

# Having a skinful

## Brian O'Shea looks at the skin decontamination companies trying to fight the seven signs of contamination

**P**ERSONAL decon has always been a bit of a messy affair, both physically and psychologically, whether the individual used Fullers Earth, Dutch Powder, M258A1, M291, M295 or any other regional variant. It is usually the first sign of trouble – that something has occurred that you were not prepared for – and now you need to look after yourself in the hope that you won't need more serious help.

Many of these products, such as Fullers Earth, are designed merely to get the agent off the skin, and come in a pad form that can be used to dab the affected area. Yet this does not always deal with the problem, as Dr Gunnar Hemmer, from OWR explained. "You cannot remove it very easily from the body," he said. "The activated carbon sponge we use is the first step – to pick up the big droplets – but to stop the ongoing penetration, the rest of the agent (and any agent that is beginning to penetrate) needs to be removed from the skin and destroyed. We dissolve the agent with the reactive substance, there is soap and a specific solvent for lipophilic agents and thickeners.

Powders also can have the potential of re-aerosolising the agent as the pad is thrust onto the skin and also if it is not known whether the area has been properly covered by the powder. Tim Henry, of E-Z-EM explained. "The first rule of skin decon is to get it off the skin; that is what the high-tech dirts and kitty litters do – they are very good at being adsorbent and it is an important first

step. RSDL has a sun tan lotion consistency and a sponge that is impregnated with this lotion, and you want to wipe it on as quickly as possible. There is no doubt about coverage because it is a lotion – as opposed to powder, where you have to pad it on and then check, and then for the face there is no actually way to check. RSDL may even improve the seal with the respirator; you leave the lotion on for two minutes and then when situations allow you wash it off."

### Topical solution

E-Z-EM's RSDL is certainly the latest standard in skin decontamination; used by troops in both Gulf Wars it has been around for a while, and is yet to be bettered. Since the Joint Program Executive Officer for Chemical and Biological Defence (JPEO CBD) in the US cleared the product for procurement in March it has received orders in excess of \$12 million and more are confidently expected. Recently there has been a European competitor to RSDL, with OWR offering their Aldecont product. While E-Z-EM has been close-lipped about the chemical composition of their product, OWR have been relatively open, admitting that it is a sodium hypochlorite and soap solution. Hypochlorites have an even longer history in the military than RSDL, being familiar in the First World War and also being the active ingredient in the M291 individual decon kit. Previously, the focus had been on a dried

form and OWR are confident that the oxidation potential of their liquid solvent will be reactive to all chemical agents.

Both products have undergone testing to show that they remove or neutralise both blister and nerve agents (blood not usually seen as a skin contamination problem), which is a large claim since the two work in different ways and have different chemical compositions. "RSDL is expensive, but what is unique about it and justifies the expensive is that it is designed for the skin," said Tim Henry. "There are all kinds of ways to decon equipment that are less expensive and very, very aggressive, but you would never put them on skin. My reaction as a chemist when I heard about this 'universal decontaminant' was disbelief – there are no silver bullets. But we went through the blister, blood and nerve agents and there are multiple mechanisms happening; the solvent captures the product and makes it ready for presentation to the reactive substances. It has a strong base, and that alone accounts for a lot of the reactivity – when you take material that is strongly basic and present it to a chemical, in most cases there is a reaction. The neat thing about chemical weapons – and this is less true of TICs – is that the lethality of a chemical weapon is dependent on the exact structure of that chemical, so the only thing you have to do is change it into something else. It is not like trying to go from Point A to Point B; you need to go from Point A to absolutely anything else, because its efficacy is bound



*Powder on pads is not just for skin. The US also uses it for vehicles*

*Alldecont has become the new competitor to RSDL*



up with something unique about that product.”

In many respects this is the important part of the product, as it doesn't try to be overly ambitious; some things are best not entered into. For example, the exact reaction blister agents such as mustard have with the skin is still unknown; to disrupt this process, one would have to understand the mechanisms first and that would be a huge body of research. “I'm not going to go there [and try and understand that process], but we have studies that show RSDL greatly reduces the size and severity of those lesions caused by exposure to mustard. How mustard reacts to the skin and the body I leave to someone else,” said Tim Henry.

Dr Hemmer pointed out that Alldecont would do nothing for the skin and areas that had already been affected; this is designed to stop the contamination getting any worse. “The chemical reaction happens on the skin; the reaction is between the chemical and the decon agent on top of that. It is not like a medical product that will help the skin; you neutralise it and wash it away in one step.”

### **Avoid contact with eyes...**

There are problems with all skin decon products, but they tend to be operational rather than technical (though products such as M258A1 needed to be kept out of eyes, mouth and wounds – all things you'd rather not worry about when you have been slimed with VX); just when do you put the product on? The old Cold War scenario used to be fairly straightforward: there would be gallons of the stuff splashing around and it would be fairly apparent when there had been an attack. Current scenarios have less of the agent and less of a warning, yet it doesn't change the toxicity of the agent. Aerosolised VX on the skin has a serious effect regardless of whether it has come out of an IED or a 122mm rocket, and it can take an unnoticeable amount to get a reaction. Typically, the reaction might start off as sweating (not uncommon in the Middle East), not be initially noticed and only become apparent as the dose increases as the agent is absorbed through the pores. Typical trigger points have been a detector alarming or noticing symptoms in others; while the former might be useful (if the detectors are out) the latter is more an indicator that you're next.

Once the obvious signs are displayed then all effort is put into masking and suiting up, rather than trying to ensure that you have your skin decon lotion to hand, and then once that is done what use is skin decon cream? Quite a lot, suggested Tim Henry. “This product has been tested by the US DoD, as well as others, and the premise is that there is enough time to apply the product for it to alleviate damage – but it is not a substitute for respirators. In animal studies the time it takes after application of nerve agent has been studied; after two minutes, four minutes, fifteen minutes etc When RSDL is applied there is a nearly immediate cessation of VX poisoning through the skin. It needs to be within reach of the warfighter – he needs to be wearing it or put it on within minutes. In Canadian government labs pigs treated with RSDL up to 15 minutes after exposure to VX had life signs monitored. All the animals lived. I believe that the idea of applying RSDL will have a positive effect, even if applications if delayed.”

OWR's Gunnar Hemmer admitted that this was a problem, but pointed to the threat assessment. “The main warfare agents likely to be used are blister; skin irritation from blister agents will not appear straight away and you normally have enough time to work against it with chemicals. Of course this is not the case with nerve; you'd need atropine and obidoxime in the case of GB and skin decontamination would help after that. Contamination with VX needs immediate direct skin decon, because of the high skin penetration effect. Atropine would be the second step to fight against the symptoms.”

Tim Henry suggested that application of RSDL would minimise the reduction in combat effectiveness that occurs from the debilitating effect of atropine, and technically he is correct. Until chemical weapons can be treated with the respect that they deserve and not inflated, however, then risk-averse behaviour is going to be most likely and everyone will be getting their atropine out at the smallest hint of a dose. Tim Henry ran through some of the other scenarios where skin decon might be useful. “It may well be that when you have been through an event, and you are taking your garb off or you know you are in an event and your suit gets caught, or you get shot, and then you have been exposed,” he said. “Or you are concerned about the integrity of the suits seal, or you come across someone who is showing symptoms and you want to interact with that

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person; whether you put your suit on or not, or help him put his respirator on, skin decon is called for. With nerve agent we can demonstrate that this active material is going to nearly immediately stop the further absorption and poisoning of agent on the skin.”

### The next step

Perhaps one of the most important applications of skin decontamination solutions has yet to be reached – that of wound decon. This is something that is of immense concern to paramedics and other EMS staff, and both companies are looking at the potential of their product. “RSDL has been limited to intact skin and we haven’t got to the subject of wound study, but Canadian Health Services and the DoD are looking at wound studies,” said Tim Henry. “In the interest of getting the product into the hands of the right folks and getting it through the FDA, all the work has been done on intact skin. I see no reason, however, why if I was standing in the battlefield and I had been wounded and I suspected that there was agent in the wound, why I wouldn’t use RSDL. If you use it you have a much better chance of living, and in my mind there is no decision to be made, but being a medical device and pharmaceutical manufacturer we are careful about our claims and we have not submitted clinical data through the FDA clearance process.”

Gunner Hemmer agreed, “In principle Alldecont cannot be used for broken skin, and this is because of the stringent German medical product laws. From a practical point of view, and based on many years experience in the German Army, if I was in the field and

thought I’d been contaminated I’d put it on everything, whether I have a wound or not. Although the hypochlorite in our product is not registered to be used on broken skin, it is already certified for wound treatment in other applications. The decision to use these chemicals for skin decontamination did not come from OWR, it was made by the German Army.”

Much like escape hoods, decon creams have a place in the inventory – as long as it fits into the operational scenario, and there are enough customers out there who do see the need (E-Z-EM have sold to more than ten MoDs worldwide). Their base makes them effective against certain chemical agents, but they are limited against all toxic industrial chemicals, which are far more diverse – E-Z-EM is currently assessing which TICs they can neutralise – meaning that they might have a limited applicability to those that are acid or OP. That would all change, however, if the product could be seen to have a role in wound decon, whereupon the product would become solid gold. OWR have recently passed the German skin tests and should be able to export Alldecont by time of print. As is always the case, price (which OWR indicate will be much lower than RSDL) is only balanced by capability. RSDL has been available for more than 15 years (Alldecont has been through ten years of testing), and having been through the FDA (among others) process, and having the seal of approval of a JPEO purchase, will still be seen as the leader, regardless of price. The real race may well be to prove its efficacy in skin decontamination, but to be the first to show genuine results in wound decon.



*Too much? Decon powder is difficult to judge on the face*

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