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GEOLOGY OF THE GOLD QUARRY DEPOSIT

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INTRODUCTION

The Gold Quarry deposit is located in the Maggie Creek (Schroeder Mountain) mining district, approximately 11 km north of the town of Carlin, in northeastern Nevada (Fig. 1).

Early production in the Gold Quarry area was from quartz veins containing free gold in the near-surface, highly silicified portions of what is now known as the Gold Quarry orebody. In 1936, a shipment of 59.7 tons averaging 0.42 oz/ton Au and 0.88 oz/ton Ag was made to the railhead at Carlin. This material was reported to have come from sheared, fractured, and iron stained quartzite and chert (Roberts et al., 1967).

Other past producers in the district include the Copper King, a small underground mine approximately 2 km northwest of the Gold Quarry orebody, that worked copper ore from a N60W striking ore zone. This mine was listed in 1974 as the only North American occurrence of the mineral Faustite, a hydrous zinc-copper aluminum phosphate (Roberts et al., 1974). The Good Hope mine lies roughly between the Copper King and Gold Quarry mines. Here, a 75m inclined shaft developed a 1 to 2 m wide vein of galena, silver, copper carbonates, and abundant barite during the years around 1910. No significant gold production was reported at the Good Hope mine. Total production from the Maggie Creek district from 1932 to 1958 was 858 oz Au, 4,387 oz Ag, 656,058 lb Cu, and 27,603 lb Pb.

The main orebody at Gold Quarry, discovered in 1979, is roughly equidimensional, 300m in horizontal dimensions and 300m in depth, although in detail the ore distribution is complex (Fig. 2B). Proven and probable reserves, mineable by open-pit methods, are currently estimated at 144,000,000 tons averaging 0.049 oz Au/ton. These reserves include a high-grade zone of 51,000,000 tons of 0.077 oz Au/ton. This material will be used to feed the Carlin No. 2 mill at an average rate of 7000 tons/day. The remaining tonnage (93,000,000 tons of 0.034 oz Au/ton) will be treated by dump leach methods. The mill, dedicated in September of 1985, is operated by the Carlin Gold Mining Company, a wholly-owned subsidiary of Newmont Mining Corporation.

GEOLOGICAL SETTING

The pricipal geologic feature of the Maggie Creek mining district is the Carlin Window. The Carlin Window is roughly circular in outline and is about 3 km in diameter (Fig. 1). The window exposes thin-bedded limestone of the Silurian Roberts Mountains Formation and an overlying, relatively massive unnamed

Devonian limestone. These autochthonous units are surrounded by chert, shale and quartzite of the upper plate of the Roberts Mountains thrust fault. The primarily siliceous, thin-bedded lithologies of the allochthonous upper plate are part of the Ordovician Vinini Formation. Some thin-bedded silty limestone beds are present in the Vinini, but these constitute only a minor part of the sequence. The Gold Quarry orebody is located almost entirely within the shale and silty limestone of the Vinini Formation.

An erosional unconformity separates the Paleozoic rocks from the overlying water-laid tuff and siltstone of the Carlin Formation of Pliocene age (Regnier, 1960). The presence of silicified clasts in gravel beds of the Carlin Formation indicates that the orebody was exposed to erosion at the time the Carlin Formation was laid down.

MINERALIZATION AND ALTERATION

Steeply dipping normal faults and associated fractures are the major controlling features of Gold Quarry mineralization. Mechanically induced fracture systems formed channels which directed the mineralizing hydrothermal fluids. This produced the observed pattern of high grade ore zones concentrated along major strucures surrounded by overlapping lower grade zones (Fig. 2B). Most major faults within the deposit are roughly parallel to the northeasterly and northwesterly trending boundaries of the Carlin Window (Fig. 1).

Secondary control of gold mineralization was provided by host rock lithology. Relatively porous siltstone and silty limestone units are noted as hosting local concentrations of gold at some distance from major structures.

The most reliable pathfinder element for exploration at Gold Quarry was found to be gold. High arsenic values also were found to be directly associated with zones of gold mineralization. This arsenical association has been documented at numerous other deposits, including the Carlin Main Pit and the Maggie Creek mine. Slightly larger than the anomalous gold zones, the arsenic distribution appears to be controlled by the same structures and lithologies as the gold. Sb, Cu, Pb, Ni, and Zn were found to occur in geochemically anomalous amounts, but are restricted mostly to fault-controlled ore zones.

Wall-rock alteration at Gold Quarry has been described by Hausen et al. (1983). Silicification is the most pervasive style of alteration and appears to have been superimposed on original siliceous siltstone. Silicification is most intense along high angle faults, particularly along their hanging walls. Such areas commonly are mineralized and locally contain up to several oz Au/ton. Alunitization followed the main stages of silicification, forming replacements along fractures. Alunite appears to be mostly supergene in origin, but may have been formed during late epigenesis near the paleosurface.

Removal of carbonate minerals from limestone by hydrothermal solutions occurred along faults and at localized areas within

the silty limestone units of the Vinini Formation. The bulk of the limestone sequence lies below and to the west of the deposit (Fig. 2A) and seems to have been unaffected by this process. Baritization is locally common at Gold Quarry, especially in the vicinity of larger faults. Most of the barite occurs as crystal druses or veins along fractures throughout the deposit. Argillization was apparently the final hydrothermal alteration event; it created large areas of gold-bearing clay altered rock (Fig. 2) and an abundance of clay seams along fractures and bedding planes.

Supergene oxidation followed the formation of the Gold Quarry orebody. Weathering removed most of the carbonaceous material from the shallower levels of the deposit. Drill data indicates that primary, unoxidized, carbonaceous ore is present at depths greater than 120 to 200 m below the surface and is commonly associated with calcareous lithologies.

REFERENCES

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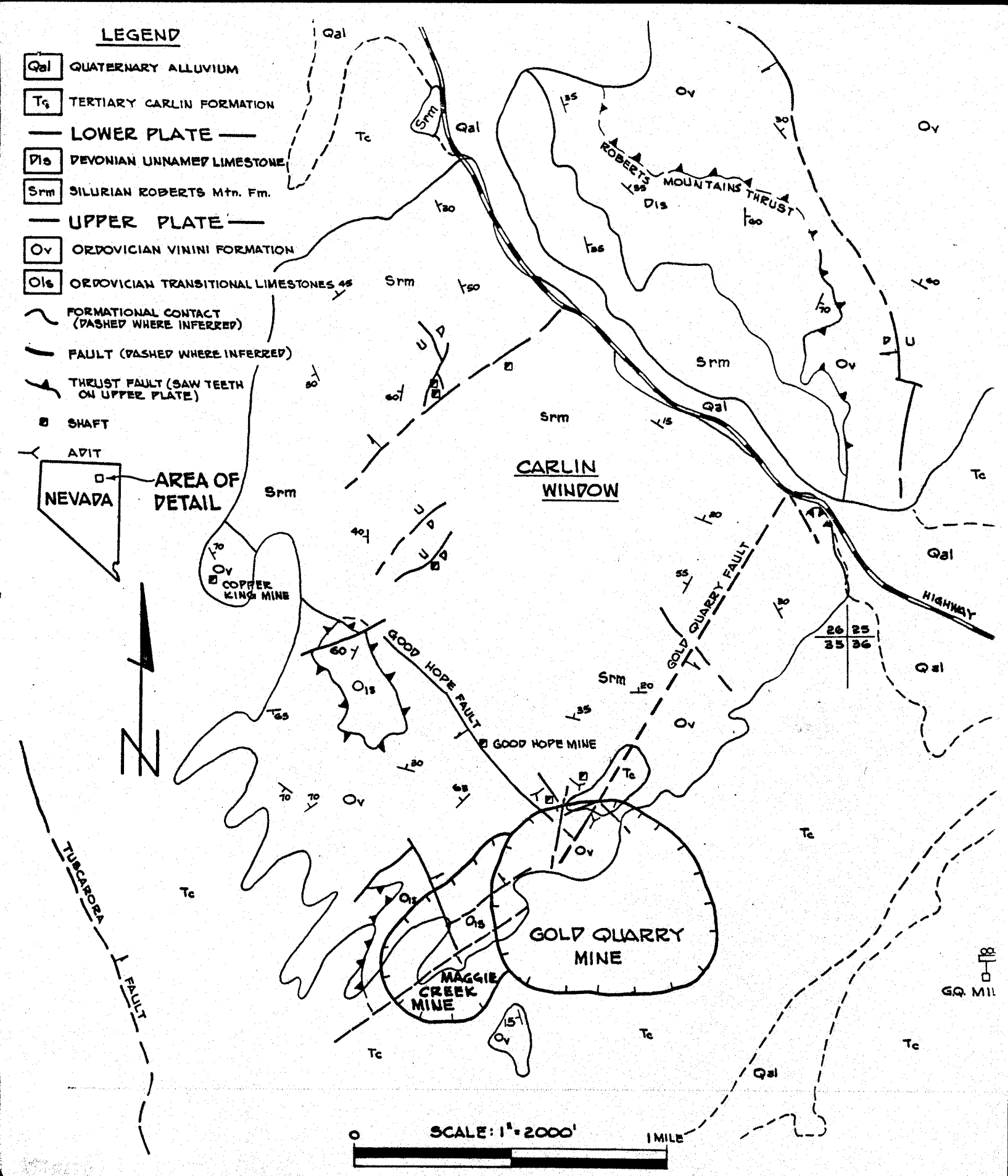
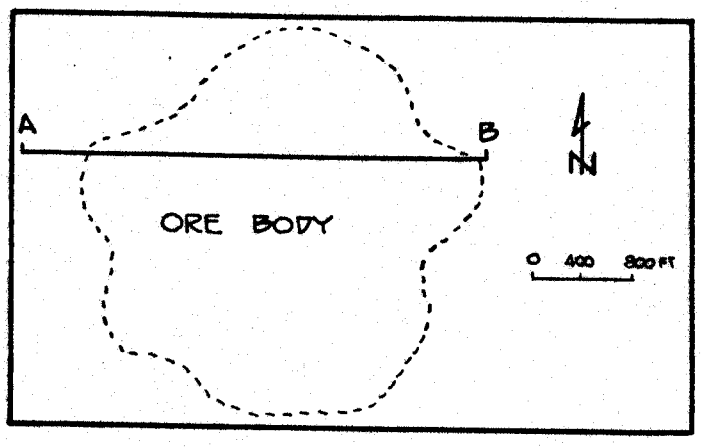


FIGURE No. 1

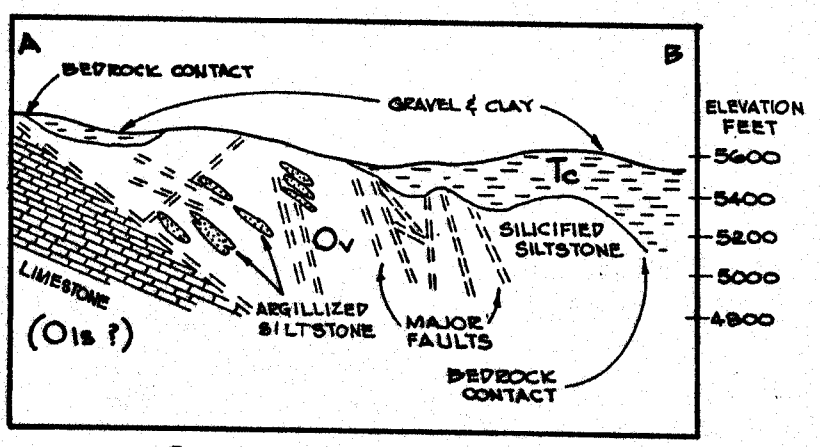
MAGGIE CREEK MINING DISTRICT

GENERAL GEOLOGY

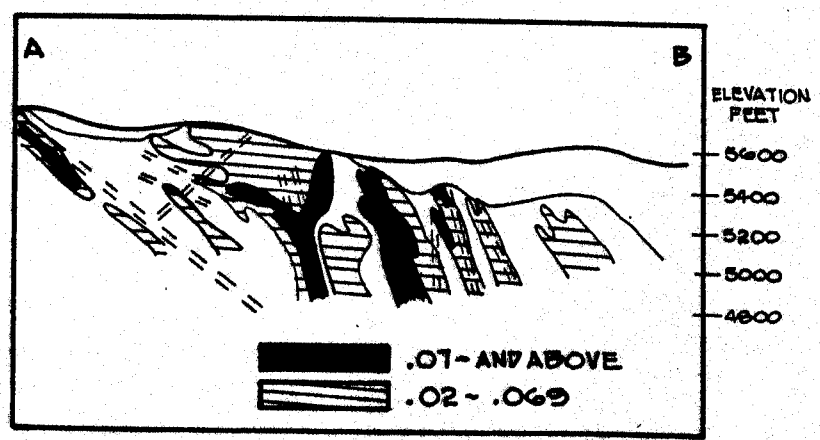
(AFTER EVANS AND CREBS 1971)



PLAN MAP
GOLD QUARRY DEPOSIT



GOLD QUARRY DEPOSIT
EAST-WEST SECTION AB
LITHOLOGIC SECTION



GOLD QUARRY DEPOSIT
EAST-WEST SECTION AB
DISTRIBUTION OF GOLD oz./ton

FIGURE #2
(AFTER - HAUSEN, EKBURG, KULA)