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Item 8

Discussion of the Disseminated-Gold-Ore-Occurrence Model

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INTRODUCTION

The ultimate objective of the 1982 workshop was, if possible, to develop an ore-occurrence model for the disseminated-gold-deposit type. Such a model should assure a common vocabulary and body of factual data that define the common classifiable deposit characteristics and lead to the systematic identification of favorable geologic environments of deposition. Several ore-occurrence models for other types of deposits at various qualitative and quantitative levels have been created to organize data systematically for meeting special-purpose needs (Erickson, 1982; Cox, 1983a, b), but the seeming diversity between sediment- and volcanic-hosted disseminated gold occurrences appeared, at the outset, to pose difficulties in arriving at a simple model. Options for framing a model were considered first, and the elements composing one followed.

Recently, two types of occurrence models have been developed, each of which provides an example of model technology. A genetic-geologic uranium model, for example, encompasses the widely ranging igneous, sedimentary, and metamorphic environments in which uranium forms (Finch and others, 1980). The environment and processes of formation of deposits thought to have a common origin are considered in a time-process sequence. The matrix is intended to consider every event, condition, and process that influenced mineralization, and thus aid in evaluation of the resources. As an example of the second type of model, the computer program "Prospector" (Duda, 1980) was designed for the identification or recognition of specific types of deposits (for example, porphyry copper, massive sulfide) and links field and laboratory observable or inferred evidence with an inference network of plausible rules based on probabilistic reasoning. Such a model provides a systematic methodology for creating a useful resource model and may assist in evaluating geologic terranes and the discovery of unrecognized resources.

The consensus of the workshop was that a definitive or quantitative model, such as those described above, may be premature for disseminated gold deposits; however, documentation of the geologic attributes as well as of existing gaps in data is an important first step in establishing the status of knowledge.

Jerritt Canyon, Nevada

[Data from R. C. Banghart, D. J. Birak, and W. E. Daly, Freeport Minerals Co. n.d., no data available]

A. Name/location ----------------	Jerritt Canyon district (Bell mines), sec. 33, 34, 35, T. 41 N., R. 53 E., Elko County, Nev.
B. Deposit type ------------------	Carbonate-hosted disseminated gold.
C. Other examples ----------------	Carlin, Cortez, Pinson, Aligator Ridge, and Windfall, Nev.
D. Regional attributes	
1. Presence of gold ----------	A known antimony district, commonly in association with gold.
2. Terrane --------------------	Accreted Roberts Mountains tectonostratigraphic oceanic sediment overlies miogeosynclinal (eastern)-facies lower-plate ore host rock seen in windows of thrust plates.
3. Basement -------------------	Not exposed.
4. Igneous association -------	Absence of major intrusive igneous rocks; small felsic stock, scattered dioritic dikes and sills and rhyodacite flow, local travertine hot-spring deposit.
5. Structural regime ---------	Basin-and-range and extensional faults, Roberts Mountain thrust fault.
6. Level of erosion ----------	Deposits now near surface; some may have been eroded.
E. District attributes	
1. Host rocks ----------------	Sedimentary limestone, siltstone, and chert of the Hanson Creek (Ordovician and Silurian) and Roberts Mountains Formations (Silurian and Devonian), underlain by the Eureka Quartzite (Ordovician).
2. Traps ---------------------	Fault intersections, silica capping, thrust fault.
3. Preparation ---------------	Hydrothermal alteration (silicification, argillization, oxidation) weathering.
4. Size ----------------------	260 km^2; two current pits, four minable ore bodies; gold, silver, antimony, and barite present; past production insignificant.
5. Extensions ----------------	Good possibilities.
F. Deposit attributes	
1. Host rocks ----------------	Banded fine-grained gray black carbonaceous middle limestone unit in the Hanson Creek Formation, and laminated medium-gray calcareous locally carbonaceous siltstone of the Roberts Mountains Formation, overlain by the upper plate of the Roberts Mountains thrust, containing chert, argillite, shale, greenstone and quartzite (Hawkins, 1982).
2. Size/shape ----------------	30 by 2,400 m; extremely irregular along faults and bedding; 13.7 million ton containing 0.205 oz Au/ton (12.5 million t at grade of 7.0 g Au/t), which approximates 2.8 million oz Au (87.3 million g Au); no past production.
3. Physical characteristics	
a. Ore/gangue mineralogy --	Ore: free gold (max 1-4 m) and unknown mineralogic species in carbonaceous and oxidized types of ore; gangue: includes stibnite, pyrite, carbon, realgar, orpiment, barite, quartz, cinnabar, aragonite, variscite.
b. Structures -------------	Microveins at fault intersection with favorable strata below thrust fault, and disseminations in permeable reactive host rocks.
c. Textures ---------------	Fine grained, open vuggy silicification, permeable host.
d. Host-rock type/age -----	Chert-carbonate-silt sedimentary rocks of Ordovician to Devonian ages.
e. Paragenesis ------------	n.d.
4. Chemical characteristics	
a. Solution chemistry	
(1) Inclusions ---------	n.d.
(2) Stability ----------	n.d.
(3) Solubility ---------	n.d.
(4) Isotopes -----------	n.d.
(5) Cause of deposition	n.d.
b. Temperature ------------	Generally low in ranges of simple sulfides and silicates (clays and jasperoid?) open vuggy silicification suggests shallow, low-temperature environment.