P7-1 RESISTIVITY INVESTIGATION OF METEL TAILING DISCHARGE PIPELINE IN CAYELI-RIZE (TURKEY)

DERMAN DONDURUR
D.E.U. Jeofizik Muh Bolumu 35100 Bornova, Izmir, Turkey
E-mail: dermand@izmir.eng.deu.edu.tr

Investigation of buried shallow pipes and cables is the subject of geotechnical and environmental geophysics. Those structures described as linear targets offering some characteristic geological and physical properties with respect to the surrounding can be explored by certain geophysical methods. These properties could be specified as their great lengths (greater than several kilometers or more), shallow depths (a few meters below), small cross-sectional areas and polarisable or nonpolarisable surfaces.

In the context of this study, an investigation was carried out in order to find metal tailing discharge pipeline laid at the path of the coastal highway along the Black Sea in NE Turkey from Samsun to Georgia. Since the exact location is not known for this pipeline (location and burial depth), it was essential to find the pipeline with other means rather than digging or excavating because the pipeline was in actual use carrying metal tailings of the Cayeli Copper Corporation (CBÝ) in NE Turkey along the Black Sea Coast. Therefore, it was essential to cross this pipeline with a passover bridge. This pipeline carries the metal tailing of the mine to the mixing-tank constructed at the coast in order to dilute with sea water for eventual discharge the slurry with another pipeline to the water depths of 350 m below the anoxic layer in the Black Sea.

In order to determine the strike and the depth of the pipeline by electrical resistivity method, combined sounding-profiling method, allowing us to reveal two-dimensional resistivity distribution of underground, was considered. For this purpose, in order to decide an appropriate resistivity electrode configuration, an analogue resistivity modeling experiment was carried out. In this experiment, a resistivity-modeling tank was used and using dipole-dipole, Wenner and gradient electrode configurations. An apparent resistivity pseudo section was obtained for comparison of their ability to detect pipe like targets. For modeling a pipe, having a highly resistive plastic covering material and transporting conductive mine wastes inside, a conductive aluminium stick was isolated by using plastic material and used as a model of the metal tailing bearing pipe. As a result of analogue modeling experiment, dipole-dipole electrode configuration was selected because of its greater response in amplitude.

In the field study, resistivity pseudo-sections were obtained with dipole-dipole electrode configuration on four different profiles for the region between the mixing tank and the Black Sea Coast. The lengths of the profiles were varied from 18 to 21 m. In order to get high resolution resistivity sections, both the station intervals and the distance between electrodes were taken to be 1 m. Because the depth of burial was not known, the coefficient between the current and potential electrodes for dipole-dipole configuration was taken as n=8.

Finally, high resistivity anomalies of mine metal tailing pipeline on the sections, resulted from its resistive plastic coverage, were tracked and the strike of the target was determined. The depth of burial was found to be approximately 3 m.