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REMEDIATION OF DIOXIN-CONTAMINATED SOILS THROUGH THERMAL DESORPTION AND VAPOR MANAGEMENT VIA THERMAL OXIDIZER AT BIÊN HÒA AIRBASE, VIETNAM

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Abstract

During the US-Vietnam War, millions of liters of harmful herbicides, including Agent Orange, were dumped in Vietnam, resulting in severe health issues caused by polychlorinated dibenzo-p-dioxins and dibenzofurans ("dioxins"). Even decades later, dioxin contamination continues to affect the local population. In response to this problem, the Center for Technology Environmental Treatment/Chemical Force (CTET/CF), the GAET Corporation (Vietnam), and HAEMERS Technologies SA (Belgium) have collaborated to establish a joint operation. Their aim is to assess the effectiveness of thermal desorption treatment on dioxin-contaminated soil at Biên Hòa Airbase.

The primary objective of this trial treatment is to demonstrate the capabilities of thermal treatment technology and design in meeting specific targets for dioxins at the site. The goal is to reduce the contamination level from over 17.000 ppt Toxic Equivalents (TEQ) to below 300 ppt TEQ. To achieve this, Haemers Technologies has developed a thermal treatment pilot plant comprising two main units: (i) The thermal pile of 237m³ composed of three types of materials: 187m³ of contaminated soils, 25m³ of contaminated sludges and 25m³ of soil washing cake; (ii) The vapor treatment unit composed of a thermal oxidizer where dioxins are destroyed and a quench tower that rapidly cools the vapor, preventing dioxin reformation. This unit generates no liquid or solid waste. The pilot project has successfully demonstrated that soil can be remediated by heating it to 335°C, with a pollutant removal rate of 99 wt.%. Additionally, dioxins can be destroyed at 1.100°C, achieving a destruction rate of 99.9999 wt.% in the thermal oxidizer. This zero-waste solution offers an improved method for remediating dioxin-contaminated soils, with air emission results meeting the standards set by Vietnam, the European Union (EU), and the United States (US).

Overall, this project showcases an efficient thermal treatment technology for remediating dioxin-contaminated soils. It ensures the complete destruction of all toxic components while enabling soil recycling.

Key words: agent orange, dioxins remediation, thermal conductive heating, thermal oxidizer, zero-waste

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