

Industrial, Commercial Absorbents in Waste Applications

Understanding the benefits of bio-based products can lead to a safer, more productive and eco-friendly operation.

■ By Lisa Owen and Tom Uskup

Spills happen every day, big and small. Whether it is a hydraulic leak on heavy trucks and compactors or a bottle of cooking oil that breaks on Aisle 7 in the grocery store. Even in waste applications, spills are an unavoidable reality any time an operation uses, maintains or repairs industrial or commercial equipment. Precautions can help limit the number or extent of spills, but even the best precautions will not be able to eliminate spills entirely.

The Spill Problems

Spills in the waste arena, despite all efforts to be careful, are common

occurrences inside and outside of facilities. The following are just some of the types of leaks that can occur:

- *Hydraulic leaks* are perhaps the most perplexing and well-known issue. These are the frustrating, slow drip of hydraulic oils underneath equipment vehicles or machinery. Most of the equipment or service trucks have complex systems, engines or generally a lot of moving parts that require lubricant or coolant to operate. Making it more difficult to troubleshoot or isolate, these leaks can occur while in operation or simply at rest.

- *Over-servicing of fluid chambers or reservoirs* is self-explanatory. Routine maintenance involves checking or topping off various fluid types such as brake

Some absorbents, like this GreenSorb product, have a reduced impact on the environment and are easily handled by employees. Photo courtesy of RSC Bio Solutions.



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fluid, coolant or some type of hydraulic fluid. During the process of filling, the chamber ends up with more fluid than needed and the fluids go everywhere else aside from the chamber or tank.

- *Fuel leaks or spills* occur periodically. These events are definitely unexpected despite numerous precautions and specialized equipment used for dispensing and using fuel. Problems can occur at the fuel depot where a driver can become distracted during a fill-up and the pump does not shut off. Another situation can involve damage to a fuel line, tank or reservoir that leads to loss of fuel.

- *Component replacement* is usually the time when a large quantity of fluid is lost. After a period of operation, most trucks or equipment will require an overhaul of one or more major components. It could involve an engine replacement, but most times it's a major system. For example, an engine radiator may require servicing or replacement, and the process of draining coolant out of the old unit or even adding fluid to the new radiator may result in excess fluid on the facility floor.

The Absorbent Solutions

The interesting thing about cleaning up the spills identified above is how many choices are available in the marketplace to address the mess. Waste companies use a variety of liquids such as hydraulic oils, engine oils, lubricants, solvents, acids, coolants and fuels that are in regular use at every facility. When these are spilled on the shop floor or out in the field, there are many clean-up solutions.

Crushed Clay (aka "Cat Litter")

This is probably the most well-known product used primarily for oil and grease clean-up. It is packaged and sold by numerous manufacturers and brands. It has been around for more than 50 years and is an older technology that's been used by generations of mechanics. Despite its widespread popularity, crushed clay is also well known as a very dusty product that doesn't really absorb well. That dust content is the part of the product that has any effectiveness, but it's also the same silica dust that causes respiratory health risks to workers. The product is very inexpensive, which is the main attraction in using it. However, facilities that use crushed clay will end up paying high disposal costs to remove the waste material. In connection with the high disposal fees, most users have to use excessive amounts of the product to accomplish any drying of spilled liquids. The total cost associated with using crushed clay in a waste facility is a higher cost-per-use than most purchasing managers realize.

Sorbent Pads (aka "Diapers")

Another popular choice by many shops, these pads come in different shapes, sizes and can also be limited to working with certain liquids. Most pads are made of polypropylene material, which is a petroleum-based product. Pads are supplied by numerous distributors and dealers. The initial purchasing mindset of shop managers has been that pads are more attractive on the floor in terms of a clean, white square. However, most users quickly realize when they pick up the pad from the floor that residue or slickness was left behind under the pad. Used pads are difficult to handle or carry while dripping, and typically a second pad or follow-up cleaning with a rag, degreaser or mop treatment is required. This difficulty means that the use of pads require more time in clean-up. Pads also do not perform well in open shop environments that are drafty, as they will often blow away. The disposal of these pads brings up some environmental concerns and requires special waste handling, increasing the costs of shop operation. The consensus is

that pads are a high cost-per-use product that requires special waste disposal.

Alumina Silicate

This material typically falls into the category of a zeolite or perlite. It is usually mined from volcanic ash and processed with extreme heat. As an absorbent, it is generally a white color and has a very fine, granular consistency. This product is very lightweight and can be dusty, which can lead to eye or respiratory irritation. Some manufacturers have taken steps to reduce the dustiness by adding suppressants. However, this type of material is known to absorb humidity over time, so it may gradually lose its effectiveness as an absorbent. The product's performance advantages are balanced against its dustiness and lightweight properties to limit its widespread adoption in waste environments.

Diatomaceous Earth (DE Powder)

Another product comprised of naturally or artificially calcined remains of microscopic water plants. It's a mined product and starts out as hydrous silica formations and, when processed, becomes a fine, light-colored powder. It has a very high porosity formed by a vast number of air cavities previously occupied by billions of diatoms per cubic inch, making it very lightweight and absorbent. The commercial form of this product can be very dusty, similar to silicate products and not a good performer outside or in shops with air circulation.

Plant By-Products

These are a relatively new, bio-based alternative to crushed clay and pads. These are derived from corncob grindings, cellulose paper-based material, plant seed grindings, peat moss (Sphag) and even wood shavings. These products are typically selected for use with oil clean-up and once soaked with oil, can be burned to generate energy. However, most users experience the need for follow-up cleaning or at least a second application of the product to complete the absorption job due to residue or slickness left behind after the first application. Despite the product having some performance advantages, the dustiness and lightweight properties seem to limit these various forms of bio-based products into widespread adoption by waste facilities.

Montmorillonite

This is a new absorbent technology developed from specialized soils with specific pH balance and ionic attractions to the chemicals in spilled liquids. This material is bio-based and possesses a large surface area and porosity, allowing it to perform well on a variety of spilled liquids. It is a very stable and low-dust material with the ability to encapsulate and bind with spilled liquids, potentially making the waste disposal much simpler. Because of its performance characteristics and less product needing to be used to absorb a spill, the volume of waste created is reduced along with accompanying labor costs. While this material has a higher cost per pound, analysis shows the use of the material can be more economical and have a lower cost-per-use for waste applications.

The Cleaning Process: Planning Ahead

In dealing with any of the spill types identified above, facilities should develop specific action plans or standard operating procedure (SOPs) to deal with a spill. Facilities that maintain and update their SOPs are better prepared to manage spills in the workplace. In general, the principal factors to consider with spilled liquids are workplace safety and environmental impact.



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Safety matters in the workplace usually relate to the employer of the facility and involve OSHA guidelines. The top issues as it relates to absorbents are:

- Hazards of the liquids to workers
- Slip and fall accidents
- Safety of the material after clean-up
- Presence of silica or nuisance dust related to respiratory or eye health

On the other hand, environmental matters usually relate to:

- Hazards of spilled liquids to the surroundings
- Liquids reaching water drains or waterways
- The characteristics of the cleaned-up waste
- Where it is safe to dispose of the waste

In every case, organizations should maintain current Safety Data Sheets (SDS) on all liquids and chemicals in use throughout their facility. Manufacturers of absorbents also publish an SDS for their products. The SDS is the newer, more comprehensive format of the more commonly known "MSDS" format.

Common misconceptions in selecting the best cleaning solution include choosing the most widely used or least expensive products. However, there are new choices available that clean more efficiently, save on labor costs, reduce the use of additional degreasers and reduce the need for mopping with water-based cleansers. Ultimately, certain absorbents deliver improved safety, less downstream waste and less impact on the environment.

Preparation is also an important issue that can be overlooked. Being well prepared is inexpensive insurance against hazardous spills. Many facilities are usually under-prepared, which can cost the organization more in the long run

to hire outside environmental service firms for a spill clean-up. As a rule of thumb, facilities managers need to contemplate the worst possible spill that could occur and then plan accordingly by acquiring supplies necessary to be prepared for the worst-case spill scenario.

The demand for absorbents is on the rise due to increased performance needs and environmental awareness and, as a result, the global market for absorbents is estimated at more than \$3 billion. Spills occur every day, and it's clear there are many absorbent options available from which waste facility managers can choose. Even with the introduction of new and innovative absorbent technologies, old habits can be tough to change, but understanding the benefits of bio-based products can lead to safer, more productive and eco-friendly operations. | **WA**

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