First Line Technology
Technical White Paper

Contents

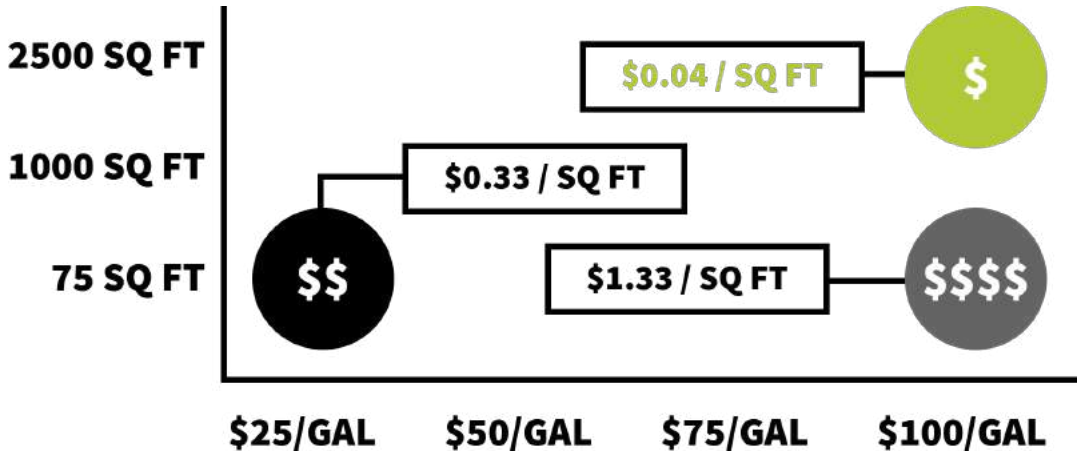
The True Cost of Decontamination

By Chris Hodge, *Developer of Dahlgren Decon*

How Much Does Decontamination Really Cost?

The traditional way to compare the value of decontamination solutions was to compare the cost per gallon for their acquisition. But all decontamination solutions are not created equal and cost per gallon can be misleading. Some have more reactive potential in similar volumes and are therefore more effective, and thus, more cost effective. This can have a significant impact on the total life cycle cost.

When considering cost as an independent variable, the requirement should never be to meet a certain threshold for cost per gallon. It should be to achieve a desired end state. Evaluation of cost should consider the quantity required to achieve the stated end state. The real question, I propose, is how much does it cost to cover and effectively decontaminate a particular amount of contaminated surface area? Focusing on the desired end state and the associated cost to cover gives us a much better understanding of the actual cost of decontamination rather than just the cost of a volume of material.



For example, one decontaminant costs only $25 per gallon and effectively covers 75 square feet. Another solution costs $100 per gallon but effectively covers 2,500 square feet. If costs per gallon is all that is comparted, the $25 per gallon decontaminant is clearly the best. However, if 2,500 square feet of surface must be decontaminated, thirty-three gallons of the $25 per gallon solution would be required. This would cost significantly more ($833) than the one gallon of $100 per gallon decontaminant.

In the case of Dahlgren Decon, one gallon, against any chemical or biological agent other than VX, is capable of effectively decontaminate up to 3,000 square feet. If the bulk contaminant is reduced with a FiberTect wipe prior to the application of Dahlgren Decon, coverage and effective decontamination of more than 10,000 square feet with a single gallon is possible.

This should challenge the notion that price per gallon can be compared to determine best value.

Time and Personnel Costs

Another factor to consider in evaluating the true costs of different decontamination solutions and their use is time. The time it takes to deploy the decontamination process, plus the required dwell time (or the time to neutralize contamination), plus any time required for rinsing, etc., is really the true time it takes to complete a decontamination mission.
Time and personnel are expensive. More importantly, if the goal of decontamination is to restore the ability of materiel and personnel resources to return to their normal duties, time costs capability. The simpler and faster the decontamination process is to deploy, the less decontamination costs in terms of money and capability.

In the past, it would take a large team, with significant amount of hardware and decon from a centralized bulk storage location (think logistics of inventory), a long time to set up a decon

line and execute the decon mission. Large sprayers, capable of heating the decontaminant, generating foams, and applying at high pressures were required. Collecting large amounts of effluent due to the required methods of application was a necessary consequence. The decon team might even have to dig pits to contain significant volumes of runoff. Afterwards, blivits of hazardous material would have to be dealt with and/or soil remediation activities would be required.

Compare past scenarios with the art of the possible today.

What if there were very effective process that could be deployed in minutes, that neutralized the threat in minutes, and generated no significant run off? What if there was no need for centralized storage or large and complex equipment to maintain and set up? Effectiveness would be multiplied, and logistical needs would be greatly reduced. Instead of a team and a complicated set up to execute the decon mission, the decon mission could be executed rapidly at the individual or vehicle level and carried out quickly.

This is significant because when considering the true cost of decon, the time that it takes to restore the contaminated area or equipment to normal activities or original state must be considered.

Corrosion and Environmental Impact

When centralized logistics, throughput (the time it takes to return to normal activity), the cost of the decon solution, the amount of coverage each unit of decon provides, the disposition of effluent, and the corrosion or destruction of equipment or infrastructure are considered, a clearer understanding of the full life cycle cost of decontamination comes into focus.

DECON METHOD	WATER	BLEACH	DAHLGREN DECON	DF200*
$ / GALLON	$	$	$$$	$$
$ / COVERAGE	LOW	LOW	LOW	MODERATE
pH	NEUTRAL	> 12	NEAR NEUTRAL	9.6 - 9.9
CORROSIVITY	LOW	HIGH	LOW	HIGH
ACTIVE AGENT (%)	0	5	4.5 - 5.2	2 - 4
VOLUME	HIGH	HIGH	LOW	HIGH
DWELL TIME (MIN)	N/A	30	2 - 15	1 - 60

When looking across the landscape of decontaminants as in the slide above, it is evident that some decontaminants such as water and bleach require rather high volumes of liquid while others require smaller volumes. Some decontaminants, such as hydrogen peroxide -based solutions, require higher pHs to be effective and thus can be highly corrosive. Others, such as peracetic acid-based solutions, do not require higher pHs and can be formulated in such a way to be much less corrosive.

Ideally, there would be a solution that is less corrosive and requires smaller volumes. One that can be quickly mixed and requires a short wait and dwell time would also be desirable.

By combining a dry decon process, such as using FiberTect wipes, to remove the bulk contamination, and Dahlgren Decon to neutralize the remaining contamination, a highly efficient process providing a desirable combination of these factors can be achieved.

Annual corrosion costs in the United States are estimated to be over $1 trillion. There is no need to utilize corrosive decon technologies to add to this problem. When considering the types of high value, long service life assets that are in play in most decon scenarios, this becomes even more significant. High value, long lead time items should not be treated as consumables.

Degrading equipment should never be part of the decon process. If the decon process neutralizes the threat, but is slow, longer contact times are required. Longer contact times lead to greater levels of corrosion, and lifecycle costs are on the rise.

Consider the environmental impact of a decon process. Historically, decon has been largely about dilution. The old model of decon was to apply a 50 to 1 ratio of decontaminant (such as water or bleach) to a contaminant. This creates a significant amount of runoff to manage.

Consider a release of contamination at a sports stadium accommodating 50,000 people. In this scenario, sprayers would be set up and would dispense large amounts of water. The people will be rinsed, but now there will be a massive amount of contaminated water running into the sewers and into the environment. This creates a new problem that must also be addressed.

When the amount of decontaminant left behind as a residual is reduced, the environmental impact and the cost to clean up are also reduced. When the bulk of contamination is captured in a dry wipe that can disposed of easily and surfaces can be misted with decon to eliminate the remaining contaminant instead of spraying large volumes of decon and generating runoff, the game has been fundamentally changed in a way that greatly reduces the environmental impact as well as the cost to restore a site after a contamination event.