

ESTD/ E-22-01 Akko (Israel)

Context & Project Description

The project was located in Israël, in Haifa Bay on a large disaffected chemical industrial factory made of many decaying buildings. The purpose of this pilot project was to assess the feasibility of thermal desorption for treating mercury contaminated soil using the Smart Burner™ Technology.

Equipment

Haemers Technologies has designed a pilot plant composed of two main unit:

- A thermal pile of 275m³ composed of 15 Propane Smart Burners
- A Vapor Treatment Unit (VTU) where Mercury and VOCs were captured in activated carbon Tanks or in liquid form by condensation (condensate)



Treatment target

The following tables summarized the contaminants soil targets after treatment and their maximum concentrations in the soil:

	Max. concentration [mg/kg]	Target values [mg/kg]
Total Mercury	5206	455
Mercuric inorganic	Unknown	307,0
Mercury Elemental	Unknown	46,0
Methyl Mercury	Unknown	102,0

Key words

Contaminants
Hg
VOCs

Max. concentration
5206 mg/kg

Volume
275 m³

Tonnage
440 T

Nb of heating tubes
15

Temperature Target
350°C

Project duration
**30 days of
treatment**

Treatment targets
Hg_{total}: 455 mg/kg

Location
Akko, Israël

Future Use
Housing
Client

**Tidhar Harel Menivim
Partnership**

Consultant
LDD Advanced Technologies

Date
January-April 2022

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VOCs and S-VOCs	Max. concentration [mg/kg]	Target values [mg/kg]
Tetrachloroethylene (PCE)	263,65	20,3
Trichloroethylene (TCE)	32,48	1,76
BTEX		
Benzene	0,17	1,5
Toluene	0,18	168,0
Ethylbenzene	0,92	11,2
Xylenes	0,55	49,7
Pesticides		
Hexachlorobenzene	195,28	0,04
Hexachlorocyclohexane, Beta-	Unknown	1,12

Monitoring

Two main parameters were monitored within the pile itself throughout the whole project. All parameters monitored were compiled into a report which was daily communicated to the client.

1°) Temperature monitoring:

Ten thermocouple tubes were installed within the pile. 3 thermocouples were installed at different depth within each tube for HT to be able to have a live visualisation of the temperature.

2°) Pressure monitoring:

Four pressure tubes were installed (two on each side of the pile). Pressure tubes allows HT staff to m annually measure (with an adapted measuring equipment) the pressure within the pile. The pressure was taken daily at each tube location.

3°) Combustion gases monitoring:

The combustion gases from the burners are collected and emitted at a stack. The stack was monitored daily for various parameters (i.e. O₂, CO₂, CO, CxHy, NOx).

4°) Contaminated vapor monitoring

The VTU was equipped with 9 measuring location which allowed HT's staff to have a precise understanding of the key physic-chemical parameters within it. Each monitoring location was analysed at least once a day. The VTU stack was particularly monitored to ensure compliant emission for key parameters (Hg, VOCs, CO, aso). All parameters were compiled in a report and communicated daily to the client.

Conclusion

A pilot test was performed between January and April 2022. It was carried out on heavily contaminated soil with VOC and S-VOC and mercury. Those soils were gathered in a pile for thermal treatment. After 3 weeks of installation (i.e., mounting of thermal pile, vapor treatment unit and condensate tanks), the system was lit within one week and lasted 30 days.

The following has been demonstrated during the treatment:

1. Ex-situ thermal desorption can successfully treat mixed contaminated soil with mercury and VOC, S-VOC contaminated soils to residential levels for subsequent beneficial use.
2. Haemers Technologies' design has proven to be effective in recovering the mercury and chlorinated vapors.
3. Haemers Technologies' operations have proven to be fully compliant with air emission and did not affect ambient air quality.

The pilot project demonstrated that Ex-Situ Thermal Desorption with propane burners is a very effective technology for treating this type of contaminated material soils in the most sustainable way.