

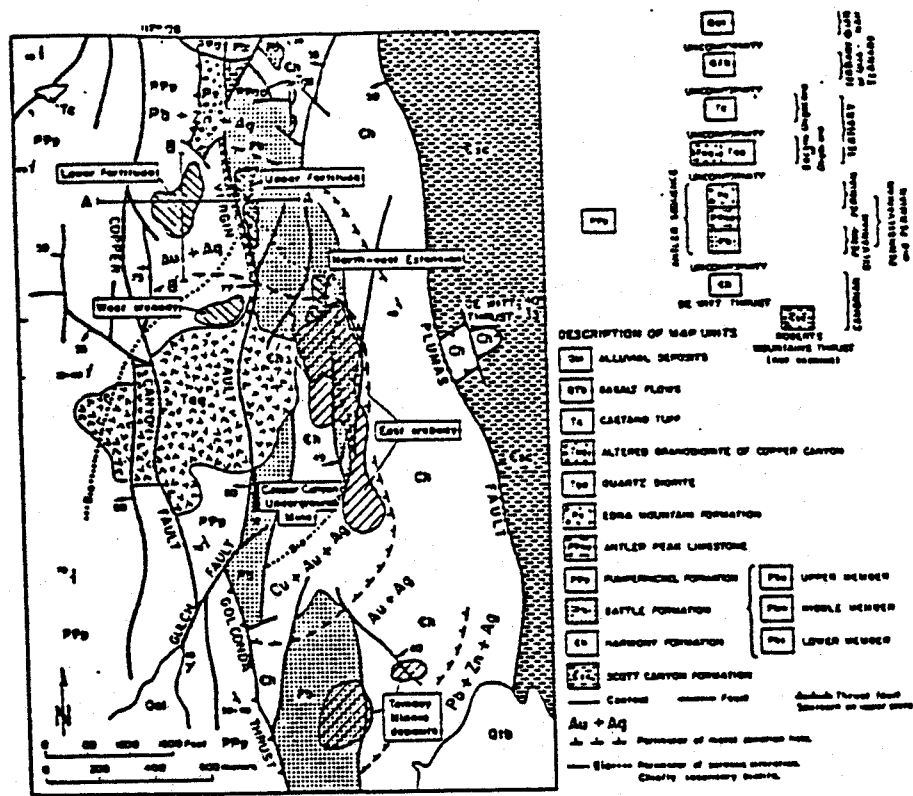
granodiorite porphyry that has intruded a sequence of Paleozoic sedimentary and volcanic rocks. The East ore body and Tomboy-Minnie deposits were replacement-disseminated bodies within the basal calcareous conglomerate of the Battle Formation. The West orebody was hosted by andradite-diopside-bearing skarn developed in the Pennsylvanian and Permian Pumpnickel Formation.

Blake et al (1984) demonstrated a well defined pattern of mineral zonation centered on the Copper Canyon stock. The altered granodiorite contains anomalous but subeconomic copper, molybdenum, gold and silver. Adjacent to the stock and extending outward for up to 1,500 ft is a copper-silver-gold zone containing the East and West ore bodies, which is bordered by the outer limit of potassic alteration. Further outward (1,500 ft to 3,000 ft) from the stock is a high sulfide gold-silver zone which contains the Tomboy-Minnie and Fortitude deposits. The outermost zone is a zone of lower overall sulfides characterized by lead-zinc-silver veins.

The FORTITUDE gold-silver deposit (fig. 15, 16) is related to a "wallrock" copper porphyry system developed within Middle Pennsylvanian to Permian Antler Sequence rocks adjacent to an altered granodiorite intrusive stock at Copper Canyon. Gold-silver ores of the Fortitude deposit occur with disseminated and massive sulfide replacement mineralization of skarn-like or calc-silicated limey horizons of the Antler Sequence contact meta-sedimentary rocks. A major north-trending, steeply westward dipping normal fault was important as a conduit for hydrothermal fluids responsible for metallization in the Fortitude area. Gold-silver metallization is best developed near a marble front where retrograde chloritization and destruction of prograde calc-silicate mineral phases is most prevalent. Fluid-inclusion studies performed on the Copper Canyon system indicate a wide variation in fluid chemistry during several hydro-silicate stages that ranged in temperature from 500 to 250 degrees C. Surface rock-chip and structure geochemistry did not adequately define the existence of the Fortitude deposit in the highly-mineralized Copper Canyon area. Air-borne and ground magnetometer surveys delineated the Fortitude deposit and were instrumental in the discovery process (Wotruba, et al, 1987).

The open-pit mine has been producing since December, 1984. As of January, 1987, recoverable in situ reserves were placed at 1.5 million oz gold and 2.26 million oz silver. Initial reserves estimates for the Fortitude deposit were 16 million tons grading .150 opt gold and .57 opt silver (Jackson, 1982). Mill recovery is about 96%. The current strip ratio is 5:1, down from the initial 17:1.

Echo Bay Mines' McCOY Mine (fig. 17, 18) lies about 30 miles to the south of Battle Mountain in the North-Central Fish Creek Mountains. Estimated reserves at McCoy total 6.1 million st of ore grading 0.054 oz gold per ton. Gold mineralization occurs in skarn and shear zones which are associated with a Tertiary quartz monzonitic to granodioritic stock. The stock, informally referred to as the Brown stock, intruded Triassic carbonate and siliceous sedimentary rocks of the Augusta Mountain sequence. The Brown stock is elliptical in plan, about 2,200 ft long and 1,400 ft wide. Northeast- and northwest-trending faults with minor displacement are the dominant structural features at McCoy. Metasomatism associated with emplacement of the Brown stock formed skarn along limestone-intrusive contacts and stratiform skarn along limestone-pebble conglomerate contacts. Mineralized skarn is present from the surface to depths in excess of 600 ft, and up to 350 ft laterally away from the intrusive. A marble halo up to 600 ft wide surrounds the stock. Mineralization consists of gold with subordinate silver and copper. Typical gold grades in skarn range from .051 to 0.100 opt. Gold occurs with disseminated, variously oxidized sulfide minerals associated with skarn. Sulfide mineralogy consists of pyrite with lesser pyrrhotite and occasional chalcocite and sphalerite. The deposit was explored



Generalized geologic map of the Copper Canyon area, modified from Blake et al. (1984).

Figure 16. After Wotruba, Benson &amp; Schmidt, (1987)

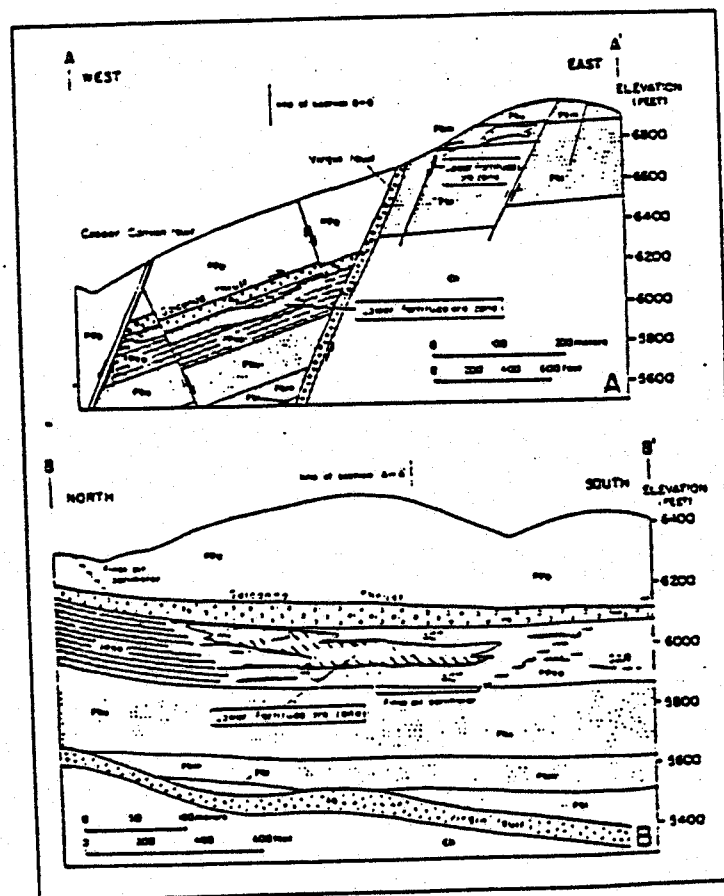


Figure 17. After Kuyper, (in press)

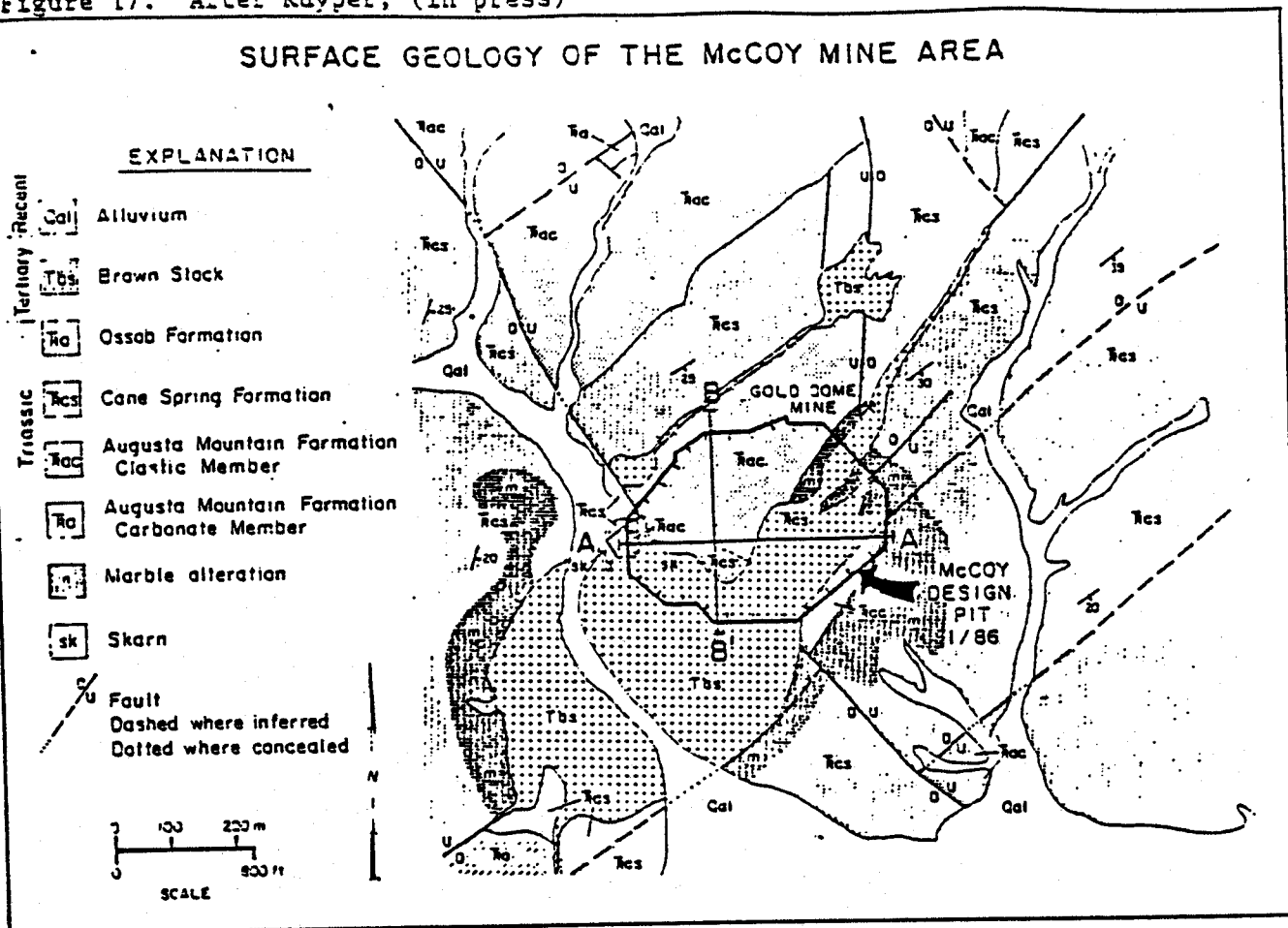
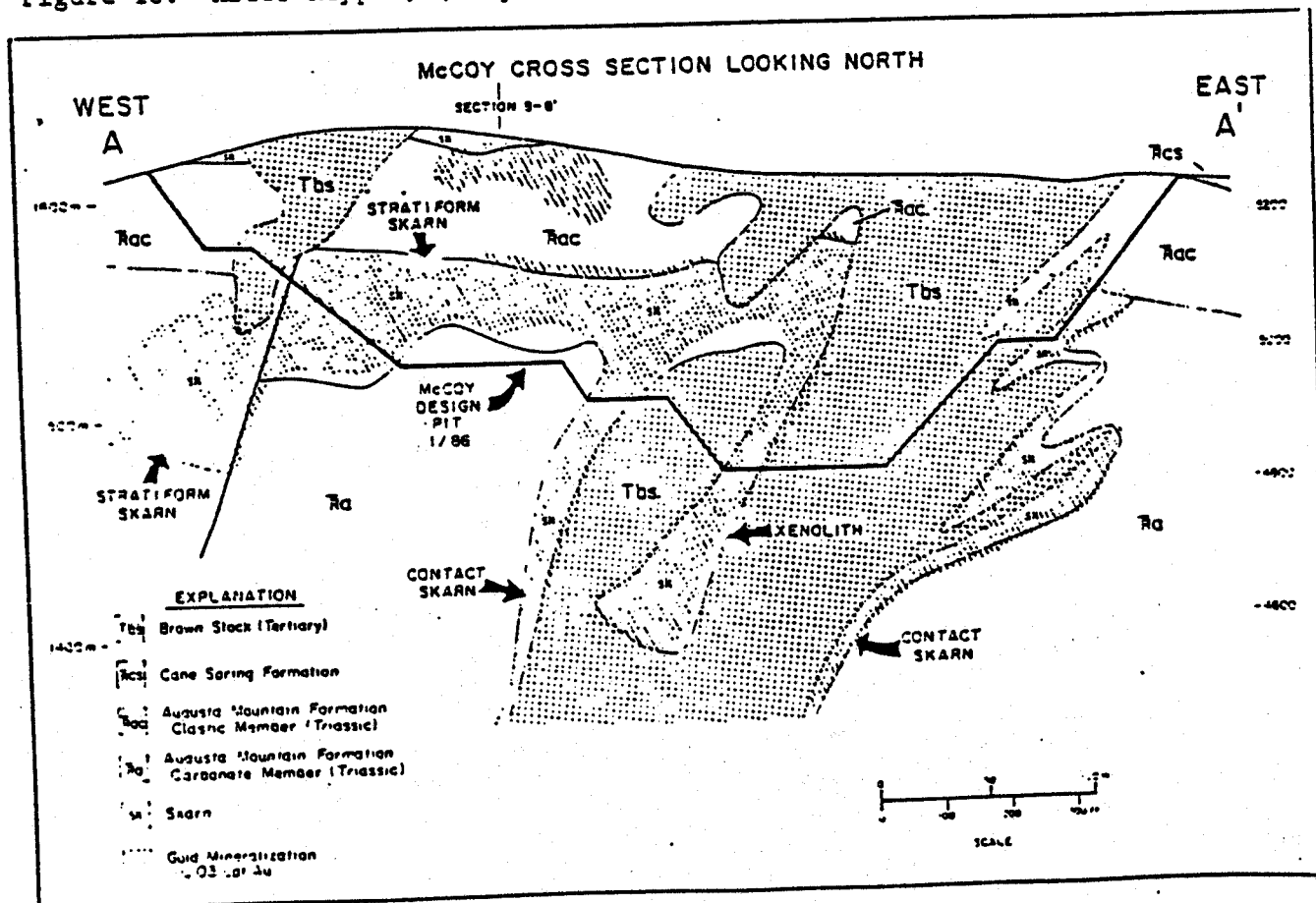


Figure 18. After Kuyper, (in press)



by Summa Corporation, Houston International Minerals, and Gold Fields Mining Corporation from 1969 to 1984. Tenneco Minerals Company conducted metallurgical, engineering and cost studies during the spring and summer of 1985. Mine and mill construction began during December, 1985 and the first dore was poured in April, 1986 (Kuyper, 1987).

Earlier in 1987 Echo Bay Mines announced discovery of a new deposit named "COVE" located about 1 mile northeast of McCoy along the east flank of the Fish Creek Mountains. Drill-indicated geological reserves are calculated at 35.5 million tons, grading 0.076 opt gold and 3.2 opt silver for a total in situ content of 2.7 million oz gold and 146.4 million oz silver (Min. Rec. 6-8-88). The discovery is largely alluvium covered but a gold-anomalous jasperoid crops out in the vicinity. The mineralization at Cove is rumored to have closer affinities to disseminated gold deposits than to skarn deposits, as no skarn mineral suite has yet been recognized.

NOTE: MILEPOSTS 235 THROUGH 241 ARE MISSING on this part of I-80 presently under construction.

235.0 To the southwest of the highway, the mining districts of Hilltop and Lewis are located in the Shoshone Range around the base of Mount Lewis. MOUNT LEWIS, the high peak ahead to the right with the radio tower occupies the center of a collapse structure known as the Mount Lewis cauldron. It is one of the oldest Tertiary volcanic centers in Nevada. Relatively deeply eroded, the greater part of the rocks exposed lie well below the base of the original volcanic edifice. Within the subsided mass, breccia pipes, plugs, dikes, and remnants of tuff and volcanoclastic deposits record an episode of Oligocene volcanism. A ring fault outlines the deeply eroded cauldron. Thrust faults of early Mississippian and early Mesozoic age that cut Paleozoic and Mesozoic strata in the cauldron have been deformed by subsidence and dip steeply inward near the ring fault. In the interior of the cauldron, the faults dip more gently where they form a concentric pattern around a centrally located cluster of plugs and breccia pipes.

238.0 As we head east through the Reese River Valley, the mouth of Crum Canyon is visible on the south. To the east of Mt. Lewis, the HILLTOP gold deposit (fig. 19, 20) lies about 5 miles south of the canyon mouth. A resource of 10.35 million tons grading .073 opt gold has been defined, of which 3.3 million tons grading .051 opt gold is shallow oxide ore mineable at a 2:1 strip ratio (No. Miner 8-25-86).

In the Hilltop Mine region, cherts, quartzites, shales, and greenstones of the Ordovician Valmy Formation are intruded by irregular plugs, dikes, and sills of 38.1 m.y. old dacite porphyry and dikes and sills of a basic dacite porphyry and younger rhyolite. Moderate, pervasive quartz-sericite-pyrite alteration associated with low grade, disseminated, copper-molybdenum mineralization occurs in sedimentary rocks and dacite porphyry. Discordant and concordant breccias are developed in altered chert in the hanging wall of the Hilltop Mine Fault.

The Hilltop ore body, as described by Lisle and Desrochers (1987), consists of extensive stratiform gold mineralization occurring within the 30°-west-dipping Hilltop fault and in thick hanging-wall breccias. Dimension of the ore zone are 1,000 ft along strike, 2,200 ft down-dip and up to 195 ft thick. Gold is associated with arsenic-rich and later antimony-rich hydrothermal events which followed a low-grade disseminated copper-molybdenum mineralization event. Historic production came from thin quartz veins and discordant breccias believed to have formed after the base-metal event but prior to the main-stage gold event. Recurrent movement along

# GEOLOGICAL SOCIETY OF NEVADA

## 1988 FALL FIELD TRIP GUIDE BOOK

### GOLD DEPOSITS OF NORTH CENTRAL NEVADA

Marigold

Cove

McCoy

Rain

Suprise

*Suprise*

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SPECIAL PUBLICATION #8

September 22-24, 1988