UR1981-40

1981/40. Chromite investigations, Beaconsfield

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Abstract

The total probable ore reserve, weighting grades by block tonneages at 4 mass percent chromite cut off grade, is 331 000 t at 8.6 mass percent chromite, with a block weighted overburden depth of 8.1 m and a stripping ratio of 3:1.

At 6.5 mass percent chromite cut off grade, the total probable ore reserve is 149 000 t at 14.4 mass percent chromite. For this reserve, the block weighted overburden depth is 11.6 m and the equivalent stripping ratio is 5:1.

INTRODUCTION

This report covers investigations conducted by the Tasmania Department of Mines (DOM) in the South Rifle Range (SRR) Prospect of Northern Chromite Pty Ltd. A complete account of investigations conducted until early 1980 was given by Summons (1980). The present report provides a:

(1) *summary to date,*

(2) *calculation of the total probable chromite ore reserves in the SRR Prospect,*

(3) *indication of aspects of current concern*

which may affect the eventual exploitation of the chromite deposit in the SRR Prospect.

When using the term 'ore' in a strictly technical sense (*e.g.* a body comprising an aggregate of minerals that can be extracted profitably), with reference to *industrial minerals* one tends to find that *factors additional to bore hole intersections and assay results can have a profound bearing upon reserves assessment.* Some of these factors are:

(1) Product specification

(2) In-situ characteristics

(3) Processing technology

(4) Environmental considerations

(5) Transport distance

(6) Market considerations

In the case of industrial minerals these factors commonly predominate, whereas for metals they tend to be subordinate.

Processing technology (*i.e.* beneficiation), in particular, of industrial minerals tends to be both specialised and not widely understood. Thus it can easily happen that a particular organisation with appropriate experience can produce a specification product where many others have failed (White *et al.*, 1979).

Chromium (Cr) has an atomic number of 24 and an atomic weight of 51.996. To convert Cr_2O_3 assay results to Cr mass percent, the following calculation must be performed:

$$\text{Molecular weight of } Cr_2O_3 = (51.996 \times 2) + (15.9994 \times 3)$$
$$= 103.992 + 47.9982$$
$$= 151.99$$
$$\therefore \frac{Cr}{Cr_2O_3} = \frac{103.992}{151.99}$$
$$= 0.6842$$
$$\therefore \textit{Cr (mass\%)} = \textit{Cr_2O_3 (mass\%) x 0.68}$$

The refractory industry has found chromite ($FeCr_2O_4$) useful for forming bricks and shapes, as it has a *high melting point* (1857 ± 20°C), *moderate thermal expansion and stability of crystalline structure* (Weast, R.C. (ed.), 1975).

OUTLINE OF CHROMITE INVESTIGATION ACTIVITY, OCTOBER 1978 TO JULY 1981

Northern Chromite Pty Ltd hold Mineral Leases 67M/72 and 68M/70, as well as an extensive exploration area (E.L. 11/79, 44 km^2) in the vicinity of Beaconsfield. Regular production of a concentrate containing 99% chromite had commenced in November 1977 (Summons, 1978) at Barnes Hill. He reported that an area of potential eluvial/alluvial chromite in the Rifle Range area to the north-east of Barnes Hill was overlain by approximately 20 m of Cainozoic piedmont gravels. Examination of assay plans for the Barnes Hill chromite deposit indicated that the Rifle Range area may contain high-grade deep-lead gutters of grade >12 mass% chromite surrounded by low grade sand and gravels grading 4-12 mass% chromite (Summons, 1978).

Hill (1979) reported the following:

Area	Tonneage potential	Cr_2O_3 (mass%)	Chromite equivalent (mass%)	Overburden	Comment
Rifle Range	400 000	8.28	12.17	Up to 30 ft (9 m)	Overburden is gravel; based on 5 churn drill holes by Tas. Dept. of Mines

The factor for conversion of mass% chromium (assay results from the DOM Launceston Laboratory) to mass% chromite is 2.4 ± 6% (Summons, 1980). Samples of varying grade from the Barnes Hill treatment plant were also used for the determination of density factors by the Launceston laboratory; the results were plotted on a graph of *density* versus *mass% chromite* which has the form of a line between the points 1.77 t/m^3 at 0.0 mass% chromite and 2.76 t/m^3 at 100 mass% chromite (Summons, 1980).

Summons concluded that the laboratory results, in conjunction with the probable ore reserve data, indicated the SRR Prospect to be of similar size, but of higher grade than the pre-mining reserve of the Barnes Hill mine. The results also suggested that a commercially viable mining operation could be established on the SRR Prospect.

A pilot run of South Rifle Range (SRR) 'ore' in the Barnes Hill treatment plant yielded the following results:

From approximately 100 tonnes of 'ore' excavated from a costean, 6.75 tonnes of concentrate were recovered (mould sand, +150 μm). This concentrate assayed:

50.2%	Cr_2O_3
13.4%	Al_2O_3
21.1%	FeO
9.0%	MgO
93.7%	

This grade of Cr_2O_3 was regarded as satisfactory and further work on the South Rifle Range (SRR Prospect) was forecast (Fox, 1980*a*).

Previous percussion drilling had shown that in PBRR-7 the recoverable chromite intersection was 2.25 m @ 9.3% and 2.95 m @ 13.5% in PBRR-9. A test pit (costean) measuring 22 m x 4 m x 10 m (depth) excavated between these two percussion holes yielded the following information (Krummei, 1980):

overburden: 8 m (gravels)
chromite horizon: 2 m (mainly foetid dark-green, plastic clay)
dry tonnes treated: 105 t
grade of head feed: 7.02% (total heavy mineral (7.37 t))
recovery: 4.75 t mould sand [+105 μm?]
recovery of +105 μm material: 88% (negligible free iron oxide)
head feed chromite: 65.8% +105 μm (accords with DOM analyses)
stripping ratio at Barnes Hill: virtually zero
stripping ratio at Rifle Range: 6 t waste/1 tonne ore

In mid-1980, Hill (1980) reported that the programme of geological mapping and auger sampling over the exploration licence area had been temporarily shelved pending:

(1) outcome of possible overburden sales,
(2) identification of assured product markets.

Preliminary tests had indicated the presence of recoverable ore reserves at the Rifle Range Prospect. However, preliminary results required further testing to determine:

(1) proven ore reserves at an economic head-feed grade,
(2) product acceptance of the coarse chromite sand after extensive trials to be conducted in various foundries (Fox, 1980*b*).

Summons *et al.*, (1980) reiterated the assessment that indicated ore reserves in the SRR Prospect were comparable in tonneage, but higher in grade than the pre-mining reserve at Barnes Hill.

A costean (60 m long and 10 m wide) excavated in October 1980, adjacent to the test pit described above (Krummei, 1980) yielded the following results (Fox, 1981*a*):

'In each case (PBRR-7 and 9) the base of the ore zone was marked by the occurrence of moderately to highly weathered serpentinite. Mining of the costean showed that the mode of occurrence of the chromite in the clay bore an alarming similarity to Barnes Hill in that there was considerable irregularity in both ore zone thickness and grade. The depth of mining along the costean ranged from 0.5 m to 5.0 m, with grades ranging from near barren ore to something approaching the anticipated grade. Much of the clay was very sticky and plastic. The silicon (Si) content and the sizing of the product (after treatment) were in accordance with mould sand requirements. However, the grains showed a very dull appearance which was found to be due to severe clay coating on the grains.

treated: 880 t [dry tonnes?]
grade: 5.07% heavy mineral
recovery: 10.5 t of mould sand
product assaying 48% Cr_2O_3
(compared with 55 to 57% Cr_2O_3 for Barnes Hill)
and a grain fineness number (GFN) of 49.6
(compared with a GFN of 65-70 for Barnes Hill)'

Summons (1981) summarised DOM drilling and laboratory results completed/received up until 22 May 1981, as follows:

Drill hole number	Interval (m)	Results	Magnetic separation results *	Approx. chromite grade (%)	Grade reliability
PBRR-7		+	Early generation drilling. Results summarised by Summons (1980).		
PBRR-8		+			
PBRR-9		+			
PBRR-10		+			
PBRR-11		+			
PBRR-17	13-16	+	MA1 : Cr_2O_3 up to 42% MA2 : Cr_2O_3 up to 42%	0.4	reliable
PBRR-18	9.8-11	+	MA1 : Cr_2O_3 up to 42% MA2 : Cr_2O_3 up to 42%	6.5	reliable
PBRR-19	2-4	+		5	reliable
PBRR-21	12-15	+	MA2 : Cr_2O_3 from 51.3% to 55.1%	14	part reliable
PBRR-22	7-8			4	grab sample
PBRR-23					
PBRR-24	8-9	+	MA1 : Cr_2O_3 up to 42% MA2 : Cr_2O_3 up to 40%	5	part reliable
PBRR-25	5-7.9			4	grab sample
PBRR-26	6-7			5	grab sample
PBRR-27, 28, 29	sub-economic grade and coincidentally lying outside the original prospect area.				

* Mass% chromite figures in the two magnetically separated fractions make interpretation of results in this table difficult.

Summons (1981) concluded from the above table that 'any estimate of reserves is precluded until a complete appraisal of the nature of the chromite in the SRR Prospect is made'.

RESERVE ASSESSMENT

With due regard for the above remarks, Tables 1 and 2 enable the calculation to be made of a *total probable ore reserve* for the SRR Prospect. A summary of this reserve calculation is presented in Table 3.

Wellington (1981*a*) comments upon the analytical results found in the above tables:

'Head assays were calculated from the results obtained after sizing the samples on 600 µm and 150 µm screens, then magnetically separating the individual size fractions. *All material sizing above 1.4 mm and that lost in desliming were excluded from the magnetic separation (and hence the chromite assay) as neither size would be recovered in the mill circuit.*

The grade of chromite recovered from samples from PBRR-17 to 24 exceeded 50% Cr_2O_3 in only three cases. The average value of the (weakly) magnetic material (MA2) in all the other samples was less than 40% Cr_2O_3.

It would thus appear that *most of the spinel in the area* represented by this drilling *is low chromium spinel and unsuitable for foundry sand even it if were of higher grade than has been found in the head samples.*

The results (for sample 8.0 m - 9.0 m in PBRR-24 and onwards) in the calculated assay apply only to the size fractions +600 µm, +150 µm and -150 µm. Material coarser than 1.4 mm and slime have been excluded. The material thus excluded varies widely, ranging from 18 mass% to 66 mass%. It could be said that, in general terms, about half has been excluded, and this is quite a significant quantity (note that PBRR-25 and 26 have been excluded from the reserve assessment). While noting that the grab sampling used to get a quick grade indication was roughly down the bias, when comparing these results with those calculated from the accurately-sampled size-fractions, lower results are obtained. The conclusion is that of the total chromite in the ground, a lot would be irrecoverable in a treatment plant that excluded coarser material and slime from the chromite recovery units.'

Furthermore, it appears the head assay must be discounted for the fine chromite it embraces and the coarse chromite it excludes. Most of the chromite appears to assay less than the required 50 mass% Cr_2O_3 (Wellington, 1981*b*). However, concerning treated material extracted from the costeans excavated between PBRR-7 and 9, (Fox, 1981*b*) reports that product acceptance is good following trials conducted by various foundries.

Overburden depths for the SRR Prospect are presented in Table 4, whilst stripping ratios are to be found in Table 5.

ASPECTS OF CURRENT CONCERN

Cr_2O_3 assays obtained from magnetic separation (MA1 - iron oxide spinel (magnetite) and MA2 - chromite) show approximately equal occurrence of Cr_2O_3 in both magnetically-separated fractions, although mass MA1 << mass MA2, with minor exceptions. Only rarely does the grade of chromite exceed 50% Cr_2O_3 in MA2. Disturbingly, MA1 contains Cr_2O_3 values which in some cases are greater than the values of Cr_2O_3 found in the MA2 fraction. This indicates that iron oxides may be a problem in the mould sand product.

Table 1. ASSAY DATA (TOTAL CHROMITE), BEACONSFIELD (SOUTH RIFLE RANGE) CHROMITE DRILLING

Percussion drill hole number	Depth interval sampled (m)	Width (m)	Cr (mass%) (Cr_2O_3 x 0.6842)	Chromite (mass%) (Cr x 2.4)	Bulking	
					4 mass% chromite cutoff	6.5 mass% chromite cutoff
PBRR-7	8.0- 9.0	1.0	1.50	3.60		-
	9.0-10.0	1.0	6.10	14.64	2.25 m @ 10.70% chromite	1.25 m @ 16.30% chromite
	10.0-10.25	0.25	9.60	23.04		
PBRR-8	11.0-12.0	1.0	2.80	6.72	3 m @ 8% chromite	2 m @ 9.10% chromite
	12.0-13.0	1.0	4.80	11.52		
	13.0-14.0	1.0	2.40	5.76		-
PBRR-9	9.8-10.0	0.2	7.20	17.28		2.2 m @ 20.20% chromite
	10.0-11.0	1.0	14.3	34.32	2.95 m @ 16.30% chromite	
	11.0-12.0	1.0	2.8	6.72		
	12.0-12.75	0.75	2.0	4.80		-
PBRR-10	14.5-15.0	0.5	1.60	3.84	2.5 m @ 4.00% chromite	-
	15.0-16.0	1.0	1.20	2.88		-
	16.0-17.0	1.0	2.10	5.04		-
PBRR-11	8.0- 9.0	1.0	5.20	12.48		3.0 m @ 15.60% chromite
	9.0-10.0	1.0	8.30	19.92	6.0 m @ 9.60% chromite	
	10.0-11.0	1.0	6.0	14.40		
	11.0-12.0	1.0	1.20	2.88		-
	12.0-13.0	1.0	1.70	4.08		-
	13.0-14.0	1.0	1.70	4.08		-

Table 1. (continued)

Percussion drill hole number	Depth interval sampled (m)	Width (m)	Cr_2O_3 (mass%)	Cr (mass%) (Cr_2O_3 x 0.6842)	Chromite (mass%) (Cr x 2.4)	Bulking	
						4 mass% chromite cutoff	6.5 mass% chromite cutoff
PBRR-17	13.0-14.0	1.0	2.3	1.574	3.78	3.0 m @ 4.9% chromite	1.0 m @ 6.9% chromite
	14.0-15.0	1.0	4.2	2.874	6.90		
	15.0-16.0	1.0	2.4	1.642	3.94		
	16.0-17.0	1.0	1.7	1.163	2.79	-	
PBRR-18	10.0-11.0	1.0	4.9	3.353	8.05	1.0 m @ 8.1% chromite	1.0 m @ 8.1% chromite
PBRR-19	0.0- 2.0	2.0	1.0	0.684	1.64		-
	2.0- 4.0	2.0	3.8	2.600	6.24	2.0 m @ 6.2% chromite	
PBRR-21	12.0-13.0	1.0	15.4	10.537	25.29	3.0 m @ 17.4% chromite	3.0 m @ 17.4% chromite
	13.0-14.0	1.0	11.6	7.937	19.05		
	14.0-15.0	1.0	4.7	3.216	7.72		
PBRR-22	4.0- 6.0	2.0	1.0	0.684	1.64	-	
	6.0- 7.0	1.0	1.8	1.232	2.96	2.0 m @ 4.0% chromite	-
	7.0- 8.0	1.0	3.0	2.053	4.93		-
PBRR-23	4.0- 5.0	1.0	3.0	2.053	4.93	2.8 m @ 5.7% chromite	
	5.0- 6.0	1.0	3.9	2.668	6.40		-
	6.0- 6.8	0.8	3.5	2.395	5.75		
PBRR-24	6.0- 8.0	1.0	0.1	0.068	0.16	-	
	8.0- 9.0	1.0	2.9	1.984	4.76	1.0 m @ 4.8% chromite	-

Table 1. (continued)

Percussion drill hole number	Depth interval sampled (m)	Width (m)	Cr_2O_3 (mass%)	Cr (mass%) (Cr_2O_3 x 0.6842)	Chromite (mass%) (Cr x 2.4)	Bulking	
						4 mass% chromite cutoff	6.5 mass% chromite cutoff
PBRR-25	5.0- 6.0	1.0	1.8	1.232	2.96)	)	)
	6.0- 7.0	1.0	1.9	1.300	3.12)	-)	) -
	7.0- 7.9	0.9	1.1	0.753	1.81)	)	)
PBRR-26	4.0- 6.0	2.0	0.3	0.205	0.49)	)	)
	6.0- 7.0	1.0	2.4	1.642	3.94)	)	)
	7.0- 8.0	1.0	0.9	0.616	1.48)	-)	) -
	8.0- 9.0	1.0	1.2	0.821	1.97)	)	)
	9.0-10.0	1.0	0.7	0.479	1.15)	)	)

Table 2. PROBABLE TOTAL CHROMITE ORE RESERVES, SRR PROSPECT

Percussion drill hole number	Intersection data		Area of influence (m^2)	Volume of influence (m^3)	Density factor (t/m^3)	Tonnes
	Width (m)	Weighted chromite grade (mass%)				
(*a*) 4 mass% chromite cutoff:						
7	2.25	10.70	5640	12 690	1.88	23 857
8	3.0	8.0	8400	25 200	1.85	46 620
9	2.95	16.3	5600	16 520	1.93	31 884
10	2.5	4.0	7320	18 300	1.81	33 123
11	6.0	9.6	6280	37 680	1.87	70 462
17	3.0	4.9	3520	10 560	1.82	19 219
18	1.0	8.1	6320	6 320	1.85	11 692
19	2.0	6.2	7400	14 800	1.83	27 084
21	3.0	17.4	4400	13 200	1.94	25 608
22	2.0	4.0	3800	7 600	1.81	13 756
23	2.8	5.7	3800	10 640	1.83	19 471
24	1.0	4.8	4320	4 320	1.82	7 862
25	-	-	2760	-	-	-
26	-	-	3200	-	-	-
					Total =	330 638

(*a*) 4 mass% chromite cutoff grade:
The *total probable ore reserve*, weighting grades by block tonneages, *is 331 000 t @ 8.6 mass% chromite*. This is a decrease in tonneage of approximately 100 000 t, and a decrease in grade of approximately 1.4 mass% chromite from reserves calculated by T.G. Summons in February 1980.

Table 2. (continued)

Percussion drill hole number	Intersection data		Area of influence (m^2)	Volume of influence (m^3)	Density factor (t/m^3)	Tonnes
	Width (m)	Weighted chromite grade (mass%)				
(*b*) 6.5 mass% chromite cutoff:						
7	1.25	16.3	5640	7 050	1.93	13 607
8	2.0	9.10	8400	16 800	1.86	31 248
9	2.2	20.2	5600	12 320	1.97	24 270
10	-	-	-	-	-	-
11	3.0	15.6	6280	18 840	1.93	36 361
17	1.0	6.9	3520	3 520	1.84	6 477
18	1.0	8.1	6320	6 320	1.85	11 692
19	-	-	7400	-	-	-
21	3.0	17.4	4400	13 200	1.94	25 608
22	-	-	3800	-	-	-
23	-	-	3800	-	-	-
24	-	-	4320	-	-	-
25	-	-	2760	-	-	-
26	-	-	3200	-	-	-
					Total =	149 263

(*b*) 6.5 mass% chromite cutoff grade:
The *total probable ore reserve,* weighting grades by block tonneages, *is 149 000 t @ 14.4 mass% chromite.* This is a decrease in reserves of approximately 80 000 t, and a decrease in grade of approximately 0.7 mass% chromite, from reserves calculated by T.G. Summons in February 1980.

Table 3. SOUTH RIFLE RANGE PROSPECT. SUMMARY OF TABLE 2

Total probable ore reserve	Cutoff grade (mass%)			Tonnes	Grade (mass%)		
	Cr	Cr_2O_3	Chromite		Cr	Cr_2O_3	Chromite
Total	1.67	2.44	4.0	331 000	3.58	5.24	8.6
Total	2.71	4.00	6.5	149 000	6.0	8.77	14.4

However, the mould sand product milled from material extracted from costeans excavated on the SRR Prospect has consistently assayed greater than approximately 48% Cr_2O_3. Following trials, this product has been favourably received by various foundries.

To be sure of chromite reserve estimates calculated from the head assay result furnished by the laboratory, a complete appraisal of the chemical structure of the chromite in the SRR Prospect needs to be undertaken.

Furthermore, chromite concentrate from the SRR Prospect should also be analysed by electron microprobe to determine the chromite conversion factor, enabling accurate conversion of assay results from Cr (Cr_2O_3) mass% to chromite mass%. The chromite conversion factor used in this report is that obtained from electron microprobe analyses performed on six samples of chromite concentrate from Barnes Hill ore produced by the Northern Chromite Pty Ltd treatment plant (Summons, 1980).

Investigations to increase the recovery of chromite oversize and slimes in the mill circuit need to be undertaken on 'ore' material from the South Rifle Range Prospect.

STRIPPING RATIO CALCULATION

Table 4. CALCULATION OF OVERBURDEN DEPTHS, WEIGHTING DEPTHS BY BLOCK AREAS.

Percussion drill hole number	4 mass% chromite cutoff		6.5 mass% chromite cutoff	
	Depth to ore horizon (m)	Area of influence (m^2)	Depth to ore horizon (m)	Area of influence (m^2)
PBRR-7	8.0	5 640	9.0	5 640
PBRR-8	11.0	8 400	11.0	8 400
PBRR-9	9.8	5 600	9.8	5 600
PBRR-10	14.5	7 320	-	-
PBRR-11	8.0	6 280	8.0	6 280
PBRR-17	13.0	3 520	14.0	3 520
PBRR-18	10.0	6 320	10.0	6 320
PBRR-19	2.0	7 400	-	-
PBRR-21	12.0	4 400	12.0	4 400
PBRR-22	6.0	3 800	-	-
PBRR-23	4.0	3 800	-	-
PBRR-24	8.0	4 320	-	-
	Total =	66 800	Total =	35 760

(*a*) 4 mass% chromite cutoff:
The *average overburden depth*, weighting depths by block areas, *is 8.1 m.*

(*b*) 6.5 mass% chromite cutoff:
The *average overburden depth*, weighting depths by block areas, *is 11.6 m.*

Table 5. SUMMARY

Mass% chromite cutoff	Over-burden depth (m)	Area of influence (m^2)	Volume of over-burden (m^3)	Density of over-burden (t/m^3)	Over-burden tonneage (t)	Probable ore-reserve (t)	Ore reserve grade (mass% chromite)	Stripping ratio	
								Exact	Approx.
4	8.1	66 800	543 000	1.50	814 500	331 000	8.6	2.5	3
				1.77	961 000			2.9	
6.5	11.6	35 760	414 000	1.50	621 000	149 000	14.4	4.2	5
				1.77	733 000			4.9	

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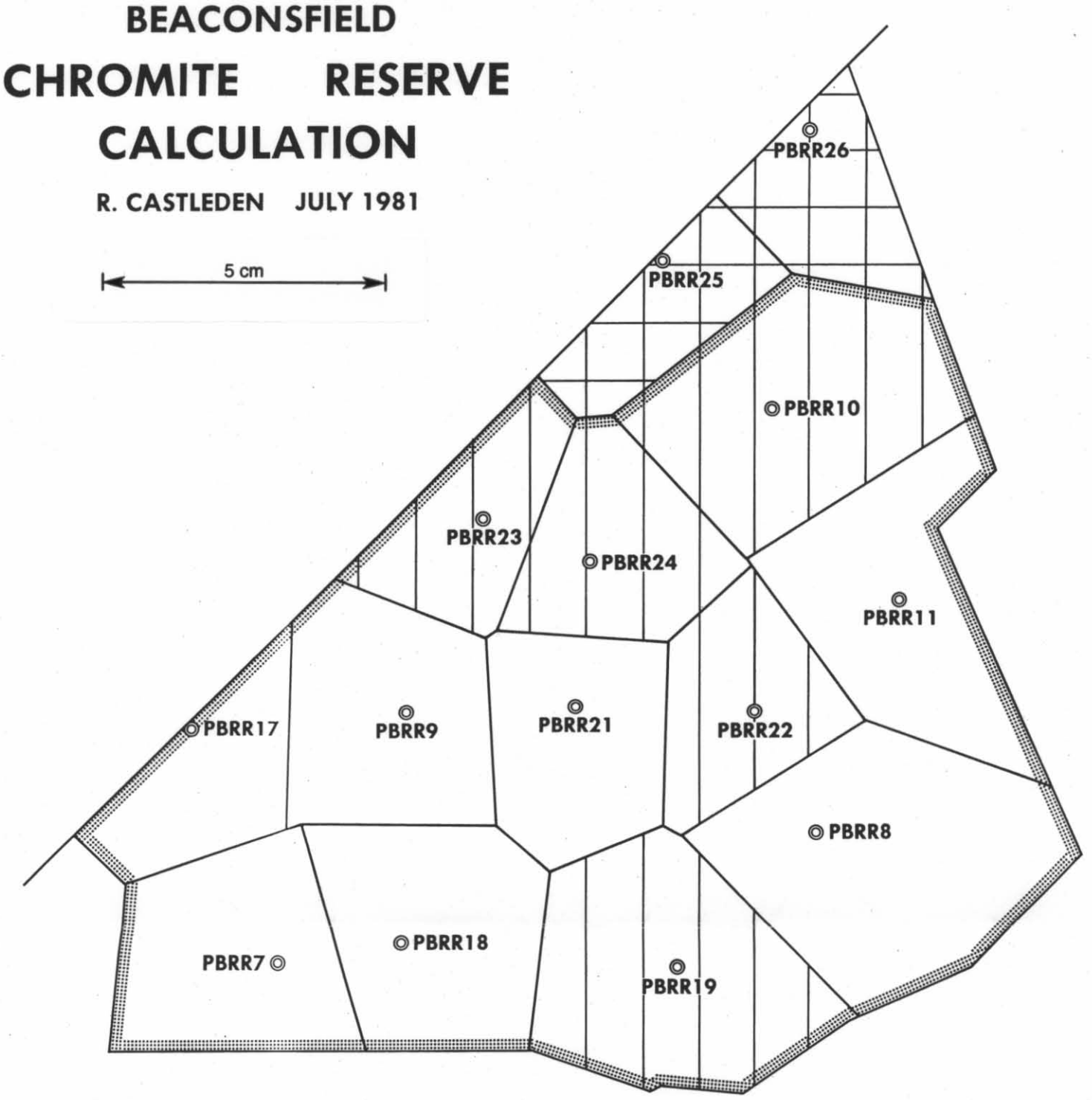
[18 August 1981]

SOUTH RIFLE RANGE PROSPECT, BEACONSFIELD

CHROMITE RESERVE CALCULATION

R. CASTLEDEN JULY 1981

5 cm



481500 m E
482000 m E
5438000 m N
5437500 m N
100
900
800
700
600

PBRR8 — Percussion drill hole number and location.

Area of influence of percussion drill hole.

Boundary of area included in reserve calculation, having cut–off grade of 4 mass % chromite.

Area excluded from the above calculation.

Area excluded from the above reserve calculation, made with a cut–off grade of 6.5 mass % chromite.

0 50 100 150 200m.

600 700 800 900

FIGURE 1

CARTOGRAPHY: G. J. DICKENS

5 cm

NORTH AND SOUTH RIFLE RANGE PROSPECTS - BEACONSFIELD

T.G. Summons. 1979.

0 50 100 150 200 m.

5 cm

CAINOZOIC

QUATERNARY
- Qs — Sand derived from Cainozoic conglomerate (Cg).
- Qp — Boulder – cobble – gravel derived from Permian strata.
- Cg — Boulder – cobble – pebble conglomerate (undifferentiated into the older and younger members)

TERTIARY
- Tbp — Beach / channel bar placer, consisting of secondary silica platelet and / gravel, heavy minerals (predominantly chromite), and quartz sand
- Tfl — Ferruginous laterite (rock enriched in limonite etc.) 'OLDER LATERITE'
- Tsl — Siliceous laterite (serpentinite replaced by skeletal and cellular textured secondary silica).

ORDOVICIAN
- Oct — Cabbage Tree Formation – quartz sandstone with chert and quartz conglomerate.

CAMBRAIN
- €p — Pyroxenite.
- €s — Serpentinite derived from either pyroxenite or peridotite.
- €s (Hw) — Highly weathered serpentinite occuring immediately beneath Tsl.
- €sl — Slate and greywacke.
- Qs/€s — Quaternary sand overlying Cambrian serpentinite.
- Qs/€s/€p — Quaternary sand overlying either Cambrian serpentinite or pyroxenite.
- Cg/Oct — Cainozoic conglomerate indirectly overlying Ordovicain Cabbage Tree Formation.
- Cg/€s — Cainozoic conglomerate indirectly overlying Cambrian serpentinite

Geological boundary – position accurate (surveyed boundary of conglomerate).
Geological boundary – position approximate.
Geological boundary – position inferred.
Photo lineament

94 — Seismic refraction traverse, with R.L. in (m)
PBRR7 (108) — Percussion drill hole collar (all holes vertical) with R.L. (m) shown in brackets.
Contours on the reminant early Tertiary? marine depositional surface (equivalent to the eroded Older laterite surface). Contour interval 2m South Prospect) and 1m (North Prospect).
Ore reserve polygonal block boundary (4% chromite cut off).
63.36 — Chromite factor (intersection width X chromite 1% chromite cutoff.

PBRR16 (99.1)
PBRR4 (97.3) 17.73
PBRR14 (100.4) 42.1
PBRR15 (98.6) 10.0
PBRR3 (107.1)
PBRR2 (109)
PBRR5 (112)
PBRR6 (124)
PBRR7 (124.7) 26.28
PBRR8 (100.3) 26.28
PBRR9 (117.5) 52.57
PBRR10 (95.5) 10.80
PBRR11 (94.1) 63.36
PBRR12 (101.5)
PBRR13 (77.4)
PBRR1 (116.3)

NORTH PROSPECT
SOUTH PROSPECT

068° 033° 140° 045° 124° 155° 095°

Tbp float
? Quartz – feldspar – tourmaline dyke.
Gabbro and albitite float and subcrop

54 39 000 m N
54 38 000 m N
54 37 500 m N
482 000 m E