

THE PRINCIPIA

Green Cleaning Purchasing Standard



“The Principia shall prioritize the purchase of cleaning products that meet industry certifications intended to minimize negative impacts on ecological systems and human health and safety, while at the same time upholding financial and performance criteria.”

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“Let’s face it—to be ‘green’ is no longer just an option. Industry giants continue to make sustainability the mandate today that quality was a generation ago. ...

At its core, sustainability is conservation and preservation. A synonym for these words is savings, the province of the purchasing profession. On the one side, sustainability bears the imprint of reduce, conserve and preserve. On the flip side is the purchasing reward of reduced costs and increased profits.

The very acts of cutting costs and saving money are intrinsic to and integrally inseparable from sustainability. The cost savings and gains in sustainability are limited only by our creativity and willingness.”

Menard (2012)



II. Executive Summary

The Principia, established on the principle that “education carries with it the obligation to use technical skills and intellectual attainments for the betterment of humanity” (Policy 10), is an institution dedicated to “seek[ing] continuously to improve its educational facilities and business practices in order to keep abreast of educational progress and in key with changing world conditions” (Policy 11). Among the many ways in which Principia demonstrates dedication to its foundational policies is through a growing commitment to sustainable practices. Developing a Green Cleaning Purchasing Standard is a practical step in formalizing and making more visible our sustainability practices at an institutional level. Cleaning products are of special importance because they have direct and often negative effects on human and environmental health and safety.

After researching various “green” certifications and the purchasing policies of other institutions, we recommend Green Seal and Underwriters Laboratory (UL) certifications based on product availability and reputability, and the fact that these are the only programs that follow ISO 14024, a best practice policy for eco-labeling established by the International Organization of Standards. In this way, our Green Cleaning Purchasing Standard facilitates the purchasing process by providing clear *guidelines* rather than limiting the process by maintaining lists of acceptable products.

Individual analyses were undertaken of each cleaning product used by the College Facilities Department (Housekeeping, Flex Crew), College Dining Services, and the School’s Housekeeping Department. The Material Safety Data Sheet (MSDS) (or Safety Data Sheet, SDS) for each cleaning product was used to summarize the Chemical Composition, Hazardous Materials Identification System (HMIS) rating¹, and safety hazards associated with each product, from which a “Priority for Transition” ranking (1,2,3) was assigned (see Table 1).

Eleven (8.1%) of 136 cleaning products currently in use meet Green Seal and/or UL Certification requirements; 59 (43.4%) are classified as Low Priority for Transition because they do not pose high levels of risk (under normal use regimes) to human or environmental health; 28 (20.6%) are classified as Medium Priority for Transition, meaning that at least one of the HMIS ratings is a ‘2’ and all ingredients are specified; 38 (27.9%) are classified as High Priority for Transition (the majority of these carry an HMIS health rating of ‘3’, indicating that “Major injury [is] likely unless prompt action is taken and medical treatment”).

Among the High Priority for Transition products are 11 disinfectants (for which there are no Green Seal or UL alternatives), 22 non-disinfectants (high hazard materials for which there *are* Green Seal or UL alternatives), and six products for which the chemical composition is not specified, making it difficult to assess the product’s potential impact on environment and human health. *In summary, one in five (20.6%) cleaning products currently in use is a high hazard, non-disinfectant product for which a Green Seal or UL option is available.*

¹ See Appendix G and <http://www.ilpi.com/msds/ref/hmis.html> for a detailed explanation.

Recommendations

- Medium Priority for Transition products and non-disinfectant High Priority for Transition products should be replaced with Green Seal or UL certified alternatives as a matter of priority.
- Green Seal or UL alternatives to Low Priority for Transition products should be evaluated since, regardless of the expected risk levels, “reducing the intrinsic hazard of a product is a desirable pollution prevention objective”.
- Priority for Transition Ranking should not be the only criterion. Purchasing histories should be reviewed to identify high volume products – and priority given to replacing high volume, high/medium hazard products with safer alternatives. Using these criteria, first priority should be given to replacing Suprox-D, HP Lime Off Cleaner, Citrus-Scrub, and Household Bleach Disinfectant.²
- In the absence of Green Seal or UL certified alternatives to disinfectants, Principia should look for products using hydrogen peroxide as the active ingredient, avoid products using asthmagens and corrosive properties (e.g., bleach, quaternary ammonium compounds, pine oil, ortho-phenylphenol) as the active ingredient, discontinue use of antibacterial soaps, distribute disinfectants in closed-loop systems (to minimize spills of concentrated product), and use EPA ratings as a guide (Appendix M).
- An audit should be conducted with an aim to reduce the number of products in use.

Next Steps

- Inform gateway suppliers of the new Purchasing Standard
- Identify and adopt lower risk alternatives for highly consumed products
- Streamline and standardize product inventories between the College and School³
- Track and quantify the impact(s) of the new Purchasing Standard

Expectations Going Forward

- Monetary Savings. Colorado State University, after implementing a green purchasing policy, realized a 23% decrease in cleaning costs – in part because of increasingly competitive “green” products, and in part because such products are often bundled into shared dispensers with multiple use determined by concentration rather than by the purchase of multiple products. The University of Georgia replaced 350 cleaning products with just three products (a disinfectant, an all-purpose cleaner, and a window cleaner), installed dilution control systems, and purchased bulk concentrates instead of ready-to-use products – and cut purchasing cost by 96%.
- Improvements to Worker Safety. Implementation of safer cleaning chemicals has been shown to reduce sick leave and to increase (by 0.5-5.0%) worker productivity.
- Reduced Environmental Threat. Using products with Green Seal or UL certifications helps to reduce chemical threats to our environment.

² Suprox-D carries a “high” priority for transition ranking despite its benign hydrogen peroxide base because the *active* ingredients are highly toxic quaternary ammonium compounds known to be asthmagens and respiratory sensitizers. Household Bleach Disinfectant (5.25%) carries a “low” priority for transition based on HMIS rankings alone (Appendix F) – but disadvantages include relatively long dwell times, corrosive properties, respiratory irritation, toxicity to aquatic ecosystems, and EPA’s highest poison rating (Category I). See also page 19 of this report.

³ No single product is used institution-wide (i.e., all College departments and School Housekeeping). Recognizing the practical constraints in harmonizing the purchasing landscape between the two campuses, it’s worth noting that efforts to standardize the purchasing profile will better reflect The Principia as operating as one institution and will also encourage bulk purchasing, which generally results in more efficient transport of materials (lowering the embodied carbon footprint) and saves money. When the University of Georgia replaced 350 cleaning products with just three (a disinfectant, an all-purpose cleaner, and a window cleaner), purchasing cost declined 96% (\$1,509,281 to \$60,602) in four years.



III. Introduction and Methodology

Introduction

The Principia – comprised of a K-12 School in St. Louis (MO) and a four-year liberal arts College in Elmhurst (IL) – has a long history of incorporating environmentally driven objectives into its institutional practices. The School supports a variety of sustainable initiatives, often student-led, including an expanding recycling program and paper reduction efforts (PrincipiaWire 2014). The College sources 100% renewable energy, sets high standards for native forest and prairie management, prioritizes energy and water efficiency, supports campus-wide recycling, and offers an academic minor in Sustainability. An educational institution's commitment to sustainable practices is a high priority for prospective students (Princeton Review 2013), and Principia's drive for sustainability in all aspects of its performance is reflective of current trends among its peers and in the society at large. Moreover, by operating with the "triple bottom line" (Figure 1) in mind, Principia serves as an agent for change by positively addressing complex sustainability issues and serving as a microcosm for society in the 21st century (Stephens 2008).

Developing a Green Cleaning Purchasing Standard is a practical step in formalizing and making more visible our sustainability practices at an institutional level. Cleaning products are of special importance because they have direct effects on human and environmental health and safety. Concerns related to products range from human health impacts, including respiratory and permanent dermatological injuries, to environmental ramifications such as smog formation, eutrophication, and increased aquatic habitat toxicity (EPA 2010). Principia College spends \$3,000 to \$6,000 monthly on cleaning products, and can use this purchasing power, coupled with that of the School, to support environmentally friendly products and services. As academic and other institutions make this commitment, the market responds by further developing sustainable alternatives to traditional cleaning chemicals, and the competitiveness of these alternatives is promoted (EPA 2010). Thus, the ramifications of Principia's Green Cleaning Purchasing Standard will go beyond the campus to play a role in the larger sustainability movement, provide guidance beyond our current generation of progressive administrators, inspire our students, and help to ensure a safe and healthy working environment for staff and building occupants.

The Green Cleaning Purchasing Standard is intended to reflect the adopted standards of peer institutions. As importantly, it is designed to address the concerns of Principia's staff. Some of these concerns were raised during a planning meeting in the early spring of 2014 involving representatives from Facilities (including Housekeeping), Work Place Safety, Purchasing, and the College's Center for Sustainability. During this meeting, a concern for worker safety and environmental degradation was expressed, as well as a recognition of downstream pollution effects. Also reiterated was the importance of maintaining federal and organizational health standards, including those of the Occupational Safety and Health Administration (OSHA), U.S. Public Health Service (Food Code), and National Collegiate Athletic Association (NCAA). Performance, too, ranked as a high priority.

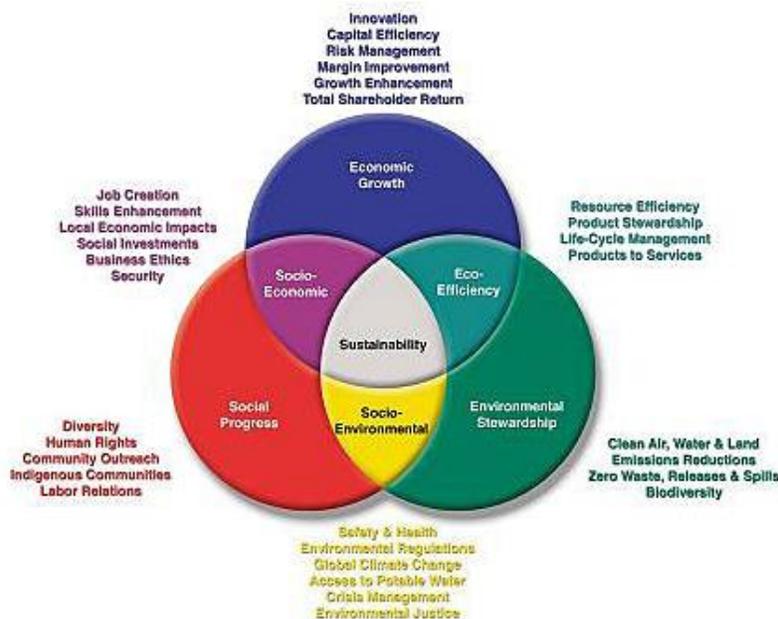


Figure 1: The so-called “triple bottom line” can be represented with intersecting circles, where areas of intersection indicate synergetic opportunities. For example, when power efficiency is improved, profits are improved due to lower power cost, while the environment benefits through reduced carbon dioxide emissions – and in this way we can see that improvements in the planet and people “bottom lines” are not necessarily at the expense of the profit “bottom line”. Adapted from Savitz and Weber (2006).

The concerns voiced in our 2014 planning meeting reflect the most common concerns of businesses and organizations polled by the Responsible Purchasing Network, which were found to be product performance, price, and availability, as well as human health (Responsible Purchasing Network 2010). An additional priority voiced by the Center for Sustainability was that products should not be “green-washed,” meaning that due diligence should be taken to ensure that we do not fall prey to products that are falsely advertised as “green” (Underwriters Laboratory 2010). As will be discussed under *Methodology* on the next page, these concerns were met by developing a Standard (see Section IV) that relates purchasing to widely recognized “green” certification requirements already broadly used within the marketplace and openly evaluated for their effectiveness; specifically, those of Green Seal and Underwriters Laboratories (UL).

Although a Green Cleaning Purchasing Standard had not been specifically articulated in the past, Principia has routinely incorporated “green” criteria into its operational decision-making, including the purchase of renewable energy credits, electric fleet vehicles, motion-detection lighting, and carpet and furnishings that meet high sustainability standards; an emphasis on carpooling; installation of water filling stations (to minimize the purchase of bottled water); and “zero waste” Dining Services at the College (Littell 2014). Tray-less Dining Services, convenient recycling, and an apiary at the School similarly reflect this trend. Principia also sets the bar high in the academic arena. The College offers a popular Sustainability degree program, internationally ranked Solar Car and Mediation Teams, progressive film and speaker series, and a vibrant Sustainability Club that sponsors, *inter alia*, a campus beekeepers association, apple orchard, aquaponics project, community garden, and Earth Day festivities. Similarly, the School has vegetable and herb gardens, as well as a

course in sustainability that encourages students to take a leadership role in sustainability initiatives on the St. Louis K-12 campus (PrincipiaWire 2014).

This report will offer recommendations for continued progress at Principia, an institution that has long been cognizant of the triple bottom line that characterizes sustainable management. Most importantly, this report aims to uphold the foundational writings of Mary Kimball Morgan as outlined in Policy 11 of *Education at the Principia*:

“The Principia shall seek continuously to improve its educational facilities and business practices in order to keep abreast of educational progress and in key with changing world conditions” (Morgan 1965).

Methodology

In early 2104, an interdepartmental planning meeting defined project goals, discussed current product choices, aired concerns about the Standard’s development and application, shared ideas about the structure and criteria for a Green Cleaning Purchasing Standard, and defined next steps.

Taking the results of the planning meeting into account, the Green Cleaning Purchasing Standard (see Section IV) was written to reflect peer institution’s standards, as well as industry best practices. After comparing and contrasting approaches taken by several institutions, the purchasing policies of Colorado State University, Pomona College, and Green Mountain College were studied in detail. The purchasing policy outlined by Green Mountain College was deemed most relevant to the goals and purchasing history of Principia. Green Mountain College’s policy is based on the commitment to specific leading “green” certifications intended to minimize adverse effects to environmental and human safety while maintaining product performance and budget realities, rather than a commitment to a collection of individual environmental goals or specific brands. This approach facilitates the purchasing process by providing clear *guidelines*, rather than limiting the process by maintaining lists of acceptable products.

Our research has also led us to incorporate Green Seal and Underwriters Laboratory (UL) certifications into our purchasing guidelines. This decision is based on the product availability and reputability that these standards offer. Green Seal and UL certifications are the only programs that follow ISO 14024, a best practice policy for eco-labeling established by the International Organization of Standards (UL 2010). Both Green Seal and UL standards rely on life-cycle based analysis of products and they establish criteria for chemical content, packaging methods, and worker training (UL 2010).

Our current purchasing profile is described in Section V, following individual analyses of each product used by the College’s Facilities Department’s Housekeeping and Flex Crews. During this analysis, the Material Safety Data Sheet (MSDS) (or Safety Data Sheet, SDS) for each product was used to summarize the Chemical Composition, Hazardous Materials Identification System (HMIS) rating, and Safety Hazards associated with that product. After doing so, each product was ranked for its Priority for Transition, as indicated in Table 1.

After presenting the purchasing profile and recommendations to the College Facilities Department, Workplace Safety, Contracting/Purchasing, and Center for Sustainability in April 2014, a request was made to expand the analysis to include the College Dining Services, as well as cleaning products in use at the School in an effort to uphold Policy 15 that “The Principia shall always be conducted as one institution” (Morgan 1965). This final analysis thus includes all 136 cleaning products in use on both campuses and our recommendations are holistic, meaning that they apply equally to the College and to the School.

Table 1: Four “Priority for Transition” product rankings (with specifications) designed to help guide purchasing decisions at The Principia.

Priority for Transition Ranking	Specifications
Meets Certification Required	Already meets certification specified in the <u>Green Cleaning Purchasing Standard</u>
Low Priority for Transition	All HMIS ratings must be ‘0’ or ‘1’. All ingredients are specified; however, as the product does not meet certification requirements, details such as aquatic toxicity, packaging standards, and biodegradability may not be specified.
Medium Priority for Transition	At least one of the HMIS ratings is a ‘2’. All ingredients are specified; however, as the product does not meet certification requirements, details such as aquatic toxicity, packaging standards, and biodegradability may not be specified.
High Priority for Transition	At least one of the HMIS ratings is a ‘3’ or ‘4’, or no rating. As it does not meet certification requirements, details such as aquatic toxicity, packaging standards, and biodegradability may not be specified.



IV. Green Cleaning Purchasing Standard

Statement of Intent

The Principia, established on the principle that “education carries with it the obligation to use technical skills and intellectual attainments for the betterment of humanity” (Policy 10), is an institution dedicated to “seek[ing] continuously to improve its educational facilities and business practices in order to keep abreast of educational progress and in key with changing world conditions” (Policy 11) (Morgan 1965). Among the many ways in which Principia demonstrates dedication to its foundational policies is through a growing commitment to sustainable practices.

The commitment to sustainability⁴ by an institution of higher learning – as reflected in its academic offerings, campus infrastructure, activities and career preparation – is important to prospective students. The Princeton Review (2013) found “a sincere and growing interest among students in identifying and applying to colleges where there is a demonstrated commitment to sustainability ... with 68% of [7,000 college applicants] saying they would value having information about a college’s commitment to the environment, reflecting a steady increase since we began asking this question in 2008.” Principia is well suited to this commitment because, at its core, sustainability is about extending the Golden Rule inter-generationally – and being a model for the thought leaders of the 21st century.

As noted earlier, a Green Cleaning Purchasing Standard is a new development for Principia, but the drive for sustainable development has never been absent. The institution’s small size, rather than confounding the drive for environmentally conscious purchasing, has offered opportunities for inter-office collaboration and coordination that has led to a shared desire for more awareness of environmental and human safety considerations and a desire to see these addressed institution-wide. From the inception of a College-wide recycling program a quarter-century ago to more recent decisions to purchase Energy Star rated appliances, electric fleet vehicles, and electric power from renewable sources, it is clear that Principia’s operational departments have long valued the triple bottom line approach to decision-making (see Figure 1). Such an approach recognizes the importance of economic viability (e.g., product price) while placing equal emphasis on ensuring the well-being of its employees and consideration for the ecological systems that surround it.

Articulating a Green Cleaning Purchasing Standard is intended to reflect and encourage existing commitments to sustainability principles, and to provide guidance to purchasing agents seeking to select products based on widely accepted sustainability performance criteria.

⁴ SUSTAINABILITY: “Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations” (EPA, Sustainability <http://www.epa.gov/sustainability/basicinfo.htm>). Sustainability was first articulated by the U.N. World Commission on Environment and Development (1987) as requiring “that we meet the needs of the present without compromising the ability of future generations to meet their own needs.”

Green Cleaning Purchasing Standard

The Principia shall prioritize the purchase of cleaning products that meet industry certifications intended to minimize negative impacts on ecological systems and human health and safety, while at the same time upholding financial and performance criteria.

Scope

Principia's Green Cleaning Purchasing Standard will be applied to all cleaning products purchased by the Facilities Department (including Housekeeping and Flex Crew) on both campuses, as well as Principia College's Dining Services.

Objectives

- The Green Cleaning Purchasing Standard aims to uphold product performance while minimizing environmental and human safety concerns.
- The Green Cleaning Purchasing Standard strives to minimize use of products containing components that fall into the following descriptions, which are based on the U.S. Environmental Protection Agency's (EPA) recommendations outlining Product Content and Use:
 - Corrosive or highly irritating
 - VOCs⁵
 - Non-biodegradable⁶
 - Bio-accumulating⁷
 - Highly flammable
 - Toxic to aquatic species
 - Known carcinogens
 - Plant nutrients
 - Skin Sensitizers
 - Acutely toxic
- The Green Cleaning Purchasing Standard strives to maximize the sustainability of product packaging and minimize carbon emissions by setting standards for:
 - Post-consumer packaging content
 - Recyclability of packaging content
 - Purchasing of concentrated product
 - Streamlining purchasing to reduce transportation requirements (i.e., carbon emissions)

⁵ VOCs: Volatile organic compounds or, "any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions." (EPA, Technology Transfer Network Ozone Depletion http://www.epa.gov/ttn/naaqs/ozone/ozonetech/def_voc.htm)

⁶ BIODEGRADABLE: The "ability to break down, safely and relatively quickly, by biological means, into the raw materials of nature and disappear into the environment." (Greengood, Biodegradable Definition, http://www.greengood.com/terms_to_know/biodegradable_definitions.htm)

⁷ BIOACCUMULATION: "General term describing a process by which chemicals are taken up by an organism either directly from exposure to a contaminated medium or by consumption of food containing the chemical." (EPA, Waste and Cleanup Risk Assessment Glossary)

Best Practices

The following best practices regarding product certification requirements are adapted from Green Mountain College's Green Purchasing Policy led by DTZ Global Corporate Real Estate Services & Facilities Management. As Green Mountain College was one of 22 colleges and universities that qualified for Princeton Review's *Green Honor Role*, and is of comparable size to Principia College, it was chosen as an appropriate institution to use as a model for our Green Cleaning Purchasing Standard.

Choosing specific certification standards and requirements is helpful in streamlining purchasing decisions so that an independent assessment of each individual product will not be necessary in the future. Information concerning many "green" objectives (e.g., packaging considerations, aquatic toxicity) is not easily or publicly available for most products – which once again points to the usefulness of identifying products known to have qualified for widely accepted certifications such as Green Seal or Underwriters Laboratories (UL). In the case of disinfectants, EPA is currently researching potential certification options in the context of their Design for the Environment (DfE) green certification label.

Recommended product certifications are outlined in Table 2, based on product use and classification.

Table 2: Product classification categories and "green" certification requirement recommended for cleaning products used by Principia College and K-12 School.

Product Classification	Suggested Certification
General purpose, bathroom, glass, and carpet and upholstery care	Green Seal GS-37 Green Seal GS-53 UL-2795
Degreasing agents	Green Seal GS-34 UL-2792
Hard surface cleaners and industrial and institutional floor care	Green Seal GS-40 UL-2759 UL-2777
Institutional and industrial hand cleaners	Green Seal GS-41 UL-2784
Odor control additives and digestive additives	UL-2796 UL-2798
Drain or grease traps additives ⁸	UL-2791
Disinfectants	DfE ⁹

⁸ Not currently in use by Principia College or present in product inventory, but included for future reference.

⁹ Or, alternatively, adherence to recommendations provided for active ingredients – see *The Special Case of Disinfectants* and Appendix M.

The Special Case of Disinfectants

Sanitizers are considered by the EPA as pesticides that must eliminate 99.9% of bacteria within five minutes – and disinfectants go even further in that they are “typically effective against a wider range of bacteria (including, in some cases, antibiotic-resistant strains such as MRSA), viruses (such as flu virus and HIV), and/or fungi (such as Athletes Foot fungus or mildew)” (Green Schools Initiative 2014). Disinfectants and sanitizers made in the U.S. must be registered by the EPA to ensure their ability to kill specified germs in the claimed dwell times (amount of time they must be in contact with the surface to kill the microbes).

Due to EPA regulations on antimicrobials registered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), disinfectants are not, at the present time, included in Green Seal certifications. Underwriters Laboratories (UL) ECOLOGO does provide a certification for disinfectants, but the certification is based in Canada and these products are not required to be registered as disinfectants with the EPA, so this standard will not be utilized for our purposes.

The EPA recognizes the need for a user-friendly standard that can identify safer disinfectants that are still effective against bacteria, viruses, and fungi. To this end, the EPA is currently piloting a pesticide certification program as part of their Design for the Environment (DfE) initiative, which will allow consumers to “easily identify greener pesticides at the point of purchase” (EPA 2015). This program is still in a pilot stage and few products have been certified; therefore, a DfE certification is not required as part of our Green Cleaning Purchasing Standard at this time.

In the absence of Green Seal or UL certified alternatives that are EPA registered, and due to the small number of disinfectants currently certified under the DfE, we find Culver et al. (2014) and the Green Schools Initiative’s (2014) “Best Practices for Disinfection” to be very helpful. These “best practices” list the following recommendations, with additional detail in each case provided on their website:

- Always pre-clean prior to the application of a disinfectant
- Determine where and when disinfectants are needed
- Follow manufacturers’ instructions regarding proper dilution, application and rinsing procedures, and dwell time(s)
- Carefully select antimicrobial products
- Avoid disinfectants containing ortho-phenylphenol
- Minimize use of chlorine bleach (sodium hypochlorite)
- Minimize use of quaternary ammonium compounds (“quats”)
- Minimize use of pine oil
- Consider switching to asthma-safe disinfectants and sanitizers
- Consider cleaning devices with sanitizing and disinfecting claims
 - Electrolyzed Water
 - Steam Cleaning

Taking all of our research into account, five general recommendations emerge to guide Principia purchasing agents in selecting disinfectants:

Recommendation #1: Be aware of active ingredients

Disinfectants with hydrogen peroxide as the *active ingredient* are safer alternatives to disinfectants containing chlorine bleach, quarternary ammonium compounds, pine oil, and/or ortho-phenylphenol. The latter are associated with asthmagens, corrosive properties, cancer, skin sensitization, and/or high aquatic toxicity and should be avoided (Green Purchasing Institute 2010, Culver et al. 2014, Green Schools Initiative 2014). Active ingredient properties, including toxicology and effectiveness, are summarized by the EPA (see Appendix M; and see page 19 for product recommendations).

Recommendation #2: Discontinue the use of antibacterial hand/dish soaps

Over-the-counter antibacterial hand and dish soaps *cannot protect against viruses, and there is no evidence that these products are more effective at preventing bacterial infection than plain soap and water.* They contribute to antimicrobial resistance and may pose serious health concerns, especially in children (FDA 2013, Stromberg 2014, World Health Organization 2015).

Recommendation #3: Implement closed-loop systems

Disinfectants should be distributed in closed-loop systems to minimize spillage of concentrated product.

Recommendation #4: Use EPA ratings as a guide

Products registered with the EPA as antimicrobials are required to rate their product as DANGER, WARNING, or CAUTION. This qualitative indication of associated hazard can serve as guide to selecting a less hazardous disinfectant (Green Schools Initiative 2014).

Recommendation #5: Investigate electrolyzed water systems

“A number of electrolyzed water technologies have recently been developed that make a range of claims, including giving users the ability to clean, sanitize and/or disinfect surfaces without the use of chemicals other than water. One model, ActiveIon, claims to be an effective sanitizer that can kill 99.9% of bacteria by applying a slight electrical charge to tap water, which creates ‘an oxygen rich mixture of positive and negative nano-bubbles.’ Other more powerful models, which add salt or other chemicals to the mix, create hypochlorous acid (a dilute bleach-like solution) that can disinfect against a broader range of bacteria, viruses and other pathogens. School districts interested in these technologies should ask manufacturers to show them their EPA and CA ‘pesticide device registrations,’ approved labels and efficacy data against specific pathogens.” (Green Schools Initiative 2014).

As industry and EPA regulations on registered disinfectants continue to evolve, Principia’s “best practices” for the purchase and use of disinfectants should be updated and revised.

Ongoing Revision of the Purchasing Standard

The ever-evolving nature of the cleaning product industry and environmental certifications is recognized within the scope of this Standard. We recommend that certification targets be subject to periodic internal and peer-review, but that any revision not compromise the stated Standard objectives outlined in Section IV: *Green Cleaning Purchasing Standard*.



V. Purchasing Profile and Recommendations

Principia's Current Purchasing Profile

Principia purchases products from a wide variety of manufacturers; e.g., 15 of 74 products currently in use by the College are unique in their manufacturer (Figure 2) and a similar trend is observed at the School. The Green Cleaning Purchasing Standard is compatible with this trend of using products from a wide range of manufacturers. Green Seal alone embraces over 50 different manufactures within its Industrial and Institutional Standards (Green Seal 2014). Notwithstanding, it is clear from case studies at other institutions that Principia could significantly reduce product diversity without compromising performance and most likely realize substantial monetary savings as a result (see *Concluding Remarks*).

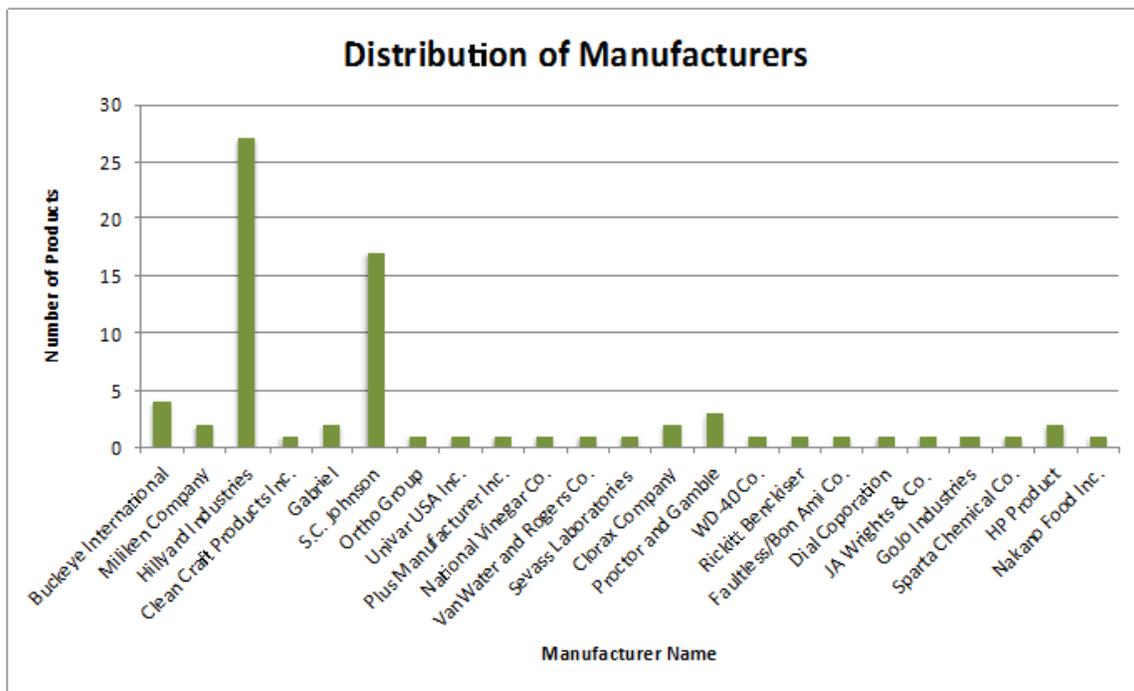


Figure 2: Distribution of manufacturers of cleaning products currently in use by Principia College. The majority of projects are sourced from Hillyard Industries or S.C. Johnson, but more than a dozen vendors supply single products for use at the College. A similar trend is observed at the School.

After performing an analysis of each product currently in use by Principia, each product was ranked into one of the following categories:

- Currently Meets Green Seal and/or UL Certification(s)
- Low Priority for Transition to Green Seal and/or UL Certification
- Medium Priority for Transition to Green Seal and/or UL Certification
- High Priority for Transition to Green Seal and/or UL Certification

Table 1 (*Introduction and Methodology* section) defines the Priority for Transition Ranking Specifications. Figure 3 illustrates the distribution of Low, Medium and High Priority for Transition rankings based on products currently in use.

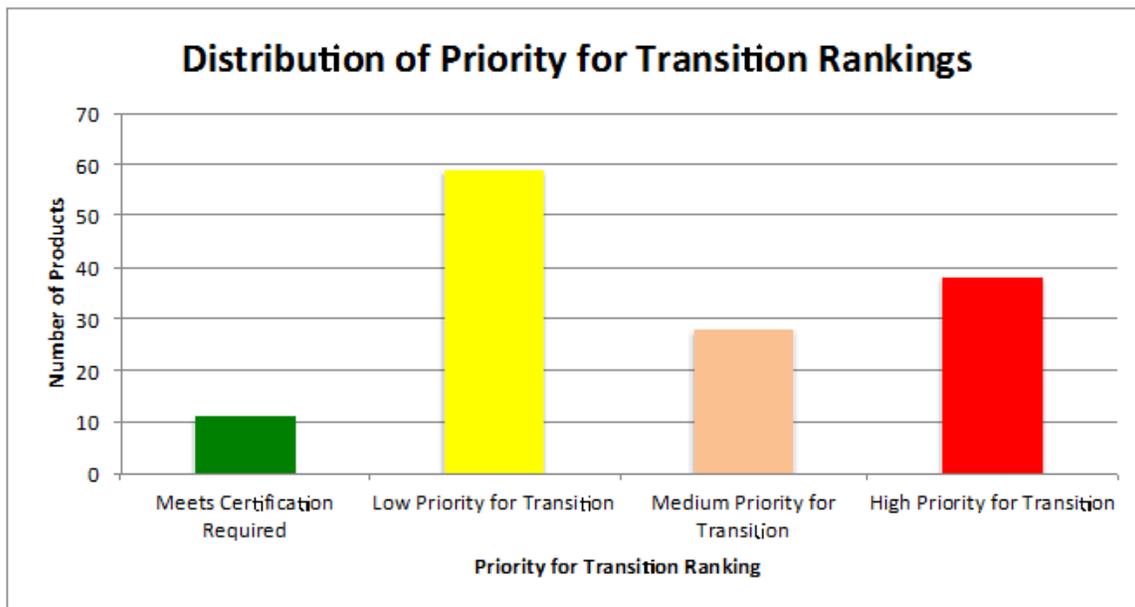


Figure 3: Distribution of Priority for Transition Rankings for Principia Cleaning Products, including products in use by the College’s Facilities Department (e.g., Housekeeping, Flex Crew) and Dining Services, and the School’s Housekeeping Department.

Distribution of “Priority for Transition” Product Rank

Currently, 11 (8.1%) out of a total of 136 cleaning products in use by Principia meet Green Seal and/or UL Certification requirements (Table 3). This is good news!

While 59 (43.4%) products currently in use are classified as Low Priority for Transition because they are not expected to pose high levels of risk (under normal use regimes) to human or environmental health, it is a recommendation of this study that transition to products with Green Seal or UL certifications occur as soon as possible and across all categories because, “regardless of the expected risk levels ... reducing the intrinsic hazard of a product is a desirable pollution prevention objective” (EPA 2010). Many environmental implications such as aquatic toxicity and biodegradability, as well as packaging methods, cannot be assured if appropriate certifications are not present.

Twenty-eight (20.6%) products are classified as Medium Priority for Transition, meaning that at least one of the HMIS ratings (see Appendix G) is a “2” and all ingredients are specified; however, details such as aquatic toxicity, packaging standards, and biodegradability may not be specified. These products have many Green Seal or UL certified alternatives and are recommended for transition as a matter of priority.

Table 3. Eleven products in three product classification categories (see Table 2) are already Green Seal or UL certified. Consideration should be given as to whether these products can replace more hazardous products currently in use for similar purposes.

Product Classification Category	Green Seal or UL Certified Product Currently in Use	Department
General purpose, bathroom, glass, and carpet and upholstery care	Sodium Salt- Phosphoric Acid	School Housekeeping
	Tenacity-Buckeye	School Housekeeping
	Buckeye Eco Glass Cleaner HD	School Housekeeping
	Buckeye Eco Hydrogen Peroxide Cleaner	School Housekeeping
	Suprox (Hillyard Industries)	College Housekeeping
	Digiclean E Foam Hand Soap (Ecolab)	College Dining Services
Hard surface cleaners and industrial and institutional floor care	Buckeye Eco Floor Cleaner	School Housekeeping
	Top Clean (Hillyard Industries)	College Housekeeping College Flex
	Stride Citrus Neutral Cleaner Concentrate (S.C. Johnson)	College Housekeeping
Institutional and industrial hand cleaners	Symmetry Green Certified Foaming Handwash	School Housekeeping
	Green Select Foaming Hand Wash (Hillyard Industries)	College Housekeeping

Finally, 38 (27.9%) products are classified as High Priority for Transition (Figure 3). The majority of these carry an HMIS health rating of 3, which indicates that “Major injury [is] likely unless prompt action is taken and medical treatment” (HMIS Ratings 2013). Eleven of these High Priority for Transition products are disinfectants (a total of 15 disinfectants are currently in use) and six additional products were so classified because they lack an HMIS rating, making it difficult to assess the product’s potential impact on environment and human health (Figure 4).

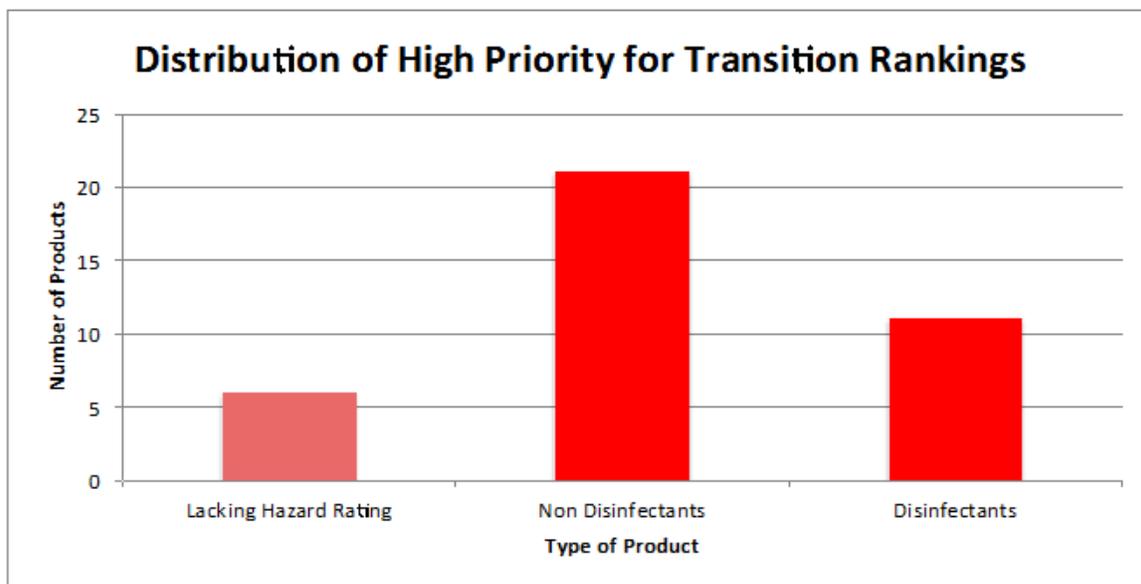


Figure 4: Distribution of High Priority for Transition Products based on HMIS ratings alone.

In summary, among the High Priority for Transition products are 27 (19.8%) *non*-disinfectant products (Table 4). These are high hazard materials that have Green Seal and/or UL alternatives and should be replaced as a matter of priority. We note that Principia uses multiple oven cleaners, stain removers and gum removers. Eliminating redundancy will reduce the number of high hazard chemicals in use and likely result in significant cost saving.

Table 4. Non-disinfectant, high hazard “High Priority for Transition” products (n=27) currently in use for which Green Seal and/or UL certified alternatives are available. (*) indicates a product with no HMIS Rating, making it difficult to assess the product’s potential impact on environment and human health.

Product Classification Category	Product Name	Department
General purpose, bathroom, glass, and carpet and upholstery care	Easy-Off Oven Cleaner	College Housekeeping
	Pledge Furniture Polish (*)	College Housekeeping
	Stainless Steel Cleaner (HP Products)	College Housekeeping
	Dry Max (Clean Craft)	College Flex
	Oxalic Acid (Univar USA)	College Flex
	Procyon Spot & Stain Remover (*)	College Flex
	Delime (PureForce)	College Dining Services
	Carpet Spotting Kit Brown-Ex Tannin	School Housekeeping
	Champion Chewing Gum/Wax Remover	School Housekeeping
	Chewing Gum Remover (Claire)	School Housekeeping
	Delible Ink Stain Remover	School Housekeeping
	Goof-Off Cleaner	School Housekeeping
	Goof-Off Heavy Duty	School Housekeeping
	Heavy Duty Foaming Oven Cleaner	School Housekeeping
	P-O-W Plus Aerosol	School Housekeeping
	P&G Pro Line Chewing Gum Remover	School Housekeeping
	Porter’s Friend Metal Polishing Cream (*)	School Housekeeping
	Proforce Oven Grill & Fryer Cleaner	School Housekeeping
	Shout Advanced Laundry Stain Remover	School Housekeeping
	Soakit (*)	School Housekeeping
Degreasing agents	Taski Profi (Johnson Diversay Inc.) (*)	College Flex
	Greasestrip Plus (EcoLab)	College Dining Services
Hard surface cleaners and industrial and institutional floor care	Tile and Grout Seal (Hillyard)	College Flex
	Buckeye Juggernaut	School Housekeeping
Odor control additives and digestive additives	Aerosol Air Refresher (*)	School Housekeeping
	Airwick Freshmatic Ultra	School Housekeeping
	Fresh Linen Air Freshener & Deodorizer	School Housekeeping

Regarding disinfectants, the EPA prohibits products registered as antimicrobials to be certified or marked as sustainable or environmentally preferable (Quinn et al. 2015). The EPA is currently sponsoring a pilot program in an attempt to develop an appropriate green standard for this category of cleaning products, but it has not yet led to widely available certified products (EPA 2015). As a result, Principia will be unable to replace these products with Green Seal or UL ECOLOGO certified alternatives at the present time. **However**, the recommendation is that disinfectants currently in use be replaced with less hazardous

disinfectants (i.e., prioritizing disinfectants with hydrogen peroxide or thymol as the active ingredient) and that the institution monitor EPA’s Design for the Environment (DfE) Anti-microbial Pesticide Pilot Project for registered disinfectants as time goes on. See Section IV: *The Special Case of Disinfectants* and Appendix M for additional detail.

Analysis of Use Volume

In the previous section, based on researched “Priority for Transition” rank, the recommendation was made that Medium Priority for Transition products and non-disinfectant High Priority for Transition products be prioritized for transition to Green Seal or UL certified alternatives “as a matter of priority” (see Table 4). Moreover, it was noted that Green Seal and/or UL alternatives to Low Priority for Transition products should also be considered since, regardless of the expected risk levels, “reducing the intrinsic hazard of a product is a desirable pollution prevention objective” (EPA 2010).

Those recommendations still stand, but we also recognize that in order to make the most significant contribution to our green cleaning purchasing landscape, Priority for Transition Ranking should not be the only criterion – a product’s rank should be cross-referenced with its use volume. To this end, 24 products were analyzed with respect to purchase volume and corresponding spending.¹⁰ Of these, Household Bleach Disinfectant (5.25%) was purchased in greatest volume over the past six months (July 2014 to April 2015). In total, 240 gallons¹¹ were purchased, nearly three times more (measured in gallons) than the next highest volume purchase (Suprox-D). Other high volume purchases are found in Table 5.

Table 5. A sample (n=24, 18% of the product landscape) of Principia’s highest volume cleaning product purchases (July 2014 to April 2015), along with each product’s Priority for Transition Ranking.

Product Name	Total Volume (gallons)	Total Cost (\$)	Priority for Transition Ranking
Household Bleach Disinfectant (5.25%)	240.0	534.80	Low Priority for Transition
Suprox-D	90.0	2,531.39	High Priority for Transition
HP Lime Off Cleaner	66.0	1,561.12	Medium Priority for Transition
Navigator	60.0	1,620.91	Low Priority for Transition
Citrus-Scrub	55.5	2,014.12	Medium Priority for Transition
Windo-Clean	52.0	1,187.28	Low Priority for Transition

¹⁰ Data provided by Bruce Alioto (Contracts Officer) and Lori Young (Facilities Department).

¹¹ Apparently this is a remarkably high number for an institution of our size and for a product designed to be used on ‘touch points’ and not as a general cleaner. Dr. Alicia Culver (Responsible Purchasing Network) suggests that we carefully examine our housekeeping protocols to ensure that disinfectants are not being used on floors or as general use surface cleaners.

Recommendations Based on “Priority for Transition” Rank and Use Volume

Prioritizing products to be transitioned based not only on hazard ranking but also on purchase volume – and then making an effort to consolidate/streamline inventory – will have the greatest effect on the institution’s budget, and therefore its commitment to sustainability as an earth- and people-friendly business model. It’s noteworthy that peer institutions have documented significant savings when products were first evaluated for redundancy, and then fewer products were purchased in bulk concentrates (e.g., Heninger 2011).

A more complete purchasing history should be reviewed to further evaluate high volume purchases; however, based on the sample product history provided, our first recommendation is that Principia transition from high volume, “High” and “Medium” hazard products (Suprox-D, HP Lime Off Cleaner, Citrus-Scrub) to alternatives that are safer for humans and the environment. Household Bleach Disinfectant, used in the highest volume of any purchased product, should also be replaced with a safer alternative.

Our highest volume purchases (Household Bleach Disinfectant, Suprox-D) are both non-food surface disinfectants. Suprox-D, in particular, is highly toxic to humans and to the environment, has a long (10 min) dwell time, is expensive (nearly \$30/gal), and does not kill all blood-borne pathogens (e.g., it kills HIV but not Hepatitis).

Conversations with the Responsible Purchasing Network (Alicia Culver, Executive Director, [in litt.](#) 9 October 2015) have recommended that we try Clorox Hydrogen Peroxide Disinfectant¹², which differs from Suprox-D (a concentrate) in that it’s pre-diluted in a spray bottle for use on touch points such as sinks, sink faucets, flush handles and door knobs only. (Restroom floors should be cleaned with a non-disinfecting bathroom cleaner.) For a concentrated disinfectant that uses hydrogen peroxide as an active ingredient, Oxivir Five 16 dilutes 1:16 for disinfecting touch points and 1:64 for disinfecting larger surfaces, has a 5 minute dwell time, and contains no quats [quarternary ammonium compounds].¹³

HP Lime Off Cleaner (General Purpose, Bathroom, Glass, Carpet and Upholstery Care) and Citrus-Scrub (Degreaser) are non-disinfectants for which Green Seal and/or UL certified products are already available.¹⁴

Next Steps

For help in reducing product redundancy and brand diversity, streamlining purchasing, and harmonizing (to the extent practicable) the product inventory on the two campus, a number of industry leaders (e.g., Staples, EcoLab) provide free audit and consulting services to colleges and universities. These services can help Principia stay abreast of the best available science in cleaning chemistry, and also help the institution realize significant budget savings.

¹² http://www3.epa.gov/pesticides/chem_search/ppls/067619-00024-20130826.pdf

¹³ Oxivir Five 16 EPA Registration label: http://www3.epa.gov/pesticides/chem_search/ppls/070627-00058-20101119.pdf and product sheet: <http://www.sealedair.com/diverse-care/diverse-care-products/oxivir-five-16-concentrate>

¹⁴ To identify Green Seal alternatives to Citrus-Scrub, for example, visit <http://www.greenseal.org/FindGreenSealProductsAndServices.aspx> and where it says “filter by Standard”, select GS-34 *Cleaning and Degreasing Agents* – the search will list all certified product options



VI. Concluding Remarks and Next Steps

Concluding Remarks

Adopting a standard that articulates purchasing goals allows these goals (e.g., monetary savings, budget allocations to “green” products, worker and environmental safety) to be monitored and recognized. At the College, these can be captured by intra- and inter-institutional performance tracking programs such as the Association for the Advancement of Sustainability in Higher Education’s (AASHE) Sustainability Tracking, Assessment & Rating System (STARS™), and also recognize Principia as a leader within the National Association of Educational Procurement (NAEP).

A 2010 Green Procurement Survey sponsored by SciQuest for the NAEP found that the number of institutions with “formal green procurement policies” was up 153% from the year before, with 24% confirming the existence of such a policy and a further 48% aspiring to launch a policy within six months. Similarly, 53% confirmed that “green procurement [is] an official, recognized component” of the institution’s sustainability initiatives, with a further 37% considering it (Yeoman and Zoetmulder 2010).

Adopting a Green Cleaning Purchasing Standard opens the door to future Purchasing Standards written with the triple bottom line (Figure 1) in mind (e.g., Purchasing Standards for Plastic and Paper Products, Electronics and Appliances, and so on), and it also provides an opportunity for Principia to reach beyond the institutional setting and use its purchasing power to progress a national and global industry in safer, more sustainable products – and a safer, more sustainable future for everyone. This commitment reflects our promise to “willingly depart from common practice whenever the fact becomes clear that there is a better way of doing things” (Policy 8: Morgan 1965) and to bless all mankind.

Expectations Going Forward

The implementation of the Green Cleaning Purchasing Standard will allow Principia to more fully embody the principles upon which the institution was founded. It is also an important step in introducing explicit sustainability objectives and targets into our purchasing standards. Through the implementation of the Green Cleaning Purchasing Standard, the following are expected to be observed:

- **Monetary Savings**

Similar policies have resulted in monetary savings at peer institutions. For example, Colorado State University, after implementing a green purchasing policy, realized a 23% decrease in cleaning costs (Staples Advantage 2012). In part this result is achieved because of increasingly competitive “green” products, and in part because such products are often bundled into shared dispensers with multiple use determined by concentration, rather than by the purchase of multiple products. Yeoman and Zoetmulder (2010) found that 80% of procurement professionals cited “do the right thing” and 66%

cited “reduced costs [as the] main drivers [for] sustainability initiatives” at educational institutions. This point is equally valid outside of educational institutions, such as the New Jersey Department of Environmental Protection’s conclusion that “environmentally preferable purchasing (EPP) not only helps improve environmental conditions, but also results in significant (but not always immediate) savings in local budget expenditures.” (Reyes et al. 2006). See also *Streamline and Standardize Purchasing*, below.

- **Improvements to Worker Safety**

Implementation of safer cleaning chemicals has been shown to reduce sick leave and to increase (by 0.5-5.0%) worker productivity (Responsible Purchasing Network 2010).

- **Reduced Environmental Threat**

Using products with Green Seal and/or UL certifications will, by definition, ensure that dangerous chemical use is regulated and will also reduce chemical threats posed to proximal ecosystems.

Next Steps

- **Inform Gateway Suppliers of the Purchasing Standard**

“Purchasing not only has a principal role to play but a duty to lead in the green revolution” (Menard 2012). In playing this principal role, Principia’s purchasing agents should communicate the Green Cleaning Purchasing Standard to gateway vendors used to purchase cleaning chemicals. There may be a need to assess the ability of these vendors to source and supply appropriate Green Seal and/or UL certified products – and to identify new partners if current vendors are unable to meet our sustainability targets.

- **Identify & Adopt Alternatives for Highly Consumed Products**

Products should be targeted for priority transition based on cross-referencing their risk factor (Priority for Transition Ranking) with their frequency or volume of use.

- Identify and pilot alternatives to products that are both high volume and carry “High Priority” (Suprox-D) or “Medium Priority” (HP Lime Off Cleaner, Citrus-Scrub) transition rankings.
- Identify and pilot alternatives to high volume, lower risk products, such as Household Bleach Disinfectant (5.25%), for which safer products are known to be available (see *The Special Case of Disinfectants*).
- Clorox Hydrogen Peroxide Disinfectant and Oxivir Five 16 are recommended by the Responsible Purchasing Network as alternatives to Suprox-D and bleach.

- **Identify & Adopt Alternatives for non-Disinfectant “High Priority” Products**

Non-disinfectant, low volume products that carry a “High Priority for Transition” ranking (see Table 4) should be evaluated to see *whether they are needed at all* and, if so, Green Seal or UL alternatives should be tested in-house and adopted based on superior performance and budgetary considerations. Hillyard and Buckeye, both trusted Principia vendors, have dozens of Green Seal certified products¹⁵ that can be sourced through existing purchasing partners and evaluated for performance.

¹⁵ Visit <http://www.green seal.org/FindGreenSealProductsAndServices.aspx> and search by manufacturer.

One example of a high hazard, “High Priority for Transition” product is oven cleaner. Principia uses three different brands of oven cleaner – one at the College and two at the School. 3M 701 Scotch-Brite 1 Qt. Liquid Griddle Quick Clean (a Green Seal certified product) might be tested with an eye to replace all three.

- **Discontinue Use of Antibacterial Soaps**

Antibacterial hand soap and antibacterial dishwashing soap, both classified as “High Priority for Transition”, are good examples of products that can be eliminated entirely without sacrificing health or safety.

According to the U.S. Food and Drug Administration (FDA 2013) and the U.S. Centers for Disease Control, there is *no evidence* that over-the-counter antibacterial soap products are any more effective at preventing illness than washing with plain soap and water. Moreover, they contribute to antimicrobial resistance, a significant threat to global health security (World Health Organization 2015). Some companies (e.g., Johnson & Johnson, Kaiser Permanente) have stopped making antibacterial soap (Stromberg 2014). When a simple sanitizer is needed, the preferred alternative is a non-antibiotic product like Purell®, which kills bacteria and viruses with alcohol (while Purell® is listed as a “High Priority for Transition” product because it lacks an HMIS ranking, it would be preferred over an antibacterial product).

- **Streamline and Standardize Purchasing for the College and School**

Currently there is no single product in use institution-wide (i.e., all College departments and School Housekeeping). Efforts to standardize the purchasing profile will not only better reflect Principia as operating as one institution, but such efforts will also encourage bulk purchasing. Bulk purchasing generally results in more efficient transport of materials, which lowers the embodied carbon footprint and saves money. When the University of Georgia (with nearly 35,000 students and 9,000 faculty/staff) replaced 350 cleaning products with just three products (a disinfectant, an all-purpose cleaner, and a window cleaner), installed dilution control systems, and purchased bulk concentrates instead of ready-to-use products, annual purchasing cost declined 96% from \$1,509,281 to \$60,602 (Heninger 2011).

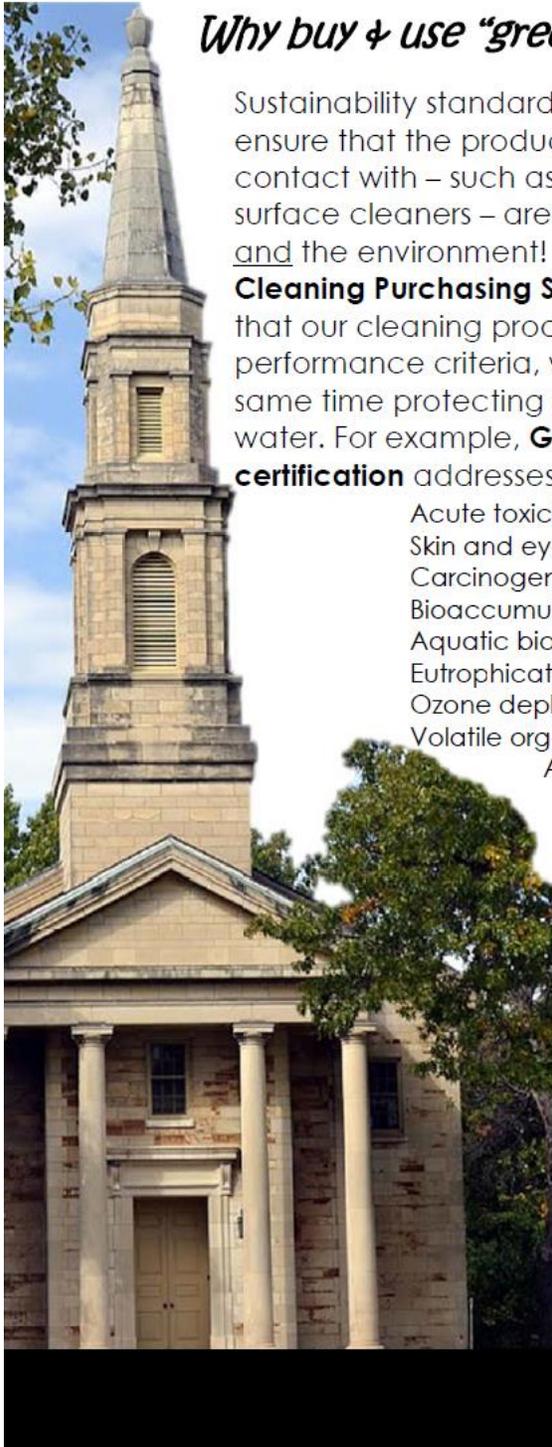
- **Track and Quantify the Impact of the Purchasing Standard**

Monetary spending and volume of green certified products versus traditionally used products should be monitored to quantify the success of the Green Cleaning Purchasing Standard (Shriberg 2002). Monitoring and assessing the purchasing landscape over time will be also instrumental in gaining recognition for Principia’s Green Cleaning Purchasing Standard by AASHE STARS™, as recognition is bestowed based on percent spent on “green” alternatives out of total budget.

- **Increase Awareness of the Purchasing Standard**

Develop and post flyers that increase awareness among students and staff regarding the importance of “green” purchasing criteria (Figure 5).

Principia shows its colors: **Gold** + **Blue** = **Green!**



Why buy & use "green" cleaning products?

Sustainability standards & certifications ensure that the products you come in contact with – such as hand soaps & surface cleaners – are safe for humans and the environment! Principia's **Green Cleaning Purchasing Standard** ensures that our cleaning products meet strong performance criteria, while at the same time protecting us, our air & our water. For example, **Green Seal certification** addresses:

- Acute toxicity
- Skin and eye irritation
- Carcinogen and mutagen components
- Bioaccumulating compounds
- Aquatic biodegradability
- Eutrophication effects
- Ozone depletion capability
- Volatile organic compound content
- Animal testing, and
- Packaging criteria



It is easy to be **Green!**

Look for products with certification marks that guarantee efficient packaging, regulated toxicity limits, and the avoidance of environmentally harmful chemicals.



Figure 5. An educational poster for use at The Principia.



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VIII. Acknowledgements

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APPENDIX A: General Purpose, Bathroom, Glass and Carpet and Upholstery Care

General:

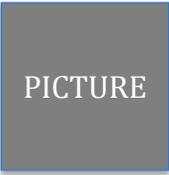
In Appendix A, general purpose, bathroom, and glass cleaners, as well as products designed for carpet and upholstery care will be addressed. The product information summarized in the following pages includes supplier details as well as chemical profile, HMIS rating, and hazards summarized from the product’s respective MSDS.

In this section:

- College Housekeeping General Purpose, Bathroom, Glass and Carpet and Upholstery Care
- College Flex Crew General Purpose, Bathroom, Glass and Carpet and Upholstery Care
- College Dining Services General Purpose, Bathroom, Glass and Carpet and Upholstery Care
- School Housekeeping General Purpose, Bathroom, Glass and Carpet and Upholstery Care

See Appendix H for Green Seal and UL Standards for Cleaning Products for Industrial and Institutional Use

Table Key:

Section Title		Certification requirements				
Product		Chemical Profile (MSDS)		HMIS Rating		Hazards
Product Name 	Manufacturer Size QTY/pkg. Supplier	Chemical name	% comp.	Health	--	Outline hazards for product as a whole.
				Fire	--	
				Reactivity	--	
				Carcinogenic	*	
				Green Seal or UL Certified!		
Low Priority for Transition						
Medium Priority for Transition						
High Priority for Transition						

Note: In order to avoid duplication in tallying the total number of products currently in use, the following symbols were used:

- Products in use at the College by both Housekeeping and Flex Crew (not the School)
- Products in use by both the College and School Housekeeping departments

College Housekeeping

General Purpose, Bathroom, Glass, Carpet and Upholstery Care		GS-37 Cleaning Products for Industrial and Institutional Use GS-53 Specialty Cleaning Products for Industrial and Institutional Use UL-2795 Standard for Sustainability for Carpet and Upholstery Care Products			
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
<p>Baking Soda</p>  <p>VanWaters & Rogers Co. 8 oz. box each Wal-Mart</p>	<p>Sodium Bicarbonate 100%</p>	<p>Health Fire Reactivity</p>	<p>0 0 0</p>	<p>No known hazards upon eye or skin contact, ingestion or inhalation.</p>	
Low Priority for Transition					
<p>Bar Keepers Friend Cleanser & Polish</p>  <p>Sevass Laboratories 21 oz. can 12 per case Hutchinson</p>	<p>Oxalic Acid 5-10%</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Causes eye and skin irritation. Harmful if swallowed. pH= 0.85-0.95</p>	
Medium Priority for Transition					
<p>Cooktop cleaner</p>  <p>J.A. Wrights & Co. 10 oz. can 12 per case</p>	<p>Silicon Dioxide 20%</p>	<p>Health Fire Reactivity</p>	<p>0 0 0</p>	<p>Respirable free silica dust is a health hazard, however free silica dust is not generated with use of this product. Product may be a mild skin irritant for skin sensitive people, and eye irritant.</p>	
Low Priority for Transition					
<p>Crew tub and tile cleaner</p>  <p>Johnson Wax 1 gallon 4 per case HP Products</p>	<p>Phosphoric Acid 1-5% Water 60-99%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>May be mildly irritating to eyes and skin. pH= 1-2</p>	
Low Priority for Transition					

<p>Easy off oven cleaner</p>  <p>Reckitt Benckiser 16 oz. can each Wal-Mart</p>	<p>Ethanol, 2-(2-butoxyethoxy)- Petroleum gases, liquefied, sweetened Sodium hydroxide Ethanol, 2-amino-</p>	<p>Health Fire Reactivity</p>	<p>3 1 0</p>	<p>Causes burns to eyes and skin. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Harmful if swallowed. pH=13.3 Corrosive Ethanol, 2-amino is OSHA regulated (3 ppm) Sodium hydroxide is OSHA regulated (2 mg/m3)</p> <p>High Priority for Transition</p>
<p>Expo dry erase board cleaner</p>  <p>Newell-Rubbermaid 8 oz. bottle each Jeanie</p>	<p>2-butoxy ethanol/acetate ---- Isopropyl alcohol ----</p>	<p>Health Fire Reactivity</p>	<p>2 2 0</p>	<p>May be harmful by ingestion or by skin contact. May be harmful if swallowed. Eye irritant. Flammable.</p> <p>Medium Priority for Transition</p>
<p>General Purpose Spotter •</p>  <p>S.C. Johnson qt. box 6 per case HP Products</p>	<p>Alcohol ethoxylates 0.1-1.5% Hydrogen peroxide 1-5%</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Moderately irritating to the eyes. May be mildly irritating to skin. May cause irritation to mouth, throat and stomach.</p> <p>Medium Priority for Transition</p>
<p>GP Forward General Purpose Cleaner</p>  <p>Johnson Wax qt. box 6 each</p>	<p>Alcohol ethoxylates 1-5% Dye <0.1%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Moderately irritating to eyes and skin. May cause irritation to mouth, throat and stomach. VOC: 0.15% pH (Concentrate)= 12.9 pH (Dilution)= 10.5</p> <p>Low Priority for Transition</p>
<p>Goo gone</p>  <p>Homax Group Inc. 12 oz. bottle each HP Products</p>	<p>Proprietary Mixture (Citrus & Petroleum Solvent-Based Stain Remover) 100%</p>	<p>Health Fire Reactivity</p>	<p>0 2 0</p>	<p>Flash point of 56 °C. VOC Content= 99.9%</p> <p>Medium Priority for Transition</p>

<p>Gum remover •</p>  <p>S.C. Johnson 6.5 oz. can 6 per case HP Products</p>	<p>1,1,1,2-tetrafluoroethane 90-99% Pentane 10-20%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Mildly irritating to eyes and skin. VOC content: 10%</p> <p>Low Priority for Transition</p>
<p>Lime Off/Descaler</p>  <p>HP Product qt. bottle 12 per case HP Products</p>	<p>Phosphoric Acid 15% Nonoxynol <2%</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Toxicity: Acute irritation of skin, eyes, and respiratory tract. Chronic toxicity unknown. Listed as Carcinogen or Potential Carcinogen</p> <p>Medium Priority for Transition</p>
<p>Magic sizing</p>  <p>Faultless Starch/Bon Ami Co. 19 oz. can each Wal-Mart</p>	<p>Butane ---- Propane ---- Isobutane ----</p>	<p>NFPA Health Fire Reactivity</p>	<p>1 0 1</p>	<p>pH= 9.8</p> <p>Low Priority for Transition</p>
<p>Pledge Furniture Polish</p>  <p>S.C. Johnson 12 oz. can 12 per case Komro</p>	<p>Butane 5-6% Propane <5%</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>Direct contact can damage the eye and skin by freezing. May produce general narcotic effects such as central nervous system depression, drowsiness, dizziness, disorientation, behavioral changes and hypotension if inhaled or ingested. Flammable aerosol product.</p> <p>High Priority for Transition</p>
<p>P.O.G. Spotter Gel •</p>  <p>S.C. Johnson qt. bottle 6 per case HP Products</p>	<p>Amorphous silica 1-5% Diethylene glycol butyl ether 20-30%</p>	<p>Health Fire Reactivity</p>	<p>1 2 0</p>	<p>Mildly irritating to eyes and skin. Combustible liquid and vapor. Oral LD50 estimated to be greater than 5000 mg/kg and dermal LD50 estimated to be > 2000 mg/kg. Toxicity is outlined of each component.</p> <p>Medium Priority for Transition</p>

 <p>Red Juice Stain Remover • S.C. Johnson 12 oz. can 6 per case HP Products</p>	<p>Sodium Lauryl Ether Sulfate 1-3% 1-Butoxypropanol 1-3% Water 3-7%</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Will cause severe eye irritation, moderate skin irritation, may cause irritation to nose, throat, respiratory tract, and stomach upon inhalation or ingestion. Percent Volatile by Volume: >97.0%</p>
Medium Priority for Transition				
 <p>Spitfire SC Power Cleaner S.C. Johnson qt. bottle 12 per case</p>	<p>Monoethanolamine 5-10% Propylene glycol 20-30% Potassium hydroxide 1-5% 2-butoxyethanol 30-40%</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Toxicity of components specified. Oral LD50 estimated to be between 2000-3000 mg/kg and Dermal LD50 estimated be >2000 mg/kg VOC: 37.23% pH= 13</p>
Medium Priority for Transition				
 <p>Soft Scrub Clorax Company 32 oz. bottle 9 per case HP Products</p>	<p>Calcium carbonate 5-20% Aluminum distearate 0-1% Sodium hypochlorite 0.5-2% Sodium hydroxide <1%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Eye irritant ad may be irritating and potentially sensitizing to skin. Toxicity of components specified. *Marked medium due to its characteristic of being potentially sensitizing to skin.</p>
Low Priority for Transition				
 <p>Stainless Steel Cleaner HP Products 15 oz. can 12 per case HP Products</p>	<p>Heavy alkylate naphtha 25-30% Isoperafinic Solvent 40-50% Mineral Oil 15-20% 1-Methyl-2-Pyrolidinone <5.0% Liquified Petroleum Gas 10.0%</p>	<p>Health Fire Reactivity</p>	<p>2 4 0</p>	<p>May cause irritation and defaulting of skin on prolonged contact, burning and irritation to eyes, dizziness, drowsiness, and throat irritation upon inhalation. Ingestions may result in vomiting, and potentially aspiration pneumonitis.</p>
High Priority for Transition				
 <p>Suprox Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>Hydrogen Peroxide 5-8% Water ---- Complex Surfactant Blend ---- Fragrance ----</p>	<p>Health Fire Reactivity</p>	<p>2 1 0</p>	<p>Contact with concentrate may cause eye burns and prolonged skin contact with concentrate may cause slight skin irritation. Ingestion can cause nausea, vomiting and gastro-intestinal irritation. Acute oral toxicity = >5000 mg/kg Percent Volatile by Volume: 94.6%</p>
Green Seal or UL Certified!				

<p>Vinegar</p>  <p>Nakano Foods, Inc. 1 gallon 6 per case HP Products</p>	<p>Acetic acid 4-10%</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>Eye irritant and irritant to respiratory tract if exposed to prolonged inhalation. pH= 2.2</p>
Low Priority for Transition				
<p>Windex</p>  <p>S.C. Johnson 1 gallon 4 per case HP Products</p>	<p>Isopropyl alcohol 1-5%</p>	<p>Health Fire Reactivity</p>	<p>0 1 0</p>	<p>Combustible liquid and vapor.</p>
Low Priority for Transition				
<p>Windo-clean •</p>  <p>Hillyard Ind. 1/2 gallon 6 per case Hillyard</p>	<p>Propylene glycol n-propyl Ether Ethanol N-butane/isobutene/ Propane blend</p> <p>---- ---- ----</p>	<p>Health Fire Reactivity</p>	<p>1 1 0</p>	<p>Mildly irritating to eyes and skin. May cause chemical pneumonitis if aspirated into lungs.</p>
Low Priority for Transition				

College Flex Crew

General Purpose, Bathroom, Glass, Carpet and Upholstery Care		GS-37 Cleaning Products for Industrial and Institutional Use GS-53 Specialty Cleaning Products for Industrial and Institutional Use UL-2795 Standard for Sustainability for Carpet and Upholstery Care Products			
Product	Chemical Profile (MSDS)		HMIS Rating		Hazards
 <p>Capture carpet dry cleaner Milliken Company 3 gallon tub each Lowe's</p>	Non-toxic absorbent synthetic polymer	25-50%	Health Fire Reactivity	1 0 0	May cause eye irritation. Skin irritant with prolonged and repeated exposure. % Volatiles: 35% at 100 C VOC: <.6% by weight Acute oral toxicity (LD50) > 5000mg/kg
Low Priority for Transition					
 <p>Capture carpet spray Milliken Company qt. bottle each Lowe's</p>	Confidential Ingredient Water Cleaning solution (non-ionic surfactant preservative)	0.3% 95-99% < 5%	Health Fire Reactivity	1 0 0	May be slightly irritating to eyes but not known to cause permanent injury to eye tissue.
Low Priority for Transition					
 <p>Dry Max Clean Craft Products 1 gallon each Cleancraft.com</p>	Petroleum Distillate (odorless Mineral Spirits) Ethylene Glycol Monobutyl ether	---- ----	Health Fire Reactivity	2 3 0	Concentrated product and solutions may cause irritation and/or burns to eyes and skin. Vapors may cause irritation and/or burns to nasal passages and respiratory tract. Harmful or fatal if swallowed. Store between 50-90 °F
High Priority for Transition					
 <p>General purpose spotter • S.C. Johnson qt. bottle 6 per case HP Products</p>	Alcohol ethoxylates Hydrogen peroxide	0.1-1.5% 1-5%	Health Fire Reactivity	2 0 0	Moderately irritating to the eyes. May be mildly irritating to skin. May cause irritation to mouth, throat and stomach.
Medium Priority for Transition					

<p>Gum remover •</p>  <p>S.C. Johnson qt. can 6 per case HP Products</p>	<p>1,1,1,2-tetrafluoroethane 90-99% Pentane 10-20%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>May be mildly irritating to eyes and skin. VOC content: 10%</p>
Low Priority for Transition				
<p>Oxalic acid</p>  <p>Univar USA Inc. 50 lbs. 1 bag Univar</p>	<p>Oxalic Acid Dihydrate 99%</p>	<p>Health Fire Physical</p>	<p>3 1 0</p>	<p>Potentially fatal if swallowed or inhaled. Can cause discoloration, irritation and burns of the skin. Can cause permanent damage to eyes. Can cause severe irritation of the respiratory system. Corrosive. Should be used in presence of mechanical ventilation. pH= 1.3 Prolonged and repeated exposure may result negative effects on cardiac and nervous tissues.</p>
High Priority for Transition				
<p>P.O.G. Spotter Gel •</p>  <p>S.C. Johnson qt. bottle 6 per case HP Products</p>	<p>Amorphous silica 1-5% Diethylene glycol butyl ether 20-30%</p>	<p>Health Fire Reactivity</p>	<p>1 2 0</p>	<p>May be mildly irritating to eyes, and skin. Combustible liquid and vapor. Oral LD50 estimated to be greater than 5000 mg/kg and dermal LD50 estimated to be > 2000 mg/kg. Toxicity is outlined of each component.</p>
Medium Priority for Transition				
<p>Procyon spot and stain remover</p>  <p>Plus Mfr. Inc. 1 gallon 4 per case St. Louis campus</p>	<p>Sodium Salt – Phosphoric Acid ----</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>Does not pose any safety hazards.</p>
High Priority for Transition				
<p>Red juice stain remover •</p>  <p>S.C. Johnson qt. bottle 6 per case HP Products</p>	<p>Ether Sulfate 1-3% Sodium Lauryl Sulfate 1-3% 1-Butoxypropanol 3-7% Water 85-95%</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Causes severe eye and skin irritation. May cause irritation to nose, throat, respiratory tract, mouth, and stomach.</p>
Medium Priority for Transition				

<p>Soil-stop</p>  <p>Hillyard Industries 1 gallon 4 per case Hillyard</p>	<p>Water ---- Sulfonated resin ----</p>	<p>Health Fire Reactivity</p>	<p>0 0 0</p>	<p>Not an irritant to eyes or skin. Percent Volatile by Weight: 87.5-88.5% pH= 5.5-6.5</p> <p>Low Priority for Transition</p>
<p>Tannin stain remover</p>  <p>S.C. Johnson qt. bottle 6 per case HP Products</p>	<p>Sodium Xylene Sulfonate 1-5% Surfactant (NJTSR# 489909-5020-P-PC) 1-5% Diethylene Glycol Butyl ether 1-5% Citric Acid 5-10% Water 60-99%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>May be mildly irritating to eyes and skin. pH=3-3.4</p> <p>Low Priority for Transition</p>
<p>Vinegar</p>  <p>National Vinegar Co. 1 gallon 6 per case HP Products</p>	<p>Acetic Acid 4-10%</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>Eye irritant and irritant to respiratory tract if exposed to prolonged inhalation. pH= 2.2</p> <p>Low Priority for Transition</p>
<p>Windo-clean •</p>  <p>Hillyard Ind. 1/2 gallon 6 per case Hillyard</p>	<p>Propylene glycol n-propyl ether ---- Ethanol ---- N-butane/isobutene/propane blend ----</p>	<p>Health Fire Reactivity</p>	<p>1 1 0</p>	<p>Slight irritant to eyes and skin, may cause chemical pneumonitis if aspirated into lungs.</p> <p>Low Priority for Transition</p>

College Dining Services

General Purpose					
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
Apex Manual Detergent (Manual Warewashing Detergent)  Ecolab Inc.	Sodium dodecylbenzenesulfonate 41% Poly(oxy-1,2-ethanediyl), .alpha.-sulfo-.omega.-hydroxy-, c10-16-alkyl ethers, sodium salts 5-20% Sodium acetate 5-20% Lauramide mea 1-5% Lauryl polyglucose 1-5% Sodium silicate 1-5%	Health (SOLD) 1 Health (DILUTE) 0 Fire 0 Reactivity 0	1 0 0 0	As sold can be slightly irritating to eyes/skin/ingestion. No known hazards in case of diluted product.	
Low Priority for Transition					
Apex Pot and Pan Soak (Presoak)  Ecolab Inc.	Sodium Carbonate >50% Sodium Silicate 5-20% Alcohols, c12-16, ethoxylated 1-5%	Health (SOLD) 1 Health (DILUTE) 0 Fire 0 Reactivity 0	1 0 0 0	As sold causes eye irritation. No known effect after skin contact or inhalation, or ingestion. No known effect after eye or skin contact, or inhalation or ingestion for dilute product. As sold pH= 10.4 to 11 Dilute pH= 10.5 List toxin limits	
Low Priority for Transition					
Apex Rinse Additive (Rinse Additive)  Ecolab Inc.	Oxirane, methyl-, polymer with oxirane 20-50% Urea 20-50% Alcohols, c10-16, ethoxylated 5-20%	Health (SOLD) 1 Health (DILUTE) 0 Fire 0 Reactivity 0	1 0 0 0	As sold product is a moderate eye irritant No known significant effects on skin inhalation or ingestion As sold pH= 4.5 to 7 Dilute pH= 6.5 to 8.5	
Low Priority for Transition					
Delime PureForce	Uronium hydrogen sulphate 20-50% Urea 1-5%	Health (SOLD) 3 Health (DILUTE) 2 Fire 0 Reactivity 0	3 2 0 0	Causes serious eye damage, severe skin burns, may cause respiratory irritation, and may cause burns to mouth throat and stomach if ingested. (Must wear appropriate protective gear) As sold pH= .1 to .2 Dilute pH= .97 Lists toxin limits	
High Priority for Transition					

<p>Digiclean E Foam Hand Soap Ecolab</p> 	<p>Urea 5-20% Tetrasodium EDTA 1-5% Alcohol 1-5% Glycerin 1-5% Sodium Xylene Sulfonate 1-5% Chloroxylenol 1-5%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>May cause mild eye irritation. pH= 1.067</p> <p>Green Seal or UL Certified!</p>
<p>Apex Power Plus (Machine Warewashing Detergent) Ecolab</p> 	<p>Sodium Carbonate >50% Sodium Metasilicate 1-5% PPG-5-Laureth-5 1-5% Troclrosene sodium, dehydrate 1-5% Phosphonic acid, (1-hydroxyethylidene)bis-, potassium salt 1-5%</p>	<p>Health (SOLD) Health (DILUTE) Fire Reactivity</p>	<p>2 0 0 0</p>	<p>As sold product causes severe irritation to eyes (must wear eye protection). Dilute product has no known effect after eye contact. As sold pH= 11 to 11.8 Dilute pH= 10.79 to 10.91</p> <p>Medium Priority for Transition</p>
<p>High Temp Grill Cleaner PureForce</p> 	<p>Glycerin >50% Potassium carbonate 5-20%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Slightly irritating to eyes, skin, and if inhaled. pH= 11.5 Exposure limits specified.</p> <p>Low Priority for Transition</p>
<p>Oasis 136 (Surface Cleaner) Ecolab</p> 	<p>2-propanol, 1-propoxy 5-20% 1-propanaminium, 3-amino--(carboxymethyl)-n,n-dimethyl-, n-coco acyl derivs., inner salts 1-5% Poly(oxy-1,2-ethanediyl), .alpha.-sulfo-.omega.-hydroxy-, c10-16-alkyl ethers, sodium salts 1-5% Xylenesulfonic acid, sodium salt 1-5% Acetic acid, (ethylenedinitrilo)tetra-, tetrasodium salt 1-5%</p>	<p>Health (DILUTE) Fire Reactivity</p>	<p>1 0 0</p>	<p>Combustible liquid and vapor. Causes severe eye irritation, and causes irritation to respiratory tract and skin. pH= 11.5</p> <p>Low Priority for Transition</p>
<p>Oasis 137 Orange Force (All Purpose Cleaner) Ecolab</p> 	<p>Sodium dodecylbenzenesulfonate 6% Poly(oxy-1,2-ethanediyl), .alpha.-sulfo-.omega.-hydroxy-, c10-16-alkyl ethers, sodium salts 1-5% Limonene 1-5%</p>	<p>Health (SOLD) Health (DILUTE) Fire Reactivity</p>	<p>2 0 0 0</p>	<p>As sold product causes severe irritation to eyes and irritation to skin. Dilute product has no known effect after eye or skin contact. As sold pH= 7.2 to 9 Dilute pH= 7 to 8.3</p> <p>Medium Priority for Transition</p>

 <p>Oasis 259 Glass Force Ecolab</p>	<p>Propylene glycol propyl ether 5-20% 1-5% Ethanolamine Sulfuric acid, mono-c10-16-alkyl esters, sodium salts 1-5%</p>	<p>Health (SOLD) Health (DILUTE) Fire Reactivity</p>	<p>1 1 0 0</p>	<p>As sold product is moderately irritating to eyes and skin and if inhaled. Dilute product is slightly irritating to eyes but has no known effect after skin contact or inhalation. As sold pH= 10.6 to 11.8 Dilute pH= 9 to 10</p> <p>Low Priority Transition Product</p>
<p>Keystone Stainless Steel Polish Aerosol Ecolab</p>	<p>Distillates (petroleum), hydrotreated light 5-20% Butane 5-20% Propane 1-5% White mineral oil, petroleum 1-5% Solvent naphtha (petroleum), medium aliph 1-5%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Flammable aerosol. Runoff to sewer may create fire or explosion hazard. Contains gas under pressure' may explode if heated. May cause drowsiness and dizziness. Harmful to aquatic life with long lasting effects. Toxicity levels of components outlined.</p> <p>Low Priority for Transition</p>
 <p>Triplet Plus (Sanitizer) Ecolab</p>	<p>Sodium carbonate 5-20% Trosclosene sodium, dihydrate 6%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Moderately irritating to eyes, slightly irritating to the skin, and may cause sensitization by skin contact. pH= 10-10.4</p> <p>Low Priority for Transition</p>
 <p>Wash N Walk No-Rinse Floor Cleaner Ecolab</p>	<p>Sodium xylene sulfonate 5-20% Glycerin 1-5% Boric acid 1-5% Alcohols, c12-16, ethoxylated 1-5% Tetrasodium edta 1-5% Cocamine oxide 1-5% Lipase, triacylglycerol <1.0%</p>	<p>Health (SOLD) Health (DILUTE) Fire Reactivity</p>	<p>1 0 0 0</p>	<p>As sold product is moderately irritating to eyes and respiratory system. Diluted product has no known significant effects or critical hazards. As sold pH= 6.2-9.4 Diluted pH=7-8</p> <p>Low Priority for Transition</p>

School Housekeeping

General Purpose, Bathroom, Glass, Carpet and Upholstery Care		GS-37 Cleaning Products for Industrial and Institutional Use GS-53 Specialty Cleaning Products for Industrial and Institutional Use UL-2795 Standard for Sustainability for Carpet and Upholstery Care Products		
Product	Chemical Profile (MSDS)	HMIS Rating	Hazards	
All Purpose Spotter 	Water 60-100% 2-Butoxyethanol 15% Isopropanol 1-5% Proprietary anionic surfactants 1-5%	Health 1 Fire 0 Reactivity 0	Direct contact may cause irritation to eyes. Prolonged or repeated contact may cause irritation to skin and may be absorbed through skin with prolonged or repeated contact. Prolonged exposure in poorly ventilated area may cause respiratory irritation. No sensitization and no carcinogenicity.	
Low Priority for Transition				
BRASSO Metal Polish 	Ethanol 0.1-1% Oxalic acid 1-5% Isopropanol 1-5% Ammonium hydroxide 1-5% Limestone 10-30% Pumice 3-7%	Health 1 Fire 2 Reactivity 0	May cause eye irritation to eyes, and skin. Components of this product have been identified as having potential environmental concerns. Ammoniacal odour.	
Medium Priority for Transition				
Brillo Hotel Size Soap Pad 	Steel wool ---- Sodium tallate ----	NFPA Health 1 Fire 0 Reactivity 0	May cause eye irritation.	
Low Priority for Transition				
Brown-Ex Tannin 	Water 60-100% Hydroxyacetic acid 5-10% Isopropanol 1-5% Nonionic surfactant 1-5%	Health 1 Fire 0 Reactivity 0	May cause irritation to eyes and skin, gastrointestinal irritation, nausea, and diarrhea. Prolonged exposure in poorly ventilated area may irritate nasal mucus. pH= 1.5-2.0	
Low Priority for Transition				

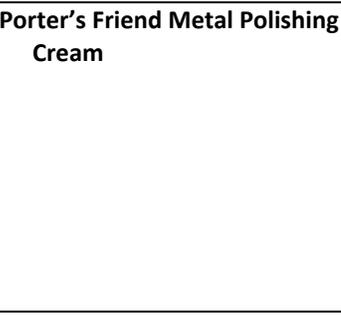
Buckeye Arena 300 	Polyurethane aqueous dispersion >80% Soft water <18.0% Additives less than 1% <2.0%	Health Fire Reactivity	0 0 0	May cause eye and skin irritation. pH=7.7 VOC= 70.0% Low Priority for Transition
Buckeye Cert 	Water >59.0% Silica (no respirable dust) >20.0% Dodecylbenzene sulfonic acid <10.0% Alcohol ethoxylate <10.0% Perfume, coloring and additives less than 1% <1.0%	Health Fire Reactivity	2 0 0	May cause redness or burning sensation to eyes and redness of skin or warming sensation if over exposed. pH= 1.7 VOC= 50.0% Medium Priority for Transition
Buckeye Eco Glass Cleaner HD 	Soft water >73.0% Propylene glycol methyl ether <23.0% Alpha olefin sulfonate <3.0% Perfume, Coloring and additive less than 1% <1.0%	Health Fire Reactivity	0 1 0	May cause eye and skin irritation. pH= 7.5 VOC= 99.0% Green Seal or UL Certified!
Buckeye Eco Hydrogen Peroxide Cleaner 	Deionized water >57.0% Linear primary alcohol ethoxylate <21.0% Hydrogen peroxide solution <13.0% Alkyl polyglucoside <5.0% Sodium xylene sulfonate <2.0% Perfume and additives less than 1% <2.0%	Health Fire Reactivity	1 0 0	Moderate eye and slight skin irritant. May be harmful if swallowed. If overexposed will cause redness or burning sensation to eyes and whitening of skin or a warming sensation. May cause dermatitis and defatting of skin tissue. pH= 4.38 (Conc.), pH=5.60 (Dilute) Green Seal or UL Certified!
Buckeye Eco Muscle Cleaner 	Soft Water 41% Benzyl Alcohol <20% Ethylene glycol phenyl ether <20% Octanoic acid <10% Dodecylbenzene sulfonic acid <4.0% Sodium hydroxide <3.0% Coloring and additives <2.0%	Health Fire Reactivity	2 0 0	No perfume added. Moderate to severe eye irritant. Slightly irritating to skin. Nontoxic to ingestion. May cause redness or burning sensation to eyes and skin if overexposed. pH= 10.4 (Conc), pH= 10.2 (Dilute) VOC= 98.0% Medium Priority for Transition

Buckeye Gel Scrub 	Phosphoric acid 12% Soft water 60-100% Octyl dimethyl amine oxide 1-5%	Health Fire Reactivity	2 0 0	Severe eye irritant. Moderate skin irritant. Nontoxic by ingestion. Inhalation of mist may cause respiratory irritation. pH= 1.0 (Conc.), pH= 1.9 (Dilute)
Medium Priority for Transition				
Buckeye Gum, Tar & Oil Remover 	D-Limonene 20% Soft Water >65% Tripropylene glycol methyl ether <7.0% Alcohol Ethoxylate <7.0% Additives <1.0%	Health Fire Reactivity	2 2 0	Severe eye and skin irritant. May be harmful if swallowed. Redness or burning sensation to eyes, redness of skin or warming sensation to skin if overexposed. pH= 9.5 VOC= 95.5%
Medium Priority for Transition				
Buckeye Status 	Odorless mineral spirits 7.0% Soft water >69.0% Polydimethylsiloxane emulsion <15.0% Hexylene glycol <7.0% Perfume and additives less than 1% <2.0%	Health Fire Reactivity	1 0 0	Overexposure will cause redness or burning sensation to eyes, redness of skin or a warming sensation. Inhalation will cause dizziness, and irritation of throat if overexposed. pH= 7.4 (Conc.), pH=7.4 (Dilute)
Low Priority for Transition				
Buckeye Workout 	Water >91.0% Propylene glycol phenyl ether <5.0% Linear alkyl benzene sulfonic acid <2.0%	Health Fire Reactivity	1 0 0	Slight eye irritant. Not irritating to skin. pH= 10.8
Low Priority for Transition				
Carpet Spotting Kit All Purpose Spotter	None listed	Health Fire Reactivity	1 0 0	May cause irritation to skin upon repeated/prolonged contact. Can cause eye irritation upon contact. VOC= 0% pH= 6.5-8.5%
Low Priority for Transition				
Carpet Spotting Kit Brown-Ex Tannin	Hydrochloric acid (H2D) 1-5% Ammonium bifluoride 1-5%	Health Fire Reactivity	3 0 0	Corrosive. Ammonium bifluoride causes severe necrosis to tissues (like hydrofluoric acid). Causes eye damage. Breathing of vapor can cause respiratory irritation and inflammation.
High Priority for Transition				

Carpet Spotting Kit Dry Solvent	Aliphatic hydrocarbons 90-100%	Health Fire Reactivity	1 2 0	May cause irritation from misting. Breathing of mists may cause irritation. Medium Priority for Transition
Carpet Spotting Kit Gum Remover	Aliphatic hydrocarbons 80-90% d-Limonene 1-10%	Health Fire Reactivity	1 2 0	May cause irritation from misting. Breathing of mists may cause irritation. VOC= 2% Medium Priority for Transition
Champion Chewing Gum & Candle Wax Remover 	Butane ---- Propane ---- * Components of hydrocarbon propellant. ---- This product may also contain isobutene. ----	Health Fire Reactivity	1 4 1	Can cause severe eye irritation, redness, tearing and possible freeze burns to eyes. Prolonged contact with the skin may cause severe freeze burns. VOC= 100% High Priority for Transition
Chewing Gum Remover 	n-Butane 60-70% Propane 20-30% Ethyl alcohol 8-10% Non-hazardous and other components below reportable levels. <0.1%	Health Fire Reactivity	1 4 0	Contact may irritate or burns eyes. Eye contact may result in corneal injury. Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis. Chronic effects include: unconsciousness, sterility, liver injury, central nervous system disorder, and lung damage. Pregnant women should not be exposed to this product. High Priority for Transition
Delible Ink Stain Remover 	Water 40-70% Triethanolamine 7-13% n-Butyl alcohol 5-10% 2-Butoxyethanol 3-7% Hexylene glycol 1-5% n-Amyl acetate 1-5%	Health Fire Reactivity	*3 2 1	May cause severe eye irritation. Symptoms may include pain, tearing, redness, and clouding of the eye surface. May cause skin irritation. Symptoms may include redness, rash and mild swelling. Harmful if swallowed. May cause respiratory irritation. pH= 9.5 VOC= 95% High Priority for Transition

FiberPRO Foam Control 	Formaldehyde <1%	Health Fire Reactivity	0 0 0	No known significant effects to eyes, ingestion, skin, or inhalation. Formaldehyde is known to the state of California to cause cancer. Low Priority for Transition
Glème Glass Cleaner 	Ethyl alcohol 1-3% n-Butoxyethanol 1-3% Propane 1-3% n-Butane 1-3% Non-hazardous and other components below reportable levels >90%	Health Fire Reactivity	1 2 0	Health injuries are not known or expected under normal use. May be harmful if absorbed through skin. Frequent or prolonged contact may defat and dry skin, leading to discomfort and dermatitis. Chronic effects include: unconsciousness, cyanosis, and dermatitis. pH= 9.5-10.5 Medium Priority for Transition
Goo Gone 	Distillates (petroleum), hydrotreated light <95% Tripropylene glycol methyl ether 1-10% Citrus extracts blend 1-10%	Health Fire Reactivity	1 2 0	Causes eye irritation, contact may cause irritation, prolonged or repeated contact may cause drying or cracking. May cause headache, nausea, drowsiness, central nervous system depression, convulsions, and loss of consciousness. VOC= 2% Medium Priority for Transition
Goof Off Cleaner VOC Compliant 	Acetone 60-100% Xylene (mixed isomers) 10-30% Ethylbenzene 1-5% Hydrotreated light distillate 7-13% Diethylene glycol monobutyl ether 1-5%	Health Fire Reactivity	2 3 1	Causes serious eye and skin irritation. May cause respiratory irritation and drowsiness or dizziness. Avoid breathing dust, fume, gas, mist, vapors and/or spray. Percent volatile 99.0% by weight. VOC/Volume 20.0%. High Priority for Transition
Goof Off Heavy Duty 	Acetone 60-100% Xylene 10-30% Hydrotreated light distillate 7-13% Ethylbenzene 3-7% Diethylene glycol monobutyl ether 1-5% Alcohol ethoxylate .1-1% Alcohols, C12-13, ethoxylated .1-1% Toluene 0-.1% Benzene 0-.1% Ethanol, 2-butoxyl 0-.1% n-Butyl alcohol 0-.1%	Health Fire Reactivity	2 3 1	Causes serious eye and skin irritation. Causes respiratory tract irritation. May cause drowsiness or dizziness. Aspiration hazard if swallowed - may enter lungs and cause damage. May cause damage to Central Nervous System (CNS), Blood and/or Immune System, Liver/Heptatoxin, Kidney/Nephrotoxin via inhalation and/or ingestion. May cause cancer via inhalation. May be harmful if swallowed. High Priority for Transition

Gum Remover	Water 15-40% Diethanolamine 5% d-Limonene 15-40% Dipropylene glycol monomethyl ether 5-10% Nonionic surfactant 10-30%	Health 1 Fire 2 Reactivity 0	May cause eye and skin irritation. pH= 9.9-10.5 Medium Priority for Transition
Heavy Duty Foaming Oven Cleaner 	Sodium hydroxide 5-8% n-Butane 1-3% Diethylene glycol monobutyl ether Propane 1-3% Non-hazardous and other components below reportable levels 80-90%	Health 3* Fire 2 Reactivity 0	This product causes eye burns. Risk of serious damage to eyes. Causes skin burns. Intentional misuse by concentrating and inhaling the product can be harmful or fatal. Causes burns. Irritating to respiratory system. Prolonged inhalation may be harmful. Target organs are central nervous system and lungs. Chronic effects include may causing central nervous system disorder and/or damage. pH= 13-14 Aerosol. High Priority for Transition
Invisible Glass 	Hydrocarbon blend ---- Hydrocarbon propellant ----	Health 2 Fire 2 Reactivity 0	May cause eye irritation including stinging, tearing, and redness. May cause frostbite and irritation. Skin contact may cause irritation including redness, discomfort, drying and cracking, or rash. Breathing small amounts during handling is not likely to cause harmful effects. Breathing large amounts may cause central nervous system excitation. Aerosol. Medium Priority for Transition
Mötsenböcker's Lift Off #4 	Acetone <10% Trade secret ingredients ----	Health 1 Fire 0 Reactivity 0	Contact with product can dry and defat skin, causing irritation or dermatitis. Causes eye irritation. If inhaled, prolonged exposure to vapors may cause dizziness. pH= 6.08 VOC= 29.1% Low Priority for Transition

	Hydrogen peroxide 2-4% Dipropylene glycol 1-2% monomethyl ether		Health Fire Reactivity	1 0 1	Overexposure to eyes causes irritation, pain on brief exposure, corneal damage on extended exposure. pH= 9.2-9.3 VOC= 86% %VOC= 1.1%
Low Priority for Transition					
	Carbon dioxide ---- Petroleum distillates, ---- hydrotreated light Tetramethrin		Health Fire Reactivity	2 3 0	Causes eye irritation and may cause skin irritation. May cause irritation to respiratory tract. Inhalation may cause central nervous system effects, including headache, dizziness, fatigue, and drowsiness. Flammable liquid and vapor. Percent volatile= 99.5%
High Priority for Transition					
	Ethanol 7-13%		Health Fire Reactivity	3* 4 0	Contact may irritate or burn eyes. Eye contact may result in corneal injury. Irritating to skin. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. VOC= 9.95%
High Priority for Transition					
	Ammonia aqueous ---- Oxalic acid ---- Alcohol (as ethanol) ---- denatured		Health Fire Reactivity	-- -- --	Possible skin and eye irritation.
High Priority for Transition					
	Sodium hydroxide 6% Butoxydiglycol 5%		Health Fire Reactivity	3 0 0	Corrosive to eyes and skin. Severely irritating to the respiratory system. Causes burns to mouth, throat, and stomach. pH= 13.3
High Priority for Transition					

Shout Advanced Laundry Stain Remover 	1-Tetradecene 10-30% Alcohols, C12-16, ethoxylated 5-10% Butane 5-10% Propane 1-5% Isobutane 1-5%	Health Fire Reactivity	2 4 0	May cause mild eye irritation. Prolonged or repeated contact may cause mild skin irritation. High concentrations may lead to central nervous system effects such as drowsiness, dizziness, headaches and/or nausea. pH= 7.5 VOC= 13.3% High Priority for Transition
Simple Green All-Purpose Cleaner 	Water >78% 2-butoxyethanol <5% Ethoxylated alcohol <5% Tetrapotassium pyrophosphate <5% Sodium citrate <5% Fragrance <1% Colorant <1%	Health Fire Reactivity	1 0 0	Mildly irritating to eyes. Prolonged exposure may cause dryness. pH= 9.5 VOC= 2.8-3.8% Low Priority for Transition
Soakit 	Unlisted ---- ---- ----	Health Fire Reactivity	-- -- --	No listed. High Priority for Transition
Sodium Salt- Phosphoric Acid	Sodium salt – phosphoric acid ----	Health Fire Reactivity	1 0 0	Nonirritating to skin and eyes. pH= 9.5 Green Seal or UL Certified!
Tenacity-Buckeye 	Sodium xylenesulfonate <3% Borax <3%	Health Fire Reactivity	-- -- --	Contact will cause irritation and redness to exposed areas. Can cause defatting of skin tissue. Green Seal or UL Certified!
Ziz-O 	Silicone dioxide ---- Deionized water ---- Anhydrous soap ---- Sodium tetraborate decahydrate ----	Health Fire Reactivity	0 0 0	Not a skin or eye irritant per FHSA Method 16 CFR 1500 but prolonged contact with eyes may cause minor physical irritation. pH= 7.5-8.5 Low Priority for Transition



APPENDIX B: Degreasing Agents

General:

In Appendix B, degreasing products will be addressed. The product information summarized in the following pages includes supplier details as well as its chemical profile, HMIS rating, and hazards summarized from the product's respective MSDS.

In this section:

College Housekeeping Degreasing Compounds
College Flex Crew Degreasing Compounds

See Appendix I for Green Seal and UL Standards for Cleaning and Degreasing Compounds

Table Key:

Section Title		Certification requirements				
Product		Chemical Profile (MSDS)		HMIS Rating		Hazards
Product Name  Manufacturer Size QTY/pkg. Supplier	Chemical name % comp.	Health Fire Reactivity Carcinogenetic	-- -- -- *	Outline hazards for product as a whole.		
				Green Seal or UL Certified!		
				Low Priority for Transition		
				Medium Priority for Transition		
				High Priority for Transition		

Note: In order to avoid duplication in tallying the total number of products currently in use, the following symbols were used:

- Products in use at the College by both Housekeeping and Flex Crew (not the School)
- Products in use by both the College and School Housekeeping departments

College Housekeeping

Degreasing Compounds		GS-34 Cleaning and Degreasing Agents UL-2792 Cleaning and Degreasing Compounds: Biologically-based			
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
<p>Citrus Scrub •</p>  <p>Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>d-Limonene 86-91% Water --- Linear Primary Alcohol --- ethoxylate</p>	<p>Health Fire Reactivity</p>	<p>2 2 0</p>	<p>VOC (concentrate)= 90% by volume D50 greater than 5000 mg/kg Acute toxicity: Eye, skin irritation and if irritating if inhaled</p>	
Medium Priority for Transition					

College Flex Crew

Degreasing Compounds		GS-34 Cleaning and Degreasing Agents UL-2792 Cleaning and Degreasing Compounds: Biologically-based			
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
<p>Citrus Scrub •</p>  <p>Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>d-Limonene 86-91% Water --- Linear Primary Alcohol --- ethoxylate</p>	<p>Health Fire Reactivity</p>	<p>2 2 0</p>	<p>VOC (concentrate)= 90% by volume D50 greater than 5000 mg/kg Acute toxicity: Eye, skin irritation and if irritating if inhaled</p>	
Medium Priority for Transition					
<p>Taski Profi</p>  <p>Johnson Diversey Inc. gallon 4 per case HP Products</p>	<p>Tridecyl alcohol ethoxylate 5-10%</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>May cause eye irritation, irritation after repeated or prolonged contact with skin, severe irritation of digestive tract, and respiratory irritation if inhaled. Percent Volatile: 85% pH= 8.8</p>	
High Priority for Transition					

College Dining Services

Degreasing Compounds		GS-34 Cleaning and Degreasing Agents UL-2792 Cleaning and Degreasing Compounds: Biologically-based		
Product	Chemical Profile (MSDS)	HMIS Rating	Hazards	
<p>Greastrip Plus (Degreaser)</p> <p style="text-align: right;">Ecolab</p> 	<p>Sodium Hydroxide 7%</p>	<p>Health 3 Fire 0 Reactivity 0</p>	<p>3 0 0</p>	<p>May be corrosive to metals. Causes severe skin burns and eye damage (must wear protective gear). pH= 13.5</p>
High Priority for Transition				



APPENDIX C: Hard Surface Cleaners and Industrial and Institutional Floor Care

General:

In Appendix C, hard surface cleaners, and institutional floor care products will be addressed. The product information summarized in the following pages includes supplier details as well as chemical profile, HMIS rating, and hazards summarized from the product’s respective MSDS.

In this section:

- College Housekeeping Hard Surface Cleaners and Industrial and Institutional Floor Care
- College Flex Crew Hard Surface Cleaners and Industrial and Institutional Floor Care
- School Housekeeping Hard Surface Cleaners and Industrial and Institutional Floor Care

See Appendix J for Green Seal and UL Standards for Floor-Care Products for Industrial and Institutional Use

Table Key:

Section Title		Certification requirements				
Product		Chemical Profile (MSDS)		HMIS Rating		Hazards
PICTURE	Product Name	Chemical name	% comp.	Health	--	Outline hazards for product as a whole.
	Manufacturer			Fire	--	
	Size			Reactivity	--	
	QTY/pkg.			Carcinogenic	*	
	Supplier					
Green Seal or UL Certified!						
Low Priority for Transition						
Medium Priority for Transition						
High Priority for Transition						

Note: In order to avoid duplication in tallying the total number of products currently in use, the following symbols were used:

- Products in use at the College by both Housekeeping and Flex Crew (not the School)
- Products in use by both the College and School Housekeeping departments

College Flex Crew

Hard Surface and Industrial and Institutional Floor Care		GS-40 Floor-Care Products for Industrial and Institutional Use UL-2777 Standard for Sustainability for Hard Floor Care Products UL-2759 Standard for Sustainability Hard Surface Cleaners			
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
 <p>Buckeye Base Hit  Buckeye Int. Inc. 16 oz. bottle 12 per case Buckeye</p>	Liquified Petroleum Gas 14.0% Monoethanolamine 3.0% Deionized Water >69.0% Propylene Glycol n-Butyl ether <10.0% Potassium Oleate <3.0% Additives less than 1% <1.0%	Health Fire Instability	1 0 1	May cause eye and skin irritation. Inhalation may cause headaches, dizziness, and nausea. pH= 12.0	
Low Priority for Transition					
 <p>Crossbow Buckeye Int. Inc. 1 gallon 4 per case Hillyard</p>	Water 60-99% Alkanolamine, Phosphate salt 5-10% Amphoteric Surfactant 1-5% Monoethanolamine 1-5% Polyether Polyol 1-5% Octyl Dimethyl Amine oxide 1-5% Sodium Xylene Sulfonate 1-5%	Health (SOLD) Health (DILUTE) Fire Reactivity	0 0 0 0	May cause very slight eye and skin.	
Low Priority for Transition					
 <p>Fast 1-2-3  Gabriel First Corp. 1 gallon 4 per case Gabriel</p>	Ethylene Glycol Monobutyl ether <7%	Health Fire Reactivity	1 0 0	Prolonged contact with unprotected skin may cause irritation, redness or burning.	
Low Priority for Transition					
 <p>Navigator Hillyard Industries 5 gallons Hillyard</p>	Ethylene Glycol 1-1.5% Zinc Oxide 0.4-.7% Water ---- Acrylic copolymer emulsion ---- Diethylene glycol monoethyl ether 2-6% Tributoxy ethyl phosphate ---- Alkene Polymd ----	Health Fire Reactivity	1 0 0	pH= 8.4 Percent Volatile by Volume: 74.5%	
Low Priority for Transition					

	Neutralizer Hillyard Industries 1/2 gallon 6 per case Hillyard	Dipropylene Glycol Methyl ether 1-4% Water ---- EDTA Tripotassium salt ---- B-Analine, N-(2-carboxyethyl)-N-[3-(decyloxy) propyl] monosodium salt ---- Linear Primary Alcohol ethoxylate ----	Health 1 Fire 0 Reactivity 0	Eye irritant. Percent Volatile by Volume: 74.5% Low Priority for Transition
	Nutra-rinse Hillyard Industries 1 gallon 4 per case Hillyard	Water ---- Tetrasodium salt of EDTA ---- B-Alanine, N-(2-carboxyethyl)-N-[3-(decyloxy) propyl] monosodium salt ---- Linear Primary Alcohol ethoxylate ----	Health 0 Fire 0 Reactivity 0	No acute or chronic hazards known. Percent Volatile by Volume: 88-89% Low Priority for Transition
	Pregame Hillyard Industries 1 gallon 4 per case Hillyard	Propylene Glycol monomethyl ether 1-5% Dipropylene Glycol Methyl ether 1-5% Water ----	Health 1 Fire 0 Reactivity 0	Concentrate may cause eye irritation. Percent Volatile by Volume: 99.1 % Low Priority for Transition
	Restorer Hillyard Industries 1 gallon each Hillyard	Water ---- Dipropylene glycol methyl ether 2-4% Isopropyl alcohol 1-3% Acrylic copolymer emulsion ----	Health 1 Fire 2 Reactivity 0	Product concentrate is a primary eye irritant. Percent Volatile by Weight: 96.5-97.5% pH= 8.25-9.25 Medium Priority for Transition
	Ripsaw Buckeye Int. Inc. 1 gallon 4 per case Buckeye	Sodium hydroxide 1.1% Sodium metasilicate 2.0% Ethanolamine 5.0% Water >56.9% Benxyl alcohol <15.0% Ethylene glycol phenyl ether <10.0% Octanoic acid <5.0% Sodium Xylene Sulfonate <4.0%	Health 1 Fire 0 Reactivity 0	Will cause burns to eyes and skin. Harmful or fatal if swallowed. Corrosive. pH (CONC.)= 12.6 pH (dilute)= 12.3 Low Priority for Transition

 <p>Seal 341 Hillyard Industries 1 gallon 4 per case Hillyard</p>	<p>Zinc oxide 0.2-.5% Water ---- Acrylic copolymer ---- Styrene acrylic emulsion ---- Tributoxyethyl phosphate 1-3% Diethylene glycol 4-6% monoethyl ether Diethylene glycol mono methyl ether <1%</p>	<p>Health Fire Reactivity</p>	<p>0 0 0</p>	<p>Mild eye irritant. Percent Volatile by Volume: 77.5-88.5% pH= 8.50-9.50</p> <p>Low Priority for Transition</p>
 <p>Take Down (Green Apple) Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>Water ---- Mixture of bacterial spores ---- Alcohols (C12-15 Ln. saturated) ethoxylate ----</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Prolonged exposure may produce slight to moderate irritation in sensitive individuals; VOS of concentrate: 1.46%</p> <p>Low Priority for Transition</p>
 <p>Tile and grout cleaner Hillyard Industries 1 gallon 4 per case Hillyard</p>	<p>Phosphoric acid 6-12% Butyl cellosolve (2-butoxyethanol) 3-8% Water ---- Dodecyl Benzene Sulfonic acid ----</p>	<p>Health Fire Reactivity</p>	<p>2 0 0</p>	<p>Product concentrate is corrosive on prolonged exposure to skin and may result in skin burns. Eye irritant. Harmful or fatal is swallowed. Chronic local effects may consist of multiple areas of superficial destruction of skin or dermatitis Percent Volatile by Weight: 86.5-87.5% pH (CONC.)= 0-1.5 pH (diluted)= -1.48</p> <p>Medium Priority for Transition</p>
 <p>Tile and grout seal Hillyard Industries 1 gallon 4 per case Hillyard</p>	<p>Water ---- Perfluoroalkyl methacrylic copolymer ----</p>	<p>Health Fire Reactivity</p>	<p>3 0 0</p>	<p>Prolonged contact with skin may produce skin burns. Inhalation may be fatal. Percent Volatile by Weight: 98-99% pH= 4-5</p> <p>High Priority for Transition</p>
 <p>Top clean • Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>Water ---- Alcohol ethoxylate 3-5% Sodium xylene sulfonate 1-3% FD&C Yellow #5 <0.5 <0.01</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Prolonged eye contact may produce eye irritation.</p> <p>Green Seal or UL Certified!</p>

School Housekeeping

Hard Surface Cleaners and Industrial and Institutional Floor Care

GS-40 Floor-Care Products for Industrial and Institutional Use
 UL-2777 Standard for Sustainability for Hard Floor Care Products
 UL-2759 Standard for Sustainability Hard Surface Cleaners

Product	Chemical Profile (MSDS)		HMIS Rating		Hazards
3M TroubleShooter Baseboard Stripper 	Water	60-90%	Health	2	Will cause severe eye irritation with symptoms including significant redness, swelling, pain, tearing, cloudy appearance of the cornea, and impaired vision. Will cause moderate skin irritation with symptoms including localized redness, swelling, itching, and dryness. May be absorbed through skin and cause target organ effects. Inhalation will cause respiratory irritation. Target organ effects included central nervous system depression with symptoms including headache, dizziness, drowsiness, incoordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness. Prolonged or repeated exposure may cause liver, kidney, and bladder effects. pH= 11-12 VOC= 10-49%
	2-Butoxyethanol	10-30%	Fire	2	
	Petroleum gases, liquefied, sweetened	5-10%	Reactivity	0	
	Ethanolamine	3-7%			
	Non-ionic surfactant	.1-1.0%			
	Perfumes	.1-1.0%			
	D-limonene	.0558%			
					Medium Priority for Transition
Buckeye Base Hit 	Liquified petroleum gas	14.0% 3.0%	Health	1	May cause eye and skin irritation. Intentional misuse by concentrating and inhaling contents may be harmful or fatal. pH=12 This is an aerosol product.
	Monoethanolamine	60-100%	Fire	0	
	Deionized water	10-30%	Reactivity	1	
	Propylene glycol n-butyl ether	1-5%			
	Potassium oleate				
					Low Priority for Transition

Buckeye Eco Floor Cleaner 	Soft water >64.0% Alkyl polyglucoside <15.0% Ethoxylated alcohol <15.0% Sodium xylene sulfonate <5.0% Coloring and additives <1.0% less than 1%	Health Fire Reactivity	1 0 0	Overexposure will cause redness or burning sensation to eyes or skin. pH= 8.6 (Conc.), pH=7.1 (Dilute) VOC= 79.0% Liquid. Green Seal or UL Certified!
Buckeye Juggernaut 	Monoethanolamine 10.0% Sodium metasilicate pentahydrate 2.0% Sodium hydroxide 1.0% Water 10-30% Bensyl alcohol 10-30%# Ethylene glycol phenyl ether 5-10% Diethylene glycol ethyl ether 5-10% Sodium xylene sulfonate 1-5% Octanoic acid 1-5%	Health Fire Reactivity	3 0 0	This product is corrosive. Will cause burns to eyes and skin. Harmful or fatal if swallowed. pH=13.0 (Conc.), pH=12.3 (Dilute) High Priority for Transition
Buckeye Lucent 	Diethylene glycol ethyl ether 4.6% Soft water 30-60% Styrene-acrylic polymer 30-60% Ethylene copolymer emulsion 5-10% Acrylate copolymer 1-5% Tributoxyethyl phosphate 1-5% Polyurethane aqueous dispersion 1-5%	Health Fire Reactivity	0 0 0	May cause eye and skin irritation. Not toxic by ingestions. Oral feeding of rats resulted in no deaths at 5010 mg/kg. Low Priority for Transition
Buckeye RPM 	Soft water 60-100% Acrylic emulsion 7-13% Ethylene copolymer emulsion 5-10% Linear primary alcohol ethoxylate 1-5%	Health Fire Reactivity	0 0 0	Not irritating to eyes. Not irritating to skin. Not toxic by ingestion. pH=7.6 (Conc.), pH=7.5 (Dilute) Low Priority for Transition
Buckeye Screen Clean 	Propylene glycol methyl ether 1-5% Soft water 60-100%	Health Fire Reactivity	0 0 0	May cause eye irritation, but not to an extent to be regulated under WHMIS. pH=9.0 (Conc.), pH=9.0 (Dilute) Low Priority for Transition



APPENDIX D: Institutional and Industrial Hand Cleaners

General:

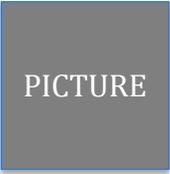
In Appendix D, institutional and industrial hand cleaners will be addressed. The product information summarized in the following pages includes supplier details as well as chemical profile, HMIS rating, and hazards summarized from the product’s respective MSDS.

In this section:

- College Housekeeping Institutional and Industrial Hand Cleaners
- School Housekeeping Institutional Industrial Hand Cleaners

See Appendix K for Green Seal and UL Standards for Hand Cleaners for Industrial and Institutional Use

Table Key:

Section Title		Certification requirements			
Product	Chemical Profile (MSDS)	HMIS Rating	Hazards		
Product Name 	Manufacturer Size QTY/pkg. Supplier	Chemical name % comp. Health Fire Reactivity Carcinogenetic	-- -- -- *	Outline hazards for product as a whole.	
			Green Seal or UL Certified!		
			Low Priority for Transition		
			Medium Priority for Transition		
			High Priority for Transition		

Note: In order to avoid duplication in tallying the total number of products currently in use, the following symbols were used:

- Products in use at the College by both Housekeeping and Flex Crew (not the School)
- Products in use by both the College and School Housekeeping departments

College Housekeeping

Institutional and Industrial Hand Cleaners		GS-41 Hand Cleaners for Industrial and Institutional Use UL-2784 Standard for Sustainability Hand Cleaners			
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
 <p>Antimicrobial Lotion Soap GoJo Ind. 800 mL box 12 per case HP Products</p>	Ethanalamine <3% Oleic Acid	Health Flammability Reactivity	1 0 0	May cause eye irritation and upset stomach and nausea if ingested. pH= 7.0-10.0 Low Priority for Transition	
 <p>Green Select Foaming Hand Wash Hillyard Industries 1250 mL box 6 per case Buckeye</p>	Water ---- Mild Anionic Surfactant mixture (Sodium Lauryl sulfoacetate) ----	Health (SOLD) Health (DILUTE) Fire Reactivity	1 0 0 0	Product concentrate is an eye irritant. Prolonged overexposure to concentrate without thorough water rinse may cause eye irritation. Green Seal or UL Certified!	
 <p>Lava Soap  WD-40 Co. 4 oz. bar 48 per case HP Products</p>	Pumice 10-30% Titanium Dioxide 0.1-1% Crystalline silica, quartz 0.1-1%	Health Fire Reactivity	0 0 0	Respirable crystalline silica is listed by IARC and NTP as a known human carcinogen. Titanium dioxide is listed by IARC as a possible carcinogen. May cause eye irritation. Percent Volatile: <10% pH= 10.3 Low Priority for Transition	
 <p>Non-alcohol foaming hand sanitizer Hillyard Industries 1250 mL box 6 per case Buckeye</p>	Benzalkonium Chloride 0.24% Distilled Water >90.0% Perfume and other additives <9.76%	Health Fire Reactivity	0 0 0	% Volatile by weight >95.0 Low Priority for Transition	
 <p>Spa Bath Cartridge GoJo Industries 800 mL box 12 per case HP Products</p>	Sodium Lauryl Sulfate ---- Ammonium Chloride ----	Health Fire Reactivity	1 0 0	May cause eye irritation, and may cause upset stomach and nausea if ingested. Low Priority for Transition	

School Housekeeping

Institutional and Industrial Hand Cleaners		GS-41 Hand Cleaners for Industrial and Institutional Use UL-2784 Standard for Sustainability Hand Cleaners		
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards
 <p>Lava Bar Soap </p>	Pumice 10-30% Titanium dioxide .1-1% Crystalline silica, quartz .1-1% Non-hazardous ingredients ----	Health Fire Reactivity	0 0 0	May cause eye irritation. VOC= <10% pH=10.3
Low Priority for Transition				
 <p>Member's Mark Amber Antibacterial Liquid Hand Soap</p>	No ingredients provided ---- ----	NFPA Rating Health Fire Reactivity	0 0 0	May cause irritation to eyes and respiratory tract. pH= 5.50-7.00
Low Priority for Transition				
 <p>Symmetry Green Certified Foaming Handwash</p>	Deionized water >89% Alpha olefin sulfonate <5.0% Cocamide MEA <5.0% Perfume and additives less than 1% <1.0%	Health Fire Reactivity	0 0 0	May cause eye irritation including redness or burning sensation. VOC= >95% pH= 8.7
Green Seal or UL Certified!				



APPENDIX E: Odor Control Additives and Digestive Additives

General:

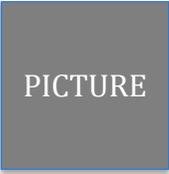
In Appendix E, products with odor control additives and digestive additives will be addressed. The product information summarized in the following pages includes supplier details as well as chemical profile, HMIS rating, and hazards summarized from the product's respective MSDS.

In this section:

College Housekeeping Odor Control Additives and Digestive Additives
 School Housekeeping Odor Control Additives and Digestive Additives

See Appendix L for Green Seal and UL Standards for Digestion Additives for Cleaning and Odor Control

Table Key:

Section Title		Certification requirements			
Product	Chemical Profile (MSDS)	HMIS Rating	Hazards		
Product Name 	Manufacturer Size QTY/pkg. Supplier	Chemical name % comp. Health Fire Reactivity	-- -- --	Outline hazards for product as a whole.	
				Green Seal or UL Certified!	
				Low Priority for Transition	
				Medium Priority for Transition	
				High Priority for Transition	

Note: In order to avoid duplication in tallying the total number of products currently in use, the following symbols were used:

- Products in use at the College by both Housekeeping and Flex Crew (not the School)
- Products in use by both the College and School Housekeeping departments

College Housekeeping

Odor Control Additives and Digestive Additives		UL-2796 Standard for Sustainability for Oder Control Products UL-2798 Standard for Sustainability for Biological Digestion Additives for Cleaning and Oder Control		
Product	Chemical Profile (MSDS)	HMIS Rating	Hazards	
<p>Stench & Stain</p>  <p>S.C. Johnson qt. bottle 6 per case HP Products</p>	<p>Alcohol ethoxylates 5-10% Sodium lauryl sulfate 1-5%</p>	<p>Health 2 Fire 2 Reactivity 0</p>	<p>Causes severe eye irritation, moderate skin irritation, and may be irritating to nose, throat, respiratory tract, mouth, throat, and stomach. No environmental data available. Oral LD50 estimated to be greater than 5000 mg/kg. Dermal LD50 estimated to be > 2000 mg/kg.</p>	
Medium Priority for Transition				
<p>Comet Deodorizing Cleanser with Chlorinol</p>  <p>Proctor and Gamble 21 oz. can 12 per case HP Products</p>	<p>Calcium Carbonate 60-100% Sodium Bicarbonate 7-13% Calcium Hydroxide 1-5% Sodium Dichloro-s 1-5% Triazinetrione Dihydrate</p>	<p>Health 2 Fire 0 Reactivity 0</p>	<p>Eye and skin irritant. pH= 12.3 (1% solution) Sensitization not available. Hazardous by OSHA</p>	
Medium Priority for Transition				

School Housekeeping

Odor Control Additives and Digestive Additives		UL-2796 Standard for Sustainability for Odor Control Products UL-2798 Standard for Sustainability for Biological Digestion Additives for Cleaning and Odor Control		
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards
Aerosol Air Refresher 	Ethanol 3-7%	Health Fire Reactivity	-- -- --	Mild eye irritant. pH=4.0-5.0 High Priority for Transition
Airwick Freshmatic Ultra 	Distillates (petroleum), light hydrotreated 40-60% Propane 2.5-10% Butane 10-20% Ethane, 1,1-difluoro- 10-20% Proprietary fragrance 1-2.5%	Health Fire Reactivity	2 3 0	May cause eye irritation upon direct contact with the eyes. May cause skin irritation in susceptible persons. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Extremely flammable. Aerosol. High Priority for Transition
Buckeye Eco Odor Eliminator 	Soft water >74.0% Undeceth-11 <10.0% Sodium xylene sulfonate <8.0% Fragrance <6.0% Sodium citrate <1.0% Coloring less than 1% <1.0%	Health Fire Reactivity	1 0 0	May cause eye irritation. Low Priority for Transition
Fresh Linen Air Freshener & Deodorizer 	Acetone 60-70% Propane 15-20% n-Butane 10-15% Non-hazardous and other components below reportable levels 1-2.5%	Health Fire Reactivity	1 4 0	Contact with eyes may cause irritation. Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis. High Priority for Transition

Sodium Hypochlorite 5.25% Regular/Scented	Sodium hypochlorite 5.25% Sodium chloride 4.12% Sodium hydroxide .1-.2%	Health Fire Reactivity	1 0 0	Liquid and mists may cause severe but temporary eye damage. The liquid will irritate the skin, causing redness and possibly inflammation. Inhalation of fumes or mists causes respiratory tract irritation and irritation of mucous membranes. If sodium hypochlorite is mixed with ammonia or other chemicals, evolution of chlorine or chlorine based compounds results. These gases can produce pulmonary edema. Never mix with any other chemicals. pH= 11.5-12.4 Low Priority for Transition
Solid Air Freshener	Concentrated perfume oil	Health Fire Reactivity	1 0 0	Vapors may cause irritation of the nose, throat, and respiratory tract. Breathing high vapor concentrations may produce anesthetic effects, nausea, dizziness, headaches. May cause irritation to eyes. pH= 6.0-8.0 Low Priority for Transition



APPENDIX F: Disinfectants

General:

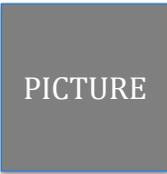
In Appendix F, disinfecting products will be addressed. The product information summarized in the following pages includes supplier details as well as chemical profile, HMIS rating, and hazards summarized from the product’s respective MSDS.

In this section:

- College Housekeeping Disinfectants
- College Flex Crew Disinfectants
- College Dining Services Disinfectants
- School Housekeeping Disinfectants

See Appendix M for the EPA Registered Hard Surface Disinfectants Comparison Chart

Table Key:

Section Title		Certification requirements			
Product	Chemical Profile (MSDS)		HMIS Rating	Hazards	
Product Name 	Manufacturer Size QTY/pkg. Supplier	Chemical name % comp.	Health Fire Reactivity Carcinogenetic	--	Outline hazards for product as a whole.
				--	
				--	
				*	Green Seal or UL Certified!
					Low Priority for Transition
					Medium Priority for Transition
					High Priority for Transition

Note: In order to avoid duplication in tallying the total number of products currently in use, the following symbols were used:

- Products in use at the College by both Housekeeping and Flex Crew (not the School)
- Products in use by both the College and School Housekeeping departments

College Housekeeping

Disinfectants					
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
<p>Lysol O</p>  <p>Rickitt Benckiser 19 oz. can 12 per case Komro</p>	<p>Ethanol 40-60% Butane 1-5% Propane 1-5% Alkyl (50% C14, 40% C12, 10% C16) dimethyl benzyl Ammonium saccharinate 0-0.1%</p>	<p>Health Fire Reactivity</p>	<p>1 3 0</p>	<p>Causes mild eye irritation. Flammable aerosol by flame projection test. Aerosol flame extension: > 18 inches (45 cm). Containers may explode when heated. pH=10</p>	
High Priority for Transition					
<p>Household Bleach Disinfectant 5.25%</p>  <p>Champion 1 gallon 6 per case HP Products</p>	<p>Sodium hypochlorite 1-10%</p>	<p>Health Fire Reactivity</p>	<p>1 0 0</p>	<p>Serious eye damage/eye irritation. Irritating to respiratory tract. Can cause corrosion of mucous membranes. Contact with liquid can cause chemical burns. pH= 12.75</p> <p>Note: Sodium hypochlorite ranks as low risk overall at low concentrations, but it is a high risk asthmagen and is acutely toxic to aquatic systems (rivers, lakes)</p>	
Low Priority for Transition					
<p>Suprox-D •</p>  <p>Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>Deionized Water 80-90% Hydrogen Peroxide 5- <10% Alkyl dimethyl benzyl Ammonium chloride (C12-16) 1- <3% Octyl decyl dimethyl Ammonium chloride ethanol 1.728% ethanol 1-3% Lauramine Oxide 1-3% Didecyl dimethyl Ammonium chloride 0.864% Diocetyl dimethyl- ammonium chloride 0.864% Phosphoric acid <1%</p>	<p>Health Fire Reactivity</p>	<p>3 2 0</p>	<p>May be corrosive to eyes and can be severely irritating to skin. Harmful if absorbed through skin. Irritation of respiratory tract and possibly fatal under inhalation. Ingestion can cause nausea, vomiting and diarrhea. VOC (concentrate)= 0.72% VOC (minimum dilution)= 0.011% pH (concentrate)= 1.75-2.75 Percent Volatile by Volume: 93-94%</p>	
High Priority for Transition					

 <p>Virex II 256 Johnson Wax qt. bottle 6 per case HP Products</p>	<p>n-Alky Dimethyl Benzyl Ammonium chloride 8.190% Didecyl Dimethyl Ammonium chloride 8.704%</p>	<p>Health Fire Reactivity</p>	<p>3 0 0</p>	<p>Corrosive to eye (may cause permanent damage including blindness). Corrosive to skin and may cause permanent damage. May cause irritation and corrosive effects to nose, throat, and respiratory tract upon inhalation. May cause corrosive effects and burns to mouth, throat, and stomach. pH= 10-10.5</p> <p>High Priority for Transition</p>
 <p>SparCling Restroom Disinfectant Spartan Chemical Co. qt. bottle 12 per case Komro</p>	<p>Hydrochloric acid 5-10% Betaines 1-5% Bis(hydroxyethyl)tallow alkyl ----</p>	<p>Health Fire Reactivity</p>	<p>3 0 0</p>	<p>Combustion products are toxic. Acid action on most metals may release hydrogen, an explosive gas. pH < 1 Harmful if swallowed (nausea, vomiting, pain, and diarrhea), harmful or irritating if inhaled, and causes irreversible eye damage and skin burns.</p> <p>High Priority for Transition</p>

College Flex Crew

Disinfectants				
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards
 <p>Suprox-D • Hillyard Industries 1/2 gallon 6 per case Hillyard</p>	<p>Deionized Water 80-90% Hydrogen Peroxide <8% Alkyl dimethyl benzyl Ammonium chloride (C12-16) 2.304% Octyl decyl dimethyl Ammonium chloride ethanol 1.728% Lauramine Oxide 1-3% Didecyl dimethyl Ammonium chloride 0.864% Dioctydimethyl-ammonium chloride 0.864% Phosphoric acid <1%</p>	<p>Health Fire Reactivity</p>	<p>3 1 0</p>	<p>May be corrosive to eyes and can be severely irritating to skin. Harmful if absorbed through skin. Irritation of respiratory tract and possibly fatal under inhalation. Ingestion can cause nausea, vomiting and diarrhea. VOC (concentrate)= 0.72% VOC (minimum dilution)= 0.011% pH (concentrate)= 1.75-2.75 Percent Volatile by Volume: 93-94%</p> <p>High Priority for Transition</p>

College Dining Services

Disinfectants			
Product	Chemical Profile (MSDS)	HMIS Rating	Hazards
<p>Oasis 146 Multi-Quart Sanitizer</p> <p style="text-align: right;">Ecolab</p> 	<p>Alkyl (C14, 50%; C12, 40%; C16, 10%) 3%</p> <p>Dimethyl benzyl ammonium chloride</p> <p>Octyl decyl dimethyl ammonium chloride 2.25%</p> <p>Didecyl dimethyl ammonium chloride 1.35%</p> <p>Dioctyl dimethyl ammonium chloride .9%</p> <p>Alcohol 1-5%</p>	<p>Health (SOLD) 2</p> <p>Health (DILUTE) 0</p> <p>Fire 0</p> <p>Reactivity 0</p>	<p>As sold product causes serious eye damage, burning to skin, may result in respiratory irritation if inhaled, and is harmful if swallowed (may cause burns to mouth, throat and stomach).</p> <p>Diluted product causes eye irritation but has no known significant effects or critical hazards relating to skin contact, inhalation or ingestion.</p> <p>Lists toxicity of components.</p>
Medium Priority for Transition			
<p>Kool Klene</p> <p style="text-align: right;">Ecolab</p> 	<p>Glycerin 20-50%</p> <p>Isopropyl alcohol 5-20%</p> <p>Ethanolamine 1-5%</p> <p>Poly(oxy-1, 2-ethanediyl), .alpha.-undecyl-.omega.-hydroxy- 1-5%</p>	<p>Health 1</p> <p>Fire 2</p> <p>Reactivity 0</p>	<p>Moderately irritating to eyes, skins, and if inhaled.</p> <p>pH= 10.6 to 11.8</p>
Medium Priority for Transition			
<p>Red Sink Liquid Sanitizer (Cleaning Product)</p> <p style="text-align: right;">Kay Chemical Company</p>	<p>Quaternary ammonium compounds, c12-14-alkyl[(ethylphenyl)methyl] dimethyl, chlorides 5-20%</p> <p>Benzalkonium chloride 5-20%</p> <p>Alcohol 1-5%</p>	<p>Health 3</p> <p>Fire 0</p> <p>Reactivity 0</p>	<p>Is corrosive to eyes and skin, and causes burns to mouth, throat and stomach if ingested.</p> <p>pH= 6-8</p>
High Priority for Transition			

School Housekeeping

Disinfectants					
Product	Chemical Profile (MSDS)	HMIS Rating		Hazards	
Buckeye Eco Neutral Disinfectant 	Blend of dodecyl dimethyl and n-alkyl dimethyl benzyl ammonium chloride Soft Water <71.10% Alcohol ethoxylate <5.0% Ethylenediamine- tetraacetate acid <5.0% Perfume, coloring and additives <2.0%	Health Fire Reactivity	3 1 0	Corrosive. Causes irreversible eye damage and skin burns. Harmful if swallowed or inhaled. pH= 7.6	
High Priority for Transition					
Disinfecting wipe 	Octyl decyl dimethyl ammonium chloride 0.069% Dioctyl dimethyl ammonium chloride 0.028% Didecyl dimethyl ammonium chloride 0.042% Benzyl ammonium chloride 0.093% Other ingredients 99.768%	Health Fire Reactivity	1 1 0	May cause eye and skin irritation. Intentional misuse by concentrating and inhaling contents may be harmful or fatal. pH=12 This is an aerosol product.	
Low Priority for Transition					
Hand Sanitizer Gel 	Ethanol ---- Methanol ---- Water ----	NFPA Health Fire Reactivity	0 3 0	Direct contact with the eyes will cause pain and irritation. In halation of excessive vapors may cause headache and be irritating to the respiratory system. Ingestion may cause blindness, dizziness and fatigue.	
High Priority for Transition					
Liquid Antibacterial Soap 	Sulfuric acid ---- Monododecyl ester ---- Ammonium salt ---- Glycerol ---- Dodecanamide ---- Sodium lauryl ether sulfate ----	Health Fire Reactivity	3 0 0	Repeated or prolonged exposure may cause irritation or dermatitis. May cause moderate to severe irritation, with possibility of corneal injury. pH= 5.8-8.9	
High Priority for Transition					

<p>Lysol Brand II Disinfectant Spray </p>	<p>Carbon dioxide 4% Ethanol 79%</p>	<p>Health Fire Reactivity</p>	<p>1 3 0</p>	<p>Causes eye irritation. pH= 10 Aerosol spray.</p> <p>High Priority for Transition</p>
<p>Original Hand Sanitizer </p>	<p>Ethyl alcohol 65%</p>	<p>NFPA Health Fire Reactivity</p>	<p>2 3 0</p>	<p>Inhalation may cause irritation of the respiratory tract. May cause irritation to eyes. No expected cause skin irritation. Ethyl alcohol is a target of the central nervous system. Ethyl alcohol is a developmental toxin when consumed during pregnancy. pH= not available</p> <p>High Priority for Transition</p>
<p>Palmolive Antibacterial Dishwash Hand Liquid </p>	<p>3-Lauroylamidopropyl betaine 5-10% Sodium dodecyl benzene sulfonate 5-10% Ethanol 5-10% L(+)- Lactic acid 1-5% Sodium xylene sulfonate 1-5%</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>Causes eye irritation on direct contact. May cause skin irritation upon prolonged contact. Overexposure may cause respiratory tract irritation. Harmful if swallowed. pH= 3.25</p> <p>High Priority for Transition</p>
<p>Purell Instant Hand Sanitizer </p>	<p>Ethanol 62% Isopropanol <10% Purified water <30% Propylene glycol <1% Isopropyl myristate <1%</p>	<p>Health Fire Reactivity</p>	<p>-- -- --</p>	<p>May cause eye irritation. pH= 7.5-8.5</p> <p>High Priority for Transition</p>



APPENDIX G: About HMIS Ratings

HMIS III - HEALTH HAZARD RATINGS

* Chronic Hazard	Chronic (long-term) health effects may result from repeated overexposure
0 Minimal Hazard	No significant risk to health
1 Slight Hazard	Irritation or minor reversible injury possible
2 Moderate Hazard	Temporary or minor injury may occur
3 Serious Hazard	Major injury likely unless prompt action is taken and medical treatment is given
4 Severe Hazard	Life-threatening, major or permanent damage may result from single or repeated overexposures

HMIS III - FLAMMABILITY RATINGS

0 Minimal Hazard	Materials that will not burn
1 Slight Hazard	Materials that must be preheated before ignition will occur. Includes liquids, solids and semi solids having a flash point above 200 F. (Class IIIB)
2 Moderate Hazard	Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 F but below 200 F. (Classes II & IIIA)
3 Serious Hazard	Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)
4 Severe Hazard	Flammable gases, or very volatile flammable liquids with flash points below 73 F, and boiling points below 100 F. Materials may ignite spontaneously with air. (Class IA)

HMIS III - PHYSICAL HAZARD (formerly REACTIVITY) RATINGS

0 Minimal Hazard	Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.
1 Slight Hazard	Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.
2 Moderate Hazard	Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.
3 Serious Hazard	Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. Materials may polymerize, decompose, self-react, or undergo other chemical change at normal temperature and pressure with moderate risk of explosion.
4 Severe Hazard	Materials that are readily capable of explosive water reaction, detonation or explosive decomposition, polymerization, or self-reaction at normal temperature and pressure.

Source: <http://home.dtm.ciw.edu/resources-mainmenu-130/safety-mainmenu-189/hmis-ratings-mainmenu-197>



APPENDIX M: Disinfectants

General:

In Appendix F, disinfecting products were analyzed and the product information summarized. There are no relevant Green Seal (GS) or Underwriters Laboratory (UL) standards for this class of products.

In this section:

Efficacy of Asthma-Safe Disinfectants (developed by the Green Purchasing Institute, based on documents by manufacturers, EPA, and the California Department of Pesticide Regulation)

EPA Registered Hard Surface Disinfectants Comparison Chart

Efficacy of Asthma-Safe Disinfectants

Green Schools Initiative and Green Purchasing Institute developed this list of “asthma-safe” disinfectants based on a review of products that do not contain bleach, quaternary ammonium compounds, pine oil, or ortho-phenylphenol. The product tables are organized by “active ingredient.” This is a list of representative products, not an exhaustive list. For a fuller discussion of the health and environmental criteria used to review disinfectants see the *Green Schools Buying Guide* section on “Cleaners” at www.greenschools.net.

Efficacy Information for Antimicrobial Products Containing Accelerated Hydrogen Peroxide (AHP)					
Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Oxivir Tb (RTU, 0.5% AHP) ¹ This product has the same formulation and efficacy as Carpe Diem Tb and Accel Tb. This product is available as a pre-diluted liquid (EPA Reg. No. 70627-56) and wipes (EPA Reg. No. 70627-56)	<ul style="list-style-type: none"> • E. coli • Antibiotic-resistant Enterococcus faecalis (VRE) • Klebsiella pneumonia • Pseudomonas aeruginosa • Salmonella enterica • Staphylococcus aureus/MRSA) 			Sanitizing level	30 seconds
	<ul style="list-style-type: none"> • Acinetobacter baumannii • Clostridium difficile • E. coli • Enterococcus faecium/VRE • Pseudomonas aeruginosa • Salmonella enterica • Staphylococcus aureus/MRSA 	<ul style="list-style-type: none"> • Feline Calicivirus (surrogate for Norovirus) • Hepatitis B/C • Herpes Simplex • HIV-1 • Human Coronavirus • Influenza A (flu virus, surrogate for H1N1) • Poliovirus • Rhinovirus • Rotavirus 		Disinfection level	1 minute
	<ul style="list-style-type: none"> • Mycobacterium bovis (TB) 			Disinfection level	5 minutes
			<ul style="list-style-type: none"> • Athletes Foot Fungus 	Disinfection level	10 minutes

Oxivir Tb is a ready-to-use product containing 0.5% accelerated hydrogen peroxide (AHP) as the only active ingredient. This product is registered with CA DPR as a disinfectant, bactericide, and virucide. Fungi are also listed as a target pest. It carries a signal word of CAUTION.

The product is dispensed from a trigger spray bottle, which is sold in two sizes – 12 and 32 oz. It also is available as wipes. It is designed to be used on hard, non-porous surfaces such as vinyl, plastic, glazed ceramic, baked enamel, tile and porcelain; chrome, and laminated surfaces including walls, ceilings, tables, chairs, counter tops, telephones, fixtures, toilet exteriors, sinks, and shower stalls.



Heavily soiled areas should be pre-cleaned prior to application. Once sprayed on a surface, the surface should remain wet for 1 minute to kill bacteria and viruses, 5 minutes to kill Tb, and 10 minutes to kill fungi. After applications, wet surface areas can be wiped dry or be left to air-dry; rinsing is not required. This product should not be used to sanitize or disinfect food contact surfaces or items such as glassware, utensils, or dishes.²

Efficacy Information for Antimicrobial Products Containing Accelerated Hydrogen Peroxide (AHP)

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Oxivir Five 16 ³ Concentrate (4.25% AHP, diluted 1:16) EPA Reg. No. 70627-58	<ul style="list-style-type: none"> E. coli Enterococcus faecium Klebsiella pneumoniae Listeria monocytogenes Pseudomonas aureginos Salmonella Staphylococcus aureus 			Sanitizing level (99.9%)	3 minutes
	<ul style="list-style-type: none"> Acinetobacter baumannii E. coli Enterococcus faecium/VRE Klebsiella pneumoniae Listeria monocytogenes Pseudomonas aureginos Salmonella Shingella dysenteriae Staphylococcus aureus/MRSA Staphylococcus epidermidis/MRSE Streptococcus pyogenes 	<ul style="list-style-type: none"> Canine parvovirus Hepatitis B/C Herpes HIV-1 Human Coronavirus Influenza A (flu virus, surrogate for H1N1) Norovirus Para-influenza Poliovirus Respiratory Syncytial Virus Rotavirus Vaccina virus (smallpox) 		Disinfection level	5 minutes
				<ul style="list-style-type: none"> Athletes Foot Fungus Mildew 	Disinfection level

**The following CA-registered products have the same active ingredients and are expected to have equivalent efficacies: Carpe Diem Five 16*



Oxivir Five 16 is a concentrated product that contains 4.25% accelerated hydrogen peroxide (AHP). This product is registered with CA DPR as a disinfectant, bactericide, virucide, and fungicide. It is not approved to kill Tuberculosis. It is registered an antimicrobial cleaner, as its tests were conducted in the presence of 5% organic matter. It carries a signal word of CAUTION. It has a pH of 1.9 at the 1:16 dilution.

Oxivir Five 16 is available in portable Ready-to-Dispense (RTD) containers with hand-held automatic dilution equipment capable dispensing solutions at various concentrations, including 1:16 and 1:64 for two levels of disinfecting, 1:128 for sanitizing non-food-contact surfaces, and 1:256 for all-purpose cleaning. It can also be dispensed at the same concentrations through the JohnsonDiversey J-Fill and SmartDose automatic dilution systems, which are wall-mounted units.⁴ This product is registered for use on hard, non-porous surfaces such as floors, walls, stainless steel, glazed porcelain, and plastic surfaces in hospitals, nursing homes, schools, and commercial facility settings.

This product can be applied using a trigger spray bottle for disinfection and a mop for sanitizing and cleaning. The manufacturer recommends letting a surface remain wet for 5 minutes after application for disinfection, 3 minutes for sanitizing, and 10 minutes to kill fungi. After letting the surface remain wet for a specified dwell time, the product should be rinsed away or can be left to air-dry.⁵

Efficacy Information for Antimicrobial Products Containing Accelerated Hydrogen Peroxide (AHP)					
Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Alpha HP ⁶ Bathroom Disinfectant Concentrate (4.25% AHP, concentrate diluted 1:64) EPA Reg. No. 70627-54	<ul style="list-style-type: none"> E. coli Klebsiella pneumoniae Pseudomonas aureginosa Enterococcus faecalis (not VRE) Salmonella choleraesuis Staphylococcus aureus 			Sanitizing Level (99.9%)	3 minutes
	<ul style="list-style-type: none"> Pseudomonas aureginosa Salmonella choleraesuis Staphylococcus aureus 	<ul style="list-style-type: none"> HIV-1 	None listed	Disinfection level	1 minute
		<ul style="list-style-type: none"> Herpes simplex Influenza A (flu virus, surrogate for H1N1) 		Disinfection level	5 minutes
	<ul style="list-style-type: none"> Pseudomonas aureginosa Salmonella choleraesuis Staphylococcus aureus 			Disinfection level	10 minutes
Alpha HP ⁷ Bathroom Disinfectant Concentrate (4.25% AHP, concentrate diluted 1:128) EPA Reg. No. 70627-54	<ul style="list-style-type: none"> E. coli Klebsiella pneumoniae Pseudomonas aureginosa Enterococcus faecalis (not VRE) Salmonella choleraesuis Staphylococcus aureus 			Sanitizing Level (99.9%)	3 minutes
		<ul style="list-style-type: none"> Herpes simplex Influenza A (flu virus, surrogate for H1N1) 		Disinfection level	5 minutes
		<ul style="list-style-type: none"> HIV-1 	None listed	Disinfection level	1 minute

Alpha HP Bathroom Disinfectant Cleaner is a concentrated antimicrobial cleaning product containing 4.25% accelerated hydrogen peroxide (AHP). It is registered with CA DPR as a disinfectant, bactericide, and virucide. It has efficacy against a limited number of bacteria and viruses that are typically found in restrooms. It is not registered as a fungicide or tuberculocide. It carries a signal word of DANGER but is much less hazardous when it is diluted at varying strengths for use as a disinfectant, sanitizer or general purpose cleaner.

This product is available in portable Ready-to-Dispense (RTD) containers with hand-held automatic dilution equipment capable creating solutions of various concentrations, including 1:64 for disinfecting, 1:128 for sanitizing non-food-contact surfaces, and 1:256 for all-purpose cleaning.⁸ The manufacturer recommends using it on hard, non-porous surfaces such as mirrors, glass, sinks, faucets, tubs, glazed tiles/ceramic/porcelain, chrome and stainless steel in bathrooms, nursing homes, and hospital settings. It can be applied using trigger spray bottles for disinfection at a 1:64 dilution. At a 1:128 dilution, it can be applied using a trigger spray bottle or dispensed into a bucket and applied with a mop for sanitizing larger surfaces such as restroom floors. This product has dwell times ranging from 3 minutes for basic bacterial sanitizing to 5-10 minutes for disinfecting against a broader range of bacteria and viruses. This product can be wiped off or left to air-dry after application and should not be used on surfaces with food contact.⁹

Efficacy Information for Antimicrobial Products Containing Hydrogen Peroxide

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Envirox Concentrate 118 ¹⁰ (3.95% Hydrogen Peroxide diluted 10 oz per gallon or 1:12.8) EPA Reg. No. 69268-2	<ul style="list-style-type: none"> • E. coli • Klebsiella pneumoniae • Salmonella choleraesuis • Staphylococcus aureus (not MRSA) • Streptococcus faecalis 	<ul style="list-style-type: none"> • Hepatitis B • Herpes • HIV-1 • Influenza A (flu virus) 	None listed	99.99% (of bacteria) 99.9% (of viruses)	5 minutes



Envirox Concentrate 118 is a concentrated product containing 3.95% hydrogen peroxide that is designed to be diluted 10 ounces per gallon (1:12.8). It is registered with CA DPR as a disinfectant, but not as a fungicide or virucide. Bacteria and viruses are listed as target pests on its EPA label. It carries a signal word of CAUTION.

This concentrated product is designed to be automatically diluted using the Envirox Eco-Blend Wall Mount Dispenser and Eco-Blend Hand-held Dispenser. However, because it is sold in an open container, it can be poured directly into a mop bucket or spray bottle, which may result in misuse. For manual dilution, Envirox supplies a Bucket Buddy tool that can be used on trigger spray bottles, mop buckets, and gallon containers to measure the correct amount of product.

The product label recommends using this product on hard, non-porous surfaces such as: walls, stalls, floors, sinks, fixtures, counters, toilets, and carpet for spot treatment and cleaning. According to its label, this product can be used as a bacterial sanitizer and virucide by applying to pre-cleaned surfaces with a mop, sponge or cloth. The surface should remain wet with the solution for 5 minutes and then either wiped away to remove excess liquid or left to air-dry.¹¹

Efficacy Information for Antimicrobial Products Containing Hydrogen Peroxide

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
H2Orange2 120 One ¹² (RTU, 1% Hydrogen Peroxide) EPA Reg. No. 69268-3	<ul style="list-style-type: none"> • E. coli • Klebsiella pneumoniae • Pseudomonas aeruginosa • Salmonella choleraesuis • Staphylococcus aureus (not MRSA) • Streptococcus faecalis 	<ul style="list-style-type: none"> • HIV-1 • Influenza A (flu virus) 	<ul style="list-style-type: none"> • Athletes Foot Fungus* 	99.9% (of bacteria) 99.99% (of Influenza A virus)	5 minutes

H2Orange2 One is a ready-to-use product containing 1% hydrogen peroxide. It is registered with CA DPR as a bacterial disinfectant and virucide. Its DPR label also includes fungi as a target pest. It carries a CAUTION signal word. H2Orange2 One is sold in trigger spray bottles. The manufacturer recommends using it on hard, non-porous surfaces including: sinks, faucets, counters, toilets, wall, stalls, and floors in bathroom and institutional settings. For bacterial sanitizing and killing viruses and fungi, the product label recommends spraying pre-cleaned surfaces and allowing it to remain wet for 5 minutes before wiping away excess liquid. After application, the surface can be left to air-dry; rinsing is not required.¹³



Efficacy Information for Antimicrobial Products Containing Thymol

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Benefect Broad Spectrum Disinfectant (RTU, 0.23% Thymol) ¹⁴ EPA Reg. 84683-3 (liquid) and 84683-4 (wipes)	<ul style="list-style-type: none"> • E. coli • Pseudomonas aeruginosa • Salmonella enterica • Staphylococcus aureus (not MRSA) 	<ul style="list-style-type: none"> • HIV-1 • Influenza A (flu virus, surrogate for H1N1)¹⁵ 	<ul style="list-style-type: none"> • Athletes Foot Fungus 	99.99%	10 minutes
	Mycobacterium (TB)			99.99%	5 minutes



Benefect is an EcoLogo-certified, broad-spectrum disinfectant that lists 0.23% thymol as its only active ingredient. It is registered by the CA DPR as a bactericide, virucide and fungicide. It can kill both Athletes Foot Fungus and TB. However, it does not have demonstrated efficacy against antibiotic-resistant bacteria (such as MRSA or VRE) and has only limited efficacy against viruses. This product is available as a liquid and wipes; it must be left on surfaces for at least 10 minutes to kill most organisms. However, according to the manufacturer of this product, it does not need to be rinsed or wiped off after being applied. It is marketed for use on countertops, sinks, toilet seats, diaper pails and changing areas, toys, sports equipment and carpeting in schools, daycare centers, nurseries, fitness gyms, hospitals, nursing homes, hotels and restaurants. The manufacturer also claims that it can be used in food preparation areas because it is a botanical product.¹⁶

Efficacy Information for Antimicrobial Products Containing Thymol

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Cleanwell Daily/ Weekly/ Monthly Cleaner (RTU, 0.05% Thymol)* ¹⁷ EPA Reg. No. 84683-3-86066	<ul style="list-style-type: none"> • E. coli • Pseudomonas aeruginosa • Salmonella choleraesuis • Staphylococcus aureus (not MRSA) 	<ul style="list-style-type: none"> • HIV-1 • Influenza A (flu virus, surrogate for H1N1) • Rhinovirus 37 	None listed.	99.99%	10 minutes

**This is the same formulation as Seventh Generation's Disinfecting Bathroom Cleaner.*

Cleanwell Daily Cleaners are ready-to-use solutions that are marketed to the consumer and institutional marketplaces. They registered as bactericides and virucides by the CA DPR but are not registered against fungi or Tb.



According to the product label for Seventh Generation Disinfecting Multi-Surface Cleaner, it “cleans, disinfects, and deodorizes” and is “suitable for use on all hard, nonporous surfaces where bacteria or unpleasant odors are a concern including: children’s toys, garbage cans, appliances, countertops, high chairs and changing tables.... To disinfect: (1) Wet the surface with the spray; (2) Leave for 10 minutes. Allow to air-dry. No rinsing or wiping is required, except on direct food contact surfaces which require a potable water rinse after treatment. For heavily soiled or greasy areas, pre-cleaning is required.”

Efficacy Information for Antimicrobial Products Containing Thymol and Citric Acid

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
	<ul style="list-style-type: none"> E. coli Staphylococcus aureus (not MRSA) 			99.9%	1 minute
Sol-U-Guard 2X Botanical Disinfectant* (concentrate; 0.092% Thymol + 4% Citric acid) ¹⁸ EPA Reg. No. 66251-2	<ul style="list-style-type: none"> Pseudomonas aeruginosa Salmonella enterica Streptococcus pyogenes (Strep) 	<ul style="list-style-type: none"> Influenza A (flu virus, surrogate for H1N1) Poliovirus 1 Rhinovirus 37 	None listed.	99.9%	10 minutes

**This product is also called SBT 2 to 1 Concentrate.*



Sol-U-Guard is a concentrated disinfectant that contains both thymol and citric acid. It is registered as a disinfectant but does not have demonstrated efficacy against antibiotic-resistant bacteria such as MRSA or VRE. It also is not registered to kill fungi (such as Athletes Foot Fungus), Tb, or Hepatitis viruses. This product has a dwell time of 10 minutes for most organisms. According to the marketing material for this product, “The Sol-U-Guard Botanical 2x formula is the first EPA approved disinfectant to combine thymol and citric acid as active ingredients. Together these proven botanical disinfectants kill over 99.9%* of common household germs on hard, nonporous surfaces, some in as little as 1 minute.”¹⁹

Efficacy Information for Antimicrobial Products Containing Citric Acid

Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Clean-Cide ²⁰ [0.6%, RTU liquid] EPA Reg. No. 34810-35	<ul style="list-style-type: none"> E. coli Enterococcus faecalis Vancomycin/VRE Listeria monocytogenes Pseudomonas aeruginosa Salmonella choleraesuis Staphylococcus aureus/MRSA Staphylococcus epidermis/MRSE Mycobacterium bovis (TB) Acinetobacter baumannii 	<ul style="list-style-type: none"> Adenovirus Feline Calicivirus (surrogate for Norovirus) Herpes HIV-1 Influenza A (flu virus) Respiratory Syncytial virus Rotavirus Vaccina virus Canine Parvovirus Hepatitis B Poliovirus 	<ul style="list-style-type: none"> Athletes Foot Fungus 	Disinfectant level	5 minutes
				Disinfectant level	10 minutes

Clean-Cide Ready to Use Germicidal Detergent is a ready-to-use disinfecting cleaner with 0.6% citric acid. Citric acid is the only active ingredient reported by CA DPR for this product, and there are no hazardous ingredients listed on its MSDS.²¹ It is registered with CA DPR as a bactericide, virucide and fungicide, and according to US EPA, it is effective against a broad range of bacteria (including antibiotic-resistant strains such as MRSA and VRE), TB, and viruses, except Hepatitis C.²² A technical information sheet for Clean-cide states that it is formulated to clean and disinfect, meets OSHA Requirements for Bloodborne Pathogens, and is effective against both gram-negative and gram-positive bacteria.²³ It is not approved for use on food-contact surfaces.



Clean-Cide is available as a liquid and wipes. According to the product label instructions, the liquid must be applied at full strength to previously cleaned, hard, non-porous surfaces with a cloth, mop or brush, or by immersing equipment to be disinfected.²⁴ "The surface must remain wet with Clean-Cide for at least 10 minutes. Wipe or let air dry."²⁵

This product is approved for use in California generally on non-porous surfaces and specifically in veterinary hospitals, nursing homes, food processing/handling facilities (only on non-food contact surfaces), and household sickrooms as well as on hospital critical/semi-critical items.²⁶

Efficacy Information for Antimicrobial Products Containing Citric Acid + Silver Ions					
Product	Bacteria	Viruses	Fungi	Kill Rate	Dwell Time
Envirox Critical Care* (RTU, 4.84% citric acid + 0.003% silver ions)	<ul style="list-style-type: none"> • Listeria monocytogenes • Pseudomonas aeruginosa • Salmonella choleraesuis • Staphylococcus aureus 	<ul style="list-style-type: none"> • HIV-1 		Disinfectant level	30 seconds
		<ul style="list-style-type: none"> • Herpes 		Disinfectant level	1 minute
Various products have different EPA registration numbers	<ul style="list-style-type: none"> • MRSA • VRE 			Disinfectant level	2 minutes
		<ul style="list-style-type: none"> • Influenza A • Rhinovirus • Polio Type 2 	<ul style="list-style-type: none"> • Athletes Foot Fungus 	Disinfectant level	10 minutes

*The following CA-registered products have the same active ingredients and are expected to have equivalent efficacies: Clean Kill 30, Duraclean, Germ Control 24 – Silver Formula, One Shot Plus, PureGreen24, Spectrum 24, Staph Attack and Staph Control.

RECOMMENDED FOR LIMITED USE. Silver ions stabilized with citric acid are found in antimicrobial surface cleaning products used as broad spectrum disinfectants and non-food contact sanitizers. These products are capable of killing bacteria, viruses and fungi on hard, nonporous surfaces. They are approved for use in hospitals, schools and office buildings as well as other commercial and residential settings. They are also EPA-registered for use on toys.



As of September 2009, there were nine products containing silver ions and citric acid as active ingredients registered for use in California by the CA DPR. They are all ready-to-use products that contain 0.003% silver (ionic or metallic) and 4.84% citric acid, and can be applied by spraying, washing, soaking or dipping.

Although it can kill some pathogens (such as HIV and “Staph” bacteria) in as little as 30 seconds, the typical citric acid-stabilized silver ion surface disinfectant needs to be left on surfaces (dwell) for 10 minutes to kill other viruses (such as Rhinovirus and Influenza A, which can cause colds and flu) and fungi (such as the fungus that causes Athlete’s Foot). None of these products are found on EPA’s lists of antimicrobial products capable of killing Tuberculosis (TB)²⁷ or Hepatitis²⁸.

One of the primary benefits of silver is that because metals are inherently persistent, the antimicrobial effects of silver ions can last long after they have been applied. The CDC cited a “comparative evaluation of six disinfectant formulations for residual antimicrobial activity [that] demonstrated that only the silver disinfectant demonstrated significant residual activity against *S. aureus* and *P. aeruginosa*.”²⁹ According to manufacturers, SDC-containing products have “24 hour residual effectiveness” and a shelf life of several years. Disinfectants containing silver ions may also be useful in case of a MRSA outbreak because of its short, 2-minute dwell time against antibiotic-resistant bacteria. However, because this product is only available in a ready-to-use formulation that are typically packaged in spray bottles, it would be most practical and cost-effective for use on small “touch-point” surfaces such as sinks, restroom door handles, etc.

¹ JohnsonDiversey, Inc., 2008. *Oxivir Tb Product Information*, 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

² US EPA, 2009. *Pesticide Product Label System Product Label Information for Oxivir Tb (EPA #70627-56)*; 7/9/09; <http://oaspub.epa.gov/pestlabl/Ppls.getimage?imgid=198577>.

³ JohnsonDiversey, Inc., 2008. *Oxivir Five 16 Product Information*; 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

⁴ JohnsonDiversey, Inc., 2009. *J-Fill Dispensing System Product Information*, 2009; <http://www.johnsondiversey.com/Cultures/en-US/OpCo/Products+and+Systems/Categories/JWP+HK+US+CMS+JFill.htm>.

⁵ JohnsonDiversey, Inc., 2009. *Oxivir Five 16 Concentrate Specification Sheet*, 2009; http://www.johnsondiversey.com/wcmt/ProductAttachments/en-US/PIS/SPC750_OxivirFive16.pdf.

⁶ JohnsonDiversey, Inc., 2008. *Oxivir Five 16 Product Information*; 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

⁷ JohnsonDiversey, Inc., 2008. *Oxivir Five 16 Product Information*; 2008; http://www.ahptechnology.com/products/disinfectants/united_states_disinfectants.

⁸ JohnsonDiversey, Inc., 2009. *J-Fill Dispensing System Product Information*, 2009; <http://www.johnsondiversey.com/Cultures/en-US/OpCo/Products+and+Systems/Categories/JWP+HK+US+CMS+JFill.htm>.

⁹ US EPA, 2009. *Pesticide Product Label System Product Label for Alpha HP (EPA #70627-54)*; 3/18/2009; <http://oaspub.epa.gov/pestlabl/Ppls.getimage?imgid=196553>.

¹⁰ Envirox, LLC, 2007. *Envirox Concentrate 118 Product Information*; 2007; <http://www.h2orange2.com/products-genl-pur-cleaning.asp>. <http://www.h2orange2.com/products-genl-pur-cleaning.asp>

¹¹ Envirox, LLC, 2008. *Envirox Concentrate 118 Total Facility Care Pamphlet*; 2008; http://www.h2orange2.com/docs/Literature/EVX_TriadREV_082508.pdf.

¹² Envirox, LLC, 2007. *H2Orange2 One Product Information*; 2007; <http://www.h2orange2.com/products-genl-pur-cleaning.asp>.

¹³ US EPA, 2005. *Pesticide Product Label System Product Label for H2Orange2 One (EPA #69268-3)*; 6/7/06; <http://oaspub.epa.gov/pestlabl/Ppls.getimage?imgid=178960>.

¹⁴ Sensible Life Products, 2008. *Benefect Botanical Disinfectant Efficacy*, <http://www.benefect.com/usa/products/efficacy.htm>.

¹⁵ The efficacy data sheet on this company’s website does not include Influenza A; however, it is included on the US EPA’s list of products with efficacy against the flu virus. For a full list, go to US Environmental Protection Agency, Office of Pesticide Programs, *Antimicrobial Products Registered for Use Against Influenza A Virus on Hard Surfaces*, April 28, 2009, <http://www.epa.gov/oppad001/influenza-a-product-list.pdf>.

¹⁶ Sensible Life Products, *Benefect Botanical Disinfectant*, <http://www.benefect.com/usa/products/disinfectants.htm>.

¹⁷ Cleanwell Company 2005. *Cleanwell Ingenium™ Laboratory Validation: AOAC Germicidal Spray Method and Virucidal Efficacy for Use on Inanimate Environmental Surfaces (Confidential)*,

¹⁸ Melaleuca, Inc., 2009. *Sol-U-Guard Botanical® 2x Concentrate*, undated website viewed on September 15, 2009, <http://www.saferforyourhome.com/sol-u-guard.htm#effective>.

¹⁹ Melaleuca, Inc., *Solu-U-Guard Botanical 2X Disinfectant*, 2009; <http://www.melaleuca.com/ProductStore/Product.aspx?sku=4020>.

²⁰ US EPA Pesticide Product Label System, Wexford Labs, Inc. Label for Clean-Cide; see EPA # 34810-35 <http://oaspub.epa.gov/pestlabl/ppls.srchreslt>

²¹ Wexford Labs, Inc., 2009, *Material Safety Data Sheet Clean-Cide [0.6%]*, 2/17/2009, www.wexfordlabs.com/techdata/cleancide%20rtu%20msds.pdf

²² US EPA 2009, *EPA’s Registered Sterilizers, Tuberculocides, and Antimicrobial Products Against Certain Public Health Bacteria and Viruses*, 1/9/09, <http://www.epa.gov/oppad001/chemregindex.htm>,

²³ Wexford Labs, Inc., undated. *Clean-Cide Ready to Use Product Information Sheet*, viewed on 11/19/09; http://www.wexfordlabs.com/pdf/tds_cleancide.pdf.

²⁴ US EPA. Pesticide Product Label System, Wexford Labs, Inc. Label for Clean-Cide; see EPA # 34810-35 <http://oaspub.epa.gov/pestlabl/ppls.srchreslt>

²⁵ US EPA. Pesticide Product Label System, Wexford Labs, Inc. Label for Clean-Cide; see EPA # 34810-35 <http://oaspub.epa.gov/pestlabl/ppls.srchreslt>

²⁶ CA DPR, 2007. Pesticide label information for Clean-Cide, 4/1/07; <http://apps.cdpr.ca.gov/cgi-bin/label/label.pl?typ=pir&prodno=56090>.

²⁷ US Environmental Protection Agency, Office of Pesticide Programs, *List B: Registered Tuberculocide Products Effective Against Mycobacterium tuberculosis*, January 9, 2009; http://www.epa.gov/oppad001/list_b_tuberculocide.pdf.

²⁸ US Environmental Protection Agency, Office of Pesticide Programs, *List B: Registered Tuberculocide Products Effective Against Mycobacterium tuberculosis*, January 9, 2009;

²⁹ Bradley MJ, Lisay CM, Yurkovetsky AV, Sawan SP. Persistent silver disinfection for the environmental control of pathogenic bacteria, *American Journal of Infection Control*, 2003; 31:208-214 cited in CDC 2008.

EPA Registered Hard Surface Disinfectants Comparison Chart

Active Ingredient in Institutional Disinfectant Products	Bleach- Sodium Hypochlorite 5.25% (bleach concentrate)	Phenols	Quaternary Ammonium Compounds	Accelerated Hydrogen Peroxide (hydrogen peroxide /anionic surfactants)	Botanicals Example- Benefect – Thymol	Silver Dihydrogen Citrate Example - PureGreen 24
Product Description	<ul style="list-style-type: none"> EPA registered chlorine bleach at a 5.25% dilution. (Use only EPA registered products for disinfecting purposes.) 	<ul style="list-style-type: none"> Ready-to-use. Usually an aerosol product. Warning – not intended for use as an air freshener. 	<ul style="list-style-type: none"> Range of products that use “quats” as the active ingredients. 	<ul style="list-style-type: none"> Hydrogen peroxide in synergy with a blend of commonly used ingredients. 	<ul style="list-style-type: none"> Plant based products with natural disinfecting characteristics. 	<ul style="list-style-type: none"> Combination of citric acid and a minute amount of silver ions.
CDC Disinfection Level	<ul style="list-style-type: none"> Intermediate Level Disinfectant 	<ul style="list-style-type: none"> Some are intermediate some are low level - noted on label. 	<ul style="list-style-type: none"> Low Level Disinfectant 	<ul style="list-style-type: none"> Product Specific Low or Intermediate Level Disinfectant 	<ul style="list-style-type: none"> Intermediate Level Disinfectant 	<ul style="list-style-type: none"> Low Level Disinfectant
EPA Toxicity Category See Chart Below	<ul style="list-style-type: none"> Category I 	<ul style="list-style-type: none"> Category I or II 	<ul style="list-style-type: none"> Category III 	<ul style="list-style-type: none"> Category III or IV, product specific. 	<ul style="list-style-type: none"> Category IV 	<ul style="list-style-type: none"> Category IV
Pre-cleaning Needed	<ul style="list-style-type: none"> Surfaces must be pre-cleaned.¹ Best practices advise pre-cleaning all surfaces before disinfecting. 	<ul style="list-style-type: none"> Surfaces must be pre-cleaned.² Best practices advise pre-cleaning all surfaces before disinfecting. 	<ul style="list-style-type: none"> Product specific. Some products registered as one-step disinfectant cleaners. Best practices advise pre-cleaning all surfaces before disinfecting. 	<ul style="list-style-type: none"> Registered as one-step disinfectant cleaners. Best practices advise pre-cleaning all surfaces before disinfecting. 	<ul style="list-style-type: none"> Surfaces must be pre-cleaned according to label instructions. Best practices advise pre-cleaning all surfaces before disinfecting. 	<ul style="list-style-type: none"> Surfaces must be pre-cleaned according to label instructions. Best practices advise pre-cleaning all surfaces before disinfecting.

Active Ingredient in Institutional Disinfectant Products	Bleach- Sodium Hypochlorite 5.25% (bleach concentrate)	Phenols	Quaternary Ammonium Compounds	Accelerated Hydrogen Peroxide (hydrogen peroxide /anionic surfactants)	Botanicals Example- Benefect – Thymol	Silver Dihydrogen Citrate Example - PureGreen 24
Storage	<ul style="list-style-type: none"> If used for disinfecting purposes, bleach should not be stored longer than 3 months. When mixed with water the solution is only effective as a disinfectant for 24 hours.³ 	<ul style="list-style-type: none"> Stable in storage. Flammable if in aerosol form.⁴ 	<ul style="list-style-type: none"> Stable in storage. 	<ul style="list-style-type: none"> Stable in storage. 2 year shelf life. 	<ul style="list-style-type: none"> Stable in storage. 2 year shelf life. 	<ul style="list-style-type: none"> Stable in storage. No expiration date required.
Effectiveness	<ul style="list-style-type: none"> Effective against most bacteria and some viruses and is registered as effective against HIV, HBV, H1N1 (Influenza A), MRSA and TB.⁵ See notes below 	<ul style="list-style-type: none"> Read product label for effectiveness against specific microbes. 	<ul style="list-style-type: none"> Generally effective against a broad spectrum of microbes including MRSA and H1N1 (Influenza A), but typically not proven effective against spores. Read product label for effectiveness against TB. 	<ul style="list-style-type: none"> Effective against a broad spectrum of microbes including H1N1 (Influenza A), norovirus and MRSA. Read product label for specific claims including TB. 	<ul style="list-style-type: none"> Effective against a broad spectrum of microbes including H1N1 (Influenza A). TB and MRSA. Read product label. 	<ul style="list-style-type: none"> Effective against a broad spectrum of microbes including MRSA, norovirus and H1N1 (Influenza A). Read product label.
Dwell Time	<ul style="list-style-type: none"> 5-10 minute dwell time. (Read the label for specific 	<ul style="list-style-type: none"> Generally 10 minute dwell time. (Read the label 	<ul style="list-style-type: none"> Generally 10 minute dwell time. (Read the label 	<ul style="list-style-type: none"> 1 - 10 minute dwell time. (Read the label for specific 	<ul style="list-style-type: none"> 10 minute dwell time. (Read the label for specific 	<ul style="list-style-type: none"> 30 second to 10 minute dwell time. (Read the label

Active Ingredient in Institutional Disinfectant Products	Bleach- Sodium Hypochlorite 5.25% (bleach concentrate)	Phenols	Quaternary Ammonium Compounds	Accelerated Hydrogen Peroxide (hydrogen peroxide /anionic surfactants)	Botanicals Example- Benefect – Thymol	Silver Dihydrogen Citrate Example - PureGreen 24
	recommended dwell times.)	for specific recommended dwell times.)	for specific recommended dwell times.)	recommended dwell times.)	recommended dwell times.)	for specific recommended dwell times.)
Health Effects	<ul style="list-style-type: none"> • Mixing with ammonia, ammonium quaternary compounds and other acidic products can create poisonous gas.⁶ • Corrosive to eyes and skin, and a respiratory irritant.⁷ • Suspected cardiovascular, gastrointestinal or liver, kidney, central nervous system, respiratory, and skin or sense organ toxicant.⁸ 	<ul style="list-style-type: none"> • Phenols are recognized carcinogens (CA Prop. 65), suspected cardiovascular, developmental neurological, reproductive, respiratory, skin and sense organ toxicant.⁹ • Corrosive to eyes and skin.¹⁰ • Absorbed through the skin and by inhalation.¹¹ 	<ul style="list-style-type: none"> • Can cause contact dermatitis and nasal irritation.¹² Ammonium quaternary compounds including benzalkonium chloride, dodecyl-dimethyl-benzyl ammonium chloride and lauryl dimethyl benzyl ammonium chloride are respiratory sensitizers, and are associated with asthma.¹³ 	<ul style="list-style-type: none"> • Some products using this technology have been third-party certified by EcoLogo to meet environmental and human health criteria. (EPA does not allow eco labels on disinfectants.) 	<ul style="list-style-type: none"> • No warning or first aid statements are required on the material safety data sheet. • The botanical oils in the product are either F.D.A (Food and Drug Administration) approved as Food Additives or on the United States G.R.A.S. (Generally Recognized as Safe) list. • Third-party certified by EcoLogo to meet environmental and human health criteria. (EPA does not allow eco labels on disinfectants.) 	<ul style="list-style-type: none"> • No warning or first aid statements are required on the label.
Exposure	<ul style="list-style-type: none"> • Personal 	<ul style="list-style-type: none"> • Requires 	<ul style="list-style-type: none"> • Requires 	<ul style="list-style-type: none"> • No special 	<ul style="list-style-type: none"> • No special 	<ul style="list-style-type: none"> • No special

Active Ingredient in Institutional Disinfectant Products	Bleach- Sodium Hypochlorite 5.25% (bleach concentrate)	Phenols	Quaternary Ammonium Compounds	Accelerated Hydrogen Peroxide (hydrogen peroxide /anionic surfactants)	Botanicals Example- Benefect – Thymol	Silver Dihydrogen Citrate Example - PureGreen 24
Controls	<p>protection equipment and/or increased ventilation should be used.¹⁴</p> <ul style="list-style-type: none"> • See notes below. 	<p>personal protection equipment and increased ventilation.¹⁵</p> <ul style="list-style-type: none"> • See notes below. 	<p>personal protection equipment and proper ventilation.</p> <ul style="list-style-type: none"> • See notes below. 	<p>requirements.</p> <ul style="list-style-type: none"> • Regular ventilation is adequate. • See notes below. 	<p>requirements.</p> <ul style="list-style-type: none"> • Regular ventilation is adequate. • See notes below. 	<p>requirements.</p> <ul style="list-style-type: none"> • Regular ventilation is adequate. • See notes below.
Environmental Issues Pros and Cons	<ul style="list-style-type: none"> • Toxic to aquatic organisms.¹⁶ 	<ul style="list-style-type: none"> • Toxic to aquatic organisms.¹⁷ • Considered a persistent bio accumulative toxin by EPA.¹⁸ • Disposal restrictions in some states. Check state and local regulations. 	<ul style="list-style-type: none"> • Very toxic to aquatic life.¹⁹ Also see Material Safety Data Sheet. • Associated with antimicrobial resistance.²⁰ 	<ul style="list-style-type: none"> • Some products using this technology have been third-party certified by EcoLogo to meet environmental and human health criteria. (EPA does not allow eco labels on disinfectants.) 	<ul style="list-style-type: none"> • Third-party certified by EcoLogo to meet environmental and human health criteria. (EPA does not allow eco labels on disinfectants.) 	<ul style="list-style-type: none"> • Listed on the Grassroots Environmental Education’s ChildSafe Products List. See http://www.thechildsafeschool.org/pdf/CSGre v308.pdf for inclusion criteria.
Additional Dis-advantages	<ul style="list-style-type: none"> • May damage floor finishes, carpets, clothing and other fibers when used in higher concentrations. • Has an 	<ul style="list-style-type: none"> • Not for use on food or food utensils.²³ • May damage floor finishes and other surfaces. • Caution: Do 	<ul style="list-style-type: none"> • Thorough rinsing required. See product label for specifics. 	<ul style="list-style-type: none"> • Rinsing is required where direct skin or oral contact can occur (children’s toys). 	<ul style="list-style-type: none"> • Not yet widely available through vendors, may need to be ordered. • Strong odour. 	<ul style="list-style-type: none"> • Not yet widely available through vendors, may need to be ordered.

Active Ingredient in Institutional Disinfectant Products	Bleach- Sodium Hypochlorite 5.25% (bleach concentrate)	Phenols	Quaternary Ammonium Compounds	Accelerated Hydrogen Peroxide (hydrogen peroxide /anionic surfactants)	Botanicals Example- Benefect – Thymol	Silver Dihydrogen Citrate Example - PureGreen 24
	<p>unpleasant odor.</p> <ul style="list-style-type: none"> • Must be stored separately from ammonia and flammable products.²¹ • Rinsing is required in applications where direct skin or oral contact can occur (children's toys).²² 	<p>not use around babies and small children.²⁴</p> <ul style="list-style-type: none"> • Generally leaves a residue so rinsing is required. 				
Advantages	<ul style="list-style-type: none"> • Inexpensive. • Easy to purchase. • The same product can be used for routine and special event tasks, by changing the concentration. 	<ul style="list-style-type: none"> • Readily available. 	<ul style="list-style-type: none"> • Readily available. 	<ul style="list-style-type: none"> • Readily available. • Non-corrosive in diluted form. • No rinsing required except as above. • Some products are odourless. 	<ul style="list-style-type: none"> • Non-corrosive. • No rinsing or wiping required. • Approved by the Canadian Food Inspection Agency for use in Food Processing. • Suitable for use on children's toys. 	<ul style="list-style-type: none"> • No rinsing required. • Non-corrosive. • Odourless. • EPA registered for use on toys. • 24 hour residual protection.

***Notes:**

1. **Pre-Cleaning** - Except for disinfectant cleaners that are tested to disinfect in the presence of 5% of organic matter, all other disinfectants require pre-cleaning. Best practices recommend cleaning first and then disinfecting for optimal efficiency.

2. **Dwell Time** – is product specific. All disinfectants are tested and labeled for the specific amount of time they must be in contact with the surface to kill the microbes. The times listed here are approximate only.
3. **Personal Protective Equipment** - may be required for the concentrated form of some products, but not for the *Ready to Use* (pre-diluted form). Check the label and the Material Safety Data Sheet (MSDS).
4. **pH**. pH is a measure of how acidic or basic a product is. Look for products with a neutral pH of 7 or as close to this number as possible.
5. **Information** is from material safety data sheets, Scorecard at <http://www.scorecard.org/chemical-profiles/>, Pesticide Action Network's Pesticide Database and product information sheets.
6. **Costs** - When comparing costs, life cycle costs must be considered. Although a product may be less expensive to buy, its negative impact on surface materials may require replacing hard surfaces more frequently, may increase worker's compensation claims and may cause environmental damage.

CDC Definition of 3 Levels of Disinfection - means the use of a chemical procedure that eliminates virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial endospores) on inanimate objects:

1. *High-level disinfection* - kills all organisms, except high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by FDA. Typically not used for generalized disinfecting.
2. *Intermediate-level disinfection* - kills mycobacterium, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by EPA.
3. *Low-level disinfection* - kills some viruses and bacteria with a chemical germicide registered as a hospital disinfectant by the EPA.

EPA Toxicity Categories Require These Warnings:

Signal Word	Category	Oral Lethal Dose
DANGER, POISON (skull and crossbones)	I Highly toxic	A few drops to a teaspoonful
WARNING	II Moderately toxic	Over a teaspoonful to one ounce
CAUTION	III Slightly toxic	Over one ounce to one pint
CAUTION	IV Relatively non-toxic	Over one pint to one pound
¹ Based on a 150-pound person.		

¹ A. Culver, M. Feinberg et.al. Cleaning for Health Products and Practices for a Safer Indoor Environment. 2002. INFORM Inc. <http://informinc.org/cleanforhealth.php>.

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- ² See specific product information sheet.
- ³ University of Oklahoma Health Sciences Environmental Health and Safety Office Saf-T-Gram. Letter from the Clorox Company. <http://www.ouhsc.edu/ehso/saf-t-gram/Spring01.pdf>.
- ⁴ Material Safety Data Sheet. <http://www.spartanchemical.com/sfa/MSDSRep.nsf/0/ebe0e15bf7c02fc285256ea0005451f3!OpenDocument>.
- ⁵ EPA, Selected EPA Registered Disinfectants. <http://www.epa.gov/oppad001/chemregindex.htm>.
- ⁶ Agency for Toxic Substances & Disease Registry (ATSDR) (2007). *Medical Management Guidelines for Calcium Hypochlorite and Sodium Hypochlorite*. <http://www.atsdr.cdc.gov/MHMI/mmg184.html>.
- ⁷ Clorox Bleach Material Safety Data Sheet <http://www.thecloroxcompany.com/products/msds/bleach/cloroxregularbleach0505.pdf>. Agency for Toxic Substances & Disease Registry (ATSDR) (2007). *Medical Management Guidelines for Calcium Hypochlorite and Sodium Hypochlorite*. <http://www.atsdr.cdc.gov/MHMI/mmg184.html>.
- ⁸ Scorecard, Chemical Profiles. <http://www.scorecard.org/chemical-profiles/>.
- ⁹ Scorecard, Chemical Profiles. <http://www.scorecard.org/chemical-profiles/>.
- ¹⁰ Material Safety Data Sheets.
- ¹¹ Material Safety Data Sheets.
- ¹² Guidelines for Protecting the Safety and Health of Health Care Workers. <http://www.cdc.gov/niosh/docs/88-119/chemical.html>.
- ¹³ AOEC List of Asthmagens. <http://www.aoecdata.org/ExpCodeLookup.aspx>.
- ¹⁴ Guidelines for Protecting the Safety and Health of Health Care Workers. <http://www.cdc.gov/niosh/docs/88-119/chemical.html>.
- ¹⁵ Guidelines for Protecting the Safety and Health of Health Care Workers. <http://www.cdc.gov/niosh/docs/88-119/chemical.html>.
- ¹⁶ Brite Bleach Material Safety Data Sheet. <http://www.masseywholesale.com/msds/britebleach.pdf>.
- ¹⁷ NIOSH International Chemical Safety Card. Phenol- <http://www.cdc.gov/niosh/ipcsneng/neng0070.html>.
- ¹⁸ Ohio EPA Pollution Prevention Fact Sheet. http://www.epa.state.oh.us/ocapp/p2/mercury_pbt/fact99.pdf.
- ¹⁹ Pesticide Action Network Pesticide Database. http://www.pesticideinfo.org/Detail_Product.jsp?REG_NR=00087500081&DIST_NR=000875.
- ²⁰ R. Ventullo, R. Larson (1986) *Adaptation of Aquatic Microbial Communities to Quaternary Ammonium Compounds*. Applied and Environmental Microbiology. Vol. 51, No. 2: 356-361. Feb 1986. <http://aem.asm.org/cgi/content/abstract/51/2/356>.
- G. Sundheim, S. Langsrud, E. Heir and A. L. Holck. ***International Biodeterioration & Biodegradation***. Volume 41, Issues 3-4, 1998, Pages 235-239. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VG6-3TN9PP1-B&user=10&rdoc=1&fmt=&orig=search&sort=d&docanchor=&view=c&acct=C000050221&version=1&urlVersion=0&userid=10&md5=574a268bde54f837ce9cecad2519433.
- ²¹ Brite Bleach Material Safety Data Sheet. <http://www.masseywholesale.com/msds/britebleach.pdf>.
- ²² Chlorox Health Center: SARS. Cleaning & Sanitation in Daycare Facilities, Schools and Universities. <http://www.cloroxprofessional.com/healthcenter/sars6.shtml>.
- ²³ L. Crawford, Z. Yu, E. Keegan, T. Yu. *Infection Control Today*. A Comparison of Commonly Used Surface Disinfectants. <http://www.infectioncontrolday.com/articles/0b1feat2.html>.
- ²⁴ Ohio EPA Pollution Prevention Fact Sheet. http://www.epa.state.oh.us/ocapp/p2/mercury_pbt/fact99.pdf.