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Dee Mine Tour

On February 13, 1986, Lac personnel were given a fine tour of the Dee mine in Elko County by Frank Bergwall, mine geologist. The mine was found by the Cordex syndicate and is operated by Dee Gold Mining Company with Rayrock Mines, Incorporated as managing partner.

The Dee gold deposit was discovered in mid-1981 by G. W. DelaMare, a prospector for Cordex, 10 miles north of the Carlin mine. Of the 10-12 original samples, 5 carried anomalous gold values (I do not know what was considered anomalous but surface values up to 0.8 oz/T Au occur). Ten days after the property was leased, Cordex was drilling it. In April, 1983, the decision was made to proceed with full scale development starting in the fall of 1983. On October 17, 1984, the first dore bar was poured at Dee. Capital costs were kept to $21.5 million by buying used equipment. Drilling of 246 rotary holes totalling 26,000 feet during the exploration phase established reserves of 2,670,000 tons averaging 0.115 oz/T Au. Heap leach reserves include an additional 1,100,000 tons averaging 0.028 oz/T Au. Dee Gold Mining currently has a land position that equals 272 claims. Initial production should be about 38,000 oz Au/year. From our tour, I conclude that the possibility of finding additional reserves is excellent. The only previous exploration on site was for barite.

The Dee Gold mine is the northernmost known gold mine in the northwesterly trending Carlin gold trend. This trend,

from the Rain deposit in the south to Dee, has to date produced over 4,000,000 ounces of gold. The trend is estimated to have at least 15-20 million ounces of gold reserves. Since so much has been written on the regional geology of the Carlin trend, I will go directly to the local geology of the Dee Mine.

The geology of the Dee Mine area is still incompletely known. Some ideas based on surface mapping have changed as the mining progresses. The Dee Mine is in an area that is dominated by siliceous assemblage rocks. Allochthonous Ordovician rocks of the Vinini Formation have been thrust over Devonian rocks of the Roberts Mountain Formation and an unnamed limestone. In the mine area, the Vinini is represented by thin cherts interbedded with siltstones, minor limestone beds and calcareous to dolomitic siltstones. The Roberts Mountain Formation includes silty carbonaceous limestones and coarse grained limestones with chert beds. An unnamed fossiliferous reef limestone above the Roberts Mountain Formation has been correlated with limestone in the Bootstrap window. Tertiary deposits of gravels and tuffaceous material, up to 1000 feet deep in places, fill structurally depressed areas and partially cover the ore deposit. Tertiary dikes cut both autochthonous and allochthonous rocks.

The complex structural history of the area was instrumental in localizing ore. At least 3 thrust faults have been recognized at Dee Mine. The Roberts Mountain thrust has brought Vinini Formation rocks eastward over the Devonian Roberts Mountain Formation and unnamed limestone. The Ridge thrust has placed Devonian rocks over Vinini rocks. The Boulder thrust has brought Silurian-Ordovician siltstones and cherts over limestones and mudstones of the Devonian unnamed limestones. High angle north, northeast and northwest trending faults and shear zones show pre-and post ore movement. A north-trending shear zone through the deposit seems to be a major ore controlling structure. A north trending antiform structure has domed both the Ordovician and Devonian sediments, but Bergwall says the antiform has an E-W trend.

An antiformal feature is found along much of the Carlin trend. A dome or anticlinal feature is a common regional feature near many of the Great Basin Carlin type deposits. This arching may play an important role in creating an initial fracture and permeability system.

Three main ore zones have been identified to date. These are called the Main, North Extension and Ridge zones. The Main zone deposit occurs in a gouge zone with Ordovician rocks in the hanging wall and Devonian rocks in the footwall.

Brecciation and silicification are ubiquitous. Higher grade ore is found near bifurcating imbricate thrusts. Ore is found mostly in the Devonian rocks, but some ore is found in the hanging wall Ordovician sediments. A southwest extension to this ore zone is deeper.

The Ridge ore zone is separate from the Main ore zone by a collapsed solution cavity with vertical walls. Material on the bottom is mineralized rubble. The Ridge zone is a fracture controlled pipe-like body, strongly influenced by northwest trending structures. The shallow ore zone and deep ore zone are continuous at depth within the Ridge ore zone.

The North Extension zone, which was not visited during the tour, seems to be localized by the NE-trending Control Fault, and is an extension of the main zone.

The Dee Gold deposit is an unusual Carlin-type deposit in that good silver values are present. As a generalization, the silver values equal the gold values in the deposit. Some areas may average 3 oz/T Ag; however, while the gold mineralization favors silty rocks as a host, the silver mineralization (native silver and argentite) is hosted by limestones. Sometimes the gold and silver mineralization are not coincident. Native gold up to 100 u is the only gold mineral. Massive limestones and mudstones are not favorable gold hosts unless strongly fractured or near major

structures. The ore deposit is truly disseminated but very strongly structurally controlled.

The scenario for ore formation at the Dee Mine is as follows:

1) Ground Preparation
2) Argillization
3) Silicification
4) Gold deposition, silicification
5) Oxidation

Ore fluids moved up the high angle structures to the thrust zones and broken areas.

Both argillization and pre-ore silicification have acted to reduce permeability and gold ingress in some areas. Oxidation levels can be 400' and more due to the intense structural preparation.

Frank Bergwall assigns a Tertiary age to the gold mineralization at the Dee Mine. Cretaceous age mineralization related to intrusive activity is found in dikes and structures. Frank believes that evidence such as altered mineralized dikes and structural relations indicate a Tertiary age to the gold, but did not assign a specific age.

A fine article in the March 16, 1985 Skillings Mining Review details the mining and milling procedures. I will

just relate a few points. The strip ratio for mining is now 4-5:1 waste to ore; this ratio will be maintained through the life of the mine. Current mining costs are $0.75-0.90/ton and the total cost is $175/ounce of gold. Gold recovery is better than 85% now, silver recovery is less than 50%. Heap leach tests before mining proved that the ore would have to be milled. Silica encapsulation of the gold gave very poor recovery with heap leach techniques. Hence, the relatively high capital cost. The original mill capacity of 865 tons/day has been expanded to 1000 tons/day now.

GAG/jl

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