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GEOPHYSICAL NEWSLETTER

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induced polarization – electrical resistivity – self-potential – magnetometry – seismics – well-logging
MINING – GROUNDWATER – ENGINEERING - ARCHAEOLOGY

¡ CHEERS!

We welcome you to the first issue of our periodic bulletin, which will be presented to all our friends and clients, with the purpose of commenting on our company's recent advances in exploration geophysics. As most of you know, our company started operations in 1960, and we have already completed 548 geophysical studies in the fields of mining, groundwater, engineering and archaeology.

Through this newsletter, we will show application examples of our methods and techniques, as well as suggestions based on our 40 years of experience. We will also present you our latest advances in geophysical instrumentation (commercial and proprietary), software developed internally, as well as innovative applications. We invite you to be a part of this bulletin with any suggestion or comment you can send us.

José E. Arce

INSTRUMENTATION

Our company presently owns 18 geophysical units, permanently located at our premises in Lima. The methods we offer are Magnetometry, Induced Polarization, Electrical Resistivity, Self-Potential, Seismic Refraction, Seismic Tomography, Well-logging (electrical, gamma, deviation, sonic, EM induction, caliper, water quality, televiewer, etc.). Our experience has led us to mostly prefer proprietary instrumentation, in order to be able to guarantee quality trouble-free operation. With this in mind, and with very experienced staff of field operators, we can maintain a very high standard of data quality and safety in our surveys. We will use this newsletter to present short notes on our instruments, as well as their applications.

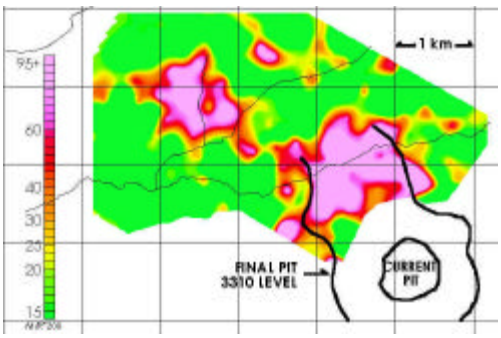
A NEW ALLIANCE....

As from April 2002, José Arce Geofísicos started a strategic alliance with Zonge Engineering & Research Organization, from Tucson, Arizona, for electromagnetic techniques (CR, MT, TEM, CSAMT, AMT, HCCSAMT, nanoTEM) and some specific IP applications. We currently hold in our offices a complete Zonge instrument set, including a high-power GGT-10 transmitter (10 kW) and a GPD-32 8-channel receiver, along with all accessories and ancillary equipment. With this alliance, our companies complement their methods and applications and are able to offer the largest variety of geophysical techniques and applications in Perú. Our 30 years of friendship with Dr. Ken Zonge, along with his company's prestige and dedication to our science, and our similar philosophies, were decisive in completing this alliance. Zonge will be operating in Perú through our company.

INDUCED POLARIZATION: *How to decide*

Probable the most widely used geophysical method in mining exploration is Induced Polarization, commonly known as IP. To explain it in few words, it consists of measuring how much and how long an electrical field can be maintained by the terrain after it has been applied and shut down. The first IP measurements where performed by Dr. Harry Seigel in 1947, using a water-filled tank with a metal sphere suspended in its center. The IP effect had already been observed several decades before, but nobody envisioned its application. This is why Dr. Seigel, an old friend of ours for more than 40 years, is considered the discoverer of this method. Financed by Newmont, Seigel worked on his PhD thesis at the University of Toronto, developing all of the method's theory for time and frequency domains, as well as most field configurations for vertical soundings (VES) and profiles. Newmont formed a group of young scientists that developed the first IP instrument, along with Seigel, and did their very first commercial survey in Cuajone in the early 1950s.

One of the ever-going arguments of IP application is how to decide which field array to use. A geophysicist's responsibility is to recommend the field configuration that allows the highest possible input signal with the least power. applied to the ground. Up to date, we have completed over 9000 vertical electrical soundings (Wenner & Schlumberger array) and over 2100 kilometers of profiles (Pole-Pole, Pole-Dipole, Dipole-Dipole and Gradient) with IP work. From our experience, we know soundings have a higher terrain flexibility because they do not depend on alignments and also require the less power than most profiling arrays (a 250W transmitter allows some 300 meters of depth penetration in 70% of field applications). Also, VESs are quite useful for fast reconnaissance or condemnation of large areas, due to its high daily field progress of 6 to 13 stations, mainly dependent on distance and accessibility between them. On the other hand, VES stations have a significant disadvantage in assuming that the polarizable target is large (i.e. large copper porphyry or skarn-type deposits), and since stations are operated and processed individually, they have less lateral resolution. Therefore, if the geophysical targets to be studied are small mineralized bodies or veins, profiles are much more preferable. The map shown below is the true chargeability by true resistivity ratio of Cuajone's Northwest extension from our IP anomaly obtained with soundings. Please note the high degree of correlation between the ratio and the projected final pit. Other maps from this survey may be found in our web page.



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Av. Petit Thouars 4380, Miraflores, Lima 18, Perú. Telephone:4227205, Fax:4426946.
perfiles@geofisicos.com.pe http://www.geofisicos.com.pe