PRELIMINARY REPORT O'CONNOR RIVER GYPSUM DEPOSIT* (114P/10E)

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INTRODUCTION

During the winter of 1984-85, a proposal to develop the O'Connor River gypsum deposit (MI 114P-005), in northwestern British Columbia was submitted by Haines Gypsum Ltd. of Vancouver. This deposit, which has been known since 1958, was evaluated by industry in 1959 and 1965, but no geological information or report on the work done were ever filed with the Ministry. This study was undertaken to obtain independent information about the location, size, and type of this gypsum occurrence.

Seven field days were spent mapping three gypsum zones and their surroundings. Emphasis was placed on defining the size and the structure of the gypsum deposit.

TOPOGRAPHY

The O'Connor River gypsum deposit is located in a rugged, steep, V-shaped river valley between elevation 850 and 1 220 metres on both sides of the glacier-fed O'Connor River. The river, which flows south, has cut vertical canyons in places and is strewn with large rounded chert and granite boulders that average 1 metre in size. At the time of the property visit, summer run-off was high and the 10-metre-wide river could not be safely forded. Relief on the property is pronounced and slopes steep, so outcrop exposure is good, particularly along the western bank of the river and along an access road on the eastern side of the valley.

REGIONAL GEOLOGICAL SETTING

The O'Connor River gypsum deposit is situated within the Alexander Terrane of the Insular Tectonic Belt. The terrane consists primarily of complexly deformed, Paleozoic sedimentary rocks and Triassic basic submarine flows and related volcaniclastic rocks.

Regionally, the terrane has been moderately metamorphosed and localized intrusives of varying compositions and age have altered host rocks by contact metamorphism. The regional geology and structural setting are illustrated on Figure 43-1.

PROPERTY GEOLOGY

The O'Connor River gypsum deposit consists of three separate zones in a carbonate host (Fig. 43-2). The host rocks were divisible into three separate units with distinctive lithological differences. The Geological Survey of Canada (Open File 926) suggests the carbonates are Early Permian to Late Triassic in age.

UNIT 1

Unit 1 consists of limestone, which is locally argillaceous and/or siliceous, quartzites, and in places skarn. Good exposures of the units are found along a road paralleling the east bank of the O'Connor River and along the banks of the River itself. The limestone is predominantly light to medium grey but colours range from white to black with local variations of pink, buff, and brown. Argillaceous limestone layers are a few centimetres thick whereas purer limestone layers range to tens of metres. Beds strike northwest and dip 20 to 40 degrees to the northeast. Several beds of quartzite were mapped approximately 550 metres north of Zone 1 (Fig. 43-2). The quartzites are grey and fine grained and layers are thin and apparently discontinuous. Rusty skarn outcrops occur 100 metres north of Zone 1 and in Zone 2. This calc-silicate rock contains no visible sulphides; its outcrops are local and small.

UNIT 2

Unit 2, a pink-buff-grey intraformational limestone breccia, is exposed along a road 120 metres north of Zone 1 and along the west side of the O'Connor River 200 metres north of Zone 2 (Fig. 43-2). The unit strikes north to northwest and dips between 25 and 45 degrees easterly. Layers range from a few centimetres to several metres in thickness and are often interbedded with limestone that is not brecciated. Clasts are angular to rounded, ranging between 1 and 5 centimetres in diameter; they are poorly sorted and randomly oriented. The matrix consists of limestone that is similar in composition to the fragments.

UNIT 3

Unit 3 is a dark-grey to black calcareous argillite; it is well exposed along the road on the east side of the O'Connor River 600 metres north of Zone 1. Beds strike north to northwest and dip 25 to 45 degrees easterly. In places, small pyrite crystals were observed in the argillite, although no other sulphides were recognized.

GYPSUM

Three separate gypsum zones are located on the property and these are referred to as Zones 1, 2, and 3, respectively (Fig. 43-2).

ZONE 1

Zone 1 is situated on the east side of the O'Connor River; access is along a road paralleling the river 125 metres above the valley floor.

Zone 1 strikes 120 degrees and dips 70 to 90 degrees northeast. It is irregularly exposed over a strike length of approximately 400 metres. Gypsum exposures are found between 914 metres and 1 036 metres elevation although overburden probably covers gypsum at both lower and higher levels.

The gypsum contains few foreign inclusions and it appears to be pure although a few samples of anhydrite were found. Contact between the wallrock and gypsum is sharp and the gypsum appears to have crosscut the layered sediments. Wallrock on the north side of Zone 1 is sheared and consists of a closely fractured argillaceous limestone (Fig. 43-2).

Sink holes occur between elevations 990 metres and 1 067 metres at the southeast end of Zone 1. These surficial features, which follow the gypsum zone along strike, are often interconnected; they range from 10 and 20 metres in diameter and are 10 to 15 metres deep. Gypsum lines the walls of some of the holes.

* This project is a contribution to the Canada/British Columbia Mineral Development Agreement.

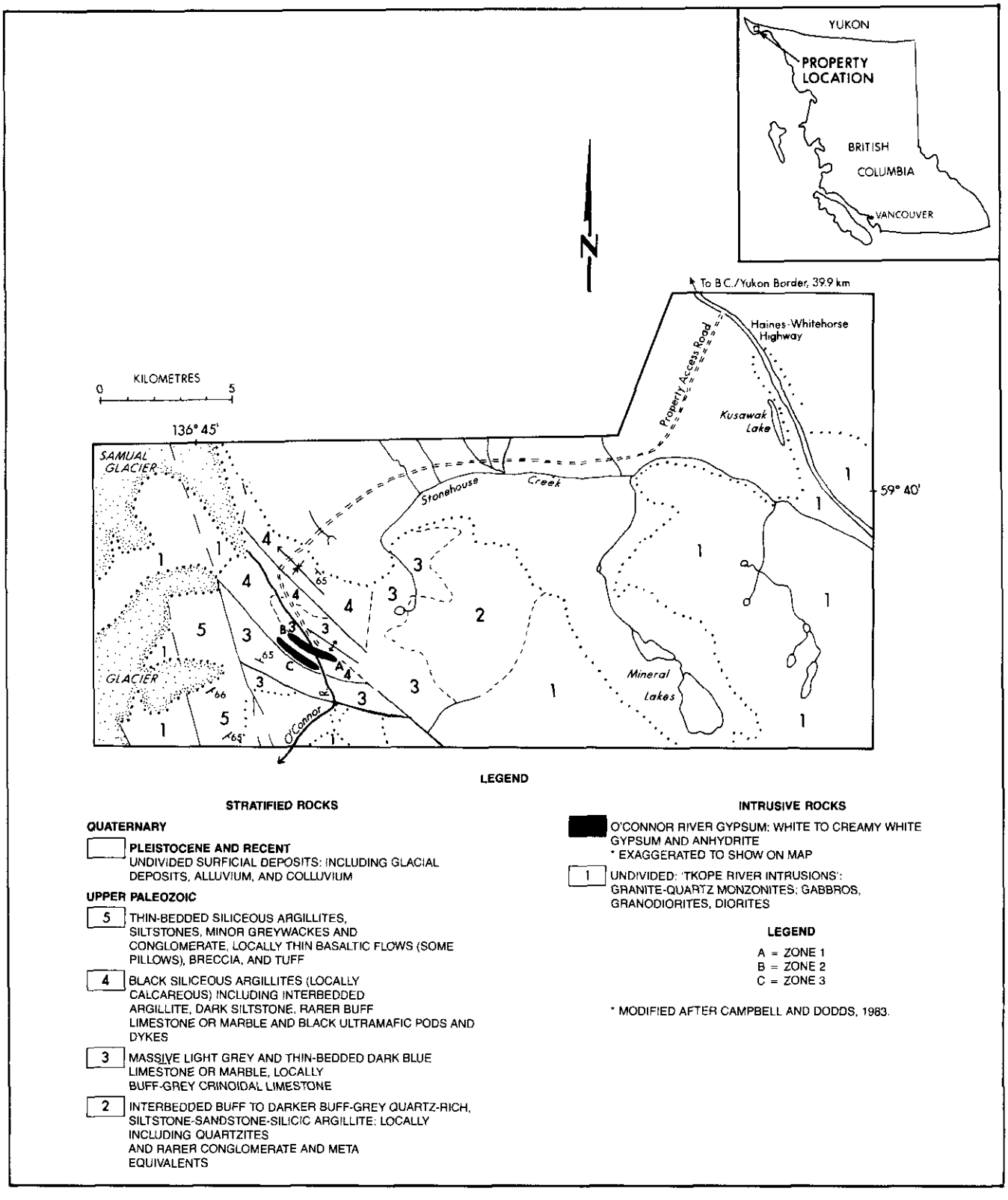

Figure 43-1. Regional geology, O'Connor River gypsum.

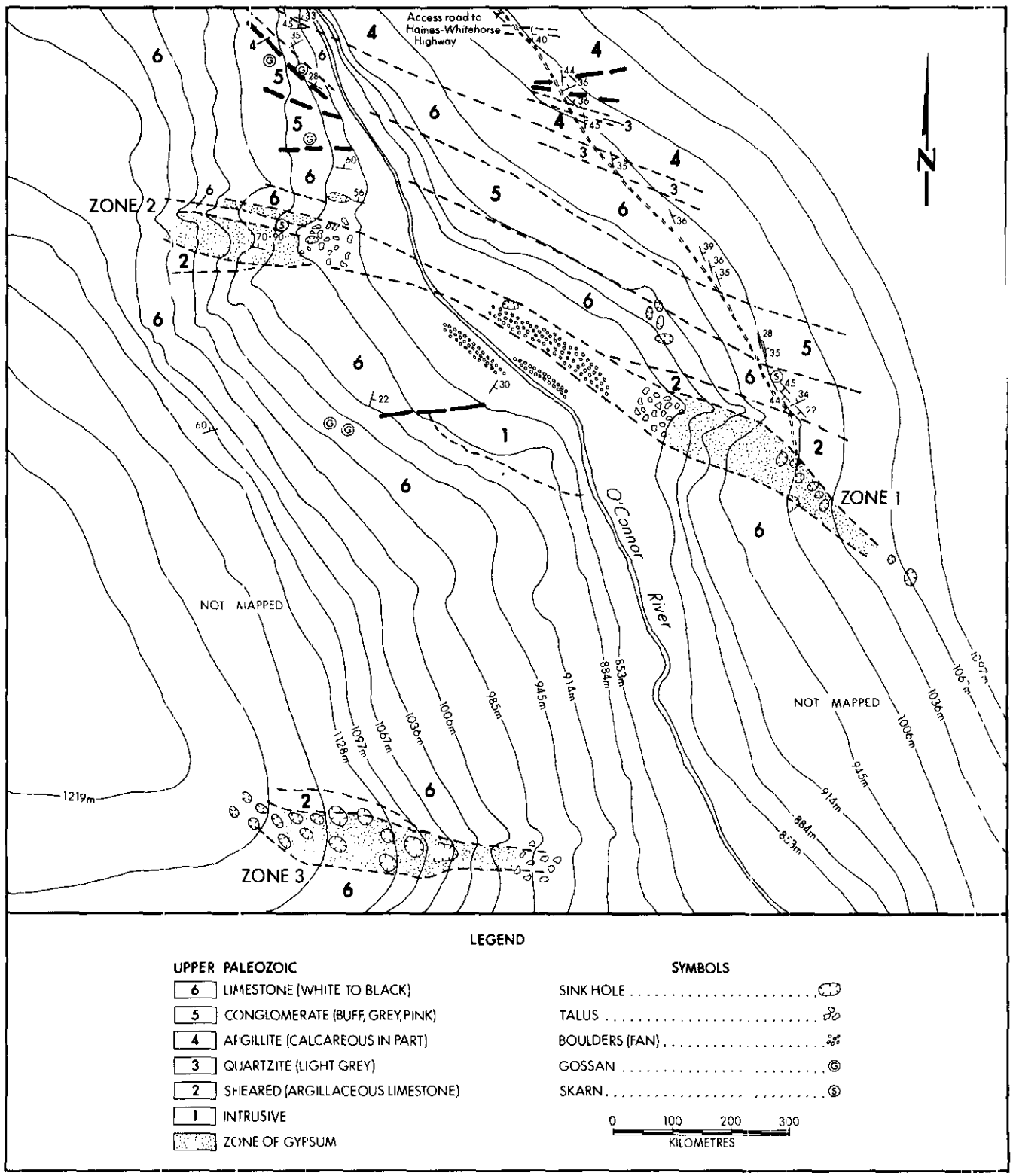

Figure 43-2. The O'Connor River gypsum showing.

ZONE 2

Zone 2, which is west of the O'Connor River, is a northwest extension of Zone 1. Zone 2 can be traced along strike from Zone 1 by following sinkholes. Zone 2 occurs between elevations 868 and 1 067 metres and has a strike length of approximately 220 metres. The zone is irregularly exposed with measured widths ranging between 60 and 100 metres.

Gypsum in Zone 2 is similar in appearance to that in Zone 1; it is white, finely crystalline, and massive. A 30-metre-wide argillaceous limestone unit, which forms a parting in the zone, is well exposed at the lower, southeast end of the zone (Fig. 43-2).

Contacts between the wallrock and the gypsum are sharp and wallrock inclusions in the gypsum are uncommon. The few inclusions are angular, ranging up to 15 centimetres in size, and consist of argillaceous limestone. The wallrock is closely fractured and sheared.

ZONE 3

Zone 3 is on the west side of the O'Connor River approximately 1 200 metres south of Zone 2. The zone strikes east-west and appears to dip steeply toward the north. Gypsum crops out between elevations 1 036 metres and 1 158 metres.

The zone has a strike length of approximately 550 metres and is exposed over a width ranging from 50 to 110 metres. These dimensions are approximate because slopes are steep and largely covered by overburden. Sink holes are 20 and 40 metres wide and 5 to 15 metres deep and often interconnected; they occur along the length of the deposit. The gypsum is white and similar to that sampled in Zones 1 and 2. The deposit intrudes a limestone (locally argillaceous) which strikes northwest and dips moderately to the northeast.

ORIGIN OF THE DEPOSIT

The O'Connor River gypsum deposits, which occur in faulted Early Permian to Late Triassic carbonate rocks, were originally deposited as part of the sedimentary sequence. In each of the three zones exposed, gypsum cuts layered sediments; an indication that the gypsum intruded the sediments. This intrusion probably occurred as a result of tectonic movements in the O'Connor River area when pressure squeezed the calcium sulphate bodies into their present position by plastic flow along a faulted zone.

Haines Gypsum Inc. (1984) reports that the gypsum deposit contains up to 8 per cent anhydrite. Possibly the original anhydrite deposit has hydrated into gypsum by interaction with a combination of meteroic and ground waters. A similar interpretation was suggested by Baird (1984) for the Faulkland gypsum deposit in southern British Columbia (82L/5E). Both gypsum deposits have similarities in their intrusive nature and the presence of anhydrite.

SUMMARY

Three separate gypsum showings designated Zones 1, 2 and 3 are located on both sides of the O'Connor River in northwestern British Columbia. The zones have a strike length of approximately 400 metres, 220 metres, and 550 metres respectively; irregular widths range between 30 and 110 metres. The gypsum on surface appears pure and intrudes Upper Paleozoic carbonates along a northwest-trending shear zone. Zones 2 and 3, located on the west side of the O'Connor River, are not readily accessible; any development of the gypsum in these zones will be difficult.

ACKNOWLEDGMENTS

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REFERENCES

Baird, D.M. (1964): Origin of Gypsum-Anhydrite Deposits at Falkland, British Columbia, *Cdn. Jour. Earth Sci.*, Vol. 1, No. 1, August, 1964.

B.C. Ministry of Energy, Mines & Pet. Res. (1984): Development Plan, O'Connor Deposit, Haines Gypsum Inc., unpubl. report.

Campbell, R. B. and Dodds, C. J. (1983): Geology, Tatshenshini Map-Area (114P), *Geol. Surv., Canada*, Open File 926.

Minister of Mines, B.C. (1960): O'Connor Gypsum (Ventures Limited), Ann. Rept., 1960, p. 139.