

# Cluff Resources Pacific NL

ABN 72 002 261 565

12 December, 2003

The Manager (Companies),  
Australian Stock Exchange,  
Sydney, NSW, 2000.

Dear Sir,

## **TRIAL UNDERGROUND PRODUCTION TO COMMENCE ON COPETON DIAMOND FIELD**

The Company has commenced seeking tenders for sinking of a two metre by two and a half metre shaft to fifty metres depth on the Davis Block, at Mount Ross, Copeton. When the shaft is completed, a two and a half metres wide tunnel will be driven for fifty metres from its base across a buried river channel. The tunnel aims to recover diamonds from sediments at the base of the river, and determine their size, quality and value on the present wholesale market, to allow calculation of average grade for the part of the deposit accessed. An experienced mining contractor will carry out the mining program. It is budgeted at half a million dollars, and will be funded from monies received from the exercise of the Company's options during December.

The shaft is to be sunk between the Mount Ross Shaft and the Syndicate No 1 Shaft, in the centre of the Davis Block (See Figure 1 below).

The shaft and tunnel will provide access to an inferred resource of 200,000 tonnes of diamond bearing sediments with a grade of 250 carats of gem quality diamonds per hundred tonnes (see Figure 2 below). 2 kg/tonne of cassiterite (tin oxide) is also inferred. This exceptionally high grade is reported in mining literature of the early nineteenth century. Cluff's mining aims to confirm these high diamond grades, and allow determination of the most suitable mining methods for diamond production by the Company. Confirmation is expected that tunnelling in the inferred resource last century was very limited.

This Davis Block is the extension deeper beneath Mount Ross of the diamond bearing river channel worked nearer its outcrop by the Inverell Diamond Fields Company from 1897 to 1904 by the Deep Shaft, and then by the Deep Shaft Company until 1911. Four shafts subsequently accessed this Block, with high grades reported, but no large scale production has since been recorded. The Mount Ross Diamond and Tin Mining Company, which subsequently held this Block, had labour conditions suspended in 1916, perhaps due to a manpower shortage during the First World War. The Davis Block is additional to the inferred resource of one million tonnes at 50 carats per hundred tonnes reported in 1999, based on underground operations and diamond recovery by Audimco Limited, the company from which Cluff purchased the Copeton mining leases.

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If the shaft and tunnel successfully produce economic diamond grades, a second shaft will be established for safety and ventilation reasons, a permanent headframe will be installed, and the most suitable production method for the mining conditions will be trialed. Diamond bearing gravels produced will be processed through Cluff's currently operating trommel and jig plant, with a 2 km haul.

Whilst water deposited sediments are being targeted in this appraisal, the diamonds previously extracted from the Copeton deposits show few signs of long alluvial transport, and underground access is expected to provide further evidence of a local origin for these diamonds.

Although mine development on an inferred resource entails risks, the Board's opinion is that the cost of this shaft sinking is small in relation to potential profits. Much of the cost of developing a mine at Copeton has already been expended, with mining leases granted, exploration drilling completed, and a production plant operational on site. This underground development aims to capitalise on previous expenditure by the Company, and to quickly establish a positive cash flow for the Company as a diamond producer with access to half a million carats of gem quality diamonds.

Because of the unusual nature of the inferred resource calculation, a definition of an inferred resource, and the data upon which this one is based, is included in this report.

#### **TECHNICAL REPORT - INFERRED RESOURCE**

An inferred resource is one for which tonnage, grade and mineral content can be estimated with a low level of confidence. This resource is inferred, firstly from geological evidence of a buried river channel based on drilling by Cluff, and by Audimco Ltd during the 1970s and, secondly, from assumed but not verified geological continuity and grade continuity based on statements in century old publications. These state that exploratory tunnels were in a continuous run of diamond wash, and refer to the patchy nature of the alluvial, with spectacularly high grades interspersed with lower grades.

Within the inferred resource there may be areas below the selected cut off grade to ensure that the inferred mineral resource comprises a body of mineralisation of adequate size and continuity to properly consider mining. The location of such areas is uncertain, and inferred average grades are used in this resource.

#### **Basis of Inferred Resource**

The inferred resource is based on information gathered through shafts, tunnels, small mined areas, and drill holes. Shaft and tunnel information is of uncertain quality because although shafts have been reliably identified, the location of the tunnels extending from them, and small mined areas accessed by the tunnels is not known in most cases. The sources for the information include reports of the NSW Mines Department, contemporary newspaper reports, particularly the Australian Mining Standard, and a prospectus for the Mount Ross Diamond and Tin Mining Company NL, together with subsequent company reports. Many of these reports were written in an imprecise manner, and relied on field correspondents for their content, but the large number of sources provides generally consistent information.

Due to the uncertainty attached to this inferred mineral resource, it cannot be assumed that all or part of it will be upgraded to an indicated mineral resource as a result of continued evaluation. Confidence in the estimate is not sufficient to allow appropriate application of technical or economic parameters, or to enable an evaluation of economic viability. This inferred resource should not be used in economic studies.

#### **Geology**

The deposit of diamonds occurs in a "deep lead" (buried river channel) present beneath about fifty metres of basalt lava and lake sediments. The diamonds occur in extremely high grade "patches" within gravels and "wash" of the former river channel. The river deposits are about 120 metres wide, and the inferred resource extends along 450 metres of its length. To the south these river channel deposits were worked out during the period 1897 to 1911. They extend to the north for at least another 400 metres, but insufficient data is available to quantify the deposit in this area. The river predates the overlying basalt lavas, and was active before about 50 million years ago.

#### **Nature, Quality and Value of Diamonds**

1. Bulk sampling by Cluff and previous workers has shown that more than 90% of diamonds recovered during bulk sampling in many parts of Mt Ross, and the Copeton field, are of gem quality.
2. At Deep Shaft, Cotton (1915) notes that "the stones average three to the carat and are of good quality. From 40 to 50% of the stones are white, rather more are a light yellow, while a few are brown and green. Octahedral stones are conspicuous; probably 6 to 8 % of the diamonds being of this nature. A number of the crystals exhibit twinning. Pieces of Bort, several carats in weight, have also been found at this mine."

3. No microdiamonds have been identified on the Copeton Field. The minimum size of diamonds recovered by the Company during previous testing was 0.7 mm.
4. Based on Mt Ross DTM Co (1911), the composition of a sample of 707 carats in the Syndicate No 1 Shaft area was reconstructed as below:

| Size (carats) | No of Stones | Total Weight (carats) | Percentage (%) |
|---------------|--------------|-----------------------|----------------|
| > 5           | 1            | 5.5                   | 0.8            |
| > 2           | 17           | 33                    | 4.7            |
| > 1           | Say 66       | 66                    | 9.3            |
| > 0.5         | Say 498      | 249                   | 35.2           |
| < 0.5         | Uncertain    | 353.5                 | 50             |
| TOTAL         |              | 707                   | 100            |

#### **Mining Method Assumptions**

Mining methods will be assessed when access to the inferred resource is obtained.

#### **Metallurgical Assumptions**

Using a trommel and jig plant or diamond pan, both of which are owned by Cluff, a recovery of diamonds well in excess of 90% is anticipated.

#### **Cut-off Grades**

Available descriptions of the diamond bearing gravels state that highest grades are in a thin layer at the basement contact (Idress, 1948). This is common in river deposits. It is therefore assumed that wherever the base of the river deposit has not been eroded, the rich layer carrying the bulk of the diamonds is present, and the extent of this layer has been taken as the cut off of the extent of the resource.

#### **Extreme Grade Treatment**

In reporting grades, only grades from larger bulk samples or small scale mining, and statements as to the average grade throughout the mine have been used. Many instances of spectacularly rich grades are reported in the literature, but it is also stated in the literature that these will be averaged downwards by areas in which grades are poor (AMS, 1902). Hence the high grades have not been utilised in preparation of the inferred resource.

#### **Previous Extraction of the Inferred Resource**

Four shafts (Syndicate No 1, Mount Ross, Hills and Heath No 1, Davis) are recorded as accessing the inferred resource during the period 1911 to 1916. Available information indicates that the Mount Ross DTM Company, which owned the leases during that period, produced only about 2,600 carats. Total production recorded by the Mines Department from the Copeton field from 1912 to 1916 was 10,000 carats. Mines Department records show only prospectors working in the areas of the inferred resource after this period. Hence it is unlikely that large areas of the resource have been extracted. It is assumed, however, that 10% of the resource has been mined.

Portions of the deposit are considered to have reasonable prospects for eventual economic extraction, based on reported tunnelling and mining of small areas withinup to 1916, after which little production was recorded by the NSW Mines Department from this area of Mount Ross.

#### **Potential of the Deposit**

Comments in square brackets are by the author.

1. AMS (1913) (December 4) reports "As there is a large scope of deep country extending into the hills still unprospected, there is every reason to believe that development work will locate rich runs in the deeper ground – as this feature has characterised past operations".
2. Australian Mining Notes (1909-1913) states that "A low level tunnel is beyond the prospectors finances....Consequently upon this field acres and acres of ground, extending into the deep country in the hills, are unprospected, with every chance of being just as rich as were the surface shows.
3. AMS (1911) (November 30). "Some years ago, a rock shaft [Mount Ross Shaft] was commenced by the Star Company. It was abandoned after being sunk for about 40 feet. Rich faces, which were not easy to reach from the main shaft, were proved to extend in that direction, and the work promised well to repay expenditure. The Mount Ross Co. intends to bottom this shaft. The prospect of rich faces in this direction is almost assured, apart from what the Star Company left. The Deep Shaft Company is driving in the direction of the work proposed to be done by the new Company, and there is every chance of their meeting a similar rich deposit to that found in the Deep Shaft Mine." [The Company subsequently deepened the Shaft, and referred to "Ross" water drive', suggesting there may have been water problems encountered in mining. These can be now be addressed using modern mining techniques.]
4. AMS (1913), (December 4), reports that "The Rossmount Company own several [leases], occupying important positions in the centre diamondiferous area. One of these blocks – as the "Deep Shaft" mine – holds a prominent place amongst the diamond claims held, gems weighing up to four carats being obtained from it. The adjoining block, formerly known as "Davis's Shaft", has also produced deposits of tin and diamonds. As there is a scope of deep country extending into the hill still unprospected, there is every reason to expect that development work will locate rich runs."

#### **Tonnage Estimation Technique**

The resource tonnage was estimated by preparation of five cross sections across the deposit at 100 metre spacings, based on drillholes. The area of diamond bearing sediments was determined, assuming each section represented an area extending fifty metres to either side. A working thickness of two metres was assumed throughout the deposit, as this is the minimum that can be extracted by modern bulk mining techniques. The layer of diamond bearing material is always thinner than this, and the overlying lower grade or barren rocks, which also must be extracted, will dilute its grade. Tonnage was determined by using an in situ density of two tonnes per bank cubic metre, based on testing by Audimco Ltd during the 1970s.

### Grade Estimation Techniques

Grades in the "wash" reported below were corrected to a two metre thickness, assuming overlying material is barren. Notes in square brackets are explanatory additions by the author.

All grades in the past literature are in carats per "load". McNevin (1973) states that "a load comprised about three-quarters of a cubic metre of washdirt, and roughly approximated to one t.". Pittman (1901) describes the throughput of the Star of the South Mine as 300 cu yards per day in one part of his text, and as 300 loads per day in another. Assuming a load is one cubic yard, it would equate to 0.765 cubic metres. Field Geologists Manual (2000) gives a density for unconsolidated dry gravel after excavation of 1.4 g/cm<sup>3</sup>. Hence one cubic metre of dry gravel would weigh 1.4 tonnes, and 0.765 cubic metres (one load) would weigh 1.07 tonnes. For calculations below it has been assumed that mine measurements were approximate, and one load equals one tonne.

Line 9700 (Grade Assumed 150 carats per hundred tonnes)

1. Daily Telegraph, (1911), April 13, reports "The wash showing in the faces averages a thickness of about 2 ft, and produces about 50 lb of stream tin per load. The estimated diamond deposit of this claim [Deep Shaft Mine] averages 6 carats to the load throughout the mine." [This represents a grade corrected to a two metre thickness of 180 carats per hundred tonnes average for the mine.]
2. NSW Mines Department (1909) reports the recovery at Deep Shaft of 2,260 carats of diamonds from 224 loads of wash. Assuming a thickness for the "wash" of 0.3 metres (Cotton, 1915), this represents a grade of 151 carats per hundred tonnes. As production had only recommenced in about 1907, this is very likely from near this line, on the southern part of the lease, near Deep Shaft. It is also likely to be from development drives and hence representative of grades over extensive areas.
3. This grade is consistent with the average cut off grade of 187 carats per hundred tonnes over an undefined thickness being worked by the Inverell Diamond Fields Company at their mines (including Deep Shaft) when its mining operations were shut down (AMS, 1902).

Line 9800 (Grade assumed 200 carats per hundred tonnes)

1. AMS (1911) reported that "for the whole of the distance between these two shafts [beneath Line 9800] a continuous run of diamond wash has been met with".
2. It was reported (Mt Ross DTM Co, 1911) that a party of miners followed the lead for 700 feet to the north and northeast with improving values towards the centre of the Mount Ross Block [beneath this section and to its north].

Line 9900 (Grade assumed 260 carats per hundred tonnes)

1. AMS (1911) (20 April) reports, [apparently beneath Syndicate No 1 Shaft,] that the wash showing in the faces averages about two feet thick, and produces about 50 lbs of stream tin and 6 carats of diamonds to the load. This represents 180 carats of diamonds per hundred tonnes and 6 kg of SnO<sub>2</sub> per tonne over a two metre working thickness.
2. AMS (1911) (3 August) reports that "this rich diamond deposit (which is two feet thick) is estimated in prospects washed from the face to yield 150 carats per load." [This represents 4,500 carats per hundred tonnes over a two metre working thickness].
3. AMS (1911) (17 August) reports further rich developments, and the wash has increased from two feet to six feet in thickness.
4. AMS, (1911) (31 August). The Deep Shaft Party were on a very rich face of diamond wash, going from 20 carats to 150 carats to the load, and the depth of wash varies from 2 feet to 6 feet. [This averages a grade in excess of 600 carats per hundred tonnes over a two metre working thickness].
5. AMS (1911) (October 5), referring to Syndicate No 1 Shaft, states "In blocking out here a space of 18 ft by 20 ft produced over a thousand carats of diamonds." [This represents a grade of 750 carats per tonne over a two metre working thickness].
6. NSW Department of Mines (1911) reports 2,000 carats from 50 loads [600 carats per hundred tonnes], almost certainly from this area.

Line 10000 (Grade assumed to be 300 carats per hundred tonnes)

1. Cross (1911) "inspected the drives [north from Syndicate No 1 Shaft] extending to 150 feet from the boundary of the Davis property. The wash is heavy in the eastern drive [suggesting that there were two drives], and varies from two feet to six feet in depth. They have driven from the new shaft [Syndicate No 1] about 100 feet, with improving results going in a north easterly direction, and although cross drives have been put in at intervals, the width of the lead is not known, as it has not been crossed". Because of "improving results", a grade of 300 carats per hundred tonnes has been assumed for this area.

Line 10100 (Grade assumed to be 300 carats per hundred tonnes)

This line, to the north of the Mount Ross Shaft, is on the Davis Block.

2. Cross (1911) states "They have large heavy wash there; so was the Davis as far as they went. All the wash in the Davis block taken out was rich in tin and diamonds".
3. Cross (1911) continues "On the western side [of the Davis Block] both ends of the workings are rich. The eastern run [of the Davis Block, and almost certainly within the inferred resource] is, in my opinion, far better than anything that has yet been seen, as only the shallow and dry ground has been worked.
4. AMS (1911) (30 November) states that "During the time that the Star Co held this ground, [Davis's Block] rich faces were exposed in drives extending beyond this shaft. Some years ago a rock shaft was commenced by the Star Company. It was abandoned after being sunk for about 40 feet. Rich faces which were not easy to reach from the main shaft were proved to exist in that direction and the work promised well to repay expenditure. The Mount Ross Company intends to bottom this shaft. The prospect of rich faces in this direction is almost assured, apart from what the Star Company left.

5. At Hills and Heath No 1, AMS (1921) (8 September) from a primitive trial of this wash deposit – a bucketful or two – four diamonds were obtained. The Party, on indications revealed, are almost sure to open up rich tin and diamond bearing wash.
6. On this basis a grade continuation to the north of 300 carats per hundred tonnes is assumed for this line.

#### Inferred Resource Summary

| Line No | Assumed Grade (2 metre working face)(carats/100tonnes) | Assumed tonnage (tonnes) | Total carats (carats) |
|---------|--------------------------------------------------------|--------------------------|-----------------------|
| 9700    | 150                                                    | 24,000                   | 36,000                |
| 9800    | 200                                                    | 54,000                   | 108,000               |
| 9900    | 260                                                    | 48,000                   | 124,800               |
| 10000   | 300                                                    | 52,000                   | 156,000               |
| 11000   | 300                                                    | 60,000                   | 180,000               |
|         | Total                                                  | 238,000                  | 604,800               |

Assuming 10% of the deposit is worked out, with rounding off of the figures, this represents an available tonnage of 200,000 tonnes at an average grade of 250 carats per hundred tonnes.

#### Technical Data

Drillholes utilised in the study include composite percussion, blade and core drilled holes, and Calweld large diameter holes, and were professionally logged. In most cases the river channel was drilled by blade bit, and logged by cuttings. 35 drillholes were utilised in the interpretation. A diamond was recovered from one Calweld drillhole, and from mullock around shafts. Processing was by a small attrition mill and jig. Holes were located by theodolite survey. This drilling density is sufficient to establish continuity of the deep lead deposit over the area studied.

#### Tenure

The resource is located on MLs 1058, 1083, 5904 and ELA 1952. The area is owned by the Department of Land and Water Conservation, and is partly within a reserve managed by the local Council.

#### REFERENCES

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The information in this report that relates to mineral resources is based on information compiled by Peter John Kennewell, who is a corporate member of the Australasian Institute of Mining and Metallurgy. Peter John Kennewell is employed by Kennent Pty Ltd, a consultant to the Company. Peter John Kennewell has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a competent person as defined in the 1999 Edition of the "Australasian Code for Reporting of Identified Mineral Resources, and Ore Reserves". Peter John Kennewell consents to the reporting of the matters based on their information in the form and context in which it appears.

Yours faithfully,



Peter Kennewell,  
Managing Director



