“Green Cleaning in University of Oregon Student Housing”

ENVS411, Campus Sustainability
Fall 2003, Instructor: Peter Reppe

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Executive Summary

This paper reports the findings of a group project for ENVS 411, "Campus Sustainability", assessing the current use of cleaning products in University Housing and making suggestions for the implementation of alternative "green" products.

Janitorial cleaning products are necessary for maintaining clean and sanitary conditions on campus. However, the conventional products currently used at the University present multiple human health hazards (as mutagens, reproductive toxins, and endocrine disruptors) and contribute significantly to environmental degradation (polluting the air, land, and water). Although we don not have usage statistics for all products, Allstar's Stinger Cleaner/Degreaser, which contains the single "worst" compound we examined, nonylphenol, a known reproductive toxin and endocrine disruptor, UO Housing purchases 568 gallons of the product per year. 8%, by weight, is pure nonylphenol. These impacts can only be mitigated by substitution, reduction, and, to some extent, prevention (using interior building materials that are easier to clean). Our emphasis here is on substitution, probably the most crucial step to be taken in reducing the harmful impacts of janitorial products.

Switching to environmentally preferable cleaning products is not in any way an "un-mainstream" path to pursue. Even at the federal level, Executive Order 13101 mandates that all U.S. agencies comply with environmentally friendly purchasing policies. At the University of Oregon, the Comprehensive Environmental Policy Statement issued by the Vice President for Administration includes a "preferred environmental purchasing policy" statement. Unfortunately, because this policy is neither mandatory nor accompanied by any review or assessment mechanism, it does not appear to have had much effect on purchasing outside Facilities Services (where Kelly Rasmussen and Jerry Dominy have made considerable headway towards a "greening" and reduction of janitorial products).

After examining current use and health and environmental impacts in some detail, we evaluate five eco-certification systems and purchasing policies (Coastwide Lab's SEGC 114-03 Third-Party Certification, the national Green Seal Standard, GS-37, the City of Seattle's Purchasing Policy, the Sustainable Products Purchasing Coalition's Pilot Project Life Cycle Benefit/Impact Assessment Tool and the Western Regional Pollution Prevention Network's Janitorial Products Pollution Prevention Project) recommending that University housing engage in a cooperative pilot project to test effective "green" cleaning products in terms of factors we cannot at this point predict (cleaning time, labor, etc.) Because costs are determined in a bidding process we do not have actual numbers but have been told by Kelly Rasmussen (Facilities) that any differences are negligible. Chatham College (in Pittsburgh, PA) actually reports a savings of $10,000 from a reduction in toxic cleaning products, According to an EPA funded study on "green cleaning" in Richmond, CA, the average reduction per janitor (given substitutions and reduction) can be 5 pounds per year. Given the contents of these "hazard" pounds (mutagens,

carcinogens, VOC's and other toxins) which have been shown to adversely effect humans and the environment in even small amounts, these numbers are significant. At little or no cost, we suggest a way in which UO Housing can keep up with environmental trends and move towards sustainability.

I. Report

A. Introduction

As the written portion of a course project for ENVS 410 (Campus Sustainability), this paper reports our findings regarding the current use of janitorial cleaning products in University Housing and a survey of available "greener" alternatives. Because of the difficulty involved in a purchasing committee's ability to assess health and environmental impacts on their own, we also devote a fair amount of space to an examination of different certification systems, purchasing guidelines and their methodologies.

In the early stages of the project we met with May Walker, Custodial supervisor for the Hamilton Complex, and compiled a comprehensive list of cleaning products used in that facility. Based on Material Data and Safety Sheets (MSDSs) for these cleaners we realized that of the three May Walker identified as "most frequently used" (daily for the cleaning of showers and bathrooms), 2 contain suspected mutagens, one contains a notorious persistent bioaccumulative toxin and endocrine disruptor, and another contains a compound resulting in serious damage to the central nervous system from inhalation alone.

Realizing the potential impacts of these chemicals we proceeded with research on alternative eco-friendly cleaners and an examination of case studies and different methods by which the changes we advocate might be achieved. We stress that the risks to human health and the environment are significant and deserve serious attention from the University's administration.

B. Cleaning Product Use in UO Housing

1. Health Effects of Conventional Cleaning Chemicals

According to a recent EPA-funded study of janitorial injuries in Washington State approximately 8 in every 1000 workers per year submit claims for chemical-caused workplace injuries (WPRN, 2000). In the case of hotels, colleges, and hospitals, however, compensation claims increased to as much as 70 per 1000 workers. Among these injuries, 40% involved eye irritation or burns, 36% skin irritation or burns, and 12% from the inhalation of chemical fumes. On average, each claim resulted in 18 hrs of lost work time, with compensation averaging $240 and medical costs $375 for a total of about 615 dollars (Project Completion Report, "Environmental Justice through Prevention", 2000). While we do not have data specific to the University of Oregon, we believe that these statistics attest to the significance of potential worker injuries and monetary liabilities.

TABLE 1: HAZARDS/IMPACTS OF CLEANING COMPONENTS CURRENTLY USED IN UO HOUSING

Chemical Name	Product(s) Contained in	Risks?	Contains Endocrine Disruptor?	Teratogen/ Mutagen (Reproductive Toxicity)	IRHC Score[1]
n-Alkyl Dimethyl Benzyl Ammonium Chloride CAS# 68391-01-5	Rochester Midland F-25 Sanitizer, Ramsey Triguard Carpet Sanitizer, Buckeye Sanicare Quat-64	Causes burns to eyes or skin, which may heal over time.		YES May cause reproductive defects. May act as a mutagen.	N/A
n-Alkyl Dimethyl Ethylbenzyl Ammonium Chloride CAS# 68956-79-6	Rochester Midland F-25 Sanitizer, Buckeye Sanicare Quat-64				13.4
Nonylphenol Polyethylene Glycol Ether 9016-45-9	Buckeye Sanicare Quat-64, Allstaar Stinger Cleaner/Degreaser	Is a PBT (persistent, bioaccumulative, and toxic)	YES, known endocrine disruptor.		22.1
Tetrasodium Ethylenediamine Tetraacetate 64-02-8	Buckeye Sanicare Quat-64	Biodegradation releases CO2 and NO2			8.9
Dipropylene Glycol Methyl Ether (aka 2-(2-butoxyethoxy) ethanol (DEGBE) CAS# 35950-94-8 Dipropylene Glycol monoethyl ether CAS# 34590-94-8	Ramsey Trail Breaker Heavy Duty Pre-spray, Unisource Allstar Foam Up Cleaner	Central Nervous System damage from inhalation or ingestion; Liver damage (from exposure to very high levels)			13.4
Ethylene Glycol CAS# 107-21-1	State Chemical Liquid Ice-chek Activator	Ingestion leads to Kidney, lungs, liver, heart damage & CNS effects		YES. Since 1994, the EU Marketing and Use Directive has forbidden the sales of products containing ethylene glycol to the general public.	16
Octyl decyl dimethyl ammonium chloride CAS# 68424-95-5	Ramsey Triguard Carpet Sanitizer				8.2
Dioctyl dimethyl ammonium chloride CAS# 68424-85-1	Ramsey Triguard Carpet Sanitizer				8.2
Morpholine CAS# 110-91-8	3M Carpet Cleaner	Contact with eyes quickly causes permanent blindness; causes damage to eyes or skin, which if not taken care of will be permanent; severe inhalation irritant (victim will usually be temporarily incapacitated).		YES Suspected mutagen	N/A
Sodium Carbonate CAS# 497-19-8	Ramsey Triguard Carpet Sanitizer	Contact with eyes quickly causes permanent blindness; Causes damage to eyes or skin, which if not taken care of will be permanent;			7.0

What are some of the specific hazards of the cleaning products currently in routine use in UO Housing? Table 1 details some of the hazards associated with chemical compounds used daily by janitors in dorms and student housing. Among these, the glycol ethers (dipropylene glycol methyl ether, and dipropylene glycol monoethyl ether) are among the worst offenders. According to the California Department of Health Services Hazard Evaluation System and Information Service :

> "Overexposure to glycol ethers can cause anemia (a shortage of red blood cells), intoxication similar to the effects of alcohol, and irritation of the eyes, nose, or skin. In laboratory animals, low-level exposure to certain glycol ethers can cause birth defects and can damage a male's sperm and testicles. There is some evidence that workplace exposure can reduce human sperm counts. Based on the animal tests and on studies of workers, you should treat certain glycol ethers as hazards to your reproductive health."

Glycol ethers evaporate and are absorbed through lungs as well as through the skin and are especially dangerous to pregnant women and nursing mothers. Three of the chemicals currently being used contain these ethers: Ramsey Trail Breaker Heavy Duty Pre-spray, Unisource Allstar Foam Up Cleaner and Buckeye Sanicare Quat-64.

A total of five different cleaners in current use contain known or suspected mutagens or reproductive toxins (n-alkyl dimethyl benzyl ammonium chloride, morpholine, and ethylene glycol). Of these compounds, ethylene glycol has actually been banned in any product sold to the general public since 1994 in the European Union. In studies cited by Philip Dickey, staff scientist for the Washington Toxics Alliance, nonylphenol polyethylene glycol ether (found in Quat-64 and Stinger), a known endocrine disruptor, has also been shown to have "induced [the] growth of human estrogen-sensitive breast cancer cells." Nonylphenol is also a known endocrine disruptor, making it especially dangerous to pregnant women and nursing mothers.. As detailed in Table 1, in addition to these hazards, numerous compounds are known to cause permanent injury, blindness and illness. Though we do not have complete usage data available for all products, a sample is listed in Table 2. Note in particular, the high amounts of Allstar's Stinger purchased per year (568 gallons), approximately 8% of which is nonylphenol.

While students are certainly exposed to less toxic material than the janitorial staff, they nevertheless come in contact with toxins in conventional cleaners through contact with surface residues, and, most importantly, through the air. According to research by Alicia Culver (et al.) cleaning chemicals contribute significantly to Indoor Air Quality (IAQ) problems. Such problems are compounded by poor natural ventilation, a problem in many of the dorms during winter.

TABLE 2: CHEMICAL QUANTITIES, UO HOUSING TOTAL

Compound Name	**Cleaning Product found in**	**Percentage by weight**	**Total Amount of Product (not compound) used per year**
Nonylphenol CAS# 9016-45-9	Allstar Stinger Cleaner/ Degreaser	<8.0%	568 gallons
Dipropylene glycol monomethyl ether CAS# 34590-94-8	Allstar Foam-Up	not reported by manufacturer	680 gallons

n-Alkyl dimethyl benzylammoinum chlorides CAS# 68391-01-5	Rochester Midland F-25 Sanitizer	5.0%	160 gallons
ethybenzylammoinum chlorides CAS# 68956-79-6	Rochester Midland F-25 Sanitizer	5.0%	160 gallons

data courtesy Andre Moran

2. Environmental Impacts of Conventional Cleaning Chemicals

The relative environmental harm of conventional vs. "green" chemicals is vast and changing the products purchased at University of Oregon Housing has the potential to mitigate the wide-ranging environmental destruction that the current system perpetuates. Since environmental impacts change over the lifecycle of the product, we approach them here by lifecycle stage: (1) raw material extraction and processing, (2) chemical manufacturing, (3) consumer use, and (4) disposal (see Diagram 1).

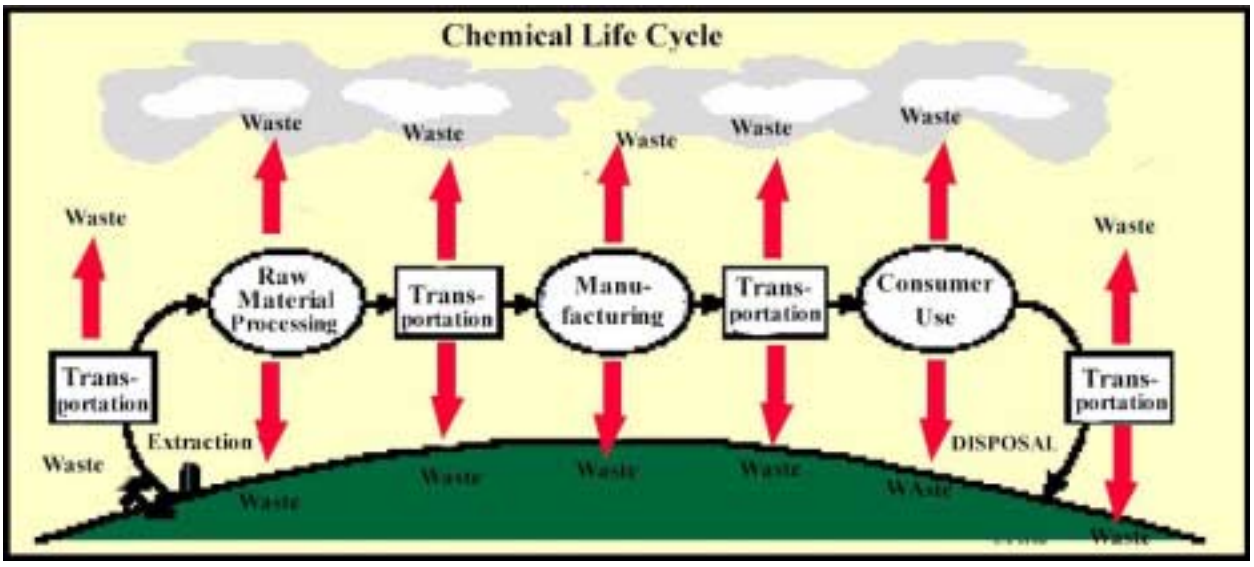

DIAGRAM 1: CHEMICAL LIFE CYCLE (courtesy Zero Waste Alliance)

During the raw material extraction and processing phase, organic compounds are taken from petroleum and plants and animals, impacting the source from which they come. Phosphates, carbonates and silicates, used as builders during processing, must be mined, causing larger or smaller impacts to the environment depending on the extraction methods used. During the manufacturing stage, various toxic substances and byproducts are released as shown in Diagram 2. These releases, even when coming from a relatively harmless compound in its user phase, affect the communities and environment in the vicinity of the manufacturing plant. Thus n-Alkyl Dimethyl Ethylbenzyl Ammonium Chloride, found in Quat-64 and Rochester Midland's F-25 Sanitizer, is not a carcinogen during its user phase but releases carcinogens

such as benzene during manufacturing (Ecogent, 1). Workers are exposed to such releases in even higher concentrations. During transportation across al phases of the chemical life cycle, communities along railway lines and major highways are at risk through spills and accidents, including smaller leakages which may go completely unnoticed.

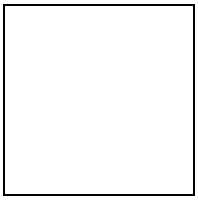

DIAGRAM 2: CHEMICAL MANUFACTURING (courtesy: Zero Waste Alliance)

During the use and disposal phases (in addition to the health hazards mentioned above), harmful substances can be released through air as volatile organic compounds (VOC's), affecting Indoor Air Quality as well as contributing to smog, acid rain, and ozone depletion. Although most water-borne contaminants end up in wastewater treatment plants, studies such as the 2002 USGS study of organic wastewater contaminants show significant numbers of these turning up in freshwater streams (Kolpin et al.). Through long term accumulations, toxins build up in water systems, ultimately affecting all forms of life. Endocrine disrupting compounds (such as the Nonylphenol Polyethylene Glycol Ether found in one of the most heavily used cleaners in UO Housing, Buckeye Sanicare Quat-64) "mimic or block the activities of hormones" leading to mutagenic and toxic effects in aquatic wildlife (Kimball and Heine). Another compound found in Quat-64, Tetrasodium Ethylenediamine Tetraacetate, mobilizes heavy metals, while phosphates (commonly found in all types of detergents) cause eutrophication (or nutrient 'over-loading'). (In the McKenzie River recreational area here in Oregon, pamphlets advise visitors of the potential dangers to humans and pets from swimming in reservoirs with toxic algae blooms, a direct result of eutrophication.)

3. Potential Benefits of Switching to Green Cleaners

We cannot emphasize strongly enough that a reduction in the use of toxics would prevent impacts at all stages of the chemical life cycle, including the depletion of natural resources, the release of land, air, and water pollution, the prevention of serious janitorial injuries, and a reduction in the number of VOCs, and PBT's to which students may be exposed.

Though we do have not the resources to project reduction figures for UO Housing, Table 3 provides an estimate from the EPA funded "Be Healthy: Clean Safely" project report. In this approximation, chemical substitutions alone have the potential to decrease use by 2.5 pounds per janitor per year.

Table 3 : Potential Hazardous Materials Use Reduction Per Janitor	
Prevention Measure	*Potential Reductions*
Chemical Substitutions	2.5 lbs/yr
Chemical Use Reduction	1.5
Avoid Aerosols; etc.	1.0
Total	5.0 lbs/yr

We also want to stress the high risks involved in chemical use. For most of the compounds found in cleaners at UO Housing, very little research has been done in the way of studying the long-term effects of daily use. Likewise, the precise environmental impacts of trace amounts of toxins are difficult to assess. In both cases multiple factors further complicate any research that might be attempted; a janitor may develop cancer at 50, but who's to say what caused it? Historically, it has been the case that science only learns of toxic effects only after a given chemical has been in use for years, as was the case with DDT. Given that all the "green" cleaning lines we have reviewed hold products to the same standard of cleaning effectiveness as an equivalent conventional cleaner and cost approximately the same amount (Kelly Rasmussen, personal correspondence) the benefits of switching over are all the more compelling.

In Appendix C we list a number of certified green cleaning products. These include "Green" lines from Coastwide Labs, a manufacturer located in Salem, and national manufacturers from which UO Housing already purchases many of its cleaning products, including Rochester Midland and 3M. Other cleaners include "single" products from both local and national companies. The only commonly used 'cleaners' for which no truly eco-friendly alternative exists are disinfectants/sanitizers — indeed, the City of Seattle makes only one exception in its environmental purchasing standard: sanitizers. In essence, disinfectants are poisons and therefore toxic, this toxicity necessary in order to kill germs, viruses, and bacteria (Coastwide Labs). There are, however, relatively safer alternatives to the products currently in use—listed, in a separate category from the other "green" cleaners in Appendix C.

C. Reporting and Certification

1. Current Reporting Standards

C1 Current Reporting Standards

MSDSs are a critical component of the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard (29 CFR 1910.1200(g)). This standard mandates that workers have a right to know what hazards are associated with the chemicals they use in the workplace. The definition of a hazardous chemical is one that is a physical hazard or a health hazard. Health hazard means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term 'health hazard' includes "chemicals which are carcinogens, toxic or highly toxic agents,

reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes". Physical hazard means a chemical for which "there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive" (http://www.ilpi.com/msds/ref/hazardous.html). Currently at least one chemical , Buckeye Sanicare Quat-64 , in use has a health rating of 3, which according to the MSDS definition poses a "severe acute exposure hazard; onetime exposure can result in permanent injury and may be fatal." MSDS sheets are where employees can find out about risks associated with the chemicals they work with, so it is extremely important that they are up to date and placed in an area accessible to employees.

There has been some criticism as to the effectiveness of MSDS sheets providing adequate data about the actual risks associated with using certain chemicals. MSDSs need to be clearly written, well organized, and legible. According to Janitorial Products Pollution Prevention Project, about a tenth of MSDS's were either illegible or confusing. Health and safety data are especially confusing and virtually no data on long term exposure effects is reported on these sheets. In our tour of the Hamilton janitorial supply room, the MSDS sheets were kept in a file cabinet, in a locked office. These sheets should be on display for the employees in a more accessible location.

These M.S.D.S. sheets have been obtained for some of cleaning/disinfecting chemicals currently in use as well as those for alternative products that promote sustainability. Since sustainability is defined as 'providing for the needs of the present without compromising the ability of future generations to meet their needs', the line of alternative cleaners have been specifically designed and tested to provide the maximum cleaning ability while minimizing environmental and health impacts (Coastwide 9). For this goal to be accomplished a set of certification criteria must be met. In order to achieve to unbiased tests, a third party certification system has been the standard for backing up 'green' claims (see tables A and B).

2. Green System Certification System Comparisons

The complex nature of chemical cleaners and the inadequacy of the information obtainable from standard Material and Safety Data Sheets (MSDS) makes it particularly difficult to assess the precise health and environmental impacts of any given cleaner. While we have, in previous sections, tried to give analyses of current cleaners used in UO Housing, we realize that the usefulness of this research is potentially dated and lacks flexibility insofar as we have discussed only a few of the compounds that may be found in industrial cleaners. In this section we present some comparisons of various certifications and /or preferred purchasing systems as a guideline for ways in which the University might establish a more permanent system of cleaning product assessment and green purchasing.

The four systems we examine are 1) Coastwide Lab's SEGC 114-03 Third-Party Certification 2) the national Green Seal Standard, GS-37, 3) the City of Seattle's Purchasing Policy, 4) the Sustainable Products Purchasing Coalition's Pilot Project Life Cycle Benefit/Impact Assessment Tool and 5) the Western Regional Pollution Prevention Network's Janitorial Products Pollution Prevention Project. We will begin by comparing the first three systems, all of which follow a pass/fail system in which a chemical either passes as "green" or fails and move on to a brief individual survey of the fourth (lifecycle) system, which, though different in methodology, provides a way of assessing the relative harm of one chemical vs. another (particularly helpful when surveying several chemicals that would all fail under one of the first three systems). Links to each group's standard or system (on which these tables are based) can be found in the bibliography.

SYSTEMS 1-3

In order to highlight differences and similarities we begin with a comparison of the Coastwide and City of Seattle Systems to the official Green Seal Standard:

TABLE A: Comparison Chart 1

Full List of Green Seal GS-37 Attributes	**Coastwide Lab's SEGC 114-03**	**City of Seattle**	**Green Seal Standard, GS-37**
Third Party Certification: All Products must be certified by an independent, neutral third party certifier	Complies	Not Specified	Complies
Performance: Each product as used when diluted with cold tap water shall clean common soils and surfaces in its category effectively, as measured by a standard test method	Complies	Not Specified	Complies
Toxicity: Undiluted product shall not be toxic to humans (oral or inhalation toxicity) LD50<2000mg/kg or LC50<20mg/L	Complies	Complies	Complies
Carcinogens and Reproductive Toxins: Undiluted product shall not contain any ingredients that are carcinogenic or are known to cause reproductive toxicity	Complies	Complies	Complies
Skin and Eye Irritation: Undiluted product shall not be corrosive to the skin or eyes.	Complies	Complies	Complies
Skin Sensitization: Undiluted product shall not be a skin sensitizer, as tested by OECD Guidelines for Testing Chemicals, Section 406.	Complies	Complies	Complies
Combustibility: Undiluted Product shall not be combustible. The product or 99% by volume of the product ingredients shall have a flashpoint above 1500ºF as tested using either the Cleveland Open Cup Tester (ASTM D92-97) or a closed cup method ISO 13736 or ISO 2719	Complies	Complies	Complies
Photochemical Smog, Tropospheric Ozone	Complies	Complies	Complies

Production, and Indoor Air Quality: Product as used shall not contain substances that contribute significantly to the production of Photochemical Smog, Tropospheric Ozone, or poor IAQ			
Toxicity to Aquatic Life: Product as used shall not be toxic to aquatic life. Threshold limits is LC_{50} ≥100mg/L for algae, daphnia, or fish.	Complies	Not Specified	Complies
Aquatic Biodegradability : Each of the organic ingredients shall exhibit ready biodegradability in accordance with the OECD definition.	Complies	Not Specified	Complies
Eutrophication: Product as used shall not contain more than .5% by weight of total phosphorus.	Complies	Not Specified	Complies
Packaging: Primary packaging shall be recyclable	Complies	Not Specified	Complies
Concentrates: Product must be a concentrate (product to water, at least 8:1).	Complies	Complies	Complies
Fragrances: Manufacturers shall identify any fragrances on the MSDS. Any ingredient added to the product must follow the Code of Practice of the International Fragrance Association	Complies	Not Specified	Complies
Prohibited Ingredients: Product shall not contain the following ingredients: alkyl phenol ethoxylates, dibutyl phthalate, heavy metals including arsenic, lead, cadmium, cobalt, chromium, mercury, nickel, or selenium, or any ozone-depleting chemicals.	Complies	Complies	Complies
Animal Testing: Discourages animal testing and will accept the results of past peer-reviewed or standard tests demonstrating compliance with criterion.	Complies	Not Specified	Complies
Full Disclosure of Ingredients: Requires full disclosure of ingredients and chemicals used to formulate the cleaning product. The information can be submitted to the third party certifier or directly to the buyer or solicitor. An alternative is to list all ingredients on the MSDS,	Complies	Complies	Complies

Although a few more factors are introduced in Table B, Table A makes clear the primary categories considered among green cleaning certification systems. Among these it is interesting to note the absence of concerns surrounding the manufacturing process (resource depletion, hazardous by-products etc.) and, specifically in the case of Seattle, the primary focus on human hazards as opposed to such factors as aquatic ecosystem impacts. On the other hand, because any given compound will likely affect multiple categories, even those systems which do not specify controls in one of the categories will, in all probability, still prohibit the compound based on other associated hazards.

Table B highlights differences between Green Seal and the other two systems, though again, the logic of the same compound failing under multiple categories dampens the overall significance of these

differences. However, we stress that relative to conventional chemical cleaners, any one of these systems provide a much "greener" and safer alternative.

TABLE B: Comparison Chart 2

Categories Not included in Green Seal GS-37 Standard	**Coastwide Lab's SEGC 114-03**	**City of Seattle**	**Green Seal Standard, GS-37**
Neurotoxins and Central System Depressants: The product in its concentrated form shall not contain any ingredients listed as neurotoxins or CNS depressants.	Complies	Not Specified	Not Specified
Endocrine Disruptors or Modifiers: Product in its concentrated form shall contain no endocrine disruptors.	Complies	Complies	Not Specified
MSDS Provided in ANSI Format: MSDS must be prepared in the more extensive ANSI 16-section format that includes information about environmental and human health beyond the current OSHA MSDS requirements.	Complies	Not Specified	Not Specified
2-butoxynethanol: Product shall contain no 2-butoxynethanol.	Complies	Not Specified	Not Specified
Tiered Rankings: Instead of a pass/fail system products are ranked on a scale	Complies	Not Specified	Not Specified
No Persistent or Bioaccumalative Compounds	Not Specified	Complies	Not Specified
Additional Excluded Chemicals: paradichlorobenzene, CAS 106-46-7; 1, 4-dioxane, CAS 123-91-1 ; sodium hypochlorite, CAS 7681-52-9 ; nitrilotriacetic acid (NTA), CAS 139-13-9 ; sodium ethylenediamine tetraacetic acid (sodium EDTA), CAS 60-00-4	Not Specified	Complies	Not Specified
Volatile Organic Compounds: No product shall contain VOC's in concentrations that exceed 10% of the weight of the product. Examples of VOC's include: benzene, carbon tetrachloride, chlorobenzene, methyl ethyl ketone, and trichloroethylene. VOC content can also be tested using Test Method 24 or 24A, 40 CFR Part 60, Appendix A.	Not Specified	Complies	Not Specified
No Combination Cleaner-Disinfectants	Not Specified	Complies	Not Specified

SYSTEM 4

Moving on the Sustainable Products Lifecycle-style assessment we see a marked difference in approach. Though the categories under consideration (Table C) do not differ so markedly, a lifecycle assessment (LCA) assigns graded quantitative scores to these categories rather than assessing them on the basis of a pass/fail system (note: the Coastwide Labs systems comes a little closer to this but not in nearly as comprehensive a way). Because an LCA follows a product through its entire life ("cradle to grave"), a huge amount of detailed information is needed (e.g. all aspects of the product's compounds'

manufacturing process). This makes the LCA type system much more time and labor intensive than any of those mentioned above. Thus, while a lifecycle-style assessment is more useful insofar as it can be used as a comparison tool to examine conventional impacts as well as those of greener alternatives and put such comparisons into quantifiable form, it would be extremely difficult for a University to require a full LCA of all and any products they are considering purchasing,

Table C: Sustainable Products Lifecycle Impact/Benefit Assessment Categories

Climate Change	Smog
Acid Rain	Ecological Toxicity
Other Air Emissions	Human Toxicity
Water Pollution	Inflows & Outflows not calculated elsewhere (e.g. resource depletion and fossil fuel use during manufacturing, co-products and solid waste outflows)
Natural Resource Depletion (as source of organic chemicals)	Use Phase (recycleability, packaging)
Solid Waste	Habitat Alteration
Stratospheric Ozone Depletion	

D. Suggestions for Implementation

1. Case Studies

Many campuses report utilizing alternative "green" cleaners. In Oregon alone, Coastwide Labs representative John Schreiner claims that their "Sustainable Earth" line is in use (though not exclusively) at Southern Oregon University in Salem, Lane Community College in Eugene, and Chemekta Community College and Western Baptist in Salem. Other campuses, including the University of Vermont and Bowdoin College, prioritize Green Seal approved products except in cases where no alternatives meet the Green Seal Standard.

Chatham College (Pittsburgh, PA) has initiated a comprehensive plan to reduce all toxic substances from campus. Their plan calls for detailed analysis of all chemicals currently in use, across the board, and the creation of an enforceable purchasing policy, backed by administrators. Chatham reports:

> "After several meetings and discussions with Green Village, the distributors of Tech 21 M, a Sun & Earth non-toxic industrial cleaning product, we put the product through the final test. The CEO of Green Village came to campus with plenty of product ready to go up against its toughest critics-four members of Chatham's cleaning crew. We had tackled the issue of cost, through savings to the college estimated at $10,000 a year; to us, it seemed to deliver superior performance, but the cleaning staff had to be pleased with the quality of the product for final

> approval. Various surfaces were tested-walls, windows, carpet stains and tile floors. Tech 21M passed with flying colors and negotiations over issues of quantity, distribution methods and training of staff were finalized. The new toxic-free cleaning products were phased in within the same month" (Chatham College Purchasing, National Wildlife Federation).

Clearly, efforts are being made to deal with a wide range of implementation obstacles facing both small colleges and large Universities. As their successes show, these problems are not insurmountable.

2. Pilot Project recommendations

In order for the University Of Oregon to test any doubts about an alternative green cleaning program in the University Housing complex, we recommend that a pilot project be implemented. This program would allow the university to decide which products have the greatest use potential for the least price. In order to oversee the project, we recommend that a G.T.F. leadership position be created to manage the project, compile the data, and make final recommendations. The Janitorial Products Pollution Prevention Project recommends that in a national survey of successful programs, none succeeded without a balance of support from administrators, purchasing committees, environmental staff, and end-users (janitorial staff).

First, a list of activities involving chemical use should be made, thus showing the types of chemicals needed. Next, chemical criteria should be decided on. When sending out requests for vendor bids, request for companies to provide life cycle information on products, indicating that "green" chemicals are preferred. Third party certified "green" chemicals should take priority and all products that can be replaced with them should be documented. For those without an entirely "green" replacement, like disinfectants, those with low Indiana Relative Combined Hazard (I.R.C.H.) scores should be preferred, thus reducing the chemical hazard to a minimum.

Once a list of acceptable replacements is created, one building the housing complex should be chosen as a test site. Order samples of acceptable products and instruct the crews in those building on proper procedure of using them. Require feedback from the janitorial staff, including effectiveness and relative ease of use (did it require more elbow grease?).

Compile the feedback and discern which products have the highest potential for replacing the current regime. This compilation would compare the cost of replacing the product with the test application feedback. Once it is known which "green" chemicals have the best cleaning power for the price the G.T.F. would be able to make recommendations to the purchasing committee as to which products should be replaced and give the replacement products profile; including cost and health and environmental safety.

E. Conclusion

The proposed change of the University of Oregon Housing's conventional cleaning products to third party certified 'green' alternatives is an opportunity for the University to not only act on its commitment of 'environmentally responsible purchasing policies" but to positively impact staff, students, and the environment (both local and regional). This paper has shown the negative health and environmental effects of conventional cleaning products currently being used; if the current status quo is maintained in UO Housing, staff, students, and the environment will continue to be exposed to chemicals that are known endocrine disruptors, reproductive toxins, and mutagens. The local environment will continue having to absorb phosphates and persistent bioaccumulative toxins.

Changing over to third party certified 'green' chemicals would be a significant step for the University of Oregon towards real sustainability. Going 'green' has the potential to reduce chemical-caused workplace injuries, reduce negative environmental impacts throughout the chemical lifecycle, and support companies that are making a positive contribution to eco-friendly product development. Given the risks and impacts at stake, and the availability of effective alternatives, we cannot urge the administration more strongly to seriously consider the suggestions we offer.

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III. Appendices

APPENDIX A: University of Oregon Environmentally Responsible Purchasing Policy

from: Comprehensive Environmental Policy Statement For The University of Oregon
Effective Date: July 1, 1997
Approved Spring, 1997 by:
Council of Deans
Faculty Advisory Council
President's Small Executive Staff
Issued by: Vice President for Administration

- II. *Environmentally Responsible Purchasing Policies.* The University recognizes that one of the primary methods of exercising its commitment to environmental responsibility is through its purchasing choices. The University will strive to obtain maximum value for its expenditures and will work towards obtaining the "best value" by balancing short and long-term costs, maintenance, life-cycle, and environmental costs in purchasing goods and services.
    - A. The University acknowledges that environmentally responsible purchasing choices will help create and sustain markets for environmentally responsible and recycled content products.
    - B. The University commits to the goal of making environmentally and fiscally responsible purchasing choices that consider life cycle costs, long-term implications, and relative environmental harm of products.
    - C. Purchasing policies will encourage obtaining products that minimize waste products, have high recycled content, use environmental production methods, demonstrate maximum durability or biodegradability, reparability, energy-efficiency, non- toxicity, and recycleability.

Appendix B: Chemical Use and Reduction in Physical Plant/ Facilities, courtesy Kelly Rasmussen

CHEMICAL NAME	USE	
301 Eclipse Neutral Cleaner	floor care	eliminate
303 Dri-Strip	floor care	eliminate
3M Brand A101 Spray Cleaner	floor care	eliminate
3M Brand Foam Scub	floor care	
3M Brand Mat Tack	hold mats to flooring	eliminate
Anchor	floor care	
Apple Cider Vinegar - 40 Grain	dance floor use	mini-use
Batteries, Wet or Dry Cell		
Battery, Electric Storage		
Before	floor care	eliminate
Big D Para Block	deodorant block for urinals	eliminate
Brite Boy Metal Polish	for brass	mini-use
CP Institutional Products Ajax	deep cleaning porcelain w/bleach	eliminate
Cream Cleanser	deep cleaning porcelain	mini-use
D Story	bacteria killer for drains	replace w/ Live Micro 535 (green)
Defoam-It	carpet cleaning additive	eliminate
De-Icer	for icy sidewalks	very specific use
Dust 'N Clean Wiper	it does what it is named	

Eclipse Restoration Polish	floor care	eliminate
Endbac II Aerosol	air freshener - aerosol	mini-use
Equinox Floor Finish - 2290	floor care	eliminate
Four Way Action	lubricant like WD40	mini-use
Fraiche	air freshener	eliminate
Fraiche - vanilla	air freshener	new
Fraiche Gree Apple	air freshener	eliminate
Glance - Use Solution	window cleaner	eliminate
Glance SC	window cleaner concentrate	eliminate
Gum Off Remover	carpet and fabric	mini-use
Host Extra Dry Carpet Cleaner	carpet	
Host Prep Pre-Spray Cleaner	carpet	
Household Bleach 5 1/4%	very limited use on tile	mini-use
Integrity	floor care	eliminate
Jackhammer Baseboard and Buildup Stripper	floor care	
KaiBlooey	deep cleaning of restrooms	mini-use
KaiDri	deep cleaning of restrooms (rinse water)	mini-use
Lemon Shine-Up	dusting/polishing finished wood	
Optic-Guard	antifogging for goggles/glasses	
Paint, Oil & Grease Heavy Duty Solvent Spotter	carpet and furniture	mini-use
Pink Lotion Soap	hand soap - for RR	
Pioneer Neutral Cleaner	floor care	eliminate
Pre-Spray Traffic Lane Cleaner	carpet	eliminate
Pro2O	dust mop treatment (non-oil)	replaced w/Conq-R-Dust
Propane		
Purell Instant Hand Sanitizer	carried on custodial carts for immediate use	
Quartet Erasettes #552	for cleaning dry-errase boards	
Reflection Stainless Steel Polish & Cleaner	for chrome	
Sani-Sorb Bits	absorbant for chemical spills	emergency use
SOS Graffiti Remover	as in the name	replaced
Speedball 2000 Power Cleaner	heavy degreaser	eliminate
Spitfire - Use Solution	degreaser	replaced
Spitfire SC	degreaser concentrate	replaced
Stride Floral - Use Solution	floors	replaced
Stride Floral SC	floors - concentrate	replaced
Stone Coat	floors	
Time Buster Stripper	floors	
Touchdown #9 Solvent	removes adhesives	mini-use
Triple S Assure Antibacterial	antibacterial hand soap	mini-use
UHS Cleaner	floor	eliminate
USCalrite Scale Remover 828	for porcelain	mini-use
Virex II 256 SC	disinfectant	replaced
Vires II 256 - Use Solution	disinfectant	replaced
Wall Power	heavy degreaser	eliminate
Hepastat 256	disinfectant	new
Sustainable Earth General Purpose	neutral cleaner - all purpose including glass	new - green

Cleaner 60		
Sustainable Earth Carpet Cleaner 62	carpet cleaning	new - green
Safety One (Light Duty)	graffiti remover	mini-use
Safety Two (Heavy Duty)	graffiti remover	mini-use
Conq-R-Dust Liquid	dust mop treatment - replaced Pro2O	
ROSCO Green Label Floor Cleaner	floor care	for a specific floor

Appendix C: Alternative Green Cleaning Products

General Green Cleaning Products/Lines:

Enviro Care Line	Rochester Midland PO Box 31515 Rochester, NY 14603 Tel 800 836-1627 Email: pluskey@rochestermidland.com
Eco 2000 line	KC Products, Inc. 707 NE Broadway, Suite 210 Portland, OR 97232 Tel 800 927-9442 Fax 503 287-5239 www.kcproductsinc.com
Sustainable Earth Line	Coastwide Labs 1.800.775.3289 www.coastwidelabs.com Regional rep : John Schreiner jschreiner@coastwidelabs.com
various	3M United States Tel 888 364-3577
various	Enviro Solutions 703 Pine Street Burlington, VT 65401-4921 Tel 800 864-6843 Email: info@enviro-solution.com www.enviro-solution.

Disinfectants/Antimicrobials:

Coastwide Labs' Hepastat 256	Coastwide Labs 1.800.775.3289

	www.coastwidelabs.com Regional rep : John Schreiner jschreiner@coastwidelabs.com
H2Orange2 Super Concentrate (112)	EnvirOx 1938 East Fairchild Street Danville, IL 61832 Tel 800 281-9604 Fax 217 662-2837 Email: Pstewart_Alphen@hotmail.com www.h2orange2.com
Public Places Disinfectant Spray (PP-100)	Microgen, Inc. 33 Clinton Road, Suite 102 West Caldwell, NJ 07006 Tel 800 420-7522 Fax 973 575-9075 Email: microgen1@aol.com www.microgeninc.com
Enviro Care Neutral Disinfectant	Rochester Midland PO Box 31515 Rochester, NY 14603 Tel 800 836-1627 Email: pluskey@rochestermidland.com www.rochestermidland.com/division/ institut/default.htm
3M Cleaner Sanitizer Concentrate	3M United States Tel 888 364-3577