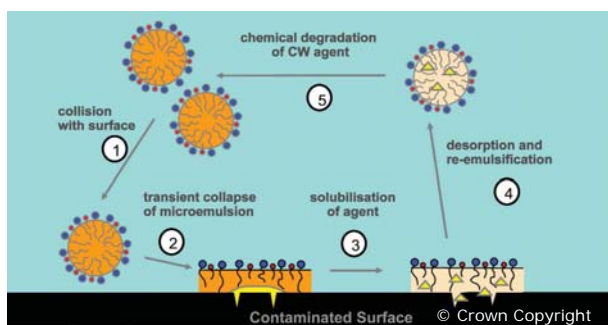


### Summary of the Opportunity

Ploughshare Innovations<sup>1</sup> is pleased to offer for commercial exploitation a cleaning formulation specially designed to military specifications. Developed through collaboration between a manufacturer of industrial cleaners and the Defence Science & Technology Laboratory (Dstl<sup>2</sup>), the fluid solves the problem of effectively removing water soluble and water insoluble material concurrently from diverse surfaces. The product developed has the following advantages:

- Comprises of only commercially available, biodegradable or environmentally benign constituents
- Prepared as a concentrated base which is diluted at point of use to reduce logistic burden and environmental impacts
- Solubilises chemical and biological agents attached to surfaces, including thickened agents
- Affordable and optimised to clean flat surfaces to the NATO<sup>3</sup> "thorough" standard
- When combined with activated decontamination agents (e.g. peracid or peroxide) chemical and biological agents that pose a significant health threat can be rendered harmless



The non-activated solution is believed to suitable as a cleaning, degreaser and general stain remover for non-porous floor coverings (metals, synthetic carpets etc.) and may be equally applicable to certain porous surfaces, such as concrete. The technology would make a robust graffiti remover and, due to its

environmental compatibility, marine applications would also a viable commercialisation avenue. Removal of carbonised debris is also likely to be efficient. This optimised formulation is available for licensing in the *industrial cleaning and consumer products* field. Other fields may be available upon request, including the civil defence/homeland security and military fields.

### Intellectual Property

The Secretary of State for Defence has ownership of all patent rights secured over the PCT/GB2007/000877 application, which draws priority from Application Number GB0605157.7 filed on 15<sup>th</sup> March 2006. The inventors include both Dstl staff expert in

<sup>1</sup> Ploughshare Innovations Limited is the commercialisation company, wholly owned by the Secretary of State of Defence, tasked with exploiting appropriate technologies originating from Dstl.

<sup>2</sup> Dstl is the UK Ministry of Defence's research establishment located near Salisbury at Porton Down.

<sup>3</sup> North Atlantic Treaty Organisation decontamination standards.

decontamination of chemical and biological agents, as well as employees of a regional speciality chemical company expert in industrial cleaning agents.

The patent specification describes a number of different phase stable microemulsions specially created to meet the challenging military standards. These formulations comprise an alkylene glycol alkyl ether, an alcohol ethoxylate surfactant, an adipate (and/or glutamate & succinate) together with modifiers or activators according to particular requirements. Ploughshare expects valid granted claims to be secured over the specific formulations.

### **Features & Benefits**

Removal of water insoluble agents from any surface is challenging and many civil cleaning and military decontamination systems may use harsh, volatile solvents such as xylene or toluene. With environmental issues at the fore, Dstl has developed a new effective cleaning fluid which meets the high NATO standards for decontamination. The product, designed for military decontamination applications, would be competitive in the civil markets of industrial cleaners and consumer products as a cleaning fluid and stain remover.

The product is a concentrated base composition with a variety of additives for different situations. Dilution of the base with water (pure or impure) provides a phase stabilised microemulsion which is particularly ideal for emulsifying water insoluble materials, such as oils, grease and materials thickened with acrylic polymers. All components are commercially available, biodegradable and/or environmentally benign. The ability of the activated solution to neutralise infectious agents used as biological weapons suggests it would be suitable for more labile infectious agents such as influenza, bacteria etc.

The large phase interface of the microemulsion facilitates rapid reactions between active decontamination reagents, such as percarbonates, peracids, peroxides, monoperoxyphthalates etc., and the harmful agents contaminating the surface. Further additives have been explored for different situations, such as, a thickened fluid to reduce creep and allow retention on vertical surfaces. Tests<sup>4</sup> have shown that the final decontamination formulations are capable of thorough decontamination of surfaces containing chemical and biological warfare agents to NATO decontamination standards.

### **Markets & Competitors**

The industrial (incl. institutional) and retail cleaning markets is a multi-billion pound sector. In 2006 the US market exceeded \$13.5billion. The industrial market is highly fragmented with a number of global players and a much larger number of national and regional entities. Increasing health and safety regulations have reduced the pool of available chemicals at a time when total usage rates are increasing. These trends have pushed development of improved product formulations and applications to the forefront of many sector players. The military & civil defence (homeland defence) decontamination market is a small niche but still an important sector and is aware of regulatory issues. At a time when the world is acutely aware of terrorist or natural harmful events there is a

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<sup>4</sup> Dstl tests using simulants and real agents including VX, GD & HD etc.

need for highly effective but environmentally compatible decontaminations systems for chemical and biological agents.

**Keywords:**

Industrial cleaner; consumer product; stain removal; degreaser; decontamination; CBW; homeland security; civil defence; defence technology.

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