DEEP GreeN

FOR A CLEAN FUTURE

Duferco Group

FAQ

V3 – September 2011

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1. Which pollutants can be treated by Thermopile©?

Thermopile© will treat just about any organic compound. This includes, among others petroleum products and their volatile constituents, polycyclic aromatic hydrocarbons (PAHs), chlorinated solvents, pesticides, PCB, Light non-aqueous phase liquids (LNAPLs), etc.
This technology can also collect and capture cyanides and mercury through a specific application.

2. What type of soils can be treated?

Thermopile© can treat all type of soils. The differences linked to the nature of the ground only have an impact on the lead time and the cost of the treatment.

3. What depth can be reached with in-situ treatment?

Currently the maximal depth achieved in a project has been 16 meters. Practically, Deep Green estimates he can intervene until 20 m of depth.

4. What surface/volume can be maximally treated?

There is neither minimum nor maximum to the technique Thermopile © in situ. The limits are often economic or bound to the deadlines.

5. It is possible to clean up under a building?

Yes

6. Which is the typical efficiency of the treatment?

The efficiency of the treatment depends on pollutant, initial concentration and type of soil. Most of the projects undertaken by Deep Green have reached rates of 99% abatement's rate and certain projects were treated until the residual value.

7. How long does Thermopile© take?

The treatment takes between 30 and 45 days per batch (mobilization and demobilization excluded).

8. Which is the average duration of mobilization?

Between 2 and 6 weeks depending on the complexity of the site and the project.

9. Where and how I may ask for a first evaluation of treatability of my site

Ask for our Project Identification Form (PIF). We will contact you as soon as possible to establish this assessment.

10. How much cost a treatability test in your lab?

Between 5000 and 15000 € depending on the nature of the pollution to be treated.

11. Is it possible to make a pilot test?

Yes, Deep Green has so called T-Lab units available for feasibility tests on small quantities (25 to 100 kg) as well as in-situ tests with 7 heating pipes (+/- 25 tons).
Deep Green also has the possibility, for larger sites, to carry out a pilot on a wider area of the order of 35 to 100 m ^{2} in situ.
Tests on small quantities last on average 1 month (excluding time for analysis and reporting). The pilot test in situ and on more important sites lasts on average 2 to 3 months.

12. Does Deep Green also work abroad?

Yes. Outside Belgium, Deep Green has already realized remediation sites in France, Spain, Italy, Norway, United Kingdom and Netherlands.

13. How can Deep Green guarantee the results?

The guarantees that Deep Green offers are related to the quality of the soil after treatment. These guarantees can be given as the technique is based on the physical principle of evaporation and conduction: the pollutants present in the soil, identified beforehand, will always volatise when the necessary pressure and temperature is reached. The soil is therefore always clean. These guarantees were also always given by Deep Green to treatments by classical thermal desorption for the same reasons.

14. What is the distance between the tubes?

The distance may vary from 1 to 2,5 meters, depending on the expected or required duration of the project and the related economics.

15. How is the process of decontamination controlled?

The decontamination process is controlled primarily by monitoring the temperature of the soil (at the coldest points, that is equidistant from the heating elements), as well as by continuously measuring the gas before oxidation.

16. How are the heating elements installed?

The heating elements are placed in equidistance varying from 1 to 2,5 meters. The placement is made, according to the depth, by means of diverse adapted drilling rigs.

17. What is the temperature reached in the ground?

The temperature of the soil can reach 150 to 300° C

18. What effect has the temperature on the stability of the ground?

The heating of the soil in the unsaturated zone has no significant effect on the stability of the land. A (temporary) decrease of density occurs due to the evaporation of the water and pollutants, without significant change of the volume or the structure.

19. How are gas-emissions controlled?

Gas emissions are continuously controlled. Releases flows are very low due to the fact that only the purge of the system is sent to the atmosphere.

20. What happens with small (waste) particles in the soil like plastic, wood etc.?

These particles pyrolyze but remain in place. The soil in place does not contain enough oxygen to ensure complete combustion of these elements.

21. Can we treat below the level of a water table?

Thermopile© must reach temperatures above 100 ° C. It is therefore impossible to work in the saturated zone of the soil. To allow a treatment by Thermopile© in situ, it is essential to lower the water to a level at least 1 m below the deepest heating element.

22. During the placement of heating pipes, doesn't some earth fall inside them?

No, heating pipes are pushed into the ground.

23. While treating different soil types, aren't you creating preferential routes?

Yes heat may create preferential routes but conduction is not affected by those preferential paths and therefore the heating itself is working indifferently in all types of soils and combinations thereof.

24. Can Thermopile© be used to evaporate the water from the ground?

Yes

25. Can herbicides, pesticides and DDT be treated with Thermopile©?

Yes. In this case a complementary treatment unit for gas emissions will be installed

26. Can Thermopile© be applied to the treatment of landfill sites?

No

27. Can Thermopile© be applied to the treatment of sludge?

Yes, taking into consideration that the treatment time (and its costs) will be proportional to the water content. Practically, Thermopile © is only fit for previously mechanically dried sludge.

28. How do you know when cleanup is complete?

First, remediation cleanup levels and cleanup times can be predicted accurately by computer simulation before the job starts. After that, monitoring systems and thermocouple probes in the soil are used to evaluate progress throughout the treatment zone. Experience has shown that there is a strong correlation between the computer predictions and actual results, and typically, pre- and post-treatment soil samples are used to confirm the adequacy of remediation. If desired, confirmatory samples are taken before the system is shut down, and the site can be declared clean before demobilization of the equipment.