A Proposal for Integrated Mine-Mill-Agricultural Complexes to Enhance Project Economics in the Chihuahua Desert and Mesa Central, Mexico

Statement of Problem:

Numerous very large mineral deposits exist in the area under consideration, and they have past, present and/or potential mineral production and have produced the largest part of Mexico's minerals wealth. These deposits are located in the Mexican Basin and Range and Mesa Central Physiographic Provinces. Many belong to the carbonate-hosted high temperature silver-lead-zinc deposit type (Megaw et al., 1988). As underground mining goes deeper, problems are invariably encountered with ground water, such that up to 10,000 gallons per minute must be pumped from the workings of some mines, and pumping sometimes constitutes up to 33% of the cost of extracting the ore. This water is not toxic, although it may have an elevated temperature, and it is discharged onto the desert surface. Only in several instances is any of that water used for agricultural purposes. What a waste! The problem to solve is how can this scarce resource of the desert, water, be combined with an abundant resource, fertile soils, to provide for economic development. Can the application of scientific and economic study of the situation, planning, and a reasonable legal environment be envisioned for such potential economic development?

Proposal

The carrying out of this proposal would produce an economic model for the development of integrated, mine-mill-agricultural (MMA) complexes around large mineral deposits. The specific targets for this particular study will be in northern Mexico.

Numerous targets are presently recognized as being qualified for study in the project. These will be rated according to priorities of the present project, and a small number of these will be selected for more detailed technological and economic evaluation. A team of scientists

and economists with expertise relevant to the project will be assembled to undertake the work necessary.

1. Specific knowledge relevant to the project with respect to the mine workings includes the following: a) quantity and quality of mine water discharged presently, and that planned with any future increases/decreases; and b) predicted hydrologic situation at the end of the mine's life for long-term agricultural planning. Treatment of the mine discharge water may or may not be necessary before agricultural use.
2. Specific knowledge necessary for the planning of agricultural activities include the following: a) quantity and quality of water available; b) quantity and quality of nearby desert land available; and c) possible crop types and economics. A problem inherent in the integrated MMA complex is that a mine is usually producing water at a more constant rate than the agricultural activities require, and this will have to be addressed. However, the agricultural complex will have an upper limit within this plan which is the future hydrologic productivity of the ultimately mined out deposit. The agricultural complex will not die with the mine; the abandoned mine can then be thought of as a big well.
3. (Optional) Specific knowledge relevant to the project with respect to the mill or concentrator operations includes the following: a) water needs, and b) quantity and quality of solid and liquid discharge (tailings).

Potential Benefits of the Project

This interdisciplinary study would produce a model for the development of integrated mine-mill-agricultural complexes. With respect to northern Mexico, there are numerous targets to which such an economic model might be applied. Megaw et al. (1988) lists 17 major deposits of this type; however, McAnulty and Rodriguez (1990) have compiled a list of 58 prospects of this

deposit type in the state of Chihuahua alone. Potential economic benefits of a successful model would effect presently operating mines, mines abandoned because of water and/or economic problems, and prospective areas yet to be evaluated. Examples of all of these varieties exist.

The development of a successful economic model as envisioned by this proposal, when combined with the financial requirements, could bring increased mineral and agricultural production and increased employment to this region. The economic model produced by this project will not be site specific to Mexico, and this integrated, interdisciplinary, model could readily be applied elsewhere in the world.

Present Participants

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Reference

Megaw,P., Ruiz, J., and Titley, S., 1988, High temperature carbonte-hosted Ag-Pb-Zn (Cu) deposits of northern Mexico: Economic Geology, v. 83, p. 1856-1885.

McAnulty, W.N., Jr., and Rodriguez G., A., 1990, Mineral Exploration in the Chihuahua Desert, An Explorationist's Perspective: Symposium on Mineral Resources of the Chihuahua Desert, El Paso, TX, Feburary.