

CLEAN BC



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INFECTION CONTROL

Surfactants

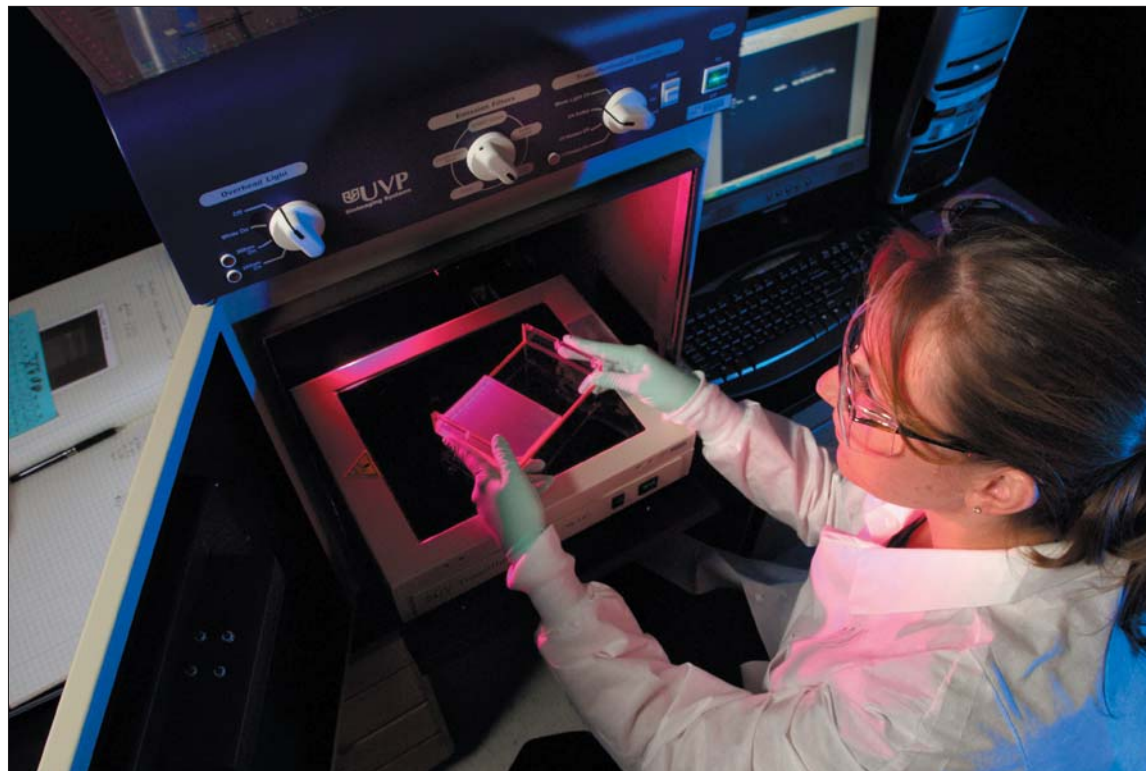
The truth behind their toxicity, their ability to cause chemical resistance and their use in cleaning products

By **NAVID OMIDBAKSHI**, Vice President Open Innovation, P.Eng, PhD Candidate, University of Waterloo

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Introduction

Surfactants constitute the most important group of detergent components. They are wetting agents that lower the surface tension of a liquid, allowing easier spreading, and lower the interfacial tension between two liquids. The word surfactant derives from the contraction of the terms surface-active-agents and covers a group of molecules which are able to modify the interfacial properties of the liquids (aqueous or non-aqueous) in which they are present¹. Surfactants play an important role in many practical applications and products, including detergents, fabric softeners, vaccine formulations, and drug delivery and medical treatment²⁻⁷, emulsifiers, paints, adhesives, ink, anti-fogging and wetting agents, ski wax, snowboard



JAMES GATHANY / CDC

wax, foaming and de-foaming agents, biocides (sanitizers) and hair conditioners (after shampoo).

Detergent formulations contain surface active agents

(surfactants) which remove dirt, stains and soil from surfaces and fabrics. The first surfactant made by man was soap. Indeed, soap was already known to the Sumerians (Babylonians) as early as 2500 years BC. Vegetable oils were cooked with potassium carbonate from burnt wood. The next step was the use of potassium hydroxide made from potash and calcium oxide. In this way, soap has been produced for millennia, mainly by the reaction of potassium hydroxide and tallow (ex-

tracted from fat of sheep and cattle). Surfactants have historically been classified according to the charge they carry when dissociated in water at neutral pH. This results in four categories, as follows:

1. **Nonionic** surfactants – do not ionize in solution.
2. **Anionic** surfactants – carry a negative charge when dissociated in water.
3. **Cationic** surfactants – carry a positive charge when dissociated in water.

4. **Amphoteric** surfactants – can carry both a positive and a negative charge when dissociated in water.

Anionics are the largest class of surfactants in terms of volume, and include the work-horse surfactants, linear alkylbenzene sulfonate (LAS), alcohol sulphate (AS) and alcohol ether (or ethoxy) sulphate (AES). Soap is also considered as anionic surfactant. These surfactants have strong detergent but weak antimicrobial

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Surfactants

properties, except in high concentrations⁸. Cationic surfactants generally include various quaternary salts, used predominantly as antimicrobial agents, fabric conditioners ("fabric softeners"), and anti-static agents. Amphoteric surfactants represent the smallest class of surfactants, and generally are used when solubility, mildness and compatibility issues are important. Amphoteric surfactants are compounds of mixed anionic-cationic character and are not considered as biocides per se⁸. Nonionic surfactants do not ionize in aqueous solutions and are comprised of two parts, a hydrophilic portion (water loving) and hydrophobic (water hating) portion. They are considered to have no antimicrobial properties⁸.

The toxicity and environmental profile of surfactants:

It is not possible to generalize the toxicity profile of surfactants since surfactants have very distinct chemical structures and, consequently, totally different properties. As an example, chained alkyl linear benzenesulfonic acids are not biodegradable while linear ones are biodegradable. Some

surfactants such as alkyl phenol ethoxylates (APE) are very toxic to aquatic life and their degradation products are even more so⁹, while others such as linear alkylbenzenesulfonic acids (LAS) and alcohol ethoxylates (AE) are readily biodegradable¹⁰. The potential for secondary poisoning effects of these surfactants is extremely low¹⁰. According to European Medicines Agency, Veterinary Medicines and Inspections¹¹, for LAS:

- toxicity has only been seen on high dose levels in all studies available;
- non teratogenic effects have been reported;
- no positive findings have been reported in mutagenicity studies;
- long-term studies have not show carcinogenic effects;
- there was no susceptibility of human gut bacteria up to a dose of 128 µg/ml in vitro;
- there was no effect on relevant dairy cultures in concentrations up to four µg/ml;
- systemic bioavailability of linear alkyl benzene sulphonic acids after application to the teat appears to be negligible;
- even maximum residue con-

centrations observed in milk were well below any dose levels or concentration at which toxicological or microbiological effects may be expected.

LAS is a petroleum-based surfactant however, based on scientific support from comprehensive studies, it has been found safe for many applications including teat-dip solutions which residuals end up in milk. This indicates that it is not true to generalize the toxicity of different surfactants.

Relevance for surface cleaning and disinfection:

The effective use of disinfectants constitutes an important factor in preventing hospital-associated infections (HAIs)¹². Based on Spaulding classification¹³, environmental surfaces are considered non-critical items because they come in contact with intact skin, and intact skin is an important barrier to disease acquisition. Use of non-critical items or contact with non-critical surfaces, while traditionally thought to carry a low risk of transmitting a pathogen to patients have recently been highlighted as being the potential cause for disease transmission. The routine use of disinfectants to disinfect hospital floors and other surfaces (eg. Bedside tables or bed rails) remains controversial. That said, there are a number of reasons to encourage the use of disinfecting products to decontaminate environmental surfaces in-

cluding¹²:

1. Epidemiologically important microbes (e.g. VRE, MRSA, *Clostridium difficile*, and viruses) can survive on environmental surfaces for long times and the use of a disinfectant can eliminate them or significantly reduce their number while the use of a cleaning agent may result in cross contamination.

2. Disinfectants are required in the United States and Canada for decontamination of surfaces contaminated by blood and other potentially infective material.

3. Detergents become contaminated and result in seeding or cross-contamination of the patients' environment with bacteria.

4. Disinfectants are more effective than detergents in reducing the microbial load on floors.

5. Disinfection of non-critical equipment and surfaces is recommended for patients on isolation precautions by the Centres for Disease Control and Prevention, and Public Health Agency of Canada.

The advantage of using a single product for decontamination of non-critical surfaces (including floors and equipment) simplifies both training and practice. Even though there is a debate on using either a cleaning or disinfecting agent to decontaminate the environmental surfaces, there is a consensus that at least one of them should be used. Even if a cleaner

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Clean BC is edited for people who maintain high standards of sanitary cleaning in commercial, institutional, residential and industrial facilities (including hospitals, nursing homes and long-term care facilities, schools, food processing plants, hotels, motels, recreational centres, shopping malls, government facilities, restaurants, building owners, maintenance contractors, sanitary maintenance distributors and carpet cleaners).

The editorial objective of **Clean BC** is to provide news and views about new cleaning technologies, new sanitary cleaning methods, cleaning regulations and standards (where applicable), educational opportunities, industry trends, and information on people within the industry.



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PROFESSIONAL HOUSEKEEPING

Let The Sun Shine In

By **BILL GARLAND**, Senior Partner, Daniels & Associates Inc.

It's time to let the sun shine in. And, by that I am not referring to a set of CDs we produced in the late 1990s on why and how to implement a day cleaning program.

For the past two years our firm has been performing certifications for both the ISSA Cleaning Industry Management Standard (CIMS) program and Green Seal's GS-42 certification. The need for both certifications is strong in our industry as both strive to bring a level of professionalism that is badly needed - but more on that a little later.

ISSA's CIMS program focuses on how a cleaning contractor or in-house operation runs their 'business'. The certification covers financial operations, employee training, quality programs, staffing programs and many other areas. Many see it as an alternative to ISO as it applies to many of the same disciplines but is applicable directly to the cleaning industry. It is an excellent road

map on how to effectively operate a janitorial business or in-house operation.

Green Seal's GS-42 certification is intended for facilities or janitorial service providers who wish to have specific accounts certified to the Green Seal standard. This is an internationally recognized standard and is the only one to certify that a facility is being

cleaned to a green standard. Cleaning to this standard does not just mean using green chemicals but also covers the washroom supplies, matting, equipment, training, safety, plastic bags, recycling and numerous other areas. In the case of both certifications, it is the customers who are demanding them. It would be a good business decision to look into both

now, before your customers demand it. My reference earlier to letting the sun shine in, is that we have to think of our organizations as a pine tree in the forest. We need to turn that tree upside down or clear the way around it in order to

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... price has ceased to be the major criteria by which contract decisions are made... clients are looking for service providers who can provide not only the best possible service in terms of a quality management operation but also a healthy one.



Green Cleaning: The green cleaning movement in the food service industry



By **MATT DEL VECCHIO**,
Vice President - Foodservice,
Avmor Ltd.

It is only a matter of time before the green cleaning movement hits the food service industry. There are a couple of interesting trends that will see operators of foodservice facilities take a proactive role in implementing sustainable cleaning solutions.

First, the restaurant industry is beginning to see signs of a green movement with the increasing popularity of organic food; environmentally friendly take out packaging; and energy and water saving equipment. However, the industry remains largely untapped

by the green movement. As the largest consumer of electricity in the retail sector, this industry has a large impact, not only on the food we eat, but also on the water we drink, and the air that we breathe. Therefore, there is great potential for green practices and policies in this industry.

Secondly, going green is no longer a fad. Rather, it is the responsible approach taken by businesses in a variety of industries. Education (schools, colleges, universities); health care (hospitals, nursing homes); government (federal, provincial, municipal); and property management (office towers, apartment buildings, condominiums, shopping centres) are significantly ahead of the foodservice industry when it comes to the green movement.

There is no better time than now to take advantage of the green movement in the foodservice industry providing it will bring operators greater efficiencies and cost savings while

improving the health and well being of their employees and consumers.

The Benefits of Going Green

A green restaurant creates opportunities to position itself as a responsible business committed to sustainability. Ultimately, going green allows your establishment to differentiate itself from the competition. Nearly 30 per cent of consumers agree or strongly agree that they are more likely to patronize a restaurant that promotes itself as a green operation, in comparison to only 6.5 per cent who strongly agree that green practices "have little to do with restaurants."¹

Consumers are increasingly educated and seeking to patronize businesses who are responsible environmental citizens. Consequently, going green not only helps restaurants attract new customers, but it also serves to increase customer loyalty. The proc-

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It's often the things you can't see that harm you the most

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Let The Sun Shine In

let the sun shine in towards the bottom so that it too may turn green and grow as well as the top.

We all know that when we walk through a forest or wooded area that the bottoms of the coniferous trees are brown because the sun does not reach them. If we think of the tree as our organization, management is at the top representing the smallest part and the largest part of the tree at the bottom representing the employees.

During visits to some organizations over the last couple of years, we have been impressed with the materials presented for review and the enthusiasm exhibited by management for whichever certification they are seeking. This enthusiasm is genuine and many firms have spent thousands of dollars in consultants or other means of reaching their goal. In addition, there is the cost of the certification itself, and the audit of each company or facility being considered.

It is the site audit that is the true test of whether the organization will be successful in its goal. This is where we see many organizations fail in their first attempt. It is when we visit the actual facility being cleaned that we find what was believed to be happening with management has not made it down to the cleaners in the building.

I must admit that this scenario is something I have seen countless times in my years in the cleaning industry. But, to see it now after the commitment of management seemed so genuine and thousands of dollars had been spent, simply amazes me. We have seen everything from cleaners not wearing Personal Protection Equipment (PPE) when working with hazardous chemicals to hazardous chemicals such as

bleach being brought in from home on a fairly large scale.

My point here is that senior management needs to take an interest in the bottom of the organization as this is where the product meets the customer and inform them so that they too are as knowledgeable as the top.

This then begs the question, why is this disconnect between senior management and the cleaners happening? We have noted in every case it is because middle management or supervision has not made it happen. This is not to say that middle management is not effective everywhere or that all of it is bad, but our experience shows that in a large number

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of cases, the commitment at the top is not flowing to the bottom. There appear to be some consistent reasons for this that we are seeing in these instances.

The number one reason is that although middle management is aware of the program, they have not had enough support from senior management to actually implement it. Supervisors are usually busy enough on a day to day basis making sure all positions are filled, quality is good and doing payroll, that just another program rolling down from up above is just another program, and they don't have the time to fully understand it or implement it.

In some cases it is because the middle management does not relate to or communicate effectively with senior management. This sometimes happens when there is a language or cultural disconnect between the two. Middle management has been hired because of their ability to get staff and not because of their managerial skills. They may view any programs from above as infringing on their authority. It also occurs

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The Green Cleaning Movement in the Foodservice Industry

ess of going green also tends to have a positive impact on the morale and productivity of your employees. By taking the initiative to improve your business practices, employees feel inspired and become invested in the goals of your company. Environmentally friendly products were once considered too costly or not potent enough to meet the needs of restaurants. However, going green is no longer an expensive process, but a financially viable one. Cost savings may even result from the implementation of energy conservation programs and recycling/waste reduction systems. It is becoming clear that going green has numerous benefits for your business, employees, consumers and the community.

Where To Begin?

The first step in going green is to make it a priority and goal for your organization as a whole. Owners and/or managers should have an understanding of what's involved in the process, and make a commitment to provide the leadership and support needed to change its business processes over time. The process may take up to three- to five-years to fully implement. Start small. Realize that every step that you take is valuable. Begin by implementing simple steps and, once successful, move on to bigger things. The whole organization, from management to the staff must work together to make going green a reality. The goal then becomes part of your culture.

Teaming up or working with an organization also helps. Associations like the Green Restaurant Association can help restaurant operators find and navigate through environmental friendly products and practices, providing support and invaluable resources. Enlist the help and advice of your dealers and manufacturers.

Green Cleaning for the Food Service Industry

Sanitation and cleanliness are primary concerns for food service operators. Yet, the products that most restaurants use for cleaning and insect control are toxic to the environment, and unhealthy for both employees and customers. Restaurants use a wide range of cleaning products con-



taining chlorine (in sanitizers, drain and toilet bowl cleaners), ammonia (in window and floor cleaners), caustic soda (in oven cleaners) and volatile organic compounds. Prolonged contact with these cleaners can cause skin problems. Also, the fumes emitted by these products can cause respiratory diseases. Indoor Air Quality (IAQ) is becoming an increasing problem as people are spending more time indoors. Poor IAQ has been linked to a variety of health issues, including many respiratory problems such as asthma. In addition, when toxic materials from these products are flushed down drains, they enter the sewage system and ultimately affect water quality. What's more, packaging could have a significant environmental impact. For all these reasons, viable alternatives to traditional chemicals should be carefully examined.

A comprehensive green cleaning program entails more than just the use of non-toxic chemicals. A good program covers all areas of cleaning, from maintenance and recycling to training. Not all green cleaning products are created equal. Therefore, it is important to do your research in order to ensure that you have chosen the best products to suit your needs. The products you choose should meet the following criteria:

- **Performance** – saves time while cleaning effectively and ensures the pristine appearance of your food service institution;
- **People** – Safeguards the health and safety of your employees and customers;
- **Planet** – Raw materials should be biodegradable and meet the highest environmental standards for safe storage, transportation and disposal. More specifi-

cally, materials used should be safe on our water systems and aquatic life;

- **Price** – Priced competitively when compared to conventional cleaning products in the same categories.

Green Cleaning Technologies

When choosing green cleaning products, it is important to be aware of the different options on the market, as well as the advantages and disadvantages of each method. Below is a quick review of biological and chemical green cleaning technologies.

Biological Cleaning: A biological cleaning solution uses biological decomposition to clean and deodorize. These solutions harness nature's own processes to recycle waste into simple and essential substances. They meet today's demands for cleaning, odor control and waste elimination without the use of potentially harmful chemicals.

There are four main advantages to using biological cleaners and odour control products:

- They are better for the environment and safer for the users and occupants when compared to traditional products;
- They use highly specialized enzyme producing microbials to clean and control odors by eliminating the soils that traditional chemical products alone cannot treat;
- They provide residual cleaning up to 80 hours after application and therefore reduce overall labour costs by continuing to work long after application;
- They help to displace unknown, potentially disease causing bacteria with known, healthy microbials and, in this way, contribute to our better health.

Chemical Cleaning: Chemical based products can also offer an environmentally responsible method for effective cleaning. For example, hydrogen peroxide is particularly attractive because it can break up organic matter and then prevent grease from sticking onto the surface. Other benefits of hydrogen peroxide are:

- Creates no toxic or hazardous by-products – it breaks down into water and oxygen;
- Is safe for hard surfaces and textile finishes;
- Biodegradable;
- Has excellent stain removal properties;
- Eliminates odors;
- Improves wastewater quality in sewer systems;
- Helps reduce biochemical oxygen demand (BOD) and chemical oxygen demand (COD) – key parameters in measuring water quality;
- Can detoxify cyanide, nitrogen compounds, chlorine, bisulfate, phenol and a host of other toxic based waste.

Although biological and chemical technologies differ from one another, they can safely complement each other. An ideal sustainable cleaning program will take advantage of the strengths of each technology in order to help obtain an effective and more complete clean.

i. Dilution Control

Dilution control allows the cleaning products purchased to perform at their optimal level. By looking for products which provide dilution control, you are not only maximizing their effectiveness and preventing waste and residue, but you are substantially reducing ready-to-use (RTU) costs while making cleaning easier and less dangerous for your employees.

ii. Customer service, support and training

Good customer service, sup-

port and training can be as important as the right cleaning solution. Look for a company who can offer added value and support in the form of hands-on training, sanitation programs, wall charts, proper labels and MSDS sheets. These tools are an integral part of the process of going green because it is crucial that the products you choose are being used properly for optimal performance.

iii. Certifications

Not all green cleaning products are created equal. Some products may claim to be 'green', without having been certified by a reputable organization. Therefore, look for certified cleaning chemicals, by organizations such as:

- **Environmental Choice Program (ECP):** organization based in Canada that offers third-party certification of many different products including cleaners and janitorial paper products. The Ecologo label is widely known as the premiere mark of environmental standards.
- **Green Seal (GS):** offers certification on a wide range of products. The GS Label is used for purchasing standards.

iv. Cleaning Programs and Best Practices

Many organizations have started green cleaning programs, either based on a standardized system or built from scratch. For example, INFORM, a sustainable business and industry advocate has also created a green cleaning report called 'Cleaning for Health'. This report outlines specific practices and tips for cleaning and suggested cleaners. This organization provides helpful documents, which may be downloaded, such as checklists, best practices and sample policy statements.

Below are some specific tips to keep in mind when creating a green cleaning program:

- Keep the variety and

amount of cleaners to a minimum. Stick with just a few that accomplish the tasks you need.

- Most things can be cleaned with a general cleaner, or no cleaner and a little elbow grease.
- Properly dispose of unused and unneeded cleaners and chemicals. 'www.earth911.org' lists chemical disposal options for most communities.
- If you cannot find a certified or environmentally preferable choice for a particular cleaner, contact the manufacturer for more detailed information on ingredients, use, disposal and toxicity. Avoid products containing dangerous chemicals.
- Avoid products with labels of 'danger', 'poison' or 'caution'.
- Focus on entryways to reduce the amount of dirt coming into a building.
- Minimize chemicals in the air. Spray cleaners on a cloth rather than a surface and use direct sprays rather than misters.
- Use green certified machinery.
- Use micro fibre cloths and mops to reduce airborne particles.

On the Road to Being Green

In addition to choosing products which are non-toxic and not harmful to the environment, there are additional steps that you can take, both in your home and company, to protect your health and your surrounding environment for future generations. Being green also takes into consideration reductions in energy and water use, and waste disposal, in addition to improvements in indoor air quality. Here are some ideas from Green Cleaning Services.²:

- **Energy Efficiency and Conservation** – Energy efficient technologies and conservation practices exist for lighting, heating, ventilation, air conditioning, foodservice appliances, office equipment and transportation. Electricity and power is available from renewable resources such as wind, solar, geothermal, small hydro and biomass. These energy sources cause dramatically less air pollution and environmental damage compared to fossil fuel, nuclear and large-scale hydroelectric energy sources.
- **Water Efficiency and Conservation** – Water efficient technologies and conservation practices exist for foodservice appliances, equipment and landscaping. Reducing water use not only protects our water sources but delays the need to expand existing treatment plants and prolongs the life of systems. Here are a few steps to reduce water consumption: regularly check that all valves are

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To promote greater effectiveness and continual improvements in our environmental investments and activities, Dustbane is introducing an environmental logo. Its purpose is to help people become aware of our improvements and learn what we have to offer. Products that fulfil the requirements will benefit both businesses and consumers, by enhancing product quality and environmental protection.

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- Emerald™** - Degreaser
- Tradition™** - Hand Soap & Body Shampoo
- Orbit™** - Zinc Free All Systems Floor Finish
- Time-Out™** - Floor Stripper



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Let The Sun Shine In

when management is more focused on sales and marketing, and leaves the entire area of operations to middle management who feel left out.

The result of all of this is that the cleaners themselves have very little clue of any programs that are being implemented, and their importance to the organization and the client. This comes down to management needing to put extra effort into reaching the cleaners and making them feel involved. There are a lot of articles on employee motivation and bonus programs, but often all that is needed is training and

direct communication to make them understand and feel part of the success of any program being implemented.

I suppose that we like to think what is in this article is not true or not happening in our organization, but I have been surprised at how often it is happening. I encourage everyone to go for certification of some sort because it will provide you with some very important tools to survive in tough labour and financial times. You just need to turn the tree upside down and let some of the sunshine get to the bottom.



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Green Seal Stands Behind Revised GS-37

The Leadership Standard for Industrial and Institutional Cleaners

Green Seal certified products are increasingly being used in schools, and more and more cleaning chemicals are demonstrating that they contribute to health and environmental problems. Updating the Green Seal standard for the cleaners used in schools and other institutional settings (GS-37) involved careful consideration of vulnerable populations' needs. Given the significance of GS-37 and the controversy that surrounds all chemical restrictions, Green Seal anticipated that consensus might not be achieved in its Scope of Work issued to all stakeholders early in the 21-month-long process. Early documents in the revision process also set out the rationale for special consideration of children, in particular, because of their sensitivity to chemical exposures and the many ways in which they may be affected during their developmental stages.

Green Seal strictly adhered to the ISO standard that governs such standard development: ISO 14020 Environmental labels and declarations – General principles, and ISO 14024 Environmental labels and declarations: Type I environmental labelling – Principles and procedures.

The process to develop the GS-37 standard was open and transparent. All interested parties were allowed to participate in the public review period and given several opportunities to register as a stakeholder for more active involvement throughout the process. Project progress and discussion were continually accessible through several electronic means (e.g. Web site, on-line forum, and e-mail). Discussions were also conducted through teleconferences with open participation. In addition, draft language on specific issues was provided to interested parties to further enable discussions.

The ISO standards also require that the criteria of an ecolabeling standard be based on sound scientific and engineering principles, and be derived from data that support the claim of environmental preferability. The GS-37 revision process provided a clear rationale for each criterion in all the support documents. It was recognized that a **conventional risk assessment approach is not sufficient for an environmental leadership standard** – which attempts to promote the safest alternatives, not to set so-called safe limits for ques-

tionable chemicals – **it is also inappropriate for protecting vulnerable populations that are not considered in standard risk assessment methodologies.** Even though some trade associations oppose the viewpoint on using a hazard-based (vs. risk assessment) approach to protect vulnerable populations, other stakeholders fully supported this approach, and yet others felt that potentially more could be done. As a result, the ballot was nearly split, with only a few specific issues with sustained opposition. It was Green Seal's task, supported by RESOLVE and the Stakeholder and Executive Committees, to sort through these differing viewpoints and the available science to create a strengthened standard that would ensure the protection of vulnerable populations and the environment.

While Green Seal strived to reach consensus and took reasonable efforts to achieve consensus,

... the success of the revision of GS-37 will be measured by the extent to which it changes the market of cleaning products to make them more protective of human health, including vulnerable populations such as children, and the environment.

it was long recognized that it is difficult to do so for environmental leadership standards that, by definition, exclude the majority of products in a market and potentially a number of manufacturers that cannot meet the standard. It is therefore no coincidence that seven trade associations object to the standard, as they are constituted to uphold the interests of all their members and members' products.

"With the extensive and intensive process involved in re-

vising GS-37, one could fairly say that Green Seal went above and beyond their requirement, and, in fact, made extraordinary efforts to achieve consensus," said Dr. Arthur B. Weissman, president and CEO of Green Seal Inc.

In the final analysis, the success of the revision of GS-37 will be measured by the extent to which it changes the market of cleaning products to make them more protective of human health, including vulnerable populations such as children, and the environment.

"We regret that some are unable to support the revised GS-37 (but), we trust that government agencies that are charged with protecting the health of their citizens will choose to support a standard that protects the rights of children over the rights of chemicals," Dr. Weissman said. "(We) anticipate that many progressive manufacturers will see the benefit of conforming with a leadership standard that promotes more sustainable cleaning products that will ensure a healthier, cleaner environment for all."



Keeping Up Appearances

By **PATRICE DUMAS**,
Vice President Sales & Marketing,
Mat Tech

The winter months, just around the corner, can be tough for the professional cleaning industry. Snow, rain and sleet can play havoc on building floors and carpets.

For carpet cleaners, their business can come to a virtual stop during the cold winter months. This is because outdoor conditions, and their impact on the indoor environment, can be so bad that facility managers believe it is simply not worth it to clean carpets or strip and refinish floors. After all, they think they will just get quickly resoiled and need to be re-cleaned.

This places an even greater burden on cleaning professionals. As carpets and floors become dirty, facility managers ask more of cleaning crews to do whatever they can to keep the unsightly

soiling to a minimum. Added to this burden is the fact that the winter's grit, dirt and contaminants are not only deposited on floors but become airborne as well, ending up on desks, counters, and surfaces high and low throughout the building.

It is estimated that for every 1000 people walking into a school, for example, as much as 10 pounds of soil is walked in as well. Further, it is estimated that it costs about \$750 to remove one pound of dirt from a facility. With more than 5.3 million school age students, you see how quickly this amount of traffic – along with soiling and cleaning costs – can accumulate. This means that these facilities will need more dusting and vacuuming during the winter months, all requiring more time – and adding to the workload – of cleaning professionals.

And winter's cleaning burden does not fall just on cleaning pro-

professionals. It costs facility managers money as well. When carpet cleaning is delayed, for instance, it harms carpet fibres causing expensive carpeting to wear out sooner and need replacement. The more grit and grime walked on to floors, the more work and time to scrub, strip and refinish will be required when warmer months return.

The White Knight on the Floor

Although winter presents many challenges for cleaning professionals and the managers of facilities, we do not need to become victims of its cleaning wrath. Because the problem centres around the soil collected on the bottom of shoes, steps taken to remove or prevent this soil from entering the facility can help minimize the soiling and harm to carpets and floors, as well as reduce the workload of cleaning professionals.

In some countries they do this

Continued On Page 8

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Continued From Page 5

The Green Cleaning Movement in the Foodservice Industry

operating properly, inspect for and repair leaks on a monthly basis, do not run water longer than necessary.

- **Recycling and Composting** – Recycling services exist for many waste products such as glass, plastic, metals, cardboard, mixed paper, grease, ink and toner cartridges. Food waste can be diverted from landfills and made into nutrient rich soil through the use of a composting service or an on-site system.

- **Sustainable Food** – Sustainable food products support the long-term maintenance of ecosystems and agriculture for future generations. Organic agriculture prohibits the use of toxic synthetic pesticides and fertilizers, irradiation, sewage sludge and genetic engineering. Locally grown foods reduce the amount of pollution associated with transportation primarily by fossil fuels. Plant-based foods require fewer natural resources and create less pollution per calorie consumed.

- **Recycled, Tree-Free, Biodegradable and Organic Products** – Recycled products are made from materials that are collected from post-consumer or post-industrial waste sources. Tree-free products are made from alternative plant sources such as hemp or kenaf. Biodegradable products are capable of being decomposed by biological agents, especially bacteria. Organic products are grown without the use of toxic synthetic pesticides and fertilizers, irradiation, sewage sludge and genetic engineering.

- **Chlorine-Free Paper Products** – Chlorine-free paper products are unbleached or whitened with alternatives such as hydrogen peroxide, oxygen and ozone. The term Process Chlorine-Free (PCF) identifies recycled paper that is unbleached or bleached without the use of chlorine compounds. The term Totally Chlorine-Free (TCF) identifies virgin paper that is unbleached or bleached with the use of chlorine compounds. The terms Elemental Chlorine-Free (ECF) identifies paper that is bleached

without the use of elemental chlorine (but may use chlorine compounds).

The Impact of Going Green

The use of green cleaning products, sustainable food, coupled with other proactive measures to reduce energy and water use, will undoubtedly have a positive impact on your health, the health of your employees and customers, as well as on the environment. When each of us takes on the responsibility of switching to green cleaning and implementing other green practices, we can make an enormous improvement to our surrounding environment.

Taking steps towards becoming a green restaurant will pay off in a number of ways: First, you will differentiate your business as one committed to sustainability. Second, you will improve the working and dining environment for employees and customers. Third, cost savings will come from reduced energy and water use. Most of all, your actions will have an impact on sustaining the environment for future generations. When you take these proactive measures at home, you are making a difference. However, when you take them with your business, you are multiplying the impact by the number of customers you serve each day.

The greening of restaurant and food service operations is a new concept that will continue to find wider acceptance in the future. The time to bring cutting edge concepts and processes to your organization is now. Start by educating yourself about the process of going green and the resources that are available to help you. Continue the process by educating others about the benefits of environmental awareness and stewardship, and how common sense principals can be applied in your organization and the food service industry as a whole.

(1) *Restaurants & Institutions*, Sep. 1, 2007. Special Report: Green and Growing, www.rimag.com/archives/2007/09/going-green.asp.

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Keeping Up Appearances

in a simple way: they remove their shoes at the door. This is common in Japan, Thailand, the Czech Republic and Sweden. In some New England states in the United States, hospitals and other large public facilities once had 'mud rooms' where building users could take off and leave their boots and galoshes. Mud rooms served as a barrier between the outside and the inside of the facility, preventing soils from being walked into the facility.

Although still common in houses, few public facilities have mud rooms any longer. Instead they now turn to high-performance matting systems to minimize the amount of soil and contaminants brought in from the outside. It is estimated that these mats, made using state-of-the-art technologies, can trap and capture 70 to 80 per cent of the soil on shoe bottoms, a significant reduction that helps keep facilities clean.

What Are High-Performance Mats?

Many facilities, unaware of the importance of matting systems, rent mats or purchase low-performing mats, often at big-box stores. Although these mats can help reduce the amount of soiling in a facility, they are not engineered to trap anything near 80 per cent of shoe bottom contaminants. Additionally, these "standard" mats often require frequent cleaning, and this, along with the fact that they are not designed to have a long performance life, results in frequent replacement. Although they may cost less to purchase initially, astute facility managers soon realize they are not cost effective in the long run.

High-performance mats are engineered to be more effective at stopping soil at the door as well as to last for an extended period of time. One way they do this is through dual-level construction. With this system, soil, moisture and other outdoor contaminants are stored below shoe level, which prevents them from being transferred into a building. Mats without this construction can flatten out over time, and as soil is deposited on these mats, it can reattach to the shoe and be tracked into the facility, completely defeating the purpose.

These mats may cost more than the standard mats mentioned earlier. However, a look at their warranties shows how cost effective a high-performance matting

Many facilities... rent mats or purchase low-performing mats, often at big-box stores. Although these mats can help reduce the amount of soiling, they are not engineered to trap anything near 80 per cent of shoe contaminants.

system can be. A standard or low-performing mat may have a warranty as short as three months, while a high-performing matting system may have a warranty that extends as much as six years. This also makes them more sustainable, reducing the amount of cleaning-related waste deposited in landfills.

The Rule of 15

High-performance mats are most effective as a system, using three different types of mats of approximately five feet each – scrapers, wiper/scrapers and wiper mats. These work together to prevent contaminants from entering a facility. This is referred to as the Rule of 15:

- Five feet of scraper mats are placed outdoors to trap as much as 50 per cent of all soils and contaminants from entering a facility.
- This is followed by five feet of wiper/scraper mats, typically placed in a vestibule between doors or directly inside a facility to gather dust and debris not cap-

tured outdoors.

- Wiper mats, again five feet long, are often referred to as the 'final line of defense' and are designed to capture any remaining soils and contaminants.

The system is so effective it has become an integral part of Green cleaning. Many Green cleaning experts say they are about the best source-reduction strategy available to help keep soils outside. Often they suggest even more than 15 feet of matting be placed at key door entries.

There is little we can do about the weather, but fortunately, with high-performance matting systems, there are things we can do to help keep contaminants from entering a building no matter what time of year it is. As winter approaches, cleaning contractors should suggest that their clients invest in these more effective matting systems. Cleaning and related costs as well as workloads may be reduced, and it makes contractors a more vital part of their customers' building operations.

Ten Reasons to Keep Shoe Bottoms Clean

(1) Carpets absorb dust from soiled shoes and can become breeding grounds for dust mites, causing asthma and allergies.

(2) On hard-surface floors, dust from soiled shoes will not be absorbed, will become airborne, and can be inhaled by building occupants.

(3) Clean shoe bottoms are healthier for a facility, whether the soil remains trapped in carpets or becomes airborne.

(4) Keeping shoe bottoms clean reduces cleaning needs and costs.

(5) If shoe bottoms are clean, carpets last longer, and hard-surface floors do not need to be scrubbed, stripped or

refinished as frequently.

(6) Dirty shoe bottoms can scratch floors and stain carpets, creating a dingy appearance.

(7) Common soils on shoe bottoms, which can be transferred to floors and carpets, include oil, chemicals and pesticides, fertilizers, animal excrement, gum, soiled water and asphalt.

(8) Soiled shoes can make floors slippery, increasing the chances for a slip and fall.

(9) Keeping shoe bottoms clean increases the life span of the shoes themselves.

(10) If your shoe bottoms are clean, you don't have to apologize for staining someone's carpet.

Do The Numbers: The Mathematics of Cleaning



Colin Butterfield

The devastating events of October 2008 have left the stock market and the banking system reeling. The Canadian dollar is down to below 80 cents and gasoline prices are still at depressing levels. Meanwhile, cleaning service providers wait to see how these events will affect their operations.

Energy prices impact the prices of most products used in our industry and this, with the downturn in the economy that is likely for a year or more, will put pressure on both in-house and contract cleaning operations to be as efficient as possible.

When outsiders look at cleaning services, they tend to see them as mop and pail organizations having few, if any, significant financial issues to consider. We, in the industry, know that the opposite is true, cleaning is a mathematical operation and in order to be successful, you have to do the math – and do it right!

Every part of a cleaning service involves mathematical calculations that, if ignored, will lead to problems. Some may be minor – such as shortages of supplies (although, to the client, a shortage of restroom supplies is a major issue) – and some major resulting in business failures or staff lay-offs. Effective cleaning management starts with the basic formula (*Figure One*).

Figure One.
Annual Cost of cleaning =
$$\frac{(\text{Cost of Labour and Materials} \times \text{Task Time} \times \text{Frequency})}{\text{Area}}$$

Labour Cost includes all overhead costs for benefits, absence relief, tools, equipment and supervision, (dollars per hour).

Cost of materials delivered to the site, needed to do the task.

Task time in hours and minutes to perform the task.

Frequency is how often the task is done per year.

Area is the size of the area being cleaned, in square feet or square metres.

Virtually all other calculations in the cleaning industry are done to provide the data for this formula.

Dilution rates are intended to ensure that enough product is used to provide adequate cleaning. Guesswork such as the “glug glug” method wastes product, money and time. Additionally, in areas where water is soft, dilution rates should be increased by as much as 50 per cent as manufacturers dilution rates are established for the hardest water likely to be found.

For example, you need to choose between two

neutral detergent products that have different prices per four litre jug and also have different dilution ratios. Since you have 20 employees each using four, 10 litre bucketsful-per-day you need to know the ‘in use’ cost per litre and multiply that by the number of bucketsful used per year. *Figure Two* shows the formula.

Figure Two.
$$(\text{Cost per 4 litre jug}) \times (20 \times 40 \times 260) \text{ the answer is in dollars per year}$$

$$((4 \times \text{dilution ratio}) + 4)$$

For floor finishes and sealers, there are two types of calculations.

To get the cost per 1000 sq. feet or cost per 100 sq. metres, you need to compare coverage rates. See the formula in *Figure Three*.

Figure Three.
$$\frac{(\text{Cost per litre})}{\text{Coverage per litre}} \text{ for a 20 litre pail that is: } \frac{(\text{Cost per 20 litre pail})}{(\text{coverage} \times 20)}$$

To decide how many pails to ship to the job site, you need to compare the coverage per 20 litre pail of each product multiplied by the number of coats needed and the area being coated. This is important because if you ship too few, time is lost waiting for location instead of being in your store room ready for the next job. See the formula in *Figure Four*.

Figure Four.
$$\frac{(\text{Area to be covered} \times \text{number of coats})}{(\text{Coverage in square metres per litre} \times 20)}$$

for example $\frac{(200 \text{ sq. metres} \times 4 \text{ coats})}{(7 \times 20)}$
$$= 5.7 \text{ pails (take six)}$$

Choosing or justifying equipment such as an autoscrubber or propane burnisher involves comparing the productivity of the machine versus the method you currently use, multiplied by the area being cleaned or burnished multiplied by the number of times the work is done in a year all multiplied by your current labour cost. Productivity data is available from ISSA (ask your janitorial supplier for a copy). A typical calculation to identify the potential savings achieved by the purchase of more efficient equipment is illustrated in *Figure Five*.

Figure Five.
$$(\text{Production rate of autoscrubber in sq. ft. per hour}) \times \text{Your hourly labour cost}$$

$$\text{Area cleaned in sq. ft.} \times \text{number of times cleaned per year}$$

Compare this with the annual cost using your present method – e.g. mop and bucket. (*Figure Six*).

(You can also use this formula to compare two similar pieces of equipment e.g. a 20- and 24-inch

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is intended to be used, it should have good cleaning performance, since all studies to support the contribution of cleaning agents have been generated using detergent with decent cleaning performance. Cleaning performance comes mostly from the contribution of surfactants used in the formulation. If surfactants are removed from a detergent formulation, the wetting capability and, consequently, cleaning performance decrease significantly. This will result in the product being ineffective for use as a detergent.

Microbial resistance:

Recently, studying bacterial adaptation and resistance to antiseptics and disinfectants has had considerable interest¹⁴. This is due to the fact that there is not enough knowledge in this field where as the resistance to antibiotics has

been well studied¹⁵. Understanding the microbial resistance to different types of biocides and potential cross-resistance can be very helpful in reducing usage of potential resistance developers, and consequently to decrease the risk for developing more resistant bacteria in our environment. In general, the mechanism of bacterial resistance to biocides is essentially of two types - Intrinsic and Acquired¹⁵.

• Intrinsic resistance is the natural, chromosomally controlled property of a bacterial cell that enables it to circumvent the action of a biocide. It is most commonly found in gram-negative bacteria, in mycobacteria and in bacterial spores. Additionally, physiological (phenotypic) adaptation is considered to alter the intrinsic resistance of bacteria - e.g. of cells contained within a biofilm¹⁶.

• Acquired resistance to biocides results from genetic changes in a cell and arises either by mutation or by acquisition of genetic material from another cell¹⁵. Acquired, resistance to biocides can result when bacteria are exposed to gradually increasing concentrations of a biocide. Examples are provided by highly QAC resistance *Serratia marcescens*, and chlorhexidine-resistant *E.coli*, *P.mirabilis*, *P.aeruginosa* and *S.marcescens*^{17,18}.

Resistance development to biocides:

The association between chronic sublethal exposure to bacterial monocultures to biocides and changes in susceptibility to both the biocides and antibiotics has been demonstrated unequivocally in the laboratory¹⁹. Such phenomenon has not yet been demonstrated any rel-

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evance to the real world¹⁹. If the increasing use of antibacterial agents within consumer products is likely to impact antibiotic resistance within the home, similar effects should already be apparent in clinical and hospital settings¹⁹.

Minimum inhibitory concentrations (MICs) have been used to evaluate the emergence of biocide resistance in bacteria. However, the possibility of failure to achieve the disinfection standard because of elevated MICs is debatable since significantly higher concentrations are used in practice²⁰. Studies carried out with biocides in their use level, demonstrate that there isn't less susceptibility to use dilutions of biocides against the bacteria with elevated susceptibility in MIC level¹²¹⁻²³.

Arguably, such studies support the view that antiseptic use in hospitals does not contribute to the biocide susceptibilities of *enterococcal* isolates. Additionally, studies conducted on the susceptibility of antibiotic-resistant bacteria showed that there was no correlation between resistance to antibiotics and a decreased susceptibility to antiseptics or disinfectants²⁴. This seems to be due to the biocidal concentration factor. Biocidal concentration is a key factor in biocidal activity²⁰. Most biocide formulations contain high concentrations of active agents to achieve an optimal, broad-spec-

trum activity for direct use on an inanimate surface, skin and in water²⁵. The mechanism of action for biocides in their MIC and in their disinfection concentrations is different²⁶. It is generally accepted that most biocides, at high concentrations, act in a non-specific way²⁵. This seems to be very relevant especially for oxidizers. Since selection or transfer of determinants for reduced susceptibility will only apply to biocides which have selective target sites, it seems unlikely (although not impossible) that it could occur with chemically reactive agents such as oxygen-releasing agents¹⁹, or with solvent molecules such as alcohols²⁷. This likelihood is further reduced by the fact that these agents are unstable or volatile, and do not persist in the environment in an active form¹⁹.

Non-ionic surfactants have no antimicrobial activity⁸ and therefore no acquired microbial resistance would be developed for them. Anionic surfactants have very low antimicrobial activity only in acidic solution, and do not have any residual activity, and therefore microorganisms would not develop any resistance against them. As per the authors' knowledge, there is no study available to support the hypothesis that non-ionic or anionic surfactants cause microbial resistance.

In summary, the mechanism

of resistance to chemical germicides is often dependent on the concentration of the germicide. At high concentrations multiple structural and metabolic targets are involved, and at low concentrations fewer targets are entailed⁸. On the other hand, some of these disinfectants, such as chlorine, have been around for a long time. Based on the current evidence, it seems that intrinsic and acquired antimicrobial resistance occurring in response to biocide exposure is not a significant problem, per se¹⁹.

Concluding remarks

Surfactants are a large class of chemicals and have different physical, chemical and toxicity properties. Some, like quaternary ammonium compounds (cationic surfactants), have microbial activity where as nonionics do not provide microbial activity. Some including alkyl phenol ethoxylates are toxic to aquatic life, and not environmentally favourable while others, such as LAS and AE, are readily biodegradable and do not accumulate in the environment.

That said, the responsibility remains on the shoulders of the product manufacturers to develop products which have a balance in their performance and environmental profile.

The Mathematics of Cleaning

Continued From Page 9

Figure Six.

(Production rate of mop and bucket in sq. ft. per hour) x Your hourly labour cost
Area cleaned in sq. ft. x number of times cleaned per year

machine to see whether going bigger is justified for your facility). The ISSA times are quite extensive and are based on average effort and real life productivity. It's possible to compare dust mopping with sweeping and with vacuuming, or spray buffing with burnishing as well as window cleaning with different methods. At last count there were 447 standard times in the handbook and more are being added each year.

In addition to the ISSA times there are task times published by APPA dealing with the cleaning of specific area types, such as classrooms, shower rooms, corridors, stairwells, offices, laboratories and a range of room types with different floor finishes. APPA developed a cleaning standard incorporating times and frequencies needed to achieve a range of quality levels and published the data in "Custodial Staffing Guidelines for Educational Facilities." The APPA standards have been adopted by the U.S. Green Building Council for LEED Building standards and are extremely useful for planning and justifying staffing levels.

Absenteeism versus inefficiency: Much effort is involved in attendance management programs designed to reduce absenteeism with the aim of reducing labour costs. There will always be a minimum

level of absenteeism with the aim of reducing labour costs. There will always be a minimum level of absenteeism due to illness or injury that no program will reduce although chronic attendance abusers should always be targeted. If as much effort was applied to efficient time management on the job as there is to absence management, the labour savings would be very significant. For example.

For a staff of 100 with an absence average of seven days per year, the time loss is 7 x 100 x 7.5 hours... 5250 hours per year.

For a staff of 100 with time loss of 15 minutes each per day due to extended breaks and late starts or inefficient assignments, the time loss is:
100 x 260 x 15 ...6500 hours per year
60

In discussions with custodial managers over several years, I've found that the typical time loss is more like one hour per day, now that really is an opportunity for cost reduction that should be addressed.

Simple calculator tools for the formulas listed above will save readers time and frustration. They are available to use (at no cost) on our web site at www.groupb.ca/Services.html click on 'Supervisors Toolkit'. In the tight times that we are facing using guesswork is not a wise practice. Also, it's always a good idea to remind your administration that there's much more to custodial management than a mop and a bucket.

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