BOREALIS: Reserves given as +2.0 MT at 0.16 oz/T Au, 0.32 oz.T Ag.

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A beautiful example of a young "hot spring" deposit.

(189)

Main host rock is a 19 m.y. old Tertiary Andesite, which also hosts Comstock, Aurora and Bodie. Structural control appears to be the intersection of normal NE cross faults with NW Basin and Range faulting.

Item 53

The main orebody is a silicified-pyritized andesite breccia, which has been subjected to both hypogene and

supergene oxidation. Porous cristobolite sinter (with high Hg) formed above and peripheral to the breccia. Movement on the NW faults has exposed the "system" at various depths, with the deeper silicified feeder zone exposed to the NE of the present pit.

Alteration is intense, ranging from advanced argillic outwards to propylitic. The main breccia zone appears to possess a highly silicified "rind" up to 5 ft. wide. The weathered section of the orebody contains hematite, kaolonite, montmorillonite, alunite (4 m.y.), jarosite and iron oxides. Higher grades correlate with the highest iron content, reflecting the original Au-pyrite association prior to oxidation.

Barite and calcite occur as late vugh linings.

Various other occurrences of the same style of ore occur nearby, and the total ore figure may will exceed 10 MT.

Mining - Treatment

All mining and dirt moving is done by contractor. The ore is heap leached, and the gold, silver and by-product Hg recovered by Zn precipitation.

Construction of the process plant commenced in May 1981 was commissioned in September 1981 and the first bullion produced in October 1981.

Summary

1. Carbonate rich (and sulfide poor) ores in Nevada are very amenable to heap leaching with cyanide, with little lime required.

2. The association of Au with Hg, As, Sb, (Ba, W) in tectonised dirty laminated carbonates is very strong.

3. Intense silica introduction with only minor pyrite introduction was the first phase of ore development.

4. Oxidation (both hypogene and supergene) makes the ores more amenable to easy recovery techniques.

5. All deposits contained micron size disseminated

gold, and although silicified, were not quartz veined.

6. The spacial relation with present day and dormant hot springs is striking e.g. present hot springs occur at Cortez, 15 km north of Cortez, 15 km from the Bell Mine at Jerritt Canyon, etc.

   Sinter occurs at Borealis and Jerritt Canyon.

7. The jasperoids that occur at "Carlin type" deposits are structurally controlled and closely resemble the structurally controlled silicified root systems of the Borealis hot springs deposit.

MKB:b
cc: J. E. Frost
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0580b

[redacted]

M E M O R A N D U M

March 26, 1982

TO: M. J. Mackenzie

FROM: M. K. Boots

RE: NEVADA FIELD TRIP MARCH 1-5, 1982

Fred Warnaars and Tony Greenish organized this trip. Jean Lawler and Dean Ayres from ~~EPRCO~~ were also present.

Mines visited included Cortez, Gold Acres, Sterling, Round Mountain and Borealis. Breif inspections of Goldfield, Tonopah and Virginia City (Comstock) workings were also made.

Overall, the close association of "hot springs" with "Carlin type" gold deposits is striking, and definitely not coincidental! A very sound case can be made that "Carlin type" mineralization represents the roots or feeder systems of higher level "hot spring" type deposits.

CORTEZ: Reserves originally 3.4 MT at 0.29 oz./T Au
Production was 3.4 MT at 0.26 oz/T Au

Apart from the features described in publicatons the following was noted.

a) Strong post depositional weathering (oxidation) is present.

b) Not one quartz vein was seen.

c) Silica soaking (jasperiods) were poorly developed, although silicification to a lesser degree was present.

d) Carbonate veining w[illegible] in open (post [illegible]) [illegible]