TRANSPORT AND DISPERSION OF HYDROGEN SULPHIDE GAS IN THE GREATER OLKARIA GEOTHERMAL AREA, KENYA

By:

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DECLARATION

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ABSTRACT

The emission of Hydrogen sulphide (H_2S) gas during the development of geothermal resource is a significant environmental aspect of concern that must be considered in any environmental management plan. Hydrogen sulphide gas is an extremely toxic and irritating gas. This research work sought to investigate the transport and dispersion of Hydrogen sulphide gas over the Greater Olkaria Geothermal area on a diurnal scale.

The transport and dispersion of Hydrogen sulphide gas over the Greater Olkaria Geothermal area was investigated using temporal analysis, correlation analysis, spatial analysis. Temporal analysis shows that the highest concentrations of Hydrogen sulphide were obtained when winds are calm and atmospheric temperatures are low. In Olkaria geothermal area, these weather conditions exist between 2000hrs and 0600hrs local time. The study suggests that if these weather conditions persist over prolonged period, Hydrogen sulphide gas concentrations around the power plants may rise to unsafe levels with respect to human health. There is need for a continuous monitoring of H_2S gas particularly when weather conditions point towards building up of H_2S gas concentration around the power plant.

Spatial and temporal analysis affirms that fairly high concentration of H_2S gas occurred close to the source points. In all the three averaging times (1-hourly, 8-hourly and 24-hourly) considered during the modeling of transport and dispersion of Hydrogen sulphide gas, high gas concentration were noted close to emission points and disperses away with distance. It can be concluded that the transport and dispersion of H_2S gas at Olkaria geothermal field is dependent on the prevailing weather conditions.

Early recognition and detection of the concentration of H_2S gas in the atmosphere is crucial in protecting employees and people living around geothermal power plants or any active geothermal area from deadly exposures. Employees working in areas that contain or have the potential to contain H_2S gas, should learn to recognize the signs and symptoms of H_2S gas exposure, monitor and take measures to protect themselves. Information on the concentration of H_2S gas, transport and dispersion is so critical hence it should be disseminated to the public to ensure their health and safety.

TABLE OF CONTENTS