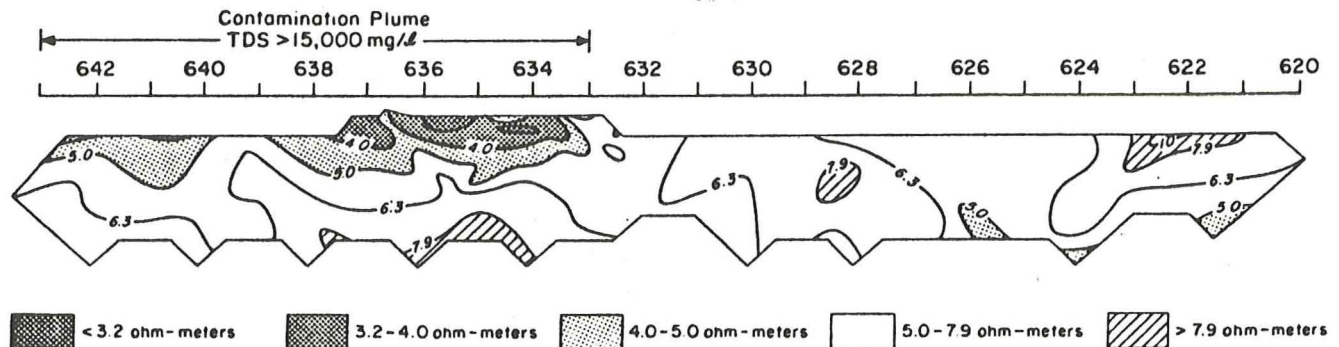


Leak and Plume Detection With Electrical Geophysics

GL03306 3/88

*Effective, Affordable, Practical Solutions
to Groundwater and Engineering Problems*



ZONGE ENGINEERING & RESEARCH ORGANIZATION, INC.

Zonge Engineering offers geophysical consulting, field survey contracting, and instrumentation manufacturing services to the groundwater and engineering industry. The company provides a variety of surface and downhole electrical geophysical techniques for detecting, mapping, and monitoring contamination from industrial and municipal sources. Some specific applications are:

- * Detection and mapping of leaks in waste-containment pond liners (evaporation ponds, cooling ponds, tailings ponds, etc.)
- * Mapping brine plumes associated with waste spills and leaks
- * Mapping brine leaks from improperly plugged injection wells
- * Detecting buried drums and other waste containers in landfills
- * Mapping fractures and subsurface transport paths to help in siting monitoring wells
- * Supplement sparse monitoring well network with geophysics for improved control at less cost
- * Monitoring waste clean-up operations and verifying success
- * Determining depths to confining layers and basement
- * Mapping hydrocarbon spills and leaks from surface and underground tanks, pipelines, drums, etc.
- * Structure assessment in evaluating nuclear waste-disposal sites
- * Mapping seawater brine incursion into fresh on-shore aquifers
- * Detection and mapping of leakage sites in reservoirs and dams

Field surveys may be done underwater or on land, surface or downhole, with applications varying from quick area reconnaissance to highly detailed mapping. Electrical geophysics can be used as an integral part of a monitoring program to help locate monitoring wells or to supplement the information from existing wells. The work often can be done at a fraction of the cost of drilling and sampling a given site, and with greater sample density than normally permissible with drilling alone.

Zonge Engineering employs a number of versatile electrical techniques:

- * Resistivity and induced polarization (IP) --- time or frequency domain; Schlumberger/Wenner, gradient, dipole-dipole and custom arrays; reconnaissance to detailed mapping
- * Complex resistivity (CR) --- detailed multi-frequency IP for maximum information; research for materials discrimination and other purposes; laboratory core-measurements and downhole services available
- * Controlled source audio-frequency magnetotellurics (CSAMT) --- high resolution, deep-to-shallow sounding, relatively insensitive to culture noise; reconnaissance or detailed mapping and monitoring of plumes, leaks, geology, and structure
- * Self-potential (SP) --- underwater or surface; quick, cost-effective mapping of leaks and plumes, especially in waste-containment ponds
- * Electromagnetic sounding --- transient electromagnetics (TEM), EM profiling, VLF, MAX-MIN; quick area coverage when cultural contamination is not severe; maps plumes, leaks, and structure
- * Ground-penetrating radar --- quick mapping of buried drums and landfill boundaries

Zonge Engineering has considerable experience in the use of electrical techniques and their application to environmental and engineering applications. Since its founding in 1972, the company has been employed by hydrologic consulting firms, government regulatory agencies, utility companies, and major energy companies for a variety of applications in the geotechnical and energy exploration industries. Our state-of-the-art instrumentation and interpretation techniques are oriented toward practical solutions with the hydrogeologist and engineer in mind.

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

SPECIALISTS IN ELECTRICAL GEOPHYSICS
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