

Accepted Manuscript

Detection of landmines in peat soils by controlled smouldering combustion:
Experimental proof of concept of O-Revealer

Guillermo Rein, Xinyan Huang, Francesco Restuccia, Thomas McArdle

PII: S0894-1777(17)30212-1
DOI: <http://dx.doi.org/10.1016/j.expthermflusci.2017.07.016>
Reference: ETF 9158

To appear in: *Experimental Thermal and Fluid Science*

Received Date: 18 February 2016
Revised Date: 12 July 2017
Accepted Date: 22 July 2017



Please cite this article as: G. Rein, X. Huang, F. Restuccia, T. McArdle, Detection of landmines in peat soils by controlled smouldering combustion: Experimental proof of concept of O-Revealer, *Experimental Thermal and Fluid Science* (2017), doi: <http://dx.doi.org/10.1016/j.expthermflusci.2017.07.016>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Detection of landmines in peat soils by controlled smouldering combustion: Experimental proof of concept of O-Revealer

Guillermo Rein*, Xinyan Huang, Francesco Restuccia, Thomas McArdle

Department of Mechanical Engineering, Imperial College London, UK

Abstract: We study a novel landmine detection technology, called *O-Revealer*, which uses controlled smouldering combustion and is valid for minefields in peat soils. We have conducted laboratory experiments with two types of dummy landmines buried in peat, the plastic SB-33 and the metal PROM-1. The ignition and spread of a smouldering front was monitored under different soil moisture and wind conditions. Special attention was paid to the thermal conditions that could trigger thermal runaway of the explosive charge. In all experiments, the smouldering fire burned across the peat, leaving the dummy completely exposed to the open for easy identification and quick demining. The spread rate and peak temperature both decrease with soil moisture, and both increase with wind speed. The results show that for the SB-33 landmine, the heat damage to the shell can be significant, and the chance of thermal runaway ranges between low (moist peat and no wind) to high (dry peat and wind). For PROM-1 landmine, the damage and chance of runaway are always very low. In addition, using rock samples, we show that *O-Revealer* helps identify objects buried in the soil, thereby avoiding false detections. These experiments show the benefits of the technology and its feasibility for field application in peat minefields worldwide like Falkland Islands, Vietnam, Burma, Laos, Uganda, Zimbabwe or former Yugoslavia.

Keywords: demining; fire; heat transfer; soil; explosive.

1. Introduction to Humanitarian Demining

The landmine problem worldwide is rising. It is estimated that 2 to 5 million landmines are laid every year, while the rate of clearance is 10 times slower [1]. It matters because according to the International Committee

* Corresponding author. Tel: +44 20 7594 7036.

Email: G.Rein@imperial.ac.uk (Guillermo Rein)

Download English Version:

<https://daneshyari.com/en/article/4992613>

Download Persian Version:

<https://daneshyari.com/article/4992613>

[Daneshyari.com](https://daneshyari.com)