O12-7 THE INVESTIGATION OF SOIL AND GROUNDWATER POLLUTION USING GEOPHYSICAL METHODS IN ISPARTA LANDFILL

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Today, contamination of both groundwater and soil has become an increasingly important problem. Many studies have been carried out for the identification and solution of this problem around the world. However, such studies are quite recent in our country. Industrial and domestic solid wastes are disposed improperly by non-scientific methods without the awareness of the importance of pollution they cause in groundwater, soil and air pollution.

This study presents the preliminary results of a geophysical survey conducted in an afford to identify groundwater and soil contamination caused by a solid waste site in the city of Isparta. In addition, results are integrated with the hydrogeologic and soil chemical studies. The objective of this study is to monitor the change of conductivity with time using measurements made once every three months by taking advantage of the electromagnetic VLF method allowing fast and inexpensive data collection. Measurements are made at three frequencies (16.0, 23.0, 28.5 kHz) along 9 profiles 40 m apart with a station separation of 5 m. in addition, in the same direction, there are 11 DC-Resistivity profiles 25 m apart. The data set obtained is interpreted qualitatively with the integration of hydrogeological and soilchemical investigations.

According to a previous hydrogeological investigations in the landfill area, two-thirds of the alluvial aquifer in the study area is severely polluted. The analysis of the samples taken from the wells mostly indicate high values of NO_3, NO_2, ve NH_4. Dump site is on very permeable alluvium, has no water-proofing (Karaguzel ve Irlayici, 1998).

Soilchemical investigations are carried out along 11 profiles, whose first stations coincide with of the geophysical survey profiles, by taking soil samples at various depths (Kaya, Isildar and Karaguzel, 1999). Results show that in the vertical and horizontal directions high levels of waste-origined chemical concentrations are observed along with PH and EC values that are in agreement. Furthermore, water samples taken from a well 630 m away from the site does not indicate contamination.

The extend of landfill-induced contamination controll by groundwater flow in the N-S direction is mapped using apparent resistivity pseudosection and surface mapping. To the north of the landfill low apparent resistivities are observed in both horizontal and vertical directions. When in-phase and out-of-phase components measured at three different times are analyzed, it is observed that especially the out-of-phase component with negative values clearly reflect the contamination in the same direction. In addition, with measurement taken at different times, the temporal change of high conductivity values can be marked as well. The monitoring with VLF-EM and DC-Resistivity results demonstrate a good agreement with the results of hydrogeologic and soil chemical investigations.

In practice, electrical and electromagnetical methods are usefull for the investigation of groundwater pollution since the dissolved solid content is directly related to conductivity. Because it is fast, easy and inexpensive, the VLF-EM method is shown to be an especially suitable method for monitoring of pollution. However, it is very important that results be incorporated with the results of hydrogeologic investigations.

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