

# **ANNUAL REPORT**

## **Mineral Leases**

**177 – 178 – 179 – 182 – 183 – 184 - 185**

### **HARTS RANGE REGION, N.T.**

**NORTHEAST CORNER - ALICE SPRINGS [SF 53-14] 1:250,000**

**SOUTHEAST CORNER - ALCOOTA [SF 53-10] 1:250,000**

**SOUTHERN EDGE - HUCKITTA [SF 53-11] 1:250,000**

### **FOR PERIOD**

**2016 – 2017**

### **LICENCE HOLDER:**

**INMINERALS PTY LTD**

### **REPORT COMPILED BY:**

**INMINERALS PTY LTD**

**July 15 2017**

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# 1 SUMMARY

Following three and a half years of exploration and characterisation of the target, the MLs embodied in this report lie along the eastward-flowing Plenty River, just to the north of the Strangways and Harts Ranges, and along the northward-flowing lower reaches of Sprigg Creek, to where it is joined by Haddock Creek, and thereafter, along Entire Creek to near its confluence with the Plenty River. Exploration was focussed principally on detrital garnet and other industrial minerals in the sands of the creek bed.

Substantial systematic sampling efforts were undertaken throughout and subsequent detailed and bulk sampling, analysis and testing in part all demonstrate that the river sands generally contain economic to moderately high grades of garnet.

The combined length of the Plenty River in the MLs, with substantial widths, exceeds 130km, and a *conservative estimate* for total *extractable* garnet yield is 4.5 million tonnes. The Plenty River is thus a world class garnet sand resource.

Sample intervals, appropriate for measured resource estimates, were provided by independent mining engineers and geological consultants and the sampling was performed accordingly.

Mineralogical examination of the garnet in the river sands within the Plenty River MLs indicates that the garnet is almost exclusively dominated by almandine (60%)-pyrope (30%)-grossular (up to 25%, but generally below 10%) solid solutions, and sourced from psammopelitic and pelitic gneisses and granulites and from garnetiferous amphibolites and amphibole granulites.

From the limited garnet hardness testing carried out to date, these garnets are exceptionally hard, with Knoop hardnesses ranging from 1600 to 2000; they were the hardest garnets known to be currently commercially available at the time. Furthermore, the individual grains are quite fresh and show little if

any sign of weathering; the grain morphologies are quite favourable, and leaching tests carried out on samples yield very low values of leachates.

As previously established, garnet grades in lower Spriggs and Upper Entire Creeks within the Entia Dome had an average grade of 15.6%. The measured garnet resource for the approximately 14km detailed sampling length has been reported on previously. This is a small but worthwhile resource, now shown to be economically viable. Northern Entire Creek, outside the Entia Dome, while probably possessing lower overall garnet grades is still quite prospective, since the creek widths on the floodplain are considerably larger, with much higher inferred resource tonnages.

Mineralogical work has demonstrated that there are two garnet populations in the heavy mineral fraction. The dominant “red” garnets, comprising approximately 67% of total garnet, are blocky angular fragments of originally larger garnet grains, largely derived from the Irindina Gneiss.

The remaining 33% comprise the “purple” or lilac garnets, which tend to be more rounded, resulting from the abrasion of generally smaller isolated dodecahedral grains, largely derived from the Riddock Amphibolite. These are comparatively clear, with few inclusions, but have correspondingly smoother edges, and are probably less hard (being relatively enriched in the grossular and pyrope components).

Both garnet populations are quite “clean”, having little or no clayey coatings or clayey crack infills. The overall blend of garnet should provide a product quality similar to that established for the Plenty River, which meets or exceeds all internationally accepted garnet quality criteria.

Metallurgical testing on the two bulk samples programs, and the 27”E” samples collected previously, assisted in the optimisation of separation techniques. Results to date serve not only to establish the viability of garnet production but have modified the envisaged processing stream to allow dry extraction of other industrial minerals if present in sufficient concentrations.

## **LOCATION AND ACCESS**

Mls 177; 178; 179; 182; and 185 are centred on the eastwards flowing Plenty River. Access is via the Plenty Highway, which runs east from the Stuart Highway, roughly subparallel to the Plenty River, mainly on its southern side. Numerous station roads and tracks run off the Plenty Highway, crossing the Plenty River, and in most places, rough and rarely used but quite navigable tracks run along parts of the banks of the River.

Access to the MLs 183 and 184 is via the Plenty Highway, to the Entire and Valley Bore road which turns off to the south. This road enters the Huckitta Dome through the gap in the low lying ranges at Mount Eaglebeak; continue south past Valley Bore, and turn east along the Spriggs Creek Bore road.

The Plenty Highway actually crosses Entire Creek several kilometres east of the Entire and Valley Bore road junction; from this crossing, the northern reaches may be accessed along the creekbed.

## **GEOLOGY**

The ELs that preceded Mls 177; 178; 179; 182; and 185 lie in the flood plain of the Plenty River, with little in the way of massive outcrops; numerous smaller outcrops and rock bars, however, indicate that for the most part, the riverbed lies in the mid-Proterozoic metamorphic rocks of the Harts Range Group. To the west, some of the shallow feeders cut through deeply weathered and essentially undifferentiated Lower Triassic rocks, but these have no real significance in terms of the garnet genesis or resource volume.

Of the Harts Range Group rocks, the most significant are the Irindina Gneiss, and the Riddock Amphibolite; both are heterogeneous, and may carry from zero to 18 volume% garnet, though the average for the Gneiss is closer to 10%. From a consideration of the regional geology, petrology and topography, it is evident that the sources of most of the garnet in the river sands are the two rock units named previously. There appears to be little if any contribution of grossular-andradite garnet from the rare calc-silicate rocks that are garnetiferous, and similarly, almandine-rich garnets from the weakly

garnetiferous lower grade schists to the north of the River have not contributed significantly to the overall garnet composition or grade in the river sands.

The geological-lithological distribution of rocks adjacent to the then ELs can be seen on the Alice Springs, Alcoota, Illogwa Creek and Huckitta 1:250,000 Geological maps. For a better appreciation of the distribution of petrological types, refer to the Geology of the Strangways Range Region, the Arltunga-Harts Range Special, and the Quartz 1:100,000 geological maps. Written summaries of the regional geology of the areas are presented in the notes to accompany the Geology of the Strangways Range Region, and the Arltunga-Harts Range Special 1:100,000 geological maps. There was no equivalent in print for the Quartz Geological map, however the compilation notes appear as BMR Record 23, 1982, [Shaw *et al.*]. The previous geological summary was compiled directly from the abovementioned references, which are not presented here.

The geology as it relates to MLs 183 and 184. The feed for the Entire Creek system is from the southwest, in fairly steep terrain from the rocks of the Early Proterozoic Harts Range Group, most specifically the Irindina Gneiss, and the Riddock Amphibolite, which are drained by the feeders of Spriggs and Entire Creeks. Both these rock units are heterogeneous, and may carry from zero to 18 volume % garnet, though the average for the Gneiss is closer to 10%. From a consideration of the regional geology, petrology and topography, it is evident that the sources of almost all of the garnet in the creek sands are the two rock units named previously. There appears to be little if any contribution of grossular-andradite garnet from the rare garnetiferous calc-silicate members within the Irindina Gneiss.

Most of lower Spriggs Creek actually traverses the Entia Gneiss, which is non garnetiferous, and is joined by Haddock Creek which also drains a smaller area of mostly Entia Gneiss. There is a little but noticeable drop in garnet grade at the confluence of Entire Creek with Inkamulla Creek, since the latter drains a large area of Entia gneiss. (Note that the Entia Gneiss is locally intruded by a suite of pegmatite's and hydrothermal veins, some of which carry minor amounts of garnet, however, this is volumetrically insignificant). Entire Creek drains the northern part of the Entia Dome, and once through the pass at Mount Eaglebeak, forms a flood plain cut by a number of channels which all drain towards the Plenty River. Over all its length, the dominant alluvium washed into the Entire is non garnetiferous, although a small western tributary (the so called "Red River") draining Irindina Gneiss does contribute

some garnet. Consequently the Entire creekbed has substantial sand volumes but of lower inferred garnet grades, whereas the Spriggs Creeks sands are volumetrically small, but of relatively high garnet grade.

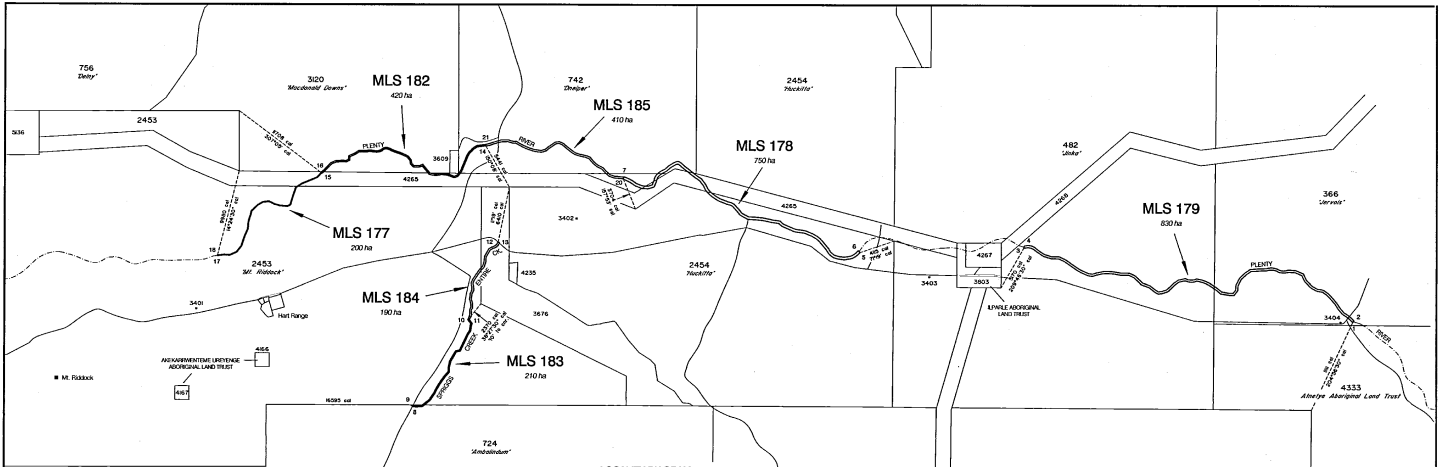
The geological-lithological distribution of rocks drained by the creek system can be seen on the Illogwa Creek and Huckitta 1:250,000 Geological maps. For a more detailed appreciation of the relevant rock types, refer to the Quartz 1:100,000 geological map which clearly shows the distribution of the garnet source rocks. Written summaries of the regional geology of the area encompassed by the EL are presented in the notes to accompany the Huckitta and Illogwa Creek 1:250,000 geological maps; there is no equivalent in print for the Quartz 1:100,000 geological map, however the compilation notes appear as BMR Record 23, 1982 (Shaw et al.).

## **METALLURGICAL AND ENGINEERING**

Previously, the garnet recovered from bulk sampling was used for a number of application or “performance” tests, and was also used, in part, in the metallurgical and extraction and processing plant engineering and design study undertaken at Readings Metallurgical Services (Lismore), supervised by metallurgist, Mr Kelvin Fiedler.

The primary part of the study was completed. The proposed plant was considered able, with little or no modification, to separate in many cases, a number of other saleable industrial minerals simultaneously with garnet. These may include one or more of magnetite, rutile, ilmenite, muscovite, biotite, the aluminosilicates, corundum, monazite and zircon.

Samples of sized garnet fractions from the bulk sampling, representing “production samples”, was sent to a number of domestic and overseas dealers and end users for their in-house testing and evaluation.



LOCALITY DIAGRAM  
Not to Scale

MLS 177		Approximate length 17.8 km		Approximate Area 205 Ha		RM 1		RM 2		MLS 183		Approximate length 12.4 km		Approximate Area 210 Ha		RM 1		RM 2	
#	Latitude	Longitude	Description	#	Latitude	Longitude	Description	#	Latitude	Longitude	Description	#	Latitude	Longitude	Description	#	Latitude	Longitude	Description
17	22°50'02.130S	134°51'08.214E	MLS177 SW	18	22°50'02.130S	134°51'08.214E	MLS177 SW	8	22°50'02.130S	134°51'08.214E	MLS183 SW	9	22°50'02.130S	134°51'08.214E	MLS183 SW	10	22°50'02.130S	134°51'08.214E	MLS183 SW
18	22°50'02.130S	134°51'08.214E	MLS177 NW	19	22°50'02.130S	134°51'08.214E	MLS177 NW	9	22°50'02.130S	134°51'08.214E	MLS183 NW	10	22°50'02.130S	134°51'08.214E	MLS183 NW	11	22°50'02.130S	134°51'08.214E	MLS183 NW
15	22°50'04.095S	134°50'58.802E	MLS177 SE	16	22°50'04.095S	134°50'58.802E	MLS177 SE	10	22°50'04.095S	134°50'58.802E	MLS183 SE	11	22°50'04.095S	134°50'58.802E	MLS183 SE	12	22°50'04.095S	134°50'58.802E	MLS183 SE
16	22°50'04.095S	134°50'58.802E	MLS177 S	17	22°50'04.095S	134°50'58.802E	MLS177 S	11	22°50'04.095S	134°50'58.802E	MLS183 S	12	22°50'04.095S	134°50'58.802E	MLS183 S	13	22°50'04.095S	134°50'58.802E	MLS183 S
Average width 0.115 km																			
Average width 0.175 km																			
Average width 0.225 km																			
Average width 0.2 km																			
Average width 0.19 km																			
Average width 0.246 km																			
Average width 0.18 km																			
Average width 0.18 km																			

<p>I, <b>SEAN JOHN BLASMAN</b> hereby certify that the survey described herein was carried out by me or under my direct supervision and that the data herein has been reduced in accordance with the relevant Survey Act and the Practice Direction.</p> <p>Surveyor's Name: <b>SEAN JOHN BLASMAN</b> Date: <b>15th Aug 2012</b></p> <p>Surveyor's Signature: <i>[Signature]</i></p>				<p>NAME: <b>BRUN RUSSELL SURVEYS PTY LTD</b></p> <p>100 HERRINGWOOD ROAD, BRUNNICK, VIC 3083</p>		<p>LEGEND</p> <p>Control Point:  Control Point</p> <p>High Watermark:  High Watermark</p> <p>Locust:  Locust</p> <p>Level Point:  Level Point</p>		<p><b>MINERAL LEASES S177, 178, 179, 182, 183, 184 AND 185 Plenty River Locality</b></p> <p>SCALE 1:200000</p> <p>S.2010/5</p>	
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CURRENT

While the previous metallurgical and engineering test work was comprehensive and a valuable data source, Inminerals took the view of re-evaluating the old process and recovery technology seeking new or improved techniques making the project more economic given the large distances from mine site to customer base. As such numerous discussion were held with engineering firms, ore samples were provided for fresh evaluation and test work and this reengineering work commenced. Not being overly satisfied with their performance it was decided to curtail those engineers involvement and seek alternative engineering options which meant starting the process again.



After the prospect of some new technological advancements the most recent engineering flow sheet\plant design returned the same as had already been settled on. Reassured to know the flow sheet\plant design was correct the first time, it's a little disappointing there was nothing new out there.

One of the main issues of concern to develop has been the lodging of a Native Title Claim application over an area of the Harts Range which covers a lot of the Inminerals tenement portfolio.

Even though analyses and controlled testing demonstrates ours to be superior in many ways, the flood of cheap Imports from Asia makes it tough to compete economically. Building a project like this is difficult in good times, with declining business conditions, and declining business sentiment everything just gets tougher. Add the recent Native Title Claim application over the bulk of Inminerals tenements and perhaps everything just got tougher again.

Suffice to say, the majority of Inminerals internal resources in recent times are being utilized in the corporate arena.

#### REGULATION 126 Statement

This document and its content are the copyright of the Inminerals Pty Ltd. The document has been written for submission to the Northern Territory Department of Mines and Energy as part of the tenement reporting requirements as per the Minerals Titles Act (NT).

ML's 177 – 178 –179 – 182 – 183 – 184 – 185 are mineral lease awaiting development therefore any information included in the report originates from historical reports and is listed in the "References" section at the end of the document. If any technical consultants in the exploration phase of the tenement included information from other Open File sources, it is unknown to the document writer, the 'relevant person'. Inminerals Pty Ltd authorises the department to copy and distribute the report and associated data at these tenements expiry.

#### REFERENCES

- EL7914 Chambigne Resources Pty Ltd 1993; 1994; 1995; 1996
- EL8004 Chambigne Resources Pty Ltd 1993; 1994; 1995; 1996
- EL8076 Chambigne Resources Pty Ltd 1994; 1995; 1996; 1997; 1998
- EL8384 Chambigne Resources Pty Ltd 1994; 1995; 1996; 1997; 1998
- EL8423 Chambigne Resources Pty Ltd 1994; 1995; 1996; 1997; 1998
- EL8829 Chambigne Garnet Pty Ltd 1993; 1994; 1995; 1996; 1997; 1998; 1999

EL6940 Clarence River Finance Group Pty Ltd 1994; 1995; 1996

EL7788 Clarence River Finance Group Pty Ltd 1994; 1995; 1996

EL9240 Clarence River Finance Group Pty Ltd 1996; 1997; 1998; 1999; 2000; 2001  
2002; 2003; 2004; 2005; 2006; 2007

EL9595 Chambigne Garnet Pty Ltd; Inminerals Pty Ltd 2003; 2004; 2005

MLS155-162 Clarence River Finance Group Pty Ltd; Chambigne Garnet Pty Ltd;  
Inminerals Pty Ltd 1995 through 2016 inclusive

MCS245-249 Chambigne Resources Pty Ltd;  
Inminerals Pty Ltd 2004 through 2016 inclusive

MLS177; 178; 179; 182; 183; 184; 185  
Chambigne Garnet Pty Ltd; Inminerals Pty Ltd 2012; 2013; 2014; 2015; 2016; 2017