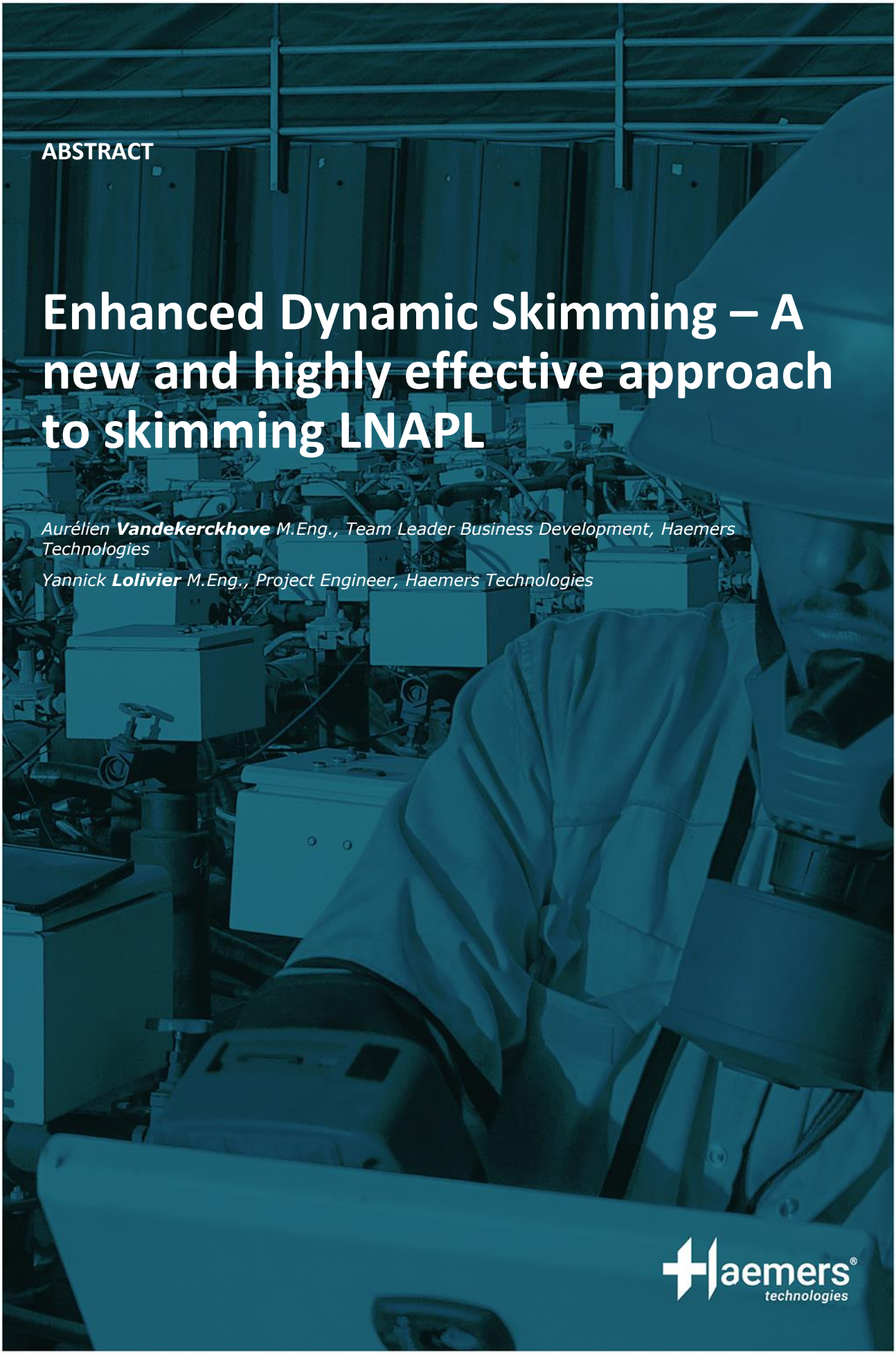

ABSTRACT

Enhanced Dynamic Skimming – A new and highly effective approach to skimming LNAPL

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A new and highly effective approach to skimming LNAPL

Actual dynamic solutions for recovering LNAPL have multiple general disadvantages such as a high sensitivity to viscosity and clogging, high electrical consumption, unsuitable to groundwater level variations, high effluent water production, incapability to recover very thin layers, risk of secondary pollution, emulsion production, no central storage of recovered product and high maintenance.

This solution avoids these various disadvantages because it allows for the dynamic and effective vacuum suction of the hydrocarbon free phase at any depth. It creates an imbalance between the level of the free phase inside the pumping well and the level present in the soil located around the well. This imbalance allows for the forced recharge of the well by a free phase of pollutant, which is immediately pumped and eliminated.

Skimming is carried out using pump cycles. During each cycle, the floating liquid is pumped sequentially and independently in each well while monitoring is carried out by a PLC. The frequency of pumping between two cycles depends on 2 factors:

- the time required to recharge the well with the pollutant,
- the time of suction per well, linked to the quantity of free phase present in the well.

Pumping into the wells is achieved using a proprietary float connected to the pumping unit with a flexible hose.

The pumped mixture is then transferred automatically to a settling tank. The product is stored in a tank, awaiting removal by a specialised company. The small quantities of effluent are then sent to a coalescence separator.

The limitations are that the soil must be sufficiently permeable to allow for the movement of the product and groundwater towards the wells and the NAPL must have a low viscosity to be able to move towards the wells. Although the technology allows to pump viscous product, the pumping time will then depend on the forces recharge of the wells.

Enhanced Solution

The technology fits perfectly into an overall solution for the remediation of a polluted site, in addition to other complementary techniques (soil excavation, thermal desorption, bio-remediation, chemical oxidation…).

Indeed, the viscosity is inversely proportional to temperature. It means that by increasing temperature, the viscosity of the product will decrease. Heating the soil and groundwater can be done using In Situ Thermal Desorption. By reducing viscosity of the product, the wells will fill up quicker which will allow the dynamic skimming to pump faster the NAPL.

It guarantees the complete disposal of the thinnest free phase, but also viscous layers in combination with heating. Such performance is unmatched using traditional techniques.

It was already observed on different In Situ Thermal Desorption sites where pumping of the NAPL was also performed, that the heating of the soil increased the performance of the product recuperation. Combining In Situ Thermal Desorption and dynamic skimming can drastically reduce the time of skimming project.


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