GEOLOGIC MINE MAP OF GRANT GOLD MINE, FAIRBANKS MINING DISTRICT, ALASKA

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INTRODUCTION

From December 1980 to June 1981, the authors spent 25 man-days mapping underground at the Grant gold mine on the southeast flank of Ester Dome, 8 miles northeast of Fairbanks (pl. 1). A Brunton compass-tape traverse augmented by survey control points was the main method of study.

Exploration and development of the mine has been intermittent since the 1920s. Prior to 1950, about 6,000 tons of ore were selectively mined from the Irishman vein (Roger Burggraf, pers. commun., 1981). Tricon, Inc., has been developing the property during the last several years and now has a gravity-feed mill facility there.

Two structurally controlled auriferous vein-fault deposits, the Irishman and O'Dea zones, are currently being evaluated by Tricon, Inc. Other deposits have been discovered during underground drifting, drilling programs, and geophysical investigations.

Principal underground workings consist of over 2,700 ft of drifts, crosscuts, and raises on the 100-, 150-, and 200-ft levels of the Irishman system, and the 80-, 120-, and 200-ft levels of the O'Dea breccia zone. Host rocks for all known deposits are polymetamorphic schist and quartzite of undetermined age.

IRISHMAN VEIN

The Irishman vein fault contains at least three ages of vein quartz; late-stage silica injection was accompanied by free gold, arsenopyrite, lead-antimony sulfosalts, and (rarely) scheelite. Ore fluids were emplaced along a fault zone trending sinuously N. 20°-40° E. and dipping steeply to the southeast. The vein fault dips from 58° to 72° on the 150- and 200-ft levels but flattens out to from 15° to 35° in raises above the 100-ft level, where it intersects an incompetent graphite-muscovite schist lithology. Underground exploration and development have shown the Irishman vein fault is over 400 ft long and open ended at depth. The southwest end of the system is open ended, but the northeast end is cut by a N-NW-striking joint-fault system. The nature of movement along this crosscutting fault is not understood. Vein widths vary from 3 to over 22 in. and average 12-14 in. on the 100- and 150-ft levels.

O'DEA BRECCIA ZONE

Underground development by Tricon, Inc., during 1980-81 has concentrated on the O'Dea breccia zone, which has been shown by development work to be at least 750 ft long. This system consists of auriferous quartz breccia cemented by iron, arsenic, and antimony oxides, broken schist fragments, mylonite, and minor sulfide zones. Vein-fault widths vary from 6 in. to over 6 ft, and average 42 in. in the present workings. The deposit appears to be open ended at depth and to the southwest; the northeast end is truncated by the same fracture system that cuts the Irishman ore body on the 150-ft level, but the offset, if any, is poorly understood. Multiple injections of silica also

occurred along the O'Dea breccia zone, but unlike the Irishman system, recurrent movement along the vein-fault zone resulted in heavily oxidized broken and brecciated zones. At the south end of the drift, the O'Dea structure apparently splits and could be several tens of feet wide.

The O'Dea breccia zone trends oblique to the Irishman vein fault with an average strike of N. 45°-54° E. On the basis of stope and raise work, the zone appears to dip from 46° to 50°, which is significantly more shallow than the Irishman vein fault. Vein flattening is also less conspicuous in upper levels of the O'Dea breccia zone. Complex, locally auriferous, poorly understood cross-cutting structures occur in upper sublevels in the south raises (pl. 1). If the strike and dip of the O'Dea-breccia and Irishman zones persist at depth, they may intersect below the 200-ft level. Promising mineralized zones and fault breccia parallel to the O'Dea breccia zone have been discovered by underground crosscut and geophysical exploration; these zones remain at a preliminary stage of evaluation. Width of the ore structures in all systems appears to be controlled by the relative competency of the host rock.

Further DGGS work on the mineralogy of the ores, with fluid inclusion studies by M.S. Robinson and metallurgical testing by C.N. Conwell, are in progress.

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