BARNES HILL CHROMITE DEPOSIT

BEACONSFIELD
MINERAL DISTRICT
TASMANIA

By
RH Wilpolt

2 February 1971

000

912002

2nd February, 1971.

Mr. W. P. Murphy,
Tennant Trading (Australia) Pty. Limited,
Gold Fields House,
Sydney Cove. 2000.

Dear Mr. Murphy,

BARNES HILL CHROMITE DEPOSIT

BEACONSFIELD MINERAL DISTRICT

TASMANIA

At the request of Tennant Trading (Australia) Pty. Limited, I spent November 9 and 10, 1970 in making a geological examination of the above deposit. I was accompanied in the field for one-half day by your Mr. G. Ross and Mr. Petuley, a member of the Syndicate, spent the full two days showing me around the property.

The Barnes Hill Deposit is located approximately 2 miles west of the Township of Beaconsfield, County of Devon and is easily accessible from Beaconsfield by an all-weather road. To concentrate the ore the Syndicate had built a sluice and were awaiting the arrival of a 40 mesh screen.

GENERAL GEOLOGY

The general geology of the immediate area is shown on the attached map entitled, "Asbestos in Tasmania". The chromite, in Barnes Hill and other nearby deposits, has been derived from the weathering of serpentinite which underlies large areas of the valley of Andersons Creek. Chromite has been observed in places as small octahedra disseminated in the serpentinite and in local concentrations as "veinlets" up to 2 inches wide cutting in the serpentinite.

The Barnes Hill Deposit was studied by the Tasmanian Department of Mines and 55 shallow auger holes were drilled. This work was written up in, "Alluvial Chromite Deposits, Anderson Creek Area, Beaconsfield", Department of Mines (Tasmania) Technical Report 7, pp. 69-76, 1963, by A. J. Noldart (copy attached). It was Noldart's idea, as a result of this work, that the chromiferous concentrations occur in the lower position of a cap of Tertiary gravels, immediately above a very plastic, greenish-brown to brown residual clay. The clay was supposedly derived in situ from the weathering of the underlying serpentinite. The thickness of this gravel

.../2

cap ranges from a few inches to about 20 feet. Some chromite was included in the clay. The Tertiary gravel cap covers the uppermost portion of the hill. According to Noldart the thickness of the chromiferous zone is not constant but ranges from 0 to 4-5 feet. The results of this work indicated potential reserves of about 7,500 tons of chromiferous concentrates and the ore graded about 240 lbs. of chromite concentrate per yard of gravel.

Mr. Petuley, the Syndicate's geologist, differs from the Noldart conclusions in that he believes that there are three zones of flat-lying chromite-bearing sands and clays in the hill and that the total thickness of ore will be much greater than Noldart's 4-5 feet. He numbers these zones Bed Nos. 1, 2 and 3 (top to bottom). I have shown the limits of these beds as interpreted by Mr. Petuley, on the attached map (Fig. 1). He believes that the chromite-bearing sands and clays in Barnes Hill represent beach deposits and that Barnes Hill itself is an erosional remnant of a deposit which formerly was more extensive.

SAMPLING AND TESTING

While in the field, I took 28 channel samples of the Barnes Hill deposit from trenches which had just been excavated by the Syndicate. One composite grab sample (No. 29) was taken from the trench excavated in the transported lateritic material which underlies the flat between Barnes Hill and Anderson Creek. The location of these samples is indicated in Fig. 1 and description, thickness, percentage Cr_2O_3 and the specific gravity of several samples is summarized in Table 1. The weighted average of the 28 channel samples of ore from Barnes Hill is 8.23% Cr_2O_3. The chromium assays were analyzed by atomic absorption spectroscopy (certificate attached). The higher grade material is usually black in colour although there is a surprisingly large amount of chromite in the brown clays (see Table 1). The various zones differ in Cr_2O_3 content, the weighted averages for Bed Nos. 1, 2 and 3 being 9.3, 8.0 and 6.7 percent Cr_2O_3 respectively.

Eight samples were examined for the percentage of heavy minerals using bromoform and the sink-float technique with further analysis of the heavies fraction. The results are summarized in Table 2.

DISCUSSION

I could not decide, as a result of my field examination,

...3/

whether Noldart's or Petuley's interpretation of the geology was the correct one. One reason for this indecision was that the trenches excavated by the Syndicate do not, in general, overlap so that there are gaps in the exposures and it is difficult to correlate the different beds (see Fig. 1). Thus, I am not sure whether the chromiferous zone simply drapes itself over the surface of Barnes Hill (Noldart's thesis). If Petuley is correct and there are 3 zones which extend under the hill, the cumulative thicknesses of my channel samples suggest that one could expect a total stratigraphic thickness of about 30 feet of chromiferous material where all three zones are present in vertical section. It would be very easy to determine the correct interpretation by drilling 3 or 4 vertical holes which collar in Petuley's Bed No. 1 and test for the presence of Bed Nos. 2 and 3 immediately underneath.

RESERVES

At the present time, I cannot justify using Petuley's concept of 3 beds with a maximum of about 30 feet in stratigraphic thickness in calculating possible reserves. However, after observing the exposure in 3 sets of trenches, I believe one can assume that there is at least a mantle of chromiferous sands and clays draped over the slopes of Barnes Hill. The area involved includes about 20 acres. The various factors used in the calculations are as follows:

Area of possible reserves - 20 acres (the area included within lower contact Bed No. 3 (Fig. 1))
Thickness of chromiferous material - 7 feet
S.G. - 2.9 (tonnage factor 13 cu. ft.)
Average ore grade - 8.2% Cr_2O_3 (14.14% chromite)
Metallurgical recovery - 70.0%
Concentrating ratio (55% Cr_2O_3 concentrate) - 10:1
(assuming that an effective and economic process is possible)

The reserve calculations are as follows:

43,560 x 7 x 20/13 = 469,100 long ton ore
469,100/10 = 46,910 long ton 55% Cr_2O_3 concentrate.

469100 tons @ 8.2% Cr_2O_3

100% recovery ⇒ 38466.2 tons Cr_2O_3
70% " ⇒ 26926.9 " "

ie. 26926 tons of 100% Cr_2O_3
x " " 55% "

⇒ x = 48957 tons (ie. concentrating factor = 469100/48957 = 9.58 ≈ 10)

CONCLUSIONS AND RECOMMENDATIONS

It is my understanding that the Syndicate has been unable to produce any concentrate to date using their screen-sluice arrangement and that a consulting engineer has stated that spirals will have to be used to concentrate the ore. Our sink-float tests (Table 2) indicate that problems exist - e.g., the high SiO2 content of Sample Nos. 23 and 28 and the fact that none of the heavy fractions assayed in the 50% Cr2O3 range. I do not believe it is the purpose of this report to attempt a solution of the metallurgical problems which obviously exist and, therefore, have limited myself to the geology and ore reserves of Barnes Hill. I do suggest, however, a mineralogical study of the ore and concentrate as a better understanding of the mineral relationships could be important metallurgically.

The above ore reserve calculations suggest that almost 470,000 long tons of possible ore of 8.2% Cr2O3 are possibly present draped over most of the surface of Barnes Hill. The tonnage is probably larger because the hillside is a sloping surface, which I have not taken into consideration in these calculations. I do not believe that one could selectively mine the higher grade material in order to up-grade the entire procedure. If a 70% plant recovery is achieved, about 47,000 long tons of 55% Cr2O3 concentrate might be recovered. Of course, if an economical concentration method cannot be devised, Barnes Hill remains a valueless mineral deposit.

Mr. Petuley's concept of three flat-lying chromiferous-bearing zones (Beds 1, 2 and 3) stratigraphically superimposed on each other within Barnes Hill could be checked very easily by drilling three or four holes located fairly high topographically on the hill. If he is correct the reserves would be at least doubled or, depending on the areal distribution and thickness of the zones, could be increased more than that. In my opinion there is a good possibility that Mr. Petuley's thesis is correct.

In the area between Andersons Creek and Barnes Hill, the one composite ore sample (No. 29) assayed 4.33% Cr2O3 but only a trace of heavies was recovered in the sink-float test. The area involved is much larger than Barnes Hill (400 - 800 acres ?). More work will have to be done before one could give any opinion concerning the reserves and potentiality of this part of the Syndicate's holdings.

Respectfully submitted,

R. H. Wilpolt,
Consulting Geologist.

004

912006

TABLE 1 - ASSAY RESULTS

(Cr_2O_3 → chromite × 1.7244)

Sample No.	Location (Trenches)	Bed No.	Colour *	Thickness (feet)	%Cr2O3	Product - Thickness x%Cr2O3	Spec Grav
					%FeCr2O4		
1	Northeast	3	B&G	3.0	13.50	40.50	
2	Northeast	3	BR	1.1	~~8.48~~ 5.76	6.34	2.56
3	Northeast	3	G	3.5	9.93 0.89	3.12	
4	Northeast	2	LG	2.5	1.55	3.87	
5	Northeast	2	B	3.5	14.40	50.40	
6	Northeast	2	B&G	4.0	8.81	35.24	
7	Northeast	1	B	2.0	9.28	18.56	
8	Northeast	1	B	4.0	13.70	54.80	
9	Northeast	1	B&G	3.0	18.55	55.65	
10	Northeast	1	B	2.0	~~33.41~~ 22.69	45.38	3.77
11	Southeast	3	G	3.5	~~5.77~~ 6.76 3.92	13.72	2.56
12	Southeast	3	DG	2.0	2.65	5.30	
13	Southeast	3	B&G	2.0	10.63	21.26	
14	Southeast	2	B&G	4.0	12.40	49.60	
15	Southeast	2	B&G	2.5	3.08	7.70	
16	Southeast	2	LG	3.5	3.36	11.76	
17	Southeast	2	B	2.0	14.50	29.00	
18	Southeast	1	LG	1.5	0.75	1.13	
19	Southeast	1	LG	1.5	~~4.15~~ 4.86 2.82	4.23	2.63
20	Southeast	1	B	2.5	~~3.00~~ 2.3.45 13.60	34.00	3.28
21	Southeast	1	BR	4.0	6.75	27.00	
22	North	3	B&G	7.0	8.17	57.19	
23	North	2	B&G	7.0	7.51	52.57	
24	North	2	BR	2.0	3.45	6.90	
25	North	1	B&G	6.0	14.60	87.60	
26	North	1	G&W	6.0	0.25	1.50	
27	North	1	B&G	4.0	4.96	19.84	
28	North	1	BR	2.0	5.09	10.18	
			Totals	91.6		754.34	

(arith ave 7.96)

WEIGHTED AVERAGE - 8.23% Cr2O3

* B - Black
BR - Brown (clay)
G - Gray
DG - Dark gray
W - White
LG - Light gray

005

912007

TABLE 2 - SINK-FLOAT TESTING

Sample No.	Bed No.	Colour *	Ore %Cr2O3	HEAVIES % Heavies	% Cr2O3	% Fe	% Al	% SiO2
			$FeCr_2O_4$?		↓ $FeCr_2O_4$ in overall sample (indicated)			
5	2	B	21-20 14.40	32	19.41	41.2	16.6	2.9	24.4
8	1	B	20-17 13.70	38	17-02	34.0	15.0	2.8	23.6
23	2	B&G	11-06 7.51	80	18.73	15.9	5.4	1.3	66.3
25	1	B&G	21-50 14.60	96	24.31	17.2	4.7	1.1	67.1
28	1A	BR	7-50 5.09	36	7-51	14.2	8.6	7.8	24.2

THE FOLLOWING SAMPLES YIELDED INSUFFICIENT MATERIAL:

21	1	BR	6.75	Trace
22	3	B&G	8.17	Trace
	**	R	4.33	Trace

* B - Black
G - Gray
BR - Brown (clay)
R - Red

** Transported lateritic material in area between Anderson Creek and Barnes Hill.

006

912008

CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

Scottish House
19 BRIDGE ST.
SYDNEY 2000

Certification K70-1570

This is to Certify that we did analyse the undermentioned:

APPLICANT: Tennant Trading (Australia) Pty. Ltd.,
Goldfields House,
Alfred Street
SYDNEY 2000

SUBJECT: TWENTY NINE (29) SAND SAMPLES received in our Registered Laboratory on 18.11.1970 for the purpose of analysing.

METHOD: All samples were treated as ore and analysed for Cr_2O_3 by Atomic Absorption Spectroscopy.

The specific gravity of 5 samples only was determined.

Eight samples were examined for percentage heavy minerals with further analysis of the heavies fraction. Separation of heavies was made using bromoform. For 3 of the 8 samples the % heavies was 5% or less, yielding insufficient material for the detailed analysis as required.

Analysis of the heavies fractions on samples 5,8,23,25 and 28 was carried out by Standard Wet Assay Methods, Standard Colorimetric Methods and Atomic Absorption Spectroscopy.

RESULTS: Results of our determinations are as under:

SAMPLE NO.	ORE		HEAVIES				
	% Cr_2O_3	S.G.	% Heavies	% Cr	% Fe	% Al	% SiO_2
1	13.50						
2	5.76	2.56					
3	0.89						
4	1.55						
5	14.40		32	28.2	16.6	2.9	24.4
6	8.81						
7	9.28						
8	13.70		38	23.3	15.0	2.8	22.6
9	18.55						
10	22.69	3.77					
11	3.92	2.56					
12	2.65						
13	10.63						
14	12.40						
15	6.08						
16	3.36						
17	14.50						
18	0.75						
19	2.82	2.63					
20	13.60	3.28					
22	6.75						

Trace

For CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

NUMBER 1 TO ATTACHED HERETO

MINERAL SUPERINTENDENTS CO. (A/sia.) PTY. LIMITED

SAMPLE	ORE		HEAVIES				
	% Cr_2O_3	S.G.	% Heavies	% Cr	% Fe	% Al	% SiO_2
22	0.17		Trace				
23	7.21		80	10.9	5.4	1.3	66.8
24	3.45						
25	14.60		96	11.8	4.7	1.1	67.1
26	0.25						
27	4.16						
28	5.09		30	9.7	8.6	7.8	24.2
29	4.33		Trace				

Further analysis on Sample No. 5

Ni	3.6%
Zn	0.1%
Sn	0.01%
TiO_2	1.0%

Dated:
22nd January 1971