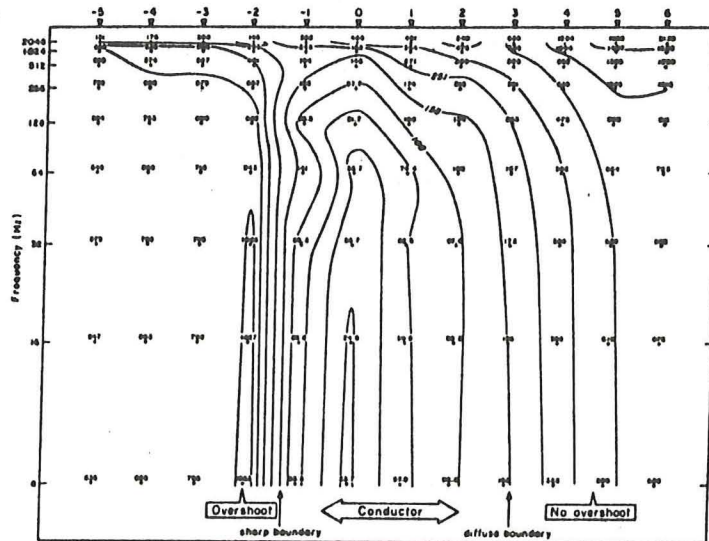


# Minerals Exploration With Electrical Geophysics

GL 03306 5086

*Effective, Affordable Methods in  
Detecting Precious Metals and Other Minerals*



**ZONGE ENGINEERING & RESEARCH ORGANIZATION, INC.**

Zonge Engineering offers a number of electrical techniques which are effective in locating and mapping gold, silver, sulfides, base metals, sulfur and other industrial minerals, coal, and uranium. Some specific uses of electrical work in mining exploration include:

- \* Precious metals: mapping the polarization response of sulfides and alteration often associated with gold and silver
- \* Sulfides (massive, disseminated, skarns): direct detection and mapping, indirect detection by mapping associated structure and alteration, mineral and grain size discrimination
- \* Industrial/base minerals: mapping mineralization and structure
- \* Uranium: mapping stream channels, structure, associated mineralization
- \* Coal: structure mapping
- \* Basement and lithology mapping, identifying silicified zones, carbonate sills, clays, graphite, hydrothermal alteration, etc.
- \* Mapping faults, fracture zones, veining, and other structure
- \* Research for improved recovery techniques

In addition, Zonge Engineering can assist in evaluating possible ground contaminants associated with mining operations:

- \* Detecting leaks in evaporation and tailings ponds without draining the ponds; mapping resulting contaminant plumes
- \* Mapping brines and other contaminants associated with in-situ leaching operations

Field surveys may be conducted on the surface, underwater, or in combination with in-hole probes. Applications vary from quick area reconnaissance to detailed mapping. Emphasis is placed on techniques which are very cost-competitive with drilling.

Zonge Engineering employs a number of versatile electrical techniques in exploration:

- \* Gradient array induced polarization (IP) --- time or frequency domain; fast, inexpensive, detailed plan-view mapping
- \* Schlumberger, Wenner, or dipole-dipole array IP --- time or frequency domain; moderate-cost mapping with depth information
- \* Complex resistivity (CR) --- multi-frequency IP for detailed mapping and research; discrimination of certain types of sulfide minerals and analysis of grain size distributions; surface, surface-to-drillhole, and downhole-logging surveys; laboratory rock and core measurements
- \* Controlled source audio-frequency magnetotellurics (CSAMT) --- detailed, medium-cost mapping of massive conductors, geology, and structure
- \* Transient electromagnetics (TEM) --- mapping massive conductors and conductive structure
- \* Self-potential (SP) --- quick, cost-effective reconnaissance mapping of electrochemical potentials associated with sulfides
- \* Reconnaissance electromagnetic sounding --- EM profiling and sounding, VLF, MAX-MIN; high-speed, low-cost mapping of massive conductors, geology and structure

Zonge Engineering has considerable experience in the use of electrical techniques and their application in mining exploration. Since its founding in 1972, the company has been employed by mining companies of all sizes for both exploration and geotechnical/environmental investigations. We use state-of-the-art instrumentation and interpretation techniques which are oriented toward practical solutions for the mining geologist.

We would be happy to assist you in evaluating the application of electrical geophysics to your project. Please write or call for copies of publications, case histories, or other information.

## **SPECIALISTS IN ELECTRICAL GEOPHYSICS**

*Field Surveys*

*Geophysical Consulting*

*Instrumentation Sale and Lease*



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