

Chilton House LEED Certification: Indoor Air Quality



Bentley University

Katie Cavanaugh

VNA Care Network

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Background

Bentley University

As part of Bentley University's commitment to environmental sustainability and community service, students are encouraged and receive support to develop sustainability plans for non-profits, municipalities and small businesses. Students apply their education in business, environmental science and technology to help local organizations become more environmentally responsible. Typical areas addressed in the plans involve: minimization of energy usage, recycling, paper reduction, water conservation and change management. The sustainability plans are the work product of Bentley students and do not necessarily reflect the position of Bentley University.

The Author's Comments

The notion to help draft this recommendation for the VNA Care Network & Hospice stems from a long-time interest in methods and practices of sustainable living. I have just finished my sophomore year at Bentley University and am pursuing a double major in Marketing as well as Earth, Environment,, and Global Sustainability. Growing up around the area of Burlington, VT the ideas of a more sustainable and "green-minded" lifestyle were already implanted before my arrival at school. I am so amazed by the opportunities that are so readily available here including the new Liberal Studies Major as well as the chance to work on projects such as this one. I really hope to continue research in this field well into the future and I hope the information provided can help not only VNA Care Network & Hospice but other organizations that recognize the need for more eco-friendly methods.

Will O'Brien, a professor at Bentley University, played an important role in assistance with this project as well as the overall mission of sustainability for Bentley. His mission has helped implement programs at Bentley such as the newly developed Service -Learning Internship with a focus in creating similar sustainability plans for organizations in need. I was lucky to be able to work with him and hope

to continue his mission at Bentley University of implementing change and increasing information surrounding this area of study.

VNA History & Mission Statement

VNA Care Network & Hospice began all the way back in 1891 when residents raised enough money to start the Dedham society for emergency nursing. Now, they serve over 200 communities in Eastern and Central Massachusetts. Different branches of the VNA began sprouting up around the area including associations in Worcester, North Shore, Leominster, Spencer, Gloucester, and Cambridge. When the parent companies of North Shore and Cambridge merged in 1995, the VNA Care Network was created. In recent years they have also merged with the Central branches and Marblehead/Swampscott to grow the network even further. VNA hospice care has made great strides for care of the terminally ill in Massachusetts, including opening up the first hospice houses.

VNA Care Network & Hospice aims to provide a homelike environment for hospice residents who can no longer be supported by themselves or their families at home. All facilities used for patients are actually former homes donated by generous community members. Members of VNA want the most comfortable environment for their patients as well as the highest quality care. To bring this quality to a new level, efforts are being concentrated on making their newest building, the Chilton House, LEED certified at the silver level. They recognize that making more environmentally conscious choices in building and operating is a necessary shift in this world, especially for a company that cares so much about their stakeholders and patients.

The particular area of the company being concentrated on is the construction of the Chilton House located in Cambridge. The building plan has been established and is aiming to be completed by the end of summer/fall season of 2009. The Chilton House was the first hospice residence in Massachusetts and is located in Cambridge's Fresh Pond neighborhood. It was formerly a two-family home but has been concerted to accommodate individuals. After the construction, up to ten residents will be able to stay there vs. the four available rooms that they previously had. The house features a living room overlooking the garden, a deck with space to sit outdoors, and a beautifully decorated house. It's already a welcoming and well-crafted home for their patients, and achieving LEED certification is going to make it an even more beneficial spot.

Project Plan

The elements of the certification that are concentrated on in this plan are factors relating to the indoor air quality that results in the building. Elements that affect this air quality include the cleaning supplies used in the facilities as well as the furniture selection. Research has been completed on what makes certain products unfavorable and what some good options are for quality products that fit the needs of the LEED certification. Recommendations and suggestions for new practices have been created to encompass a higher awareness of an environmentally friendly atmosphere.

Why Become LEED Certified?

Achieving LEED certification brings about many positive changes for any company, organization, or even individual who seeks out this project.

1. Becoming LEED certified is good business:

LEED certified buildings enjoy government incentives, marketing benefits and increased property values. Going green also reduces costs to building management and tenants, including costs associated with sick leave, health care, productivity loss and litigation. In addition, energy and lifecycle costs savings for buildings with LEED certification are documented in USGBC case studies.

2. LEED buildings are healthier:

LEED standards create improved indoor air quality and reduce potential health problems, especially allergies and other sensitivities

3. Healthier environments increase productivity:

Healthier employees mean happier employees. Statistics show increased worker satisfaction, improved morale, reduced absenteeism, and increased productivity.

4. Green buildings help the earth:

Green programs can reduce the negative effect buildings and operations have on the environment: air and water pollution, ozone depletion and global climate change. Green practices conserve energy, promote recycling, reduce the use of raw materials and minimize the use of toxic products requiring disposal.

5. Going green increases the safety of the building and protects property values:

While the main focus of going green is for health reasons, the process provides other benefits to the facility. Green procedures actually reduce the likelihood and frequency of fires, explosions,

spills and splashes. In addition, green cleaning calls for environmentally friendly and correctly diluted products and the right product for each job. This means, for example, that stains on carpets or upholstery are treated with the mildest, effective cleaner, thereby prolonging the life of expensive furnishings and reducing exposure to harsher chemicals.

Indoor Air Quality

Indoor air quality is a major component of LEED certified buildings, but how can planners determine what fits into a quality environment? Scientific Certification Systems (SCS) is a group that has made it its mission to become a global leader in providing third-party environmental and sustainability certification, auditing, testing, and standards development. Part of this mission includes establishing guidelines and certifications for indoor air quality. Indoor air quality is an important issue because most people spend as much as 90% of their time indoors, either at home, work, or school. It is especially important for the well-being of the patients under the care of VNA because most of them spend all of their time indoors due to decreased mobility from their illnesses. Persons with respiratory problems such as asthma, young children, elderly, and persons with heightened sensitivity to chemicals may be more susceptible to irritation and illness from VOCs.

Poor indoor air quality can be caused by a number of factors, including inadequate ventilation, poor cleaning, and excessive emissions of volatile organic compounds (VOCs) or other harmful chemicals that are found in everyday products like cleaning supplies. The VOC criteria for the Indoor Advantage certification are based on emission criteria established in the Business and Institutional Furniture Manufacturer's Association (BIFMA) Standard for Low-Emitting Office Furniture Systems and Seating and the US Green Building Council's Leadership in Energy and Environmental Design. The BIFMA Emissions standards were formulated as a result of over ten years of development initiated in 1994. Their goal was to provide the industry with strong testing and conformance standard tools, that now can be used by groups like SCS.

Rules & Health Standards

CDC Standards

It's important to be extra conscious of safety regulations to help prevent the spread of disease and infection from patient to workers, workers to patients, or between patients. About half of the

residents at the Chilton house are cancer patients while the other non-cancer patients may include people with HIV/AIDS. The CDC website states that even though transmission of HIV to patients while in healthcare settings is rare, proper sterilization and disinfection procedures are required. (CDC.gov)

Indoor Air Quality

Understanding the sources of indoor environmental contaminants and controlling them can often help prevent or resolve building-related worker symptoms. Certain guidelines are helpful in aiming to improve and control the quality of air indoors.

The MDPH (Massachusetts Department of Public Health) has the statutory responsibility to "conduct sanitary investigations and investigations as to the cause of disease...and shall advise the government concerning the location and other sanitary conditions of any public institution" (MGL c. 111 sec. 5). To meet this responsibility with regard to indoor air quality, requests are referred to Emergency Response/ Indoor Air Quality (ER/IAQ) unit for assessment. After a preliminary evaluation by the ER/IAQ staff, an assessment will be scheduled for the building of concern or a referral is made to the appropriate state agency. After the indoor air quality assessment is completed, a report with recommendations for remediating any problems identified and a letter of transmittal is sent to the state and local government officials and/or the party requesting the survey. Of course, this is only if certain cases are reported when concerns reach high levels.

When IAQ (Indoor Air Quality) assessments require further follow-up beyond the scope of the IAQ unit, other programs may become involved in a building assessment, such as the Bureau of Environmental Health Assessment (BEHA). BEHA has a broad mission of protecting the public health from a variety of environmental exposures, including general indoor air quality, radon and asbestos. The BEHA responds to environmental health concerns and provides communities with epidemiological and toxicological health assessments. Facilities may contact BEHA to request technical assistance concerning indoor air quality complaints or to request an indoor air quality investigation of public buildings.

If patients or families of patients feel like the indoor air quality is of poor quality, they could easily contact government services to come check up on the facilities and make sure they are properly maintaining the quality of air that they should .

Chemical Storage

The Department of Public Health, Center for Environmental Health (CEH), Emergency Response/Indoor Air Quality Program (ER/IAQ) conducts indoor air investigations in public buildings or

building that the public may enter. The CEH works with local boards of health, school departments and the general public to address and remediate indoor air problems in public schools. During the investigation of an indoor air quality complaint in schools, building design, maintenance and school activities can all play roles in adversely affecting air quality. Over the course of hundreds of indoor air inspections done over the past several years, improper storage of chemicals in school chemistry departments has served as a source of indoor environmental pollutants as well as potential safety hazards. The following are examples of storage conditions of science laboratory chemicals. Each example lists poor storage conditions that could either be safety or chemical off-gassing hazards that can affect indoor air quality. These examples have been edited from original reports to present circumstances observed during these inspections.

Massachusetts Department of Public Health

(taken from the Infection Prevention and Control Information Sheet at www.mass.gov)

CLEANING AND DISINFECTION

Cleaning and disinfection of non-critical surfaces in patient-care areas are important components of routine infection prevention and control in healthcare facilities. Although environmental surfaces are generally not involved in the transmission of microorganisms some surfaces, especially those closest to the patient, are more likely to be contaminated with microorganisms and may serve as reservoirs. These are known as “high touch” surfaces because they are frequently touched (e.g., bedrails, commodes, door knobs, sinks and equipment in close proximity to the patient). Adherence to a regular schedule for cleaning and disinfection will help reduce the microbial burden in a patient’s environment.

General cleaning and disinfecting guidelines include the following:

Any EPA-registered hospital detergent-disinfectant may be used for environmental sanitation. Manufacturer recommendations for concentration, contact time, and care in handling should be followed. Patient care equipment should be disinfected according to established CDC guidelines.

- o Personal protective equipment (PPE), such as utility gloves, should be worn when cleaning surfaces or equipment currently or previously occupied by or used for a person who is ill.

- o Patient care areas should be kept free of unnecessary items and equipment to limit contamination.
- o On a daily basis, horizontal surfaces (bed tables), surfaces frequently touched by patients and staff (bed rails, doorknobs), and lavatory facilities should be cleaned and disinfected.
- o Once a patient has been discharged from an airborne infection isolation room, the door should be closed for one hour prior to cleaning and disinfecting.
- o Once a patient has been discharged from a room or area, in addition to the daily cleaning procedures, soiled vertical surfaces and durable patient equipment should be cleaned and disinfected.
- o Used cleaning solutions should be discarded and housekeeping equipment should be rinsed and allowed to dry prior to reuse.
- o Trash saturated with blood or body fluids should be disposed of in an appropriate biohazard container and treated accordingly; items not saturated may be discarded as routine medical waste.
- o Soiled linen should be handled as little as possible and with minimum agitation to prevent contamination of the air and of persons handling the linen. All soiled linen should be bagged or put into carts at the location where it was used; it should not be sorted or pre-rinsed in patient care areas. Linen soiled with blood or body fluids should be deposited and transported in bags that prevent leakage.

(Updated: September 2007)

Volatile Organic Compounds

A basis for measuring air quality standards in buildings is the presence of VOCs or volatile organic compounds. Basically, these are any chemicals that have high enough vapor pressures to vaporize and enter the atmosphere at a quick rate. A lot of carbon based molecules fall into this category including aldehydes, ketones, and other hydrocarbons. There is no clearly supported single definition of exactly what a VOC is, but the US adopts this definition of carbon compounds; excluding carbon monoxide, carbon dioxide, carbonic acid, and ammonium carbonate because these all

participate in atmospheric photochemical reactions (Watson). Concentrations of VOCs are found to be about ten times higher outdoors than indoors, due in large part to the concentrations found in household cleaners, furniture, paint, etc. No standards have been set for VOCs in non-industrial settings, but the federal government has regulated formaldehyde (a common VOC) use and exposure. People who are exposed to toxic air pollutants at sufficient concentrations, for sufficient durations, may increase their chances of getting cancer or experiencing other serious health effects, such as reproductive problems, birth defects, and aggravated asthma.

Why are VOCs dangerous?

VOCs pollute our air. Outside, they contribute to global warming and worsen air quality and indoors, they are a major contributor to poor indoor air quality. VOCs from cleaning products represent an ongoing health hazard that can be easily avoided simply by using low-VOC products. Under the US Green Building Council's LEED guidelines, a project can receive an extra point just for isolating its cleaning closet from the regular air supply of a building. To put this into context, architects and designers are creating specially ventilated rooms, at a cost of thousands of dollars, simply to avoid having the VOCs from cleaning supplies mix with the regular atmosphere of a building. Also, LEED guidelines include minimizing VOCs from building products and furnishings, as well as airing out a space thoroughly before occupancy (Watson).

How long are VOCs dangerous?

This all varies based on the chemical, the level of ventilation, and the other materials involved. In most cases, the first couple of weeks that a VOC-emitting material is in a space are the worst and later, the toxin levels go down, but some materials can continue to emit VOCs for months or even years. Of course, in the case of most cleaners, the supply of VOCs in the atmosphere are regularly replenished, which means that people are constantly breathing them.(Watson)

What are Low VOC Products?

Many common cleaning products contain hazardous chemicals and volatile organic compounds (VOCs), smog-forming chemicals that can be harmful to users. All-purpose cleaners as well as specialty products (such as metal polishes and glass, tile and tub cleaners) pollute indoor air and may cause respiratory and eye irritation for anyone exposed. Substituting lower emitting products for traditional

products improves both indoor and outdoor air quality and protects the health and safety of individuals exposed to them. (Watson)

Chart of Common VOCs

Chemical	What It Is	Where It's Found	Negative Effects
Formaldehyde	<ul style="list-style-type: none"> -Simplest aldehyde -Can be in liquid form, known as formalin 	<ul style="list-style-type: none"> - Found in many furniture products as a component of particle and MDF boards, glues, finishes, stains and paints -Used to create the wet-strength resin in paper towels, napkins, etc. 	<ul style="list-style-type: none"> -Difficulty in breathing -Trigger of asthma attacks, coughing, nose, eye and throat irritation -Fatigue and insomnia. -Classified as probable human carcinogen by the EPA -Long term effects may not even be fully realized at this time
Benzene	<ul style="list-style-type: none"> - Benzene is a clear, colorless, volatile, non-corrosive, highly flammable, fat-soluble, liquid at room temperature with a strong aromatic odor -Major use of benzene is as a 	<ul style="list-style-type: none"> - Household cleaning products, glues, adhesives, some art supplies, cigarettes, paint, varnish, stain removers, and gasoline 	<ul style="list-style-type: none"> - Exposure to benzene through inhalation or ingestion may produce adverse effects in the blood, on the central nervous system, and the immune system - Benzene's toxicity to the immune system manifests itself by

	chemical intermediate in the manufacture of a variety of consumer goods		depressing infection. As a result, exposure to benzene has the potential to decrease the body's ability to overcome infection
Toluene	- Clear, water-insoluble liquid with the typical smell of paint thinners, redolent of the sweet smell of the related compound benzene	- Solvent-based cleaning and sanitizing agents	-Developmental/birth defects -Liver/gastrointestinal toxicant -Cardiovascular/blood toxicant
Diethylene glycol	-Clear, colorless, flammable liquids that have characteristically sweet, balsam-like odors -Composed of a mixture of the three isomers ortho-xylene, meta-xylene, and para-xylene	-Use as a diluent or solvent in lacquers, varnishes, inks, paints, surface coatings, dyes, adhesives, cleaning fluids, and rubber cements	-Irritant of the eyes and mucous membranes -At high levels, may become flushed, feel hot, and experience confusion, dizziness, tremors, and other signs or symptoms of central nervous system toxicity
Acetone	- Colorless, mobile, flammable liquid is the simplest example of the ketones	- Often one of the primary component in cleaning agents - Active ingredient in nail polish remover and	- At very high vapor concentrations, acetone is irritating and, like many other solvents, may depress central nervous system

		as paint thinner and sanitary cleaner/ nail polish remover base	
Sodium Hypochlorite	<p>-Colorless, volatile liquid with a moderately sweet aroma</p> <p>-Produced by reacting either methyl chloride or methane with chlorine gas</p>	<p>-Common solvent</p> <p>- Paint stripping, pharmaceutical manufacturing, paint remover</p> <p>manufacturing, metal cleaning and degreasing, adhesives manufacturing</p>	<p>-Causes irritation to respiratory tract</p> <p>-Strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache</p> <p>-Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system</p>

What's Being Used Now?

Product	Price/Unit	Size	Hazards?
Liquid Laundry Detergent: "Austin's A1 Bleach"	\$0.03/oz	6 gallons (768 fl oz)	Contains sodium hypochlorite
Powdered Laundry Detergent: "Surf Sparkling Clean"	\$0.25/load	180 loads	Contains phosphorus, enzymes, ammonia, naphthalene, phenol,

			sodium nitilotriacetate, added fragrance also contains formaldehyde
Tub & Tile Cleaner: "Comet"	\$0.20/oz	32 fl oz	Contains toluene and sodium hypochlorite
Kitchen Cleaner: "Spick & Span"	\$0.23/oz	32 fl oz	Contains sodium hypochlorite
Glass & Surface Cleaner: "Windex"	\$0.19/oz	24 fl oz	Contains diethylene glycol
Toilet Bowl Cleaner: "Comet"	\$0.20/oz	32 fl oz	Contains hydrochloric acid
Dishwasher Powder: "Cascade"	\$0.20/oz	20 oz	Phosphorus & contains chlorine in a highly concentrated form
Floor Cleaner: Bleach & Water	\$0.21/oz	96 oz	Contains sodium hypochlorite

(Product information from healthgoods.com)

Environmentally Friendly Furniture

Many furniture companies have embarked on creating environmentally sustainable furniture, which can be achieved through a variety of practices. For wooden furniture, this responsibility begins with the harvesting process. Environmentally responsible furniture producers are doing everything within their power to support sustainable forestry and responsible use of this precious resource. In the past, single pieces of wood furniture survived over the course of generations. The trend recently has moved towards mass-produced and low-cost furniture, which means the wood resources are being used up at an alarmingly quick rate. Typically these companies use walnut, rift cut oak, and cherry woods. Bamboo is also used as often as possible for both furniture and flooring because of its renewable qualities since it can be re-grown in as little as five years.

Finishes, stains, and topcoats applied during the finishing products of many furniture products can release some toxic air pollutants and volatile organic compounds (VOC). Chemicals in these substances can react in the air to form ground-level "smog" that can have negative respiratory affects.

So, companies have also developed a water-based UV finish that is nearly VOC-free, which helps to preserve the air quality in any indoor environment compared to other finishes that contain harmful chemicals (Ross). These natural lacquers can also be derived from tree sap and don't differ in the level of durability compared to synthetic and chemical-filled finishes.

Emission levels are measured by unpacking new furniture product(s) and placing the product into a clean test chamber under controlled conditions. After a period of time has passed, samples of air from the chamber are taken and analyzed to measure the concentration of emissions from the furniture. The chamber test results are then used to estimate the impact of furniture emissions on building indoor air quality using a modeled office environment (SCS certified).

Use SCS-Certified Products to earn LEED Credits

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System® is a voluntary, consensus-based national standard for high-performance buildings facilitated by the US Green Building Council (USGBC).

LEED certifies buildings and systems based on credits obtained in the following categories: site choice, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design process.

SCS has certified hundreds of companies and thousands of products for indoor air quality, recycled content, and FSC chain-of-custody. SCS certified products include carpet, molding, doors, drywall, office and systems furniture, pest control, paints, insulation, and cleaning products.

Earn LEED credits for your project with products certified by SCS in the following categories:

1. SCS Indoor Advantage™ — Office furniture systems, components and seating that meet the criteria for this indoor air emissions certification program also meet the criteria of ANSI/BIFMA M-7.1-2007 and ANSI/BIFMA X-7.1-2007 Furniture Emissions Standards and therefore the criteria for LEED — Commercial Interiors EQ credit 4.5.
2. SCS Indoor Advantage Gold™ — Building materials such as adhesives and sealants, paints and coatings, textiles and wall coverings, and composite wood, as well as classroom and office furniture systems, components and seating that earn this SCS certification meet the indoor air

emission criteria of California 01350, the California Indoor Air Quality (IAQ) Specifications For Open Panel Office Furniture, and LEED EQ 4.1, 4.2, 4.4, and 4.5.

3. FloorScore®, a voluntary independent program which was developed by the Resilient Floor Covering Institute (RFCI) and is managed by SCS – Hard surface flooring and flooring adhesives that earn this certification meet the indoor air emission criteria of California 01350 and LEED EQ 4.1 and 4.3.
4. Recycled Material Content — Products certified by SCS for pre-consumer and/or post-consumer content can help a project qualify for LEED MR 4.1 and/or LEED MR 4.2.
5. SCS Sustainable Choice™ — Carpets and rugs earning this SCS certification may qualify for LEED
6. No Formaldehyde — Composite wood, laminate, and adhesive products certified by SCS either for No Added Urea Formaldehyde or No Added Formaldehyde meet the criteria for LEED EQ 4.4.
7. Forest Stewardship Council (FSC) Chain-of-Custody — Companies earning FSC Chain-of-Custody certification from SCS may sell products that qualify for LEED MR 7 credit.

LEED Requirements

LEED EQ Prerequisites

Prerequisite 1—Comply with ASHRAE Standard 62 -2004 'Ventilation for Acceptable Indoor Air Quality', Sections 4 through 7. Naturally ventilated buildings shall comply with Section 5.1

Prerequisite 2—Prohibit smoking in the building or provide a designated smoking room designed to effectively contain, capture and remove ETS from the building

Prerequisite 3- Increase breathing zone outdoor air ventilation rates to all spaces 30% above the minimum rates of ASHRAE 62.1-2004

A recent article in the Journal of Allergy and Clinical Immunology cites a report indicating that buildings seeking LEED Certification, (buildings that are registered to become LEED Certified) are susceptible to spikes in fine, airborne particulates and may underperform in an **indoor air quality test**.

The report's findings were presented at the American Academy of Allergy, Asthma, and Immunology annual meeting. These findings suggest that LEED Certified buildings may not be performing to their own standards and that LEED Certification is not necessarily indicative of a relative

improvement, when compared to non-LEED Certified buildings, in indoor air quality (IAQ). Except under certain workplace standards, indoor air pollution is not regulated in the United States.

LEED, which stands for Leadership in Energy and Environmental Design, is the leading green building certification program in the United States and measures the performance of green buildings across a series of categories including site sustainability, water efficiency, energy and atmosphere, environmental quality, building materials and resources. LEED uses its own standards to determine acceptable IAQ levels. LEED's standards exceed those set in place by the Environmental Protection Agency (EPA).

Fine particulates are defined as particles 10 microns or less (PM10). The limit for exposure to fine particulates is a four-hour average of 50 micrograms per cubic meter (mcg/m³). The current U.S. EPA standard for outdoor particulate pollution is a 24-hour average of 150 mcg/m³ (SCS certified)

Furniture Availability

Many traditional furniture companies are now offering eco-friendly options that are created with the goal of reducing the VOC emissions and improving the internal air quality of any establishment that begins purchasing these products. One vendor I found in particular, called Furnature, offers a wide variety of eco-friendly products including a good selection of reasonably price furniture. The furniture found on the website furnature.com is made completely from wood found in sustainably-managed forests and includes no harmful plastics, metals, or chemicals. The sofas and chairs don't contain foam, vinyl, formaldehyde or anything synthetic and use all water-based glue. There are also a wide variety of bed frames and mattresses that would be ideal for the Chilton House home. All products are also SCS certified and abide by all emission guidelines.

The convenient aspect of this furniture vendor is that their store is actually located in Watertown, MA so an in-store visit is certainly possible (as well as available online ordering). Furnature has been providing furniture options for people concerned about an unpolluted environment since the early 1990s. They are committed to helping create a more healing world through all practices including customer interactions, sustainable packaging, and really living out the eco-friendly mission. This company's values are well in-line with the goals of LEED certification and would be an ideal and local resource for furniture selection.

.Company Selection

I decided to focus on three brand-name cleaning supply companies which each produce environmentally-friendly and low VOC products. There are a large number of cleaning suppliers out there that are either developing with sustainable standards in mind or else creating new lines of products with an eco-friendly appeal. Cleaning supplies are necessary in any household, and the Chilton house is an especially important home that requires consciously produced products that will limit the hazardous impact that some chemicals give off. I felt that by analyzing three companies and investigating aspects such as selection, availability, company history, price, etc. that I could come to the most informed decision possible.

I was able to get in contact with all three of the companies, and was even fortunate enough to have a face to face interview with Seventh Generation because the headquarters are actually located in my home town. With each company I asked them questions including why their company has this mission, whether their products have been used in healthcare situations, and what their methods of consideration were for what went into their products. All three companies expressed that their mission for “going green” was more than just the trendy aspect of it, it was really for the consumers and the people who were unknowingly being exposed to so many chemicals on a daily basis. They also all reported that they certainly had regular customers in the world of healthcare, and Seventh Generation even gave me a few name of a well-known hospital in my area. All of the companies had material data sheets available on each of their products, which was important to know because if they weren’t willing to give out this information, this creates much skepticism regarding product contents.

After much consideration, I truly think that purchasing products from BioKleen would be the most beneficial choice for the VNA Chilton House facility.

Company List

Company	Website
Seventh Generation	www.seventhgeneration.com
Clorox Greenworks	www.cloroxgreenworks.com
Biokleen	www.biokleenhome.com

Focus: Seventh Generation

The element that sets Seventh Generation apart from the other companies that were researched during the course of the project is the longevity of the company. They began producing environmentally-friendly household products almost twenty years ago, and have continued to be at the forefront of this cultural change over time. The creation of their company was in fact one of the original socially conscious companies in this country and represented a departure from a lot of standard ways that people believed a business should be run. For once, the main focus of the company was not to make money, but to make sure they were producing products that would be the safest for their customers as well as their surrounding environment. An important part of their mission is donating 10% of all profits to non-profit community, environmental, health, and responsible business organizations that are working towards positive changes. The company derives its name from the Great Law of the Iroquois that states, "In our every deliberation, we must consider the impact of our decisions on the next seven generations." They push the idea that every time you make a choice to use one of these products, you are helping out not only yourself but the seven generations that will follow.

In keeping with building a positive and trustworthy relationship with their customers, Seventh Generation gives a complete ingredient list for each of the products they produce. This includes safety material data sheets that show specific details of each ingredient and their relative toxicity, which are available in full on their website.

Price Chart

Product	Price	Size	Price/Unit
Liquid Laundry Detergent: "Natural Liquid Laundry 2X Concentrated"	\$8.39	32 Loads	\$0.26/load
Powdered Laundry Detergent: "Natural Powdered Laundry"	\$8.39	18 Loads	\$0.46/load
Tub & Tile Cleaner: "Tub and Tile Cleaner-	\$5.99	32 fl oz	\$0.19/load

Emerald Cypress & Fir”			
Kitchen Cleaner: “Kitchen Cleaner- Wild Orange & Cedar Spice”	\$6.59	32 fl oz	\$0.21/load
Glass & Surface Cleaner: “Natural Glass & Surface Cleaner”	\$5.99	32 fl oz	\$0.19/oz
Toilet Bowl Cleaner: “Toilet Bowl Cleaner”	\$5.99	32 fl oz.	\$0.19/oz
Dish Liquid: “Natural Dish Liquid”	\$5.29	25 fl oz	\$0.21/oz
Dishwasher Powder: “Free & Clear Automatic Dishwasher Powder”	\$13.99	75 oz.	\$0.19
Floor Cleaner: (None)			

Seventh Generation also makes a number of other products for environmentally-conscious practices around the home. These products range from toilet paper, paper towels, feminine products, tissues, diapers, and baby wipes that are all chlorine free and biodegradable. Their manufacturing facility in Burlington, VT was an interesting place to visit, especially since their building is completely LEED certified.

Consumer Feedback

Information from consumer reports on line indicated that there have been some questions as to all the claims Seventh Generation has made. For example, their Automatic Dishwashing Gel is said to break down in the environment, but the claim broke down when it was found that the product contains a petroleum-derived agent that doesn't readily biodegrade. A spokeswoman said the company would remove the claim and review its product line and labeling.

Overall consumer feedback seems very positive though, and Seventh Generation has truly been a longstanding resource for the eco-friendly consumer. A lot of people are skeptical when it comes to green cleaning products that they don't quite have the same level of cleaning, and this was expressed from a few people, while others claimed that they saw no decrease in cleaning quality.

Decision

Seventh Generation was not the company I chose for a few reasons. First of all, they were certainly the most expensive choice, which is important to consider, especially for a non-profit organization. They also didn't have as many bulk options as Biokleen did and only had larger sizes available in a few of their products. The material data sheets all checked out fine, and I think that these products showed the greatest commitment to an eco-friendly, but they're not what would be as appropriate for the Chilton House.

Clorox Greenworks

When The Clorox Company launched Green Works™ natural cleaners in January 2008, we had a goal to take natural cleaning mainstream, making it more accessible and affordable without compromising cleaning performance. I am pleased to say we achieved that goal – our proposition of “powerful cleaning done naturally” has made a significant impact on the category and Green Works is now the #1 brand in natural cleaning.

Green Works™ Natural Compostable Cleaning Wipes, Green Works Natural Dishwashing Liquid, Natural Glass & Surface Cleaner, Natural Glass Cleaner, Natural Toilet Bowl Cleaner and Natural Dilutable Cleaner have been recognized by the Environmental Protection Agency's (EPA) Design for Environment (DfE) program for using environmentally preferable chemistry.

The Green Works team is also continuing its commitment to the Sierra Club. Our financial contribution supports the organization's conservation efforts, including youth education and the protection of America's clean air, water, parks and wildlife. Some people might have been surprised to hear about our relationship with the Sierra Club but I believe we are headed in the right direction. Businesses and environmental organizations should work together if we are to achieve real progress.

Price Chart

Product	Price	Size	Price/Unit
Liquid Laundry	N/A	N/A	

Detergent:			
Powdered Laundry Detergent	N/A	N/A	
Tub & Tile Cleaner "Natural Bathroom Cleaner"	\$7.99	24 fl oz	\$0.33/oz
Kitchen Cleaner "All Purpose Cleaner"	\$5.99	32 fl oz	\$0.19/oz
Glass & Surface Cleaner "Natural Glass & Surface Cleaner"	\$6.99	32 fl oz	\$0.22/oz
Toilet Bowl Cleaner "Natural Toilet Bowl Cleaner"	\$7.99	24 fl oz	\$0.33/oz
Dish Liquid "Natural Dishwashing Liquid"	\$6.50	32 fl oz	\$0.20/oz
Dishwasher Powder	N/A	N/A	
Floor Cleaner "Dilutable Cleaner"	\$7.50	32 fl oz	\$0.23/oz
Shower Cleaner "Natural Bathroom Cleaner"	\$7.99	24 fl oz	\$0.33/oz

Green Works™ products, with the exception of the natural bathroom cleaner, are recognized by the US EPA's DfE Program. Sounds good, but what does that actually mean? The DfE is a program started by the Environmental Protection Agency (EPA) to reduce risk to people and the environment by preventing pollution. This is how it works. Review teams screen the ingredients in products (cleaners are one of many different categories) to make sure that they pose the least concern among chemicals in their class. Basically, the DfE logo on a product is short hand to say the ingredients inside help protect the environment and are safer for families.

Consumer Feedback

When Clorox came out with this line of products, because it seems to be at the peak of eco-craze, many people were skeptical as to their motives. One of the frequently asked questions posted on the site was whether they were simply keeping up with the trends and wondering if these products would deliver the same quality. Clorox responded with “We've been working on natural products for the past 5 years. We set ourselves a difficult task—to set the standard for natural cleaning and create products that clean with the power you expect from Clorox. In fact, we delayed Green Works™ products from hitting the shelves by 6 months to further perfect the formula. We are fully committed to continuing to develop natural products that continue to set the standard for natural.

According to a poll conducted on viewpoints.com, 81% of people would recommend this product, while 19% of people would not. A lot of people praised them for their mild scents, high availability and I think that fact that Clorox is already a well-known company has helped them find success.

Decision

I think that these products are reliable, and could certainly carry out the functions needed at the Chilton house, but I do not think it is the best choice. The selection of products was lower than the other two companies, and they do not produce any dishwasher powder or laundry detergent. This was a deterrent because I was looking for a company that could meet all our needs through one vendor. The prices also weren't low enough to sway me away from my original recommendation and many of these products were not available in bulk quantities, which was definitely a quality I was looking for. Overall, I think that if ordering online is not something VNA would consider, this would be a good option because they are ultimately available in many more retail outlets. However, they would not be my first recommendation.

Focus: Biokleen

Jim Rimer founded Biokleen in 1989. As a previous sales representative of cleaning chemicals in the commercial and industrial industry he became more and more aware of the dangers of the products he was selling and the ingredients they contained.

He saw first hand his chemicals were creating health problems for his customers, causing negative effects - including cancer - on families and pets in the homes and businesses where these supplies were being used. Jim was selling poison and this realization shook him to the core. Jim's drive to

take a stand and make a difference helped motivate him to study chemistry. With his newfound knowledge and driven passion he formulated his first cleaner using natural, non-toxic ingredients. Today Biokleen continues to develop and create innovative products, which still measure up to Jim's beliefs and standards.

All of their products are made with the safest ingredients available:

- All Biokleen products are readily biodegradable and do not biodegrade to more harmful compounds. Ingredients have been reviewed by third parties.
- Natural extracts: grapefruit seed, lime, orange peel, and natural essential oils...no cheap substitutes, dyes, or synthetic fragrances. Complete ingredient statements on labels.
- No known carcinogens, mutagens, teratogens, or pollutants.
- Non-corrosive. Non-flammable. Non-reactive. Reviewed by a Certified Hazardous Materials Management Inspector.
- Kind to those with chemical sensitivities and allergies.

Price Chart

Product	Price	Size	Price/Unit
Liquid Laundry Detergent: "Free & Clear Laundry Liquid"	\$14.50	64 fl oz	\$0.22/oz
Powdered Laundry Detergent: "Biokleen premium laundry powder"	\$10.00	50 loads	\$0.20/load
Tub & Tile Cleaner: "Biokleen Bac-Out"	\$6.00	32 fl oz	\$0.19/oz
Kitchen Cleaner: "Biokleen Bac-Out"	\$6.00	32 fl oz	\$0.19/oz

Glass & Surface Cleaner: "Ammonia Free Glass Cleaner"	\$4.50	32 fl oz	\$0.14/oz
Toilet Bowl Cleaner: "Soy Toilet Scrub"	\$5.50	32 fl oz	\$0.17/oz
Dish Liquid: "Free & Clear Dishwashing Liquid"	\$5.50	32 fl oz	\$0.17/oz
Dishwasher Powder: "Free & Clear Automatic Dish Powder"	\$25.00	192 loads	\$0.13/load
Floor Cleaner: "All Purpose Cleaner and Degreaser"	\$80.00	5 gal. (640 fl oz)	\$0.13/oz
Shower Cleaner: "Biokleen Bac-Out"	\$6.00	32 fl oz	\$0.18/oz

Chemical Description From Biokleen:

Meets performance tests, No Aquatic Toxicity, No Human Toxicity, Readily Biodegradable-Does not Biodegrade to More Harmful Compounds, No Carcinogens or Reproductive Toxins, No Eutrophication (ingredients do not fuel algae blooms), No Skin/Eye Corrosivity, Concentrates, Not Skin Sensitizers, Safe Fragrances, Non-Combustible, No Endocrine Disruptors, Minimal VOC's, Natural Ingredients, Non-Reactive, No Asthmagens or Respiratory Sensitizers, No Neurotoxins, Made from Renewable Resources, More Neutral pH, Uses Third-Party Systems for verifications, No SARA Title III, CA 65, or EPA priority pollutants, No materials listed by the ACGIH as hazardous.

CONTAINS NO : Phosphate, chlorine, ammonia, petroleum solvents, alcohol, butyl, glycol ether, SLS or SLES, EDTA, or DEA.

Consumer Feedback

Everything I found about Biokleen really emphasized that these products worked and there were overall very few complaints with the levels of cleanliness achieved. A study done by consumer reports (consumerreports.org) found that the dishwashing liquid/power were top rated overall compared to all other eco-friendly brands. Their products use ingredients like soy and other plant-based materials that really give them a unique and natural feel. In 2008, Biokleen was nominated as one of the “Hottest Start Up Companies” on consumer reports.

Decision

I think the best option for the VNA care network is to use the products supplied by the Biokleen Company. After consideration of the wants and needs of the company, they can truly offer what the Cambridge house needs and what is required by LEED and health certifications. The key difference between Biokleen and the other brands investigated was the option to order “professional” products which are available with the same quality but in larger order quantities. Ordering in larger quantities is both cost efficient and environmentally efficient because it cuts down on packaging as well as cost of transportation. The sizes given in the price chart may be too small or too big, the nice aspect of the company is the variety of different sizes that they offer, and it may take some time to realize what the proper reorder amount is. The difference in price compared to the other companies demonstrates that these products are delivering a high quality, but at a lower cost than the other options.

One thing that is a drawback of this company is availability. These products aren't available in many retail locations, and the closest location is actually in Nashua, NH. However, there are various online resources where these products can be ordered and I think this would be a beneficial operations switch for the VNA Care Network to make.

Distribution Considerations

A large factor of this recommended initiative is the belief that going with a single supplier is a more efficient choice than simply picking and choosing certain products from multiple companies. If the Chilton house decides to order all of their products from Biokleen they will know that all products come with their quality guarantee.

Because Biokleen isn't available in many retail locations, I think a large shift needs to be made towards online purchasing of cleaning supplies. It may seem unnecessary or expensive to ship in

comparison to running to the store, but in the long run a lot of companies end up saving a lot of money. When ordering online, they give you the option of ordering in larger bulk quantities that are not available in the store. They also can keep you updated on new supplies, special discounts, how to achieve free shipping, etc. Also, not driving to and from the store will cut down on the carbon footprint of distribution for the facility, considering that delivery trucks would be travelling that mileage anyways. One particular website that carries these products, is easy to use, and is becoming increasingly popular is greenhome.com. It's great because all of the Biokleen products are featured and you can choose the order size that makes the most sense.

Ordering all of the cleaning supplies from this retailer would be much more efficient in the long run. At first I think switching over to completely online may be hard, but just as the trends are moving towards economically-friendly products, things are also shifting towards completely online services. Shopping and comparing prices is much faster and less wasteful online, and I think this is a change that VNA care is ready to make.

Pricing Differences

When considering eco-friendly alternative for LEED certification, the general opinion is usually that this is going to cause overall costs to skyrocket for the company. However, I was pleasantly surprised to find that the alternative and low VOC products from Biokleen will actually decrease costs for the Chilton House. The only product that was more expensive was the liquid laundry detergent, which may not even be necessary for the business. The fact that the prices aren't going to increase, and the benefits are significantly going to increase really support a needed switch.

The beauty of Biokleen is that it can do so much more for the patients at the hospice house than you can put a money value on. Being able to know that the air people are breathing isn't going to cause them any unexpected harm or discomfort would be worth paying more for, though luckily in this case that will not be necessary.

Product	Old Product	Biokleen	Difference
Liquid Laundry	\$0.03/oz	\$0.22/oz	-\$0.19
Powder Laundry	\$0.25/load	\$0.20/load	\$0.05
Tub & Tile	\$0.20/oz	\$0.19/oz	\$0.01
Kitchen	\$0.23/oz	\$0.19/oz	\$0.04
Glass & Surface	\$0.19/oz	\$0.14/oz	\$0.05
Toilet Bowl	\$0.20/oz	\$0.17/oz	\$0.03

Dishwasher Powder	\$0.20/oz	\$0.13/load	\$0.07
Floor Cleaner	\$0.21/oz	\$0.18/oz	\$0.03

Material Data Safety Sheets

Bio Kleen All Purpose Cleaner & Degreaser

MATERIAL SAFETY DATA SHEET

SECTION 1. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS#	%	SARA TITLE III	PEL	TLV
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SECTION 2

This product contains water-base detergents materials not listed by the ACGIH as hazardous.

Components listed as a suspected carcinogen: None

SECTION 3. HAZARDS IDENTIFICATION

Health Hazards (Acute and Chronic):

Effects of Overexposure: TLV not established for product.

Primary Routes of Entry: Ingestion, Inhalation, Skin and Eye Contact.

ACUTE:

EYE CONTACT: May cause irritation.

SKIN: Not expected to be a hazard with normal use.

INHALATION: Not expected to be a hazard with normal use.

INGESTION: May cause nausea, vomiting, and/or diarrhea.

CHRONIC: Prolonged or repeated contact may result in defatting of skin. Persons with pre-existing skin disorders may be more susceptible to the effects of the contact.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None reported.

Bi-O-Kleen All Purpose Cleaner

SECTION 4. FIRST AID MEASURES

Emergency and First Aid Procedures.

IF IN EYES: Immediately flush with large quantities of clean water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

IF ON SKIN: Rinse exposed area with clean water for at least 15 minutes. Remove contaminated clothing. Launder contaminated clothing before reuse. Get medical attention if irritation persists.

IF SWALLOWED: **DO NOT INDUCE VOMITING.** Drink two glasses of water or milk. Never give anything orally to an unconscious or convulsing person. Get prompt medical attention.

IF BREATHED: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Get prompt medical attention.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT (PMCC): Not Flammable

FLAMMABLE LIMITS IN AIR: Not Determined.

EXTINGUISHING MEDIA: Dry Chemical, carbon dioxide, foam, or water fog. Class BC or ABC fire extinguisher.

SPECIAL FIRE FIGHTING PROCEDURES: Self-contained positive pressure breathing apparatus and protective clothing should be worn in fighting fires involving chemicals.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None known.

HAZARDOUS DECOMPOSITION PRODUCTS: Not Determined For Product.

SECTION 6. SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled: Use required personal protective equipment when entering spill area. Avoid entering spill area; spilled material may be extremely slippery.

SMALL SPILL: Release of small amounts to sanitary sewer is inherent with normal end use. Use appropriate absorbent material to absorb residual material and transfer absorbed material to containers for disposal.

LARGE SPILL: Stop spill at source using dam, dike or divert techniques to prevent spill from spreading. Salvage any free product for reuse, if possible. Use absorbent to absorb any residual material. Transfer into container for disposal in Class D landfill pending approval. Follow up with water flush.

SECTION 7. HANDLING AND STORAGE

Preferred storage is between 60 and 100 deg. F. Keep Container closed when not in use. If container is to be returned or recycled, make sure container is drip dry.

Bi-O-Kleen All Purpose Cleaner

SECTION 8. EXPOSURE CONTROLS, PERSONAL PROTECTION EQUIPMENT

Occupational Exposure Limits:

ACGIH TLV	TLV(C)	STEL	OSHA STEL	PEL
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None established for product.

RESPIRATORY PROTECTION: None normally required under normal use.

VENTILATION Provide sufficient general and/or local exhaust during normal use.

PROTECTIVE GLOVES: For Prolonged Contact use Nitrile or Neoprene rubber gloves.

EYE PROTECTION: Chemical splash goggles recommended.

OTHER PROTECTIVE EQUIPMENT: None normally needed.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: Approx. 210 deg. F. (Water)

Vapor Pressure: Same as for Water (1)

Vapor Density: Not Available

Specific Gravity: 1.0

Percent Volatiles: Less than 1%

Evaporation Rate: Same as water.

Appearance and odor: Slight Amber Clear Solution. Mild Citrus Odor

pH: 7.5 ± 0.5

Solubility: 100% in water.

SECTION 10. STABILITY AND REACTIVITY

STABILITY: Product is stable

HAZARDOUS POLYMERIZATION: Will not occur.

INCOMPATIBILITY: Strong Oxidizing Agents.

CONDITIONS TO AVOID: Strong Oxidizing Agents.

SECTION 11. TOXICOLOGICAL INFORMATION

Substance	Specie	LD50
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No Data Available product or ingredients.

CARCINOGENICITY: The NTP, IARC, or OSHA does not consider this product or its components to be carcinogenic.

SECTION 12. ECOLOGICAL INFORMATION

None Available For Product

SECTION 13. DISPOSAL CONSIDERATIONS

EPA HAZARDOUS WASTE CODE: NONE

Product must be disposed of properly under Federal and State regulations for industrial wastes. Recommended disposal is incineration or Disposal in a Class D landfill of absorbed wastes pending approval. As delivered, this product when spilled, released or disposed of, is a non-hazardous waste as defined in RCRA regulations 40 CFR Part 261.

Bi-O-Kleen All Purpose Cleaner

SECTION 14. TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME: Bi-O-Kleen All Purpose Cleaner

DOT HAZARD CLASS: Not Regulated

DOT IDENTIFICATION NO. None

DOT PACKING GROUP: None

DOT RQ FOR PRODUCT: NA

DOT MARINE POLLUTANT: NA

EMERGENCY RESPONSE GUIDE NUMBER: None

CANADIAN TDG/WHMIS REGULATIONS:

TDG NAME: Bi-O-Kleen All Purpose Cleaner

TDG CLASS: Not Regulated

PIN NUMBER: None

WHMIS: D 2 B

(from biokleenhome.com)

Comet Powder Cleanser With Bleach

MATERIAL SAFETY DATA SHEET

MSDS #: H94000M

Issue Date: 11/1/99

Supersedes: N/A

Last Issue Date: N/A

SECTION I - CHEMICAL PRODUCT

Identity: **Disinfectant Powder Cleanser**

Use: **Powdered All-Purpose Cleanser**

Brands: **COMET (Regular and Lemon Fresh fragrances)**

Hazard Rating: 1

Health: 1

4=EXTREME

Flammability: 0

3=HIGH

Reactivity: 0

2= MODERATE

1=SLIGHT

Emergency Telephone Number: 24hr P&G Operator - 1-800-926-9441 or call Local Poison Control Center

SECTION II - COMPOSITION AND INGREDIENTS

Ingredients/Chemical Name: Bleach, cleaning agents (calcium carbonate, sodium carbonate, anionic surfactants),

quality control agents, perfume, color. **Comet** Cleanser contains no phosphorus.

Hazardous Ingredients as defined by OSHA, 29 CFR 1910.1200.

SECTION III - HAZARDS IDENTIFICATION

Health Hazards (Acute and Chronic):

Ingestion: Mild mucous membrane irritant.

Eye Contact: Mild eye irritant.

Inhalation: Mild respiratory irritant.

Skin: Mild skin irritant.

Signs and Symptoms of Exposure:

Ingestion:

Oral ingestion may result in gastrointestinal irritation with nausea, vomiting and diarrhea.

Eye Contact: Prolonged skin contact or direct contact with eye may result in superficial, temporary irritation similar to those produced by other household detergents.

Skin:

Prolonged skin contact or direct contact with eye may result in superficial, temporary irritation similar to those produced by other household detergents.

Inhalation: No hazards under normal conditions of product use or within the occupational exposure guidelines. Unusually high exposures may cause coughing or irritation of nose and throat.

SECTION IV - FIRST AID INFORMATION

Emergency and First Aid Procedures:

Ingestion:

Dilute with fluids and treat symptomatically.

Eye Contact:

For accidental eye contact, flush thoroughly with water for 15 minutes.

Skin:

Wash with soap and water and discontinue use.

Inhalation: For accidental, high level inhalation, remove to fresh air. Get medical attention if coughing persists.

Other: Consumer product package has a caution statement: CAUTION: KEEP OUT OF REACH OF CHILDREN. May cause eye irritation. In case of eye contact, flush thoroughly with water. If irritation persists, see a physician. If swallowed, drink a glass of water to dilute. Do not mix with other products especially toilet bowl cleansers and products that contain ammonia.

SECTION V - FIRE FIGHTING INFORMATION

Flash Point (Method Used): N/A

Explosive Limits:

LEL: N/A

UEL: N/A

Extinguishing Media: Use CO₂, water, or dry chemical.

Special Fire Fighting Procedures: None required.

Unusual Fire Hazards: None known.

Stability

Unstable:

Stable: X

Conditions to Avoid: None known

Incompatibility (Materials to Avoid): Ammonia and acids.

Hazardous Decomposition/By Products: Chlorine gas.

Hazardous Polymerization:

May Occur:

Will Not Occur: X

Conditions to Avoid: None known

SECTION VI - ACCIDENTAL RELEASE MEASURES

Personal Precautions: None

Environmental Precautions: DISPOSAL IS TO BE PERFORMED IN COMPLIANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS. Product contains biodegradable surfactant. If permitted, flush small quantities down sewer drain with large excess of water or dispose of at landfill.

Steps To Be Taken in Case Material is Released or Spilled: Vacuum to remove spill and place in trash container for disposal or flush with water. Do not dry sweep.

SECTION VII - HANDLING AND STORAGE

Precautions To Be Taken in Handling and Storing: Avoid moisture when storing to prevent loss of bleaching action and to prevent caking.

Other Precautions: None required.

SECTION VIII - EXPOSURE CONTROLS, PERSONAL PROTECTION

Respiratory Protection (Specify Type): None required with normal use. For bulk handling or other dusty conditions, use respiratory protection approved by NIOSH for dust.

Ventilation

Local Exhaust: None required with normal consumer use.

Special: None

Mechanical (General): Acceptable. *Other:* None

Eye Protection: None required with normal consumer use.

Industrial Setting: For splash protection, use chemical goggles.

Protective Gloves: None required with normal use.

Other Protective Equipment: None required with normal use.

SECTION IX - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point °F: N/A

Specific Gravity (H

2

O=1): ca. 1

Vapor Pressure (mm Hg): N/A

Percent Volatile by Volume (%): ca. 1

Vapor Density (Air=1): N/A

Evaporation Rate (nBuOAc=1): N/A

Odor Threshold: N/A

Freezing Point: N/A

Coefficient of Water/Oil Distribution: N/A

pH (1% solution): N/A

Scooped Density: N/A

Solubility in Water: Moderately

Appearance and Odor: Green powder, cedar pine or lemon scent.

Reserve Alkalinity: N/A

SECTION X - STABILITY AND REACTIVITY

Possible Hazardous Reactions/Conditions: None known

Explosion Data – Sensitivity to Mechanical Impact: None

Explosion Data – Sensitivity to Static Discharge: None

Conditions to Avoid: None

Materials to Avoid: None

Hazardous Decomposition Products: None known

Other Recommendations: None

SECTION XI - TOXICOLOGICAL INFORMATION

Calcium carbonate, an ingredient of this product, contains small amounts of crystalline silica (quartz) as a naturally occurring impurity. Prolonged, excessively high exposures to respirable crystalline silica may result in reduced lung function in some individuals. IARC has found sufficient evidence to classify crystalline silica as a carcinogen in animals, but there is limited evidence in humans.

LD50 (rats oral): 9 g/kg

ED50: 0.23 g/kg

PRODUCT as a whole:

CARCINOGENICITY: None Known

SENSITIZATION EFFECTS: None Known

REPRODUCTIVE EFFECTS: None Known

SYNERGISTIC EFFECTS: None Known

SECTION XII - ECOLOGICAL INFORMATION

No concerns at relevant environmental concentrations.

SECTION XIII - DISPOSAL CONSIDERATIONS

Waste Disposal Method: Product contains biodegradable surfactant. If permitted, flush small quantities down sewer drain with large excess of water or dispose of at landfill. DISPOSAL IS TO BE PERFORMED IN COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

SECTION XIV - TRANSPORT INFORMATION

DOT Classification: **Comet** cleanser is not DOT hazardous, and is not regulated under the DOT Hazardous Material Regulations (49 CFR, parts 171-180) which govern the sale and transport of hazardous materials.

SECTION XV - ADDITIONAL REGULATORY INFORMATION

All components are listed on the US TSCA Inventory. No components are affected by Significant New Use Rules

(SNURs) under TSCA §5.

No components of **Comet** are subject to California Proposition 65.

All ingredients are CEPA approved for import to Canada by Procter & Gamble. This product has been classified

with Hazard Criteria of the Canadian Control Products Regulation (CPR) and this **MSDS** contains all information

required by the Canadian Products Regulation.

SECTION XVI - OTHER INFORMATION

*N/A. - Not Applicable

*N/K. - Not Known

The submission of this **MSDS** may be required by law, but this is not an assertion that the substance is hazardous when used in accordance with proper safety practices and normal handling procedures. Data supplied is for use only in connection with occupational safety and health.

The information contained herein has been compiled from sources considered by Procter & Gamble to be dependable and is accurate to the best of the Company's knowledge. The information relates to the specific material designated herein, and does not relate to the use in combination with any other material or any other process. Procter & Gamble assumed no responsibility for injury to the recipient or third persons, for any damage to any property resulting from misuse of the controlled product

(from pg.com)

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