

## **Operating and management of open loop ground source heat pumps for eco-friendly use**

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Use of renewable energy gradually increases in many countries because of global warming. Geothermal energy of renewable energy shows the highest energy efficiency. Therefore, geothermal energy is used for cooling and heating system of facility. This study was conducted to evaluate influence of open loop ground source heat pumps on hydrogeological properties of groundwater used in open loop ground heat pumps. Increment of groundwater temperature was observed in most facilities because of operating the open loop ground source heat pumps. In addition, heat energy deposition was showed at some sites. However, chemical compositions of the groundwater did not have significant difference. When influence of open loop ground source heat pumps on groundwater is evaluated, considering seasonal variation of dissolved components is very important, especially, in countries showing distinct four seasons. In some facilities, Cu, Zn, and Pb concentrations in outflow of open loop ground heat pumps increased compared to those in inflow. These metals can be released from metal parts of ground source heat pumps. So, heavy metal concentrations are going to be monitored continuously for eco-friendly use. This study was supported by the Korean Ministry of Environment under "GAIA project(2014000530001)".