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date: 25/11/82.

Memo to: G. Purvis

from: J. R. Bishop

SUBJECT: Red Hills Geophysics

Area Evaluated: Red Hills Grid; 00S to 98S.

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D. DIR.	2 OCT 1984			Registrar
	DEPT. OF MINES			E & IL
	REF. No. 10 076 / 84			

Background:

The area was first investigated by RTAE in the late 1950's: grounded wire Turam was used with follow up by magnetics and gravity. Three drill holes were collared on these results: GN1, GN2 and RHP95 (the last an EZ hole). Black shales &/or disseminated mineralisation were intersected (some pyrrhotite was apparently found in GN1).

A pole-dipole IP survey was carried out in 1970-71 by CGG for the Consolidated Syndicate (Mt Lyell, Renison & Goldfields). This survey outlined the black shales and also resulted in holes RH3 & RH4 being drilled into the Red Hills lavas (disseminated mineralisation intersected).

By June 1978, the following holes had been drilled in the Red Hills area: RHP94 & 95; GN1 & 2; RH1 to RH11. The best hole was RH5 where 3m. of massive sulphides (sph. & gn.) was intersected at about 150m. below the surface. Surface mapping and the drill holes have defined a potential ore horizon lying between the Red Hills acid lavas to the east and a black shale horizon to the west. The horizon apparently thins out to the north, but is covered by glacial material to the south (south of 82S).

Geophysical Results:

A list of the various geophysical surveys is attached to this memo, with a summary of the results. The amplitudes of the anomalies do not affect the conclusions and no values are given.

The Turam and IP surveys responded strongly to the black shale horizon. Thus the presence of a nearby buried massive sulphide body might be difficult to detect by electrical methods and hence RTAE'S gravity results are particularly interesting. Fergus Fitzgerald's (F.F.) compilation map shows the gravity and Turam results to be near-coincident. North of (RTAE)40S the gravity high is to the west of the Turam which is less interesting than south of (RTAE)58S where it is to the east, however both zones, where drilled, have been adequately explained by density variations in the local rock types.



An attempt to define the extent of the mineralisation intersected in RH5 was made by applied potential surveys in 1978 and 1982. Results from these surveys suggested a very limited strike length for the mineralisation. However down hole IP (1978) and EM (1982) surveys showed that the black shales and massive sulphides were chargeable but not particularly conductive; thus the results of the applied potential survey are largely negated.

Apart from the down hole geophysics, the only response which may be recognised as a possible separate response due to mineralisation is a gradient array IP profile over RH5: a clear chargeability/resistivity anomaly was defined at 1650E, presumably over the black shales, with a weaker but still clear anomaly, to the east at 1950E.

Conclusion:

If the mineralisation intersected in RH5 was a consistent 3 to 5m thick with its top at 100m+ from the surface, and it maintained its composition and its position relative to the black shales, then it is probable that a substantial tonnage would not be detected by geophysical methods. However the drilling suggests that such a body is not present. To fit ore-body sized sulphides within the drill pattern, quite thick models are required (eg the 40m maximum thickness of Que River), such bodies would be readily detected by geophysical methods.

Integration of the drilling and geophysical results show no encouragement for economic sized mineralisation between 00S and 86S.



Methods Used: (compiled by F.F.)

Coverage

EM:	1. Turam (RTAE), 1958	4N-78S(RTAE grid)
	2. Sirotam (Geoex), 1982	4S-40S
	3. Genie (Scintrex), 1982	4S & 29S
IP:	1. Pole-dipole (CGG), 1971	32N-80S
	2. Gradient (Scintrex), 1977	80S-98S
	3. Gradient (Scintrex), 1978	profile over RH5
	4. Dipole-dipole (Scintrex), 1982	33S
Magnetics:	1. Vertical field (RTAE), 1958	20S-74S(RTAE grid)
	2. Vertical field (CGG), 1971	32N-80S
	3. Total field (Mt Lyell), 1976	8N, 0N, 8S, 16S, 24S
SP:	1. (CGG), 1971	32N-80S
Gravity:	1. (RTAE), 1958	20S-78S(RTAE grid)
	2. (Scintrex), 1980	8S, 72S, 86S
Down Hole:	1. Specific Gravity (EZ), 1958	RHP.94, RHP.95
	2. IP (Scintrex), 1978	RH5, 6R, 7, 8, 9, 10
	3. MMR (Scintrex), 1978	RH5
	4. Appl'd pot. (Scintrex), 1978	RH5 & 40m north
	5. Appl'd pot. (Scintrex), 1982	16S-40S (electrode RH5)
	6. Sirotam (Geoex), 1982	RH5

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Summary of Results.

	Comment
EM: 1. Strong responses, apparently coincident with graphitic shales.	a.
2. No response.	b.
3. No plot sighted: not evaluated.	c.
IP: 1. Good responses, apparently coincident with graphitic shales.	a.
2. Response on 80S & 86S but not on 92S & 98S.	d.
3. Clear response over shales, second (smaller) response at 1950E may be over ? sulphides.	
4. Good, classical shaped response over shales: no sign of contribution from any adjacent body.	e.
Magnetics: Results not evaluated (method not diagnostic for sulphides here, but possibly useful for mapping).	
SP: No response.	
Gravity: 1. Well defined anomalies, but these were satisfactorily explained by density contrasts in rock types.	a, f
2. 'Anomalies' on 8S & 86S are single point values: results do not agree with RTAE on 72S. Survey of dubious value.	
Down Hole: 1. Values used in RTAE evaluation of gravity anomalies.	
2. RH5: charge/resist response to black shales (30-65m.) & mineral'n (197m.). An unexplained response at 185m. is similar to mineral'n.	g.
6R: charge. response 325-370m. ? disseminated sulphides.	g.
7: charge. response 105-125m. black shales.	g.
8: no clear response.	g.
9: no response (logged to 85m.)	
10: black shales at 120m. but no strong response	g.
3. Not evaluated.	
4. Superseded by 1982 survey (5, below)	
5. This method assumes mineral'n is conductive; IP & EM surveys suggest that it is not. Therefore discouraging results should not be taken at face value.	h.
6. Logging started at base of black shales. No	



response to mineral'n.

Comment.

- a. Anomalous results shown on compilation map by F.F.
- b. Nor did Sirotem detect the black shales defined by the RTAE Turam survey.
- c. Data only, in file.
- d. The lack of gradient array IP responses on lines 92S and 98S suggest that the black shales have terminated; however it is possible that the coverage did not extend far enough to the west; that the glacial cover was too thick; or that the graphite/pyrite content of the shales decreased to the south. (Note GN2, situated between 82S & 86S, intersected about 85m. of black shales in two horizons.)
- e. This survey was done to check (erroneous) results from the applied potential survey (which was later resurveyed.)
- f. The near coincidence of gravity and EM anomalies led to RTAE drilling three holes (including RPH95); although one of these was not ideally placed to test the best responses, the anomalies were adequately tested.
- g. The down hole IP results show the black shale responses to be quite variable; ie, there is no IP 'signature' for the shales.
- h. The applied potential survey used three down-hole electrodes: one in the shales; one in barren volcanics and one in mineralisation. Results from the first two have not been plotted but presumably are similar in shape to the third (since the sulphides are not conductive &/or are of limited extent).