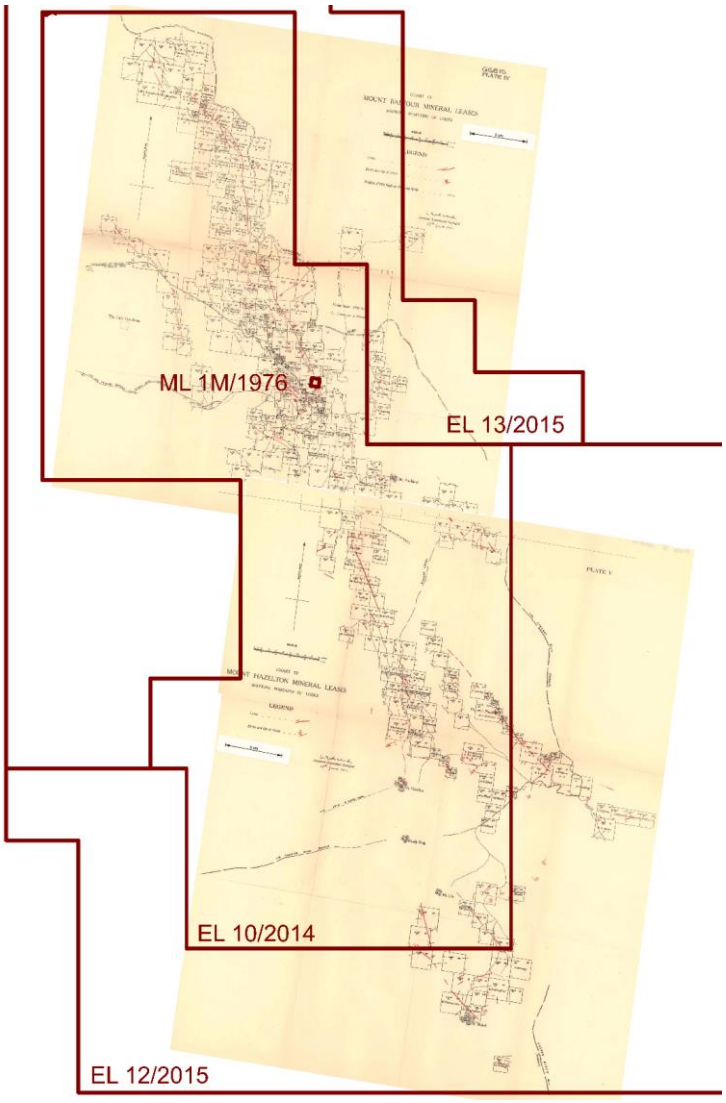

figure 2.1: Tenement position as at the time of Ward's visit in 1911 (Ward, 1911)

Thomas and Henderson (1943) chart tin and copper production from the Balfour field and provide a brief summary of work in the years between Ward (1911) and 1943.

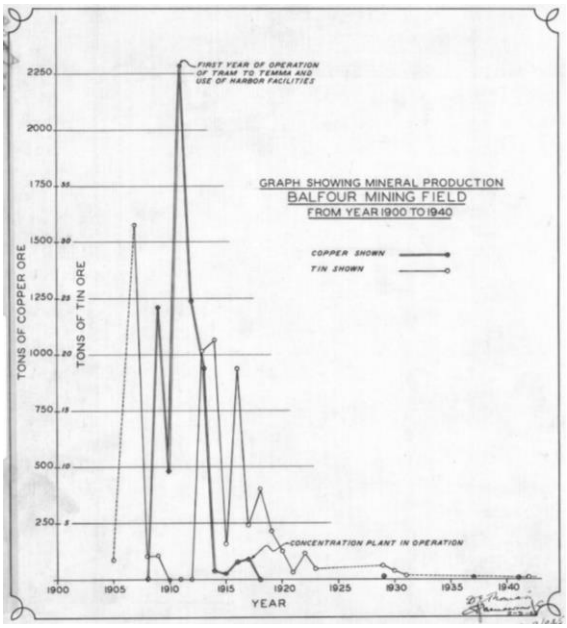

figure 2.2: Reported production of copper and tin from the Balfour field from 1900 (prior to discovery) to 1940 (after Thomas and Henderson, 1943)

Figure 2.3 to 2.8 display by decade the exploration tenements granted during that decade. The shapes were obtained from Mineral Resources Tasmania's database downloadable as a .shp file. In a number of instances tenements were partially surrendered and original shapes of tenements are not always accurate, however, it provides an excellent start point.

BHP were the first 'modern' explorers (Chesnut, 1964 & 1965) on the Balfour field. BHP drilled holes targeting tin on Specimen Hill (not on EL 12/2015) but also appear to have produced the mine compilation plans for the Murrays Reward and Central Mt Balfour plans in TCR 65_0411 (not on EL 13/2015).

In the mid 1960's Pickands Mather carried out a regional stream sediment geochemical programme on their EL 12/1965 but did not follow up any of the anomalies defined in this work (all outside of EL 12/2015 and 13/2015 though anomalous lead values were obtained from the Blackwater River just east of EL 13/2015). (Anon., 1966).

Quest Exploration Pty Ltd pegged EL 5/1968 over the northern part of EL 13/2015 to explore for alluvial chromite in the Tertiary gravels (Volker, 1969) with only 2 of a total of 73 holes intersecting economic values.

ACI pegged much of the ground in the Balfour area as EL 16/1968 starting off with regional stream geochemical sampling as well as focusing on the copper and tin lodes at Balfour (Davies, 1969a & b). In subsequent years work focused principally on the copper along the Balfour copper trend and to a lesser degree tin at Specimen Hill McIntyre, 1973a & b, Anon. 1974).

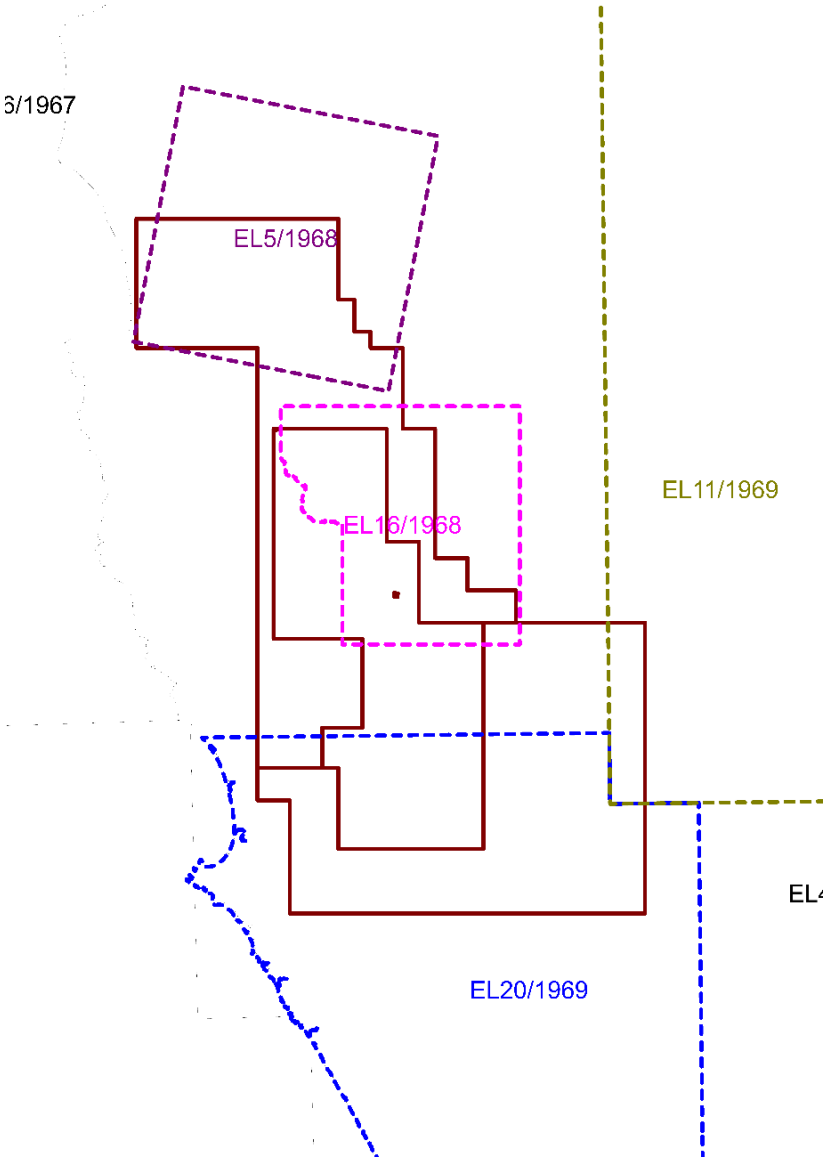

figure 2.3: Tenement position from 1959 to 1969. Zebs Minerals tenements are in maroon solid outline. This plan is not complete with Pickands Mathers EL 12/65 not shown. Tenement shapes from MRT database LICENCE_HIST_cat1

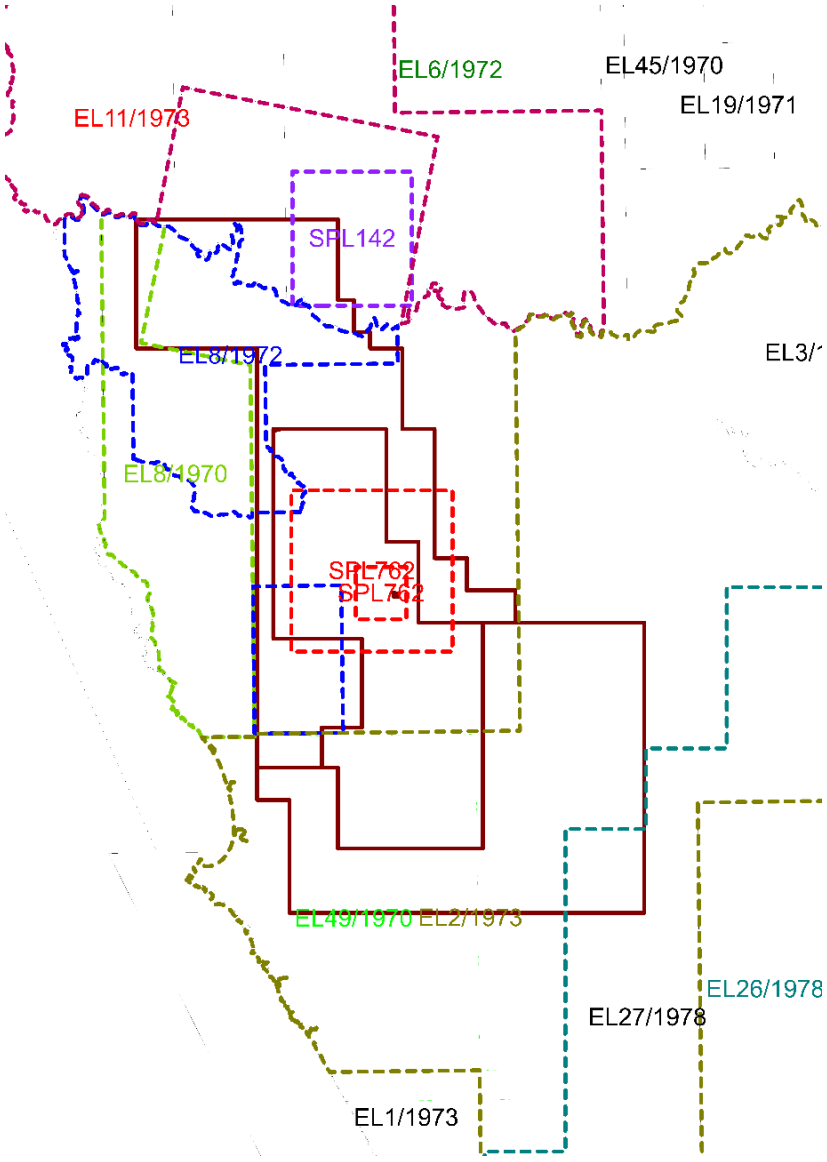

figure 2.4: Tenement position from 1970 to 1979. Zebs Minerals tenements are in maroon solid outline. This plan is not complete with CRA's EL 1/77 not shown.

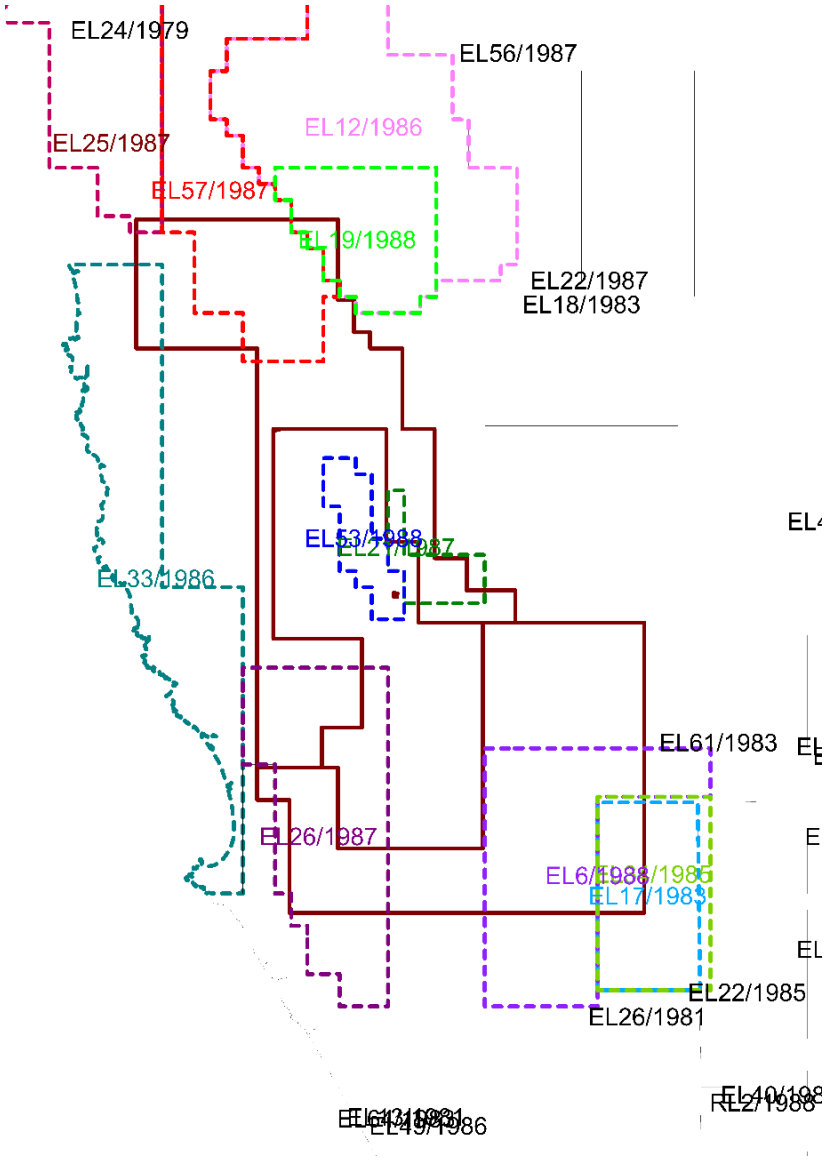

figure 2.5: Tenement position from 1980 to 1989. Zebs Minerals tenements are in maroon solid outline.

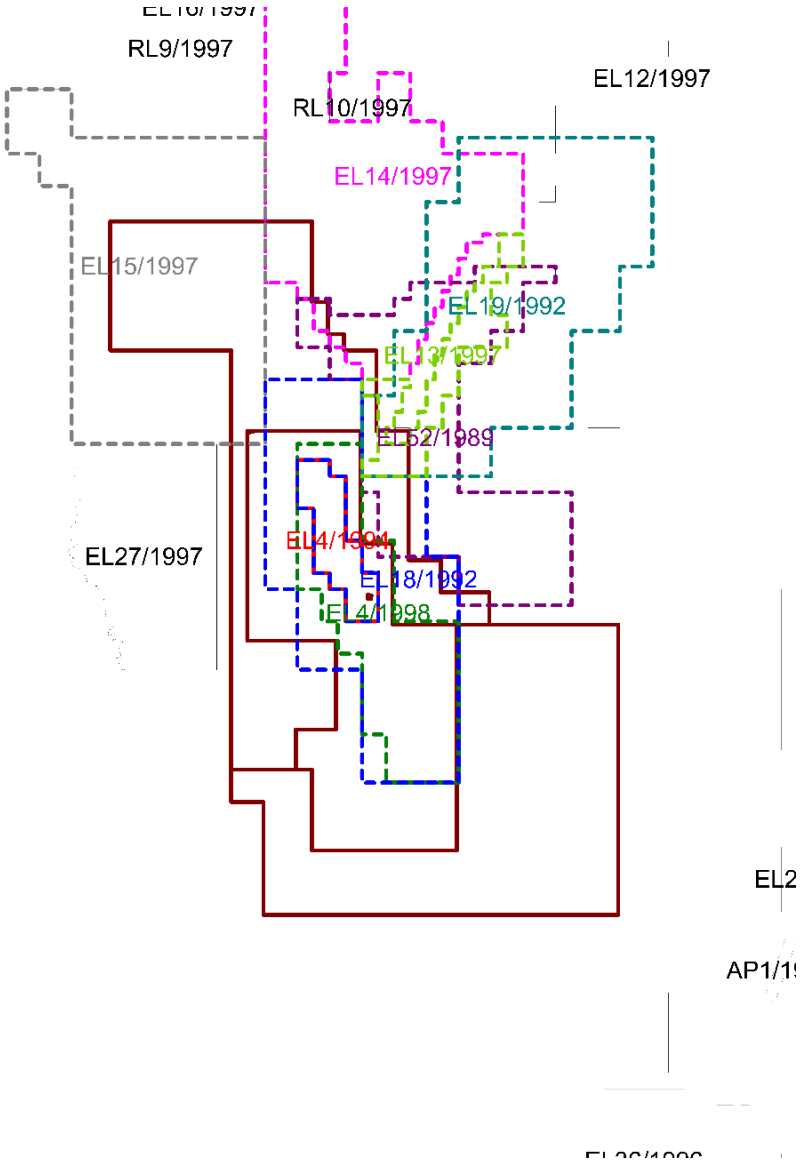

figure 2.6: Tenement position from 1990 to 1999. Zebs Minerals tenements are in maroon solid outline.

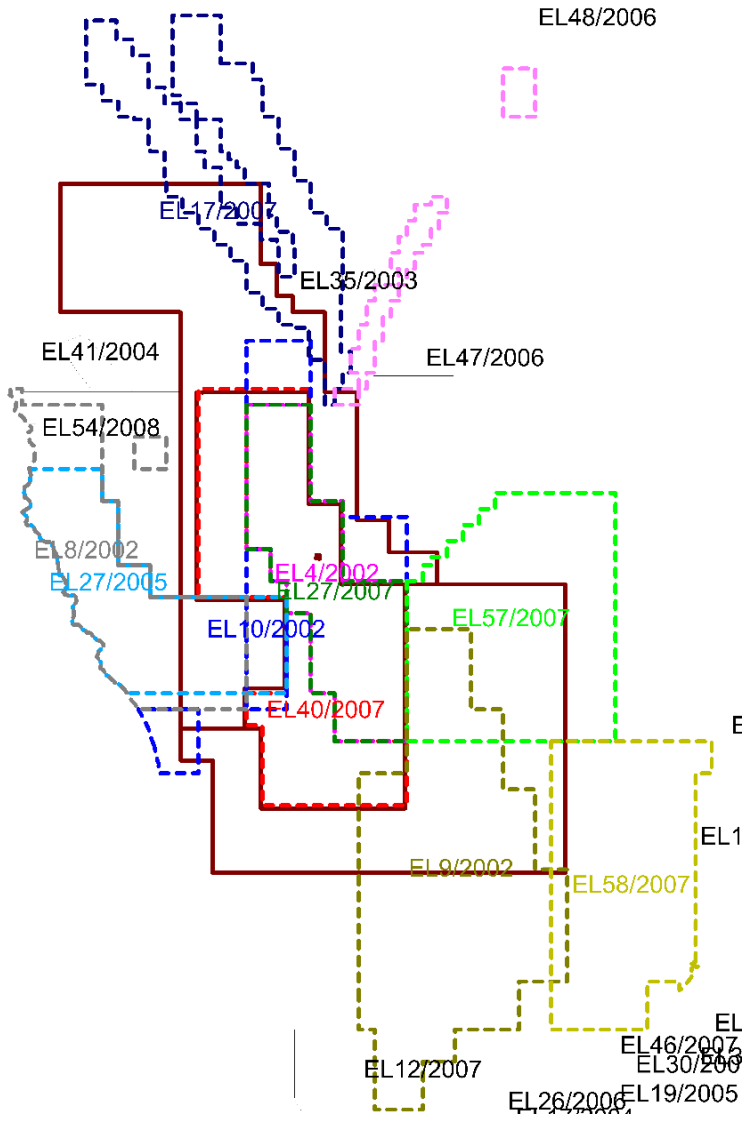

figure 2.7: Tenement position from 2000 to 2009. Zebs Minerals tenements are in maroon solid outline.

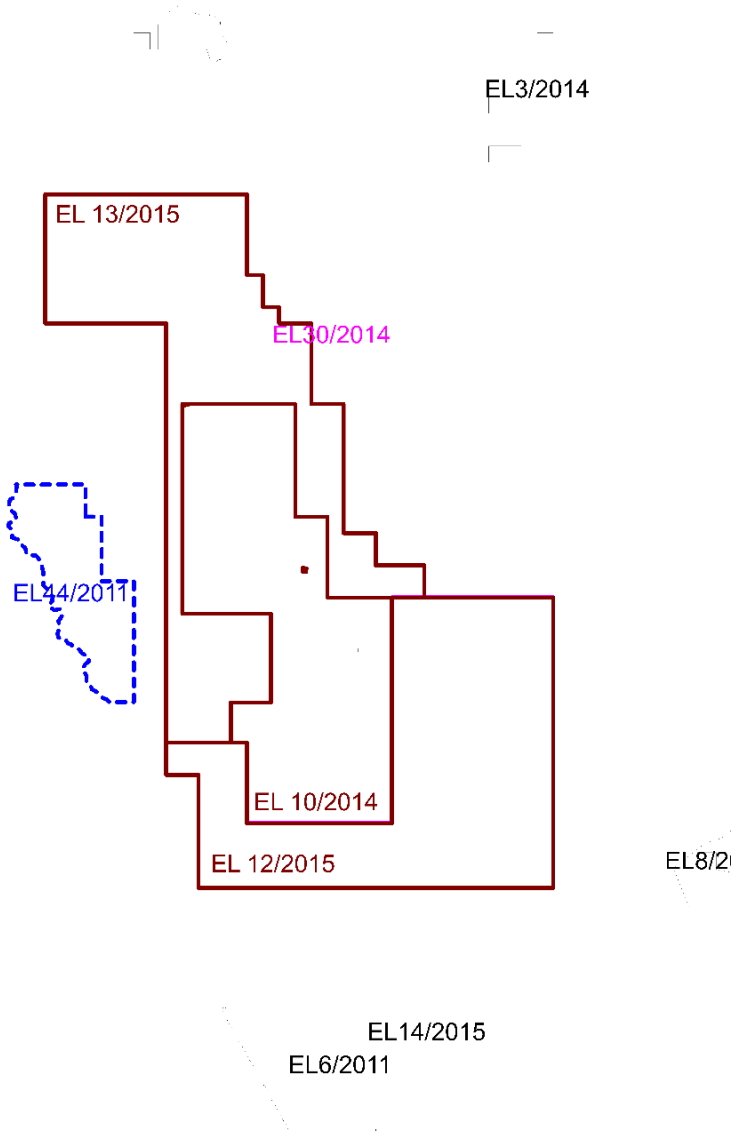

figure 2.8: Tenement position from 2010 to 2017. Zebs Minerals tenements are in maroon solid outline.

In 1972 ANZECO pegged the area south of the Arthur River as EL 8/1972 and to the north under EL 6/1972. "A programme of geological reconnaissance and stream-sediment sampling by one geologist and one field assistant was commenced in November 1972 and continued through December. During this period, a large part of the licence area was covered on a reconnaissance scale, but no significant tungsten anomalies were discovered and no evidence was found of any geological environments favourable for tungsten mineralization. The Precambrian quartzites in the Nelson River vicinity were

investigated with a view to their possible value as sources of high-grade silica. Numerous samples were taken for analysis and some were found to be of a purity sufficient for ferrosilicon production. Trenching across the outcrop, however, showed that the high-grade silica horizons were very thin and lacked the necessary tonnage to support an open-pit operation. Exploration Licence 8/72 was relinquished in August 1973." (Brandt, 1973)

The very southwesternmost part of EL 13/2015 I was included in EL 2/73 held by Esso Exploration and

CRA Exploration held the area covered by EL 13/2015 as part of their large EL 1/77 which included all of the Balfour copper project tenements held by Zebs Minerals Pty Ltd. They followed up regional aeromagnetics and stream sediment panned concentrate tin anomalies with further ground magnetics, geological mapping and stream sediment sampling (Porter, 1980; Weir, 1982).

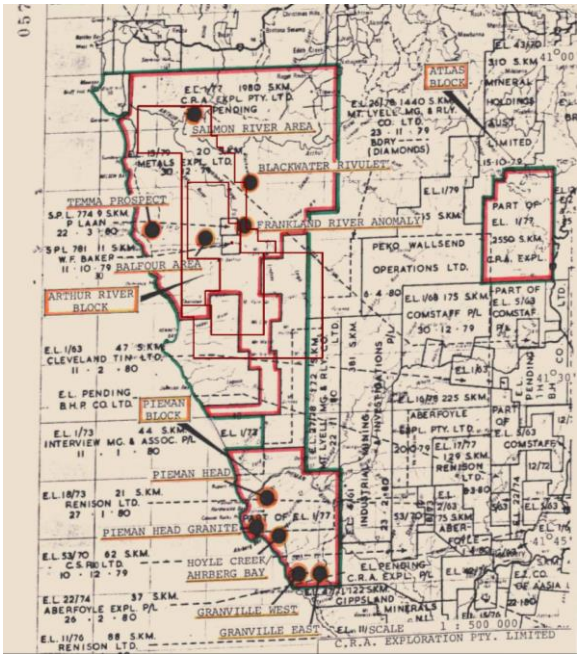

figure 2.9: EL 1/77 CRA Exploration.

Chromite in Tertiary gravels was the target for BHP (Kosseris, 1988) on EL 12/1986 with an approximate resource of 8,000 to 13,000 tonnes of Cr2O3 an order of magnitude below BHP's requirements.

This tenement was subsequently applied for by C.H. Whitehead as EL 19/1988 (Whitehead, 1988) for its alluvial chromite, platinoids, tin, heavy minerals and gold potential in the Tertiary gravels. Three areas were identified as having best chromite potential being Chromite Ridge, Walkers Quarry and Salmon Ridge. These are all outside of EL 13/2015.

Shallow augering at Walker Quarry did not identify any high grade zones whilst it showed the deposits at Chromite Ridge and Salmon Road to be very shallow.

Whitehead concluded that there was insufficient surface exposure to assess dolomite potential of the E.L. Miscellaneous silica sand samples were assayed but nothing identified as of sufficient interest to continue the EL. (Whitehead, 1990).

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Aureole Resources Pty Ltd, in JV with Winston Resources Pty. Ltd. and Sierra Nevada Resources Pty. Ltd., pegged EL 21/1987 over a large area east of Ballfour reducing it the area around the Frankland east of Balfour where they carried out a gravity survey the Balfour field in conjunction with Soloriens Mining Pty Ltd on the adjacent EL 53/1988 (Cromer, 1988; Hofto & Morrison, 1989; Morrison, 1991 & 1992).

Geopeko pegged EL 52/1989 over the Togari Group area of outcrop believing the area to have been inadequately explored for base metals and gold due to a reliance on airborne EM and magnetics and stream sediments which would only locate ideal orebodies. They trialled Huminex stream sapking with no success and concluded that the technique does not work int these reock units. Confusingly it is recommended that the licence be relinquished but then states that interesting aeromagnetic and gravity anomalies remain unexplained and that should be considered when funds become available. (Virgoe, K. & Mathison, I.).

In 1997 Morritt Holdings covered much of the northern part of EL 13/2015 in EL's 13/1997, 14/1997, 15/1997. EL 15/1997 covered the large area of Rocky Cape Group rocks in EL 13/2015 whilst EL13/1997 and 14/1997 covered the Togari Group rocks along the northeast and eastern sides of EL 13/2015. Morritt Holdings JV'd the ground with Pacific-Nevada Mining Pty Ltd from 1997 until 1999 (Reid, 1998a). Pacific Nevada also JV'd into EL 61/1994 held by Cominex along the Roger River Fault (Reid, 1998b).

Pacific Nevada targeted Proterozoic iron formation Au, Proterozoic iron formation Cu-Au pipes and Proterozoic sediment hosted Cu. Early work focussed on the magnetite bodies inland from Temma not included within EL 13/2015.

Pacific-Nevada Mining Pty Ltd flew an airborne EM (UTS Geophysics – survey type not defined) over Els 11/1997, 12/1997, 13/1997, 61/1994 and part of EL 14/1997.

Pacific Nevada Pacific-Nevada withdrew and Morritt holdings JV'd with Greenstone Resources NL in 2001 who were more interested in the potential of the Roger River Fault targeting zinc in adjacent dolomitic rocks, epithermal replacement gold in or near to the fault zone, and epithermal gold in the distal spring systems.

In 1997 IMX Resources applied for a licence over the Togari Group rocks which extend into the northeastern part of the licence (Barret, F. *et. al.* (2007). IMX flew a VTEM survey over the basalts and sediments at the base of the Togari Group (Chai, 2008) defining mapping out the conductive and magnetic stratigraphy. IMX had two somewhat unsuccessful attempts to drill two of the EM responses with water and poor ground conditions given as explanations in each instance (Barret, F. & Chai, A., 2010). The first program was 2 RC holes, the second was a three diamond hole program. The two holes targeted on the VTEM anomalies intersected black shale. The other hole was stratigraphic.

The premise that the mafic rocks at the base of the Togari Group are directly related to the tholeiitic dykes in the region is not believed to be correct (Everard, *et. al.* 2007).

Ausvaal Projects Pty Ltd pegged ELs 8/2002 and 10/2002 over parts of ELs 12/2015 and 13/2015 and appraised the recently completed WTRMP heli EM survey results defining a number of conductive anomalies and/or magnetic anomalies worthy of further investigation (Jenke, 2004; Anon., 2004).

Anomalies defined by Southern Geoscience Consultants defined 5 targets, all of which lie within EL 13/2015.

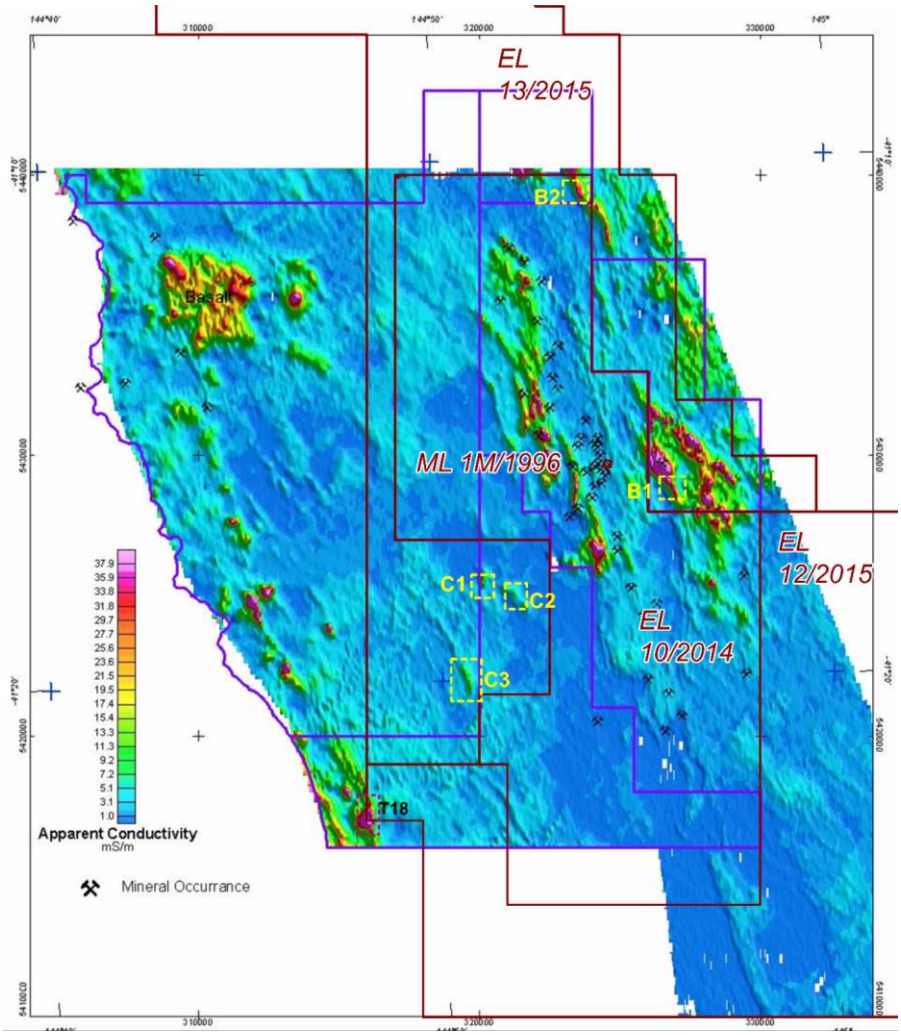

figure 2.10: WTRMP HeliEM survey results as processed by Southern Geoscience Consultants)Jenke, 2004)

Anomaly B1 is partly coincident with a magnetic high but appears to be stratigraphic and is associated with rocks including carbonaceous shales. Appears to be stratigraphic but field checking was recommended (moderate priority). (Anon., 2004)

Anomaly B2 is probably stratigraphic but field checking was recommended (moderate priority). (Anon., 2004)

Anomalies C1 and C2 are short strike length conductive responses, a number of which are associated with magnetic anomalies. The conductors are discrete and may be structurally controlled. Whilst possibly stratigraphic in nature the lack of systematic work and fairly discrete nature of the EM anomalies warrant further EM modelling and field checking (low priority). C3 part of more subtle NNW trending EM ridge. Whilst it is possible that the source is stratigraphic. There appears to have

been very little previous work. The EM needs to be remodelled and the anomaly field checked (low priority). (Anon 2004)

None of the follow-up work appears to have been done.

2.2 During Current Tenement - Zebs Minerals Pty Ltd (2014 – 2019)

There has been no active field work on the tenement with work to date consisting of a desktop compilation of historic exploration work and appraisal of existing geological and geophysical data (magnetics, radiometrics, gravity and a number of airborne EM surveys).

Plans were made for a VTEM survey over the Balfour copper belt which had to be postponed. It is hoped that this survey can be completed in the 2020/21 summer.

3.0 Exploration completed during the reporting period

There was no active field work on the tenement during the reporting period.

Work has consisted of (1) advancing the desktop compilation of historic exploration work and appraisal of existing geological and geophysical data (magnetics, radiometrics, gravity and a number of airborne EM surveys), and (2) planning for a VTEM survey over the Balfour copper belt which extends into the licence area.

4.0 Discussion of Results

The appraisal of previous exploration work was carried out in a thorough manner with all reports read and relevant data digitised and overlain in Mapinfo. The results of some of that work is shown on figures 2.9 and 2.10.

The selection of areas to relinquish was very difficult. Existing aeromagnetic data, EM surveys by Esso and stream geochemical results (from MRT's database) all contain anomalous results which demand further attention.

A number of new ideas have been generated which also need to be pursued. An anomaly compilation map is in preparation but has not been completed in time for inclusion in this report.

5.0 Conclusions

The data appraisal work has led to the recognition of areas of higher and lower prospectivity. The lower prospectivity areas are to be relinquished and the higher prospectivity areas retained and made the focus of the coming years exploration activity.

Work in the coming year will hopefully see the flying of a VTEM survey over the Balfour copper belt extending into EL 12/2015.

Other work will consist of ground follow-up of some of the geochemical and geophysical anomalies defined in the data appraisal. These can be followed up with reconnaissance mapping and stream and rock sampling at relatively low cost.

6.0 Environment

There has been no environmental impact to date.

7.0 Expenditure

	$
Geology	5,000
Geochemistry	0
Geophysics	1,000
Remote Sensing	0
Drilling	0
Gridding	0
Land Access	0
Rehabilitation	0
Feasibility Studies	0
Other	14,000
Administration	500
Total	**20,500**

8.0 References

Anon. (1973). Interim report for inclusion with reapplication for EL 16/68. *ACI Limited* [73_0950]

Barret, F., Chai, A. & Manzi, B. (2008). EL 17/2007 "Dunns". Annual Report for the period 24th October, 2007 to 23rd October, 2008. *Unpub. Report for IMX Resources NL.*

Barret, F. and Chai, A. (2010). EL 17/2007 "Dunns". Annual Report for the period 24th October, 2009 to 23rd October, 2010. *Unpub. Report for IMX Resources NL.*

Bell, D.H. (1972). EL 48/70 & 49/70. Annual report on exploration 1971 to 1972. Unpub. Report for ACI Limited.

Brandt, R.T. (1973) Summary Report on EL 8/1972. *unpub. report for Australia and New Zealand Exploration Company.* [73_0981]

Chai, A. (2009). EL 17/2007 "Dunns". Annual Report for the period 24th October, 2008 to 23rd October, 2009. *Unpub. Report for IMX Resources NL.*

Cromer, W.C. (1988). EL 21/87 – Balfour, Annual Report year 1. *unpub. report for Aureole Mining Pty Ltd* [88_8900]

Chesnut, W.S. (1965). Report on Balfour Tasmania Prospecting, Broken Hill Proprietary Limited.

Davies, H.G. (1969a) Corporate Exploration of Tasmanian Mineral Products, EL 16/68. R2512/69. *unpub. report for ACI Limited.* [69_0577]

Davies, H.G. (1969b) Progress Report, Corporate Exploration of Tasmanian Mineral Products, EL 16/68. R9039. *unpub. report for ACI Limited.* [69_0599]

Everard, J.L. (2005). Reconnaissance geology of the Norfolk Range-Sandy Cape area, northwest Tasmania. *UR2005_02*

Everard, J.L., Seymour, D.B. , Reed, A.R. , McClenaghan, M.P. , Green, D.C. , Calver, C.R. (2007). Regional geology of the Southern Smithton Synclinorium. Explanatory Report for the Roger, Sumac and Dempster 1:25 000 scale geological map sheets, far northwestern Tasmania. *ER25_2*Gauci, M. (2010) Combined Annual Report for the Period 23 January 2009 to 22 January 2010, Rocky Cape Project. *unpub. Report for Regalpoint Exploration Ltd* [09_5988]

Gouge, P. (1983) Progress report, April 1982. Interview River tungsten/tin and copper mineralisation. EL 13/81. Unpub. Report for Abigano Limited.

Hansen, M (2018). Report on Exploration from July 2017 to June 2018. Unpublished report for Zebs Minerals Pty Ltd

Hofto, V.C. and Morrison, K.C. (1989). EL 21/87 Annual Report, Year 2. *Unpub. report for Aureole Resources Prt Ltd* [89_3060]

Jenke, G. (2004). EL 8/2002 and EL 10/2002 Balfour-Temma area. *unpub. Report for Ausvaal Projects Pty. Ltd.* [04_4995]

Kosseris, (W.C. (1988) Combined Annual/Final Report for the Period ended 24th February 1988. Exploration Licence 12/1986, Montagu Area, Tasmania. *unpub report for BHP* [88_2786]

McIntyre, M.H. (1971). Mineral Exploration in EL 16/68, Balfour Northwest Tasmania 1970 – 1971, Australian Consolidated Industries Limited, Mineral Resources Division.

McIntyre, M.H. (1973a). Mineral Exploration in EL 16/68 1970-1971. *unpub report for ACI Lim=ited* . [73_0947]

McIntyre, M.H. (1973b). Mineral Exploration in EL 16/68 1972-1973. *unpub report for ACI Lim=ited* . [73_0948]

Menpes, S.A. (1996). Second Annual Report for the period ending 3rd May 1996 EL4/94 Balfour Tasmania, CRA Exploration Pty Ltd.

Morrison, K.C. (1991). EL21/87 – Balfour, Annual and Final Relinquishment Report: Aureole Mining NL & Sierra Nevada resources Pty Ltd [91_3316].

Morrison, K.C. (1992). EL53/88 Mount Frankland Annual Report: Year 4, Soloriens Mining Pty Ltd.

Newnham, L.A. (2000a). Report on Nelson Bay River Drilling Program - June-July 2000 - EL15/1997 - Arthur River. *unpub. report for Pacific-Nevada Mining Pty Ltd* [00_4494]

Newnham, L.A. (2002). Relinquishment Report - EL 15/1997 - Arthur River *unpub. report for Pacific-Nevada Mining Pty Ltd* [02_4755]

Newnham, L.A. (2000b) Partial Relinquishment Report - EL4/1998 - Balfour Area *unpub. report for Pacific-Nevada Mining Pty Ltd* [00_4493]

Newnham, L.A. (2001) Relinquishment Report - EL4/1998 - Balfour Area *unpub. report for Pacific-Nevada Mining Pty Ltd* [01_4570]

Parkinson, R.G. (1993). Mount Frankland EL18/92 Report on Exploration for the First Year of Tenure 06/11/92 to 05/10/93, CRA Exploration Pty Ltd.

Reid, R.O. (1998a). Annual Report - EL 61/94 - June 1997-June 1998. *unpub report foe Cominex Pty Ltd & Pacific-Nevada Mining Pty Ltd* [98_4816]

Reid, R.O. (1998a). Annual Report on Exploration Activity 5/12/97 to 5/12/98. EL 15/97 - Arthur River. *unpub. report for Pacific-Nevada Mining Pty Ltd* [98_4235]

Russell, S.A.J. & Tear, S.J. (1997). EL 4/94 Balfour, Third Annual and Final Report for the period 3rd May 1996 – 11th November 1997, Tasmania, Australia. Rio Tinto Exploration Pty Ltd.

Taheri, J. & Bottrill, R. (2005). The Nature and Origin of Copper and Tin-Tungsten deposits in the Balfour-Temma area, northwest Tasmania, Tasmanian Geological Survey, Mineral Resources Tasmania.

Tear, S.J. (1996). Fourth Annual Report For The Period Ending 5 October 1996, EL 18/92 Mt Frankland, Tasmania. CRA Exploration Pty Ltd

Turner, N.J. (1999). Annual Report to 5/11/99. EL15/97 - Arthur River. *unpub. report for Pacific-Nevada Mining Pty Ltd* [99_4385]

Virgoe, K. and Mathison, I. (1991). EL 52/89 Balfour, Report on Exploration Activity March 1990 to February 1991, Relinquishment Report. *Unpub. report for Geopeko Exploration.* [91_3229]

Volker, J.A. (1969). Report on chromite areas, Montagu Swamp. *unpub. Report foe Ocean Mining and Exploration NL.* [69_0573]

Whitehead, C.H. (1989) Annual Report for EL 19/1988. Montagu Tiver-NW Tasmania *unpub. report* [89_2985]

Westbrook, S. (1999). Report on exploration activity 10/7/98-10/7/99 - EL 4/98 Balfour. *unpub.*
Whitehead, C.H. (1990) Relinquishment Report for EL 19/1988. Montagu Tiver-NW Tasmania *unpub. report* [90_3178]

Ward, K.L. (1911). The Mount Balfour Mining Field, Geological Survey Bulletin No. 10, Department of Mines, Tasmania.