

2. Chromite-bearing gravel deposits in the area south of Montagu Swamp

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Chromite-bearing gravel deposits included in Exploration Licence 5/68 of Quest Mining and Exploration N.L. were examined on 4 November 1969, in the company of D. Stevens (Mining Engineer of Quest Mining), and A. Walker (prospector). It was concluded from the brief survey, that the gravel deposits had been adequately defined and that no extension or refinement of the present prospecting programme is likely to increase the proven reserves significantly.

The area comprises a series of low ridges with a NW-SE trend, which rise gradually to some 60 m above the surrounding extensive marshlands. The region is served by a network of well-maintained saw-millers' tracks which utilise the ridge-tops and to which drilling operations have been confined (fig. 3). Bush cover on much of the lower ground is impenetrably dense and traversing on the higher slopes is only possible with difficulty. The bedrock is poorly exposed, and is seen only in quarries and road cuttings, rock features are reported to occur sporadically in the creek beds. The ancient cleaved and folded shales of the country rock are weathered to a considerable depth and form an ochreous clay-loam usually taken to indicate close proximity to obscured bedrock. The clay-loam is almost always overlain by a thick mantle of humus.

The chromite-bearing gravels are composed almost entirely of more or less rounded quartz and quartzite debris with pebbles which range in size up to 0.50 mm in diameter. Exceptions are within the 300 Acre Area where the material rarely exceeds coarse sand size and the south-eastern end of Bark Hut ridge where pebbles 75 mm in diameter are common (Volker, 1969). The gravel deposits are only exposed in depth at Walker's gravel pit, where a bed of coarse sand and grit is seen to overlie a uniform bed with similar matrix and abundant dispersed pebbles, and rare lenses of fine sand. A persistent though rare component of the chromite-bearing gravel is rounded black, or black and white cherts.

The gravel deposits occur as thin narrow lobes preserved on ridges, thickest along the ridge tops and thinning rapidly away from the centre line. No gravel deposits of note are reported on the ridge flanks although shallow deposits were drilled on the Sapling Road Extension and indications of gravel are noted on the loop-road between Sapling Road and Bark Hut Road. Longitudinal sections through the ridges show undulating bedrock profiles, which on Bark Hut ridge vary between 75-100 m and on Sapling Road ridge between 75-90 m. The Walker's pit occurrence is isolated, of extremely limited extent and unique in providing high chromite values, considerable depths of gravel and lies on a steeply-sloping bedrock floor between 45-75 m. The chromite-bearing sand deposits of the 300 Acre Area are confined to a slightly elevated lobe at a height of between 30-40 m surrounded by marshland.

The surface features of the present countryside must have been derived from a pre-Tertiary land surface at a present height of 90-105 m upon which poorly consolidated sediments including gravel and heavy minerals were deposited. Subsequent erosion of this terrain lowered the general height of the land surface and produced the present topography of low ridges with shallow valleys incised some 60 m into the Precambrian sediments. During this erosional process the rivers carried from the area millions of tonnes of weathered Precambrian shales and siltstones and much of the overlying Tertiary sediments; such as remained forming lag deposits of gravel, enriched in heavy minerals, perched on ridges which still approximate to the original height off the pre-Tertiary land surface (e.g. Sapling and Bark Hut ridges). The

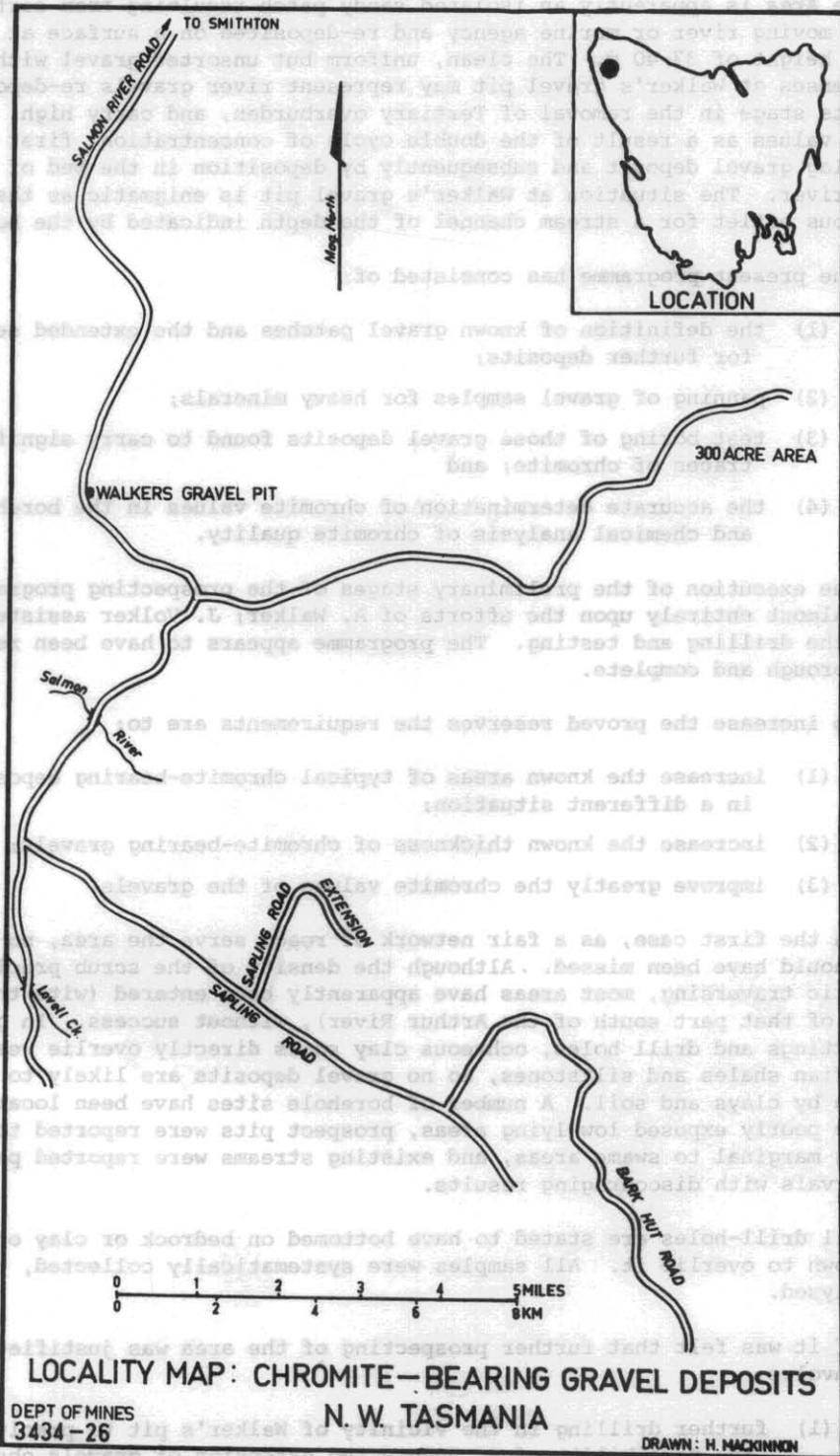
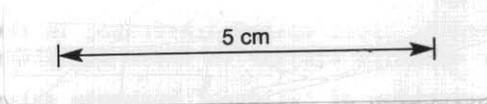


Figure 3.



300 Acre Area is apparently an isolated sandy patch resulting from sorting by slow moving river or marine agency and re-deposited on a surface at a present height of 37-40 m. The clean, uniform but unsorted gravel with rare sandy lenses at Walker's gravel pit may represent river gravels re-deposited at a late stage in the removal of Tertiary overburden, and carry high, heavy mineral values as a result of the double cycle of concentration, first to form a lag gravel deposit and subsequently by deposition in the bed of a fast moving river. The situation at Walker's gravel pit is enigmatic as there is no obvious outlet for a stream channel of the depth indicated by the boreholes.

The present programme has consisted of:

- (1) the definition of known gravel patches and the extended search for further deposits;
- (2) panning of gravel samples for heavy minerals;
- (3) test boring of those gravel deposits found to carry significant traces of chromite; and
- (4) the accurate determination of chromite values in the boreholes and chemical analysis of chromite quality.

The execution of the preliminary stages of the prospecting programme relied almost entirely upon the efforts of A. Walker; J. Volker assisted during the drilling and testing. The programme appears to have been reasonably thorough and complete.

To increase the proved reserves the requirements are to:

- (1) increase the known areas of typical chromite-bearing deposits in a different situation;
- (2) increase the known thickness of chromite-bearing gravels; and
- (3) improve greatly the chromite values of the gravels.

In the first case, as a fair network of roads serve the area, no major ridge should have been missed. Although the density of the scrub precluded systematic traversing, most areas have apparently been entered (with the exception of that part south of the Arthur River), without success. In quarries, road-cuttings and drill holes, ochreous clay soils directly overlie weathered Precambrian shales and siltstones, so no gravel deposits are likely to be overlain by clays and soil. A number of borehole sites have been located in suitable poorly exposed low-lying areas, prospect pits were reported to have been dug marginal to swamp areas, and existing streams were reported panned at intervals with discouraging results.

All drill-holes are stated to have bottomed on bedrock or clay of the type known to overlie it. All samples were systematically collected, tested and analysed.

If it was felt that further prospecting of the area was justified, it would involve:

- (1) further drilling in the vicinity of Walker's pit to preclude the possibility of an undetected extension of gravels obscured by clay soils.
- (2) systematic close-spaced traversing in the hope of locating further deposits similar to those at Walker's gravel pit.
- (3) the selection of 'wildcat' borehole sites for future drilling

in lowland areas without superficial indication of the presence of chromite (assuming a means of access is found for the drill).

The pattern of the main Tertiary drainage might be defined by geophysical means in the hope that the buried channels would carry chromite, but this would need to embrace most of the area west of Smithton and north of the Arthur River, and would be prohibitively expensive.

However, even if the area of gravel could be doubled there seems no reason to anticipate that the chromite values would attain the necessary 30 kg/m³ indicated by the Company as the limiting grade for economic exploitation.

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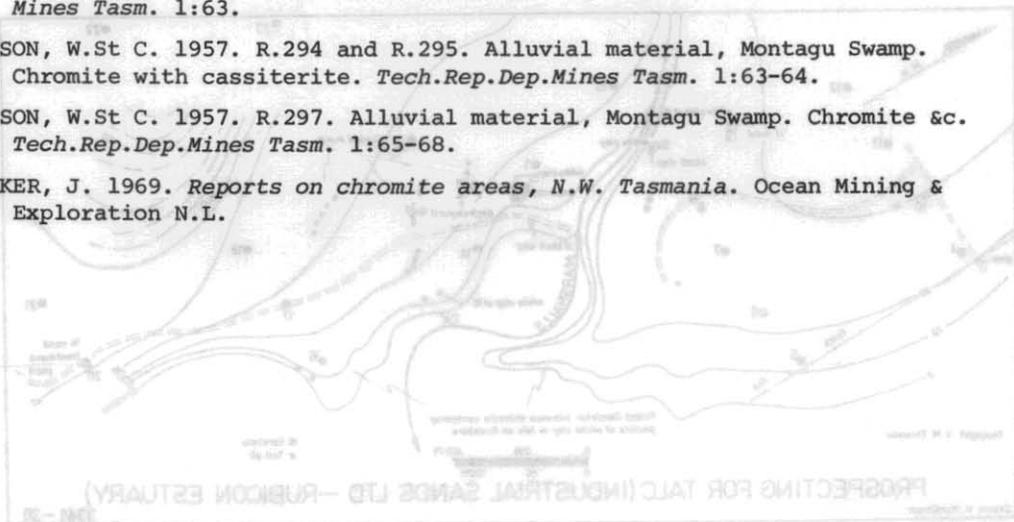


Figure 4

PROJECTING

Work by the company consists of 25 pits dug to a depth of 3.4 m (11 ft). This is approximately the depth of superficial sand over most of the area examined and so that little information was obtained concerning the bedrock.

Departmental work consisted of laying out a drilling grid by plane table and in locating the positions of the company's prospect pits. Twenty-seven holes were drilled by profile auger: Bore Holes 1-3 and 12-17 were sites by the company and so do not conform to the grid. In most of the holes water was struck at shallow depth making it difficult to log the hole and to obtain uncontaminated samples. Samples were obtained of the clay fraction where possible and these were tested for MgO content and loss on ignition in the department's laboratory.