



**GREEN SEAL™ PROPOSED REVISED  
ENVIRONMENTAL STANDARD FOR GENERAL-  
PURPOSE, BATHROOM, GLASS, AND CARPET  
CLEANERS USED FOR INDUSTRIAL AND  
INSTITUTIONAL PURPOSES (GS-37)**

**BACKGROUND DOCUMENT**

THE MARK OF ENVIRONMENTAL RESPONSIBILITY

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## **SCOPE**

The scope of the standard has included general purpose, glass, carpet, and bathroom cleaners for industrial and institutional use. During the scoping and research phase of the revision it was suggested to include product categories in the standard that were previously not included. These include primarily toilet bowl cleaners and biological cleaners (such as enzyme based). Carpet spot removers, graffiti removers, and dry erase board cleaners were also suggested. These products can be included in the standard, with the exception of biological cleaners. Further, there are not commonly used specific performance testing methods available for the other cleaners. It is recommended that the added cleaners be evaluated according to the general purpose cleaner method and criteria, except for toilet bowl cleaners, which will be evaluated according to bathroom cleaner methods and criteria, the carpet spot cleaners will be evaluated according to carpet cleaner methods and criteria, and dry erase board cleaners evaluated according to glass cleaner methods. Further, a provision will be added that will accept alternative methodology to check performance, when rationale is provided.

Toilet bowl cleaners, unlike most other cleaners used in industrial and institutional uses, are packaged in ready-to-use forms. This is typically because of the nature of the cleaning operation and the viscous quality of the product. As a result, toilet bowl cleaners will be allowed to be in ready-to-use concentrations.

Biological cleaners have active-enzyme or microbial ingredients. With these components at significant concentrations in the product, special considerations are necessary to ensure their product performance and health and environmental safety. As a result, it is recommended that a separate standard be developed to cover this product category.

### Children's Health

GS-37 continues to be a leadership standard for health and the environment. Since the products in the scope are used in institutional settings, such as those where vulnerable populations would be exposed to the products, the scope of the revision of this standard also includes focus on the special needs of children along with other vulnerable populations.

Awareness of children's additional health risks from chemicals and pollutants has grown in recent years -- for example, as expressed by the 1997 Presidential Executive Order *Protection of Children from Environmental Health Risks and Safety Risks*. Exposure to chemicals in the environment, including chemicals from cleaning products, can affect children differently and more severely than adults, for a number of reasons.

As they grow and develop, children pass through critical windows of development, which are periods of susceptibility to chemical exposures. *“For children, the stage in their development when exposure occurs may be just as important as the magnitude of exposure.”* (WHO) In some critical developmental stages, even a single exposure event could lead to irreversible, life-long impacts.

Young children’s behavior typically includes mouthing their hands, toys, and other objects, which increases the likelihood of incidental ingestion of chemical residues from surfaces. More time spent crawling or playing on the floor exposes children to chemical residues left on hard surfaces or in carpeting. Children may also be generally less aware of -- and less likely to avoid -- potential hazards in their environment.

Children’s physiology differs from adults in ways that could result in greater health risks from chemical exposures. They have a higher ratio of skin surface to body weight. Children also eat, drink, and inhale more in proportion to their body weight than adults. Their metabolic pathways may also differ from those of an adult, which may limit their ability to detoxifying chemicals. At the same time, while children grow, their neurological, immune, and other body systems are still developing and exposure to toxic chemicals could more easily damage those systems, sometimes irreversibly. According to the World Health Organization (WHO, 2006) *“Asthma and neurobehavioural impairment is increasing in several parts of the world.”*

These differences also vary from one stages of childhood development to another, from infancy through adolescence. Finally, children have more years of future life in which to develop chronic diseases.

The science and approaches to assessing health risks from exposure to chemicals has primarily focused on adults. For example, adult laboratory animals are typically used to determine dose-response relationships for chemicals, and exposure assessment assumptions have typically been based on adult behavior patterns and physiology. Thus, *“the full spectrum of effects from childhood exposures cannot be predicted from adult data.”* (WHO, 2006).

In revising Green Seal’s health and environmental standard for industrial and institutional cleaners, the uncertainty (inability) of risk assessment approaches to protect children in all stages of development must be considered. The many uncertainties inherent to health risk assessment are compounded when applied to children. Predictable and quantifiable dose-response data are required in order to determine safe or acceptable exposure limits, or thresholds, for toxic chemicals. The differences between children and adults, critical developmental windows, and uncertainty in the risk assessment process, all of these factors support taking a precautionary approach to protecting children from environmental chemical exposure, including those from cleaning products.

One precautionary approach, where an ingredient or its class exhibits potentially harmful characteristics, is to specifically prohibit or substantially reduce that ingredient or class of ingredients in products rather than attempting to determine risk-based acceptable levels

of carcinogens, reproductive toxins, toxic heavy metals, etc. Another approach is to use exposure thresholds based on child exposure assumptions rather than those developed for adults, or to apply additional safety/uncertainty factors to modify threshold levels targeted for adults. These precautionary steps would be most acceptable where alternative ingredients are available.

In order to develop a standard with a focus on child health, the various settings where children can be exposed to cleaning product chemicals must also be considered. Children can be exposed to cleaning products at school, in day care centers, and in other institutional or public buildings such as a doctor's office or a shopping center. A developing fetus or nursing infant can be exposed to chemicals as a result of their mothers' exposure; pregnant women and nursing mothers could visit or work in any public, institutional, or industrial setting, or could work directly in the cleaning profession. Exposure to chemicals in cleaning products away from home could be in addition to exposures to the same or similar chemicals at home, increasing to overall exposure to potentially harmful ingredients.

To consider specific health criteria in revising the standard, it is helpful to consider specific exposure pathways and potential chemical hazards for children and cleaning products:

- Accidental direct contact with cleaning products: some concentrated products could cause skin or eye burns, or poisoning from ingestion or inhalation. The standard criteria to prevent these effects include those set for skin and eye irritation and limits for acute product toxicity. Closed dispensing systems reduce the potential for accidental direct contact with concentrated cleaning products, and standards are being considered to better insure that product containers cannot be accidentally ruptured or spilled.
- Routine contact with residues from cleaned surfaces: some products could cause allergic skin reactions, and hand-to-mouth and object-to-mouth behavior could lead to incidental ingestion of cleaning product residues with a risk for chronic or latent health outcomes. The standard criteria to prevent these effects include those addressing skin sensitization, prohibitions for carcinogens, mutagens, and reproductive toxins, and other specific ingredient prohibitions.
- Inhalation of vapors, dusts, or aerosols from cleaning products: Exposure to vapors or aerosols could be a cause of asthma or trigger an asthma attack. Inhalation could also affect other body systems from long-term repeated exposure to chemicals. The standard criteria to address these effects include prohibitions for listed asthmagens, carcinogens, mutagens, and reproductive toxins, and other specific ingredient prohibitions. Product testing to better estimate airborne exposures such as small-chamber emissions testing is also included as an alternative.

Other populations that are vulnerable to health effects from cleaning products include custodial/janitorial workers due to higher exposures from routine use of products during the work day, and adults with compromised health or chemical sensitivities. Taking a precautionary approach with children in mind also offers more protection for these other sensitive populations as well.

*“Protection of children is at the core of the sustainability of the human species. It should be a priority of all countries and international and national organizations to provide safe environments for all children ...”* (WHO, 2006)

## **DEFINITIONS**

Definition updates are included throughout the document, in the discussion of each individual criterion. However, the definition for concentrates was updated and will be discussed here. The definition of concentrate has been modified to increase the required level of concentration for products to 1:32, which is currently met by the majority of GS certified products. ISSA reported the most common dilution ratio of 1:20 at the time of the original GS37 standard. Increased concentration of future GS certified products will save energy, packaging, and transportation impacts associated with the manufacture and use of the products.

## **PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS**

The performance of a cleaning product is an important metric particularly for environmental-based cleaners. The current GS-37 standard allows products to demonstrate performance through successful testing under one of a series of cleaning test methods, or alternatively to demonstrate comparable cleaning performance to any other product currently sold on the market.

Certification through comparable performance was allowed to provide a mechanism for assessing the performance of products whose intended use was not covered adequately by an existing performance standard. However, the exception was occasionally abused, allowing a manufacturer to select a marginally performing product against which to demonstrate acceptable performance. This exception was removed from the criterion from this revision in favor of a broader menu of acceptable performance tests to level the playing field and to maintain a threshold of acceptable performance. An alternative testing clause was added that allows and acknowledges performance testing using a peer-reviewed, fully documented test protocol that is developed and tested to by a credible third party testing organization.

Additionally, the criteria stipulates that all products requiring dilution use unheated water directly from the cold tap at no more than 50°F just prior to testing. The temperature requirement is meant to insure that all testing is performed under controlled and repeatable conditions. The temperature requirement for water used to dilute a

concentrate only applies during the testing of the product and not to the actual use of the cleaning product.

## **PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS**

### **Toxic Compounds**

The revised toxicity criteria have been split into sections according to the routes of exposure. The rationale for the proposed approach is described below.

#### Oral Toxicity

The oral toxicity threshold has been increased in this revision to an Oral  $LD_{50} \leq 5,000$  mg/kg. The previous threshold of Oral  $LD_{50} \leq 2,000$  mg/kg in the original GS-37 standard was largely based on potential exposures to adults in an occupational setting. The new threshold has been established to account for the decreased body mass of small children which will lead to increased dosages, and the increased sensitivities of vulnerable populations that may become exposed. The threshold of 5,000 mg/kg is consistent with the upper range of the ability to measure and correlate the toxic effects of exposure in mice as indicated by the OECD. Finally, this revision brings the standard in-line with other similar standards for oral toxicity measured using the OECD toxicity test for mammals (TG 401) including Environmental Choice CCD-146 and the requirements of the Consumer Product Safety Council found at 16 Code of Federal Regulations (CFR) Chapter II, Part 1500.

#### Inhalation Toxicity

The proposed revision to inhalation toxicity is aimed to minimize the impact of cleaning products on indoor air and the associated health risks to building occupants, including school age children. Studies measuring VOCs in schools, home and workplaces often implicate cleaning products as potential sources of the chemicals detected in the air (Rumchev, *et. al.*, 2004; Shendell, *et. al.*, 2004; Franke, *et. al.*, 1997; Cole and Foarde, 1992). Some epidemiological studies have suggested an association between cleaning chemicals and respiratory ailments (Declos, *et. al.*, 2006; Medina-Ramon, *et. al.*, 2003). These studies continue to raise questions about the impact of cleaning products on indoor air quality and respiratory health.

The proposed approach is intended to address the airborne impact of cleaning products, and has been updated to be more protective of children and vulnerable populations. The approach requires the evaluation of acute toxicity of the product through inhalation either through testing or through a weighted average calculation of the individual constituents in the product formulation, with the additional requirement of emissions testing for products that fail the initial acute toxicity screening.

The threshold of  $LC50 \leq 20$  mg/L for the acute toxicity testing is now required to be at 1 hour, instead of at 4 hours which is the current requirement under GS-37. The stricter requirement applies whether the product formulation is evaluated by weighted average or when it is whole product tested. The shorter time frame leads to a more conservative

determination of acute product toxicity and is therefore more protective of human health. The new criterion is consistent with the requirements of the Consumer Product Safety Council, Hazardous Substances and Articles found at 16 Code of Federal Regulations (CFR) Chapter II, Part 1500.

Alternatively, the product could undergo small chamber testing for actual product emissions. Chamber testing is based on ASTM D 5116-06, *Standard Guide for Small Scale Environmental Chamber Determination of Volatile Organic Emissions from Indoor Materials / Products*, the methodology of which is described in Appendix A to the proposed revised standard. Because of the unique nature of the chemicals used in cleaning products, it is important to measure impact of both short-term and long-term exposure to product application and compare exposures to generally accepted health risk assessment criteria. Testing would result in emissions values that would be compared to threshold criteria described in Section 4.1 of the standard.

Criteria are listed for acute and chronic exposures to total volatile organic compounds (TVOCs), formaldehyde, and toxic content. One can refer to the footnotes to the table in the proposed revised standard for a clear definition of each of the criteria. TVOCs are measured for organic compounds ranging from 4 to 16 carbons in length to encompass both the highly volatile small carbon chains as well as the lesser volatile larger molecular chains sometimes found in the indoor environment. Although there are many VOCs seen in products that do not have specific risk assessment levels (e.g., Chronic Reference Exposure Limits), measuring TVOCs serves as a safety net for the myriad potential chemicals that might be emitted. For this reason, domestic (e.g., Carpet & Rug Institute's Green Label / Green Label Plus, GREENGUARD) and international (Canada's Environmental Choice, Germany's Blue Angel and AgBB) programs measuring emissions include various TVOC measures.

Formaldehyde is considered a probable human carcinogen by the EPA and is thus prohibited from cleaner formulations under this standard. However, free formaldehyde can be formed and emitted through the reaction of ingredients within a formulation. Test criteria are therefore stipulated for all emissions testing conducted under this standard.

#### Chamber Testing Rationale

Products with an  $LC50 \leq 20$  mg/L for the acute toxicity at 1 hour will be required to be chamber tested. Only products not meeting this initial screen will need to be chamber tested (though products can be tested with the chamber test if they desire otherwise). Chamber testing will be conducted and the results used to model both acute and chronic exposures to cleaning chemicals. The inhalation chamber testing methodology is described in Appendix A of the proposed revised standard. The methodology describes the test protocol for liquid chemical cleaners in a small chamber to measure product emissions. Please refer to Appendix A of the proposed revised standard for details. Additional details and clarification is offered below.

Chronic exposures will be modeled using emissions measured after 48 hours. Acute exposures will be modeled using concentrations modeled from emissions measured at the

4 hour mark of the testing. Four hours is the earliest point at which the concentration can be measured in a repeatable way and is therefore the most representative value for acute occupational exposure to chemicals. The measurements at 4 and 48 hours, when combined with a measurement at 24 hours, form the basis for the development of a product emissions decay curve.

The product will be tested in as used concentrations and with a volume of chemical sufficient to provide an emissions source over the duration of the test period. Manufacturer directions for the product are used to determine the surface area and portions of the room over which to model the air concentrations. Exposures will be modeled using school classroom model developed under the California High Performance Schools program.

Concentrations will be compared to an appropriate threshold value. Potential sources of values include the AREL, CREL, or other appropriate source. These values may need to be calculated or adjusted in some fashion to allow comparison at the time values corresponding to the measurements and to allow for a suitable safety factor. This portion of the chamber testing is still being developed and remains under consideration by the development team and involved members of the stakeholder group.

As stated above, chamber testing is only required if the product does not meet the criterion for inhalation toxicity, or as an alternative means to demonstrate meeting the criterion for inhalation toxicity. Chamber testing is expected to cost approximately \$2,000 for the 2 day test.

#### Dermal Toxicity

The development of dermal toxicity criteria was considered for this standard. However, the standard has acted to limit the risk to populations resulting from dermal exposure through the development of criteria for skin sensitization and skin irritation criteria, skin absorption criteria, and through the inhalation toxicity criteria. It was determined that these criteria are adequate to account for most of the expected exposures to cleaning chemicals making additional criteria for dermal toxicity redundant.

#### **Carcinogens, Mutagens, and Reproductive Toxins.**

It is recommended to continue prohibiting the use of ingredients that are suggestive, likely, potential, possible, probable, reasonably anticipated, or known human carcinogens. Green Seal references known lists for carcinogens with the priority for international and national lists to follow the guidance of ISO 14024. This includes IARC, NTP, EPA, and OSHA. With these lists available, state lists such as California Prop 65, are not referenced for carcinogens. Green Seal does not cite specific URL's since these lists are readily available and the internet locations often change. However, the definition of carcinogen will be clarified to identify which lists Green Seal's references.

2-butoxyethanol was listed as a possible human carcinogen by the EPA (classification 3) and as a result would be prohibited, however its inclusion on this list changes so it should be included in the list of other prohibited ingredients.

Formaldehyde is carcinogenic to humans (IARC group 1) and is a prohibited ingredient. There are commonly used preservative ingredients that are known to release formaldehyde over time (Bronopol, DMDM-hydantoin, and Tris Nitro). To further limit the content of known carcinogens, it is recommended that these formaldehyde-donor compounds be added to the list of other prohibited ingredients.

It is further recommended to continue prohibiting the use of chemicals known to cause reproductive toxicity and include both male and female reproductive toxins and developmental toxins. California Prop 65 is the most readily available and accepted source for these compounds and shall be cited. The NTP research progress can be used for additional information, though a list is not maintained.

To harmonize with the specifications of the European Union ecological criteria for cleaners, mutagens will also be prohibited and defined according to the GHS criteria for germ cell mutagenicity. Category 1 criteria are consistent with the EU classification and labeling criteria for Category 1 and 2 mutagenic substances (Langezaal, 2002), which are required to be labeled as follows: R46 May cause heritable genetic damage.

For all of these prohibitions, existing information is used for the evaluation. Product testing and ingredient testing is not conducted. These prohibitions apply to ingredients of the product, as defined in the standard, as well as intentional components. An intentional component is considered to be a deliberately added product component, where it is added for its continued presence in the final product to provide a specific characteristic, appearance, or quality.

These prohibitions follow the common, preventative approach for these materials in other ecolabel programs (EC, 2005). This approach is further necessary, especially with regard to considering intentional components, when consideration is given for vulnerable populations, especially for children (Jarosinska and Gee, 2007). Thus the recommended approach for carcinogens, mutagens, and reproductive toxins is that where an ingredient or component exhibits potentially harmful characteristics, is to specifically prohibit these ingredients in products rather than attempting to determine risk-based acceptable levels.

### **Skin and Eye Irritation.**

The existing GS-37 already recognizes that the product should not be corrosive to the skin or eyes. The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) includes definitions (see below) and classification criteria for skin corrosion and “serious eye damage” (UN, 2005). These definitions are consistent with the definitions used by the US and the European Union for acute dermal irritation/corrosion (EPA, 1998a; OECD 2002a) and for acute eye irritation/corrosion

(EPA,1998b; OECD 2002b). However, the GHS more precisely defines these terms and uses the term “serious eye damage” instead of “eye corrosion.”

Since GS-37 was last reviewed, considerable progress has been made in the development and validation of *in vitro* test protocols for assessing these health end points. In the US, the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) has validated four *in vitro* test protocols for evaluating skin corrosion (ICCVAM, 2004) and another four test methods for serious eye damage (ICCVAM, 2006). The four test methods for skin corrosion are Corrositex®, EPISKIN™, EpiDerm™ (EPI-200), and the rat skin transcutaneous electrical resistance (TER) assay, and for serious eye damage they are the Bovine Corneal Opacity and Permeability (BCOP) assay, the Hen’s Egg Test - Chorioallantoic Membrane (HET-CAM) assay, the Isolated Chicken Eye (ICE) assay, and the Isolated Rabbit Eye (IRE) assay. The European Centre for the Validation of Alternative Methods (ECVAM) is currently conducting a validation study of *in vitro* methods for acute skin irritation. The ECVAM Scientific Advisory Committee recently reviewed the ICCVAM 2006 report on eye irritants and supported the use of BOCOP and ICE assays, but had some concern for the HET-CAM and IRE assays. However, the ECVAM Committee reiterated that positive outcomes from all four of these tests can be used as the basis for classifying and labeling substances as serious eye irritants and referred to the European Commission’s Manual of Decisions (EC, 2006) which states:

“Positive outcome from the following *in vitro* tests for eye irritation are acceptable:

- 1) isolated rabbit enucleated eye (REET, IRE) test,
- 2) isolated chicken eye (ICE) test,
- 3) bovine corneal opacity & permeability (BCOP) test,
- 4) hen’s egg test - chorio-allantoic membrane (HET-CAM) test.

Although these tests are not yet validated (and therefore not included in Annex V) it has been agreed that available evidence is sufficient to conclude that the methods are able to detect severe eye irritants. Thus, where a positive result is obtained, a substance can be considered a severe eye irritant and R41 should be applied with no further testing justified, respecting animal welfare. Where a negative result is obtained, an *in vivo* test should subsequently be required, as the *in vitro* tests have not been shown to adequately discriminate between eye irritants and non-irritants...” (p. 157)

GS-37 currently allows dispensing system concentrates to be evaluated as used rather than as the concentrate. This is because such systems typically do not require undiluted product handling by the user. However, when workers handle undiluted product they can accidentally contact the undiluted product. Thus, the revised standard proposes to have the undiluted product be evaluated for skin corrosion and serious eye damage whether the product is designed to be used in a dispensing system or not. This will provide further protection to custodians and others who handle the concentrated product. In the event of an accident, they and others who might be nearby, such as school children, are less apt to be injured if the concentrate is not corrosive to the skin or able to cause serious eye damage. However, if a dispenser system cannot meet the criterion undiluted, an exemption provision allows for evaluation as used. When this exemption is used for a product it will be qualified by Green Seal (on its listing of certified products) with a

designation. This will apply to other health criteria in the standard, when evaluated in the undiluted form.

Since Green Seal uses existing data to evaluate this criterion, testing is typically not required, unless data is not available or indicate a need for testing. As a result, the cost of testing is not expected to increase. The new testing requirements are not substantially different from the current GS-37 standard as the test using Human Skin Construct systems and BCOP test are among the validated *in vitro* tests currently approved by the U.S. and EU.

#### Respiratory Irritation

The above described criterion for skin and eye corrosion and irritation is limited to acute irritation and/or serious damage to the skin or eyes. While this criterion will limit some ingredients that may also cause respiratory irritation, it will not restrict all ingredients that may irritate the nose, throat, airways and lungs. However, there currently is no commonly accepted definition of respiratory irritation. This limitation may be due in part to the complex mixture of factors that can contribute to respiratory irritation. These include volatility, method of application, concentration in the product, presence of other materials that may oxygenate ingredients yielding peroxides and other irritating compounds, or alter the pH, as well as individual sensitivity to irritants. As a result, additional criterion for respiratory irritants is not included in the proposed revised standard.

#### **Skin Sensitization.**

The existing GS-37 already recognizes that the product should not be a skin sensitizer. At this time, an *in vitro* test for identifying skin sensitizers is not readily available. However, both EPA and OECD recommend the local lymph node assay (LLNA) as the preferred method for assessing skin sensitization. Compared to the traditional guinea pig test, it demonstrates an equivalent prediction of human allergic contact dermatitis. It also provides a quantitative assessment of dose-response, and it reduces animal welfare concerns as it reduces animal distress and can reduce the number of animals required to provide good quantitative data (Basketter *et al.*, 2007, EPA, 2003, Gerberick *et al.*, 2005, OECD, 2002c).

GS-37 currently allows dispensing system concentrates to be evaluated as used rather than as the concentrate. This is because such systems typically do not require product handling by the user. However, when workers handle undiluted product they can accidentally contact the undiluted product. Thus, the revised standard proposes to have the undiluted product be tested for skin sensitization whether the product is designed to be used in a dispensing system or not. This will provide further protection to custodians and others who handle the concentrated product. In the event of an accident, they and others who might be nearby, such as school children, are less apt to be injured if the concentrate is not a sensitizer. As noted in the previous discussion about dispensing

system concentrates, there will also be a means for closed dispenser systems to be evaluated in the as used form.

Since Green Seal uses existing data to evaluate this criterion, testing is typically not required unless data is not available or indicate a need for testing. As a result, the cost of testing is not expected to increase.

### **Skin Absorption**

Although this standard is designed to protect cleaners who use these products, one must be mindful of residual exposure to sensitive populations such as pre-school and primary school children as well as residents of nursing homes.

Many cleaning products are mixed and applied in such a way that skin contact with the liquid is common. Some ingredients in cleaning products have a high potential for skin absorption; some have a potential for systemic toxicity. Some of these formulations contain relatively low toxicity solvents such as isopropanol (rubbing alcohol) and acetone. These solvents, along with water, are known to facilitate the absorption of other more toxic ingredients in the formulation, thus presenting a systemic hazard.

Skin absorption is a very complex process. The physical characteristics of the undiluted product such as the octanol-water partition coefficient ( $K_{ow}$ ) and the permeation coefficient ( $K_p$ ) have been suggested as a means to determine skin absorption potential. Indeed, a number of modeling programs have been developed using these physical constants to predict skin absorption. However, the absorption of a chemical through the skin is not that simple. Factors such as temperature, pH, area of the skin, the number of appendages (hair follicles), the age of the skin, and the presence of other agents in a formulation such as emulsifiers and surfactants have a significant impact on skin absorption.

Although there are established standardized methods to test for skin absorption, as specified by the OECD testing protocols 428 or 429 dated April 2004 or by the OPPTS 870.7600 for Dermal Penetration Studies, as published in EPA 712-C-98-350, August 1999, these tests are done on individual chemicals, often in non-human test systems. Thus, the results may not be applicable to mixtures of chemicals as found in products covered by this standard.

There have been a number of proposals, specifically those developed by the City of San Francisco and Seattle in their performance criteria for procurement of cleaning products. However, some of these chemicals such as monoethanolamine (141-43-5) are skin sensitizers. Solvents such as 2-butoxyethanol (111-76-2) are rapidly absorbed through skin; their absorption is enhanced in the presence of water making the diluted product more hazardous. However, these proposals do not provide sufficient peer-reviewed literature on the health consequences of low exposures to these agents to support this standard.

The potential for skin absorption can be estimated for individual ingredients using lists of chemicals with skin absorption potential from credible scientific sources. There are no such lists from the federal government. However there are lists from the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances (TLV) that includes substances with a high potential for skin absorption (skin notation) and systemic health effects. Another list is from the German Deutsche Forschungsgemeinschaft (DFG) Maximum Allowable Concentrations (MAK) list for chemicals with a high potential for skin absorption H notation. As the definitions of skin notations differ from the two organizations, the most conservative listing should be utilized to identify chemicals with high skin absorption potential. Use of these lists remove the need for testing to meet this criterion.

### **Ingredients that Cause Asthma**

More than 30 articles over the last several years have documented the increased incidence and prevalence of asthma among janitors and other cleaning workers in many countries (Nazaroff, 2005, Rosenman, 2006). Henneberger (2005) commented that, "Over the past 15 years, professional cleaners have emerged as one of the high risk groups for work related asthma in industrialized nations." This adverse effect is not limited to individuals who professionally perform cleaning tasks; cleaning products also affect other building occupants and bystanders (Nazaroff, 2004, Rosenman, 2003). Case reports and epidemiologic studies have documented asthma among individuals who use spray cleaners at home (Zock, 2007, Rosenman, 2007). And a new study has documented wheezing and decrements in lung function in children whose mothers had high domestic cleaning chemical exposure during pregnancy (Henderson 2007).

While eliminating ingredients that cause asthma will reduce the number of new cases of asthma, this change will not necessarily prevent the exacerbation of symptoms among those with preexisting asthma. People with reactive airways may have further airway obstruction (through bronchospasm) triggered by viral infections, exposure to irritants, cold or exercise.

Children have a higher rate of asthma than adults. There are a number of developmental and physiological factors that may contribute to this higher rate, including incomplete metabolic defenses and immunological mechanisms, a higher breathing rate, greater surface area to volume ratio as well as behavioral differences including hand to mouth activities and more time on the ground. Some of these characteristics may contribute to greater exposure and/or to greater susceptibility to hazardous effects from chemicals in the environment. An article by Mendell (2007) reviewed 21 published epidemiologic studies on associations between indoor residential chemicals and respiratory health and/or allergy in children. Specifically, Mendell found associations between formaldehyde and phthalates and asthma, as well as suggestive evidence for aromatics, aliphatics, limonene, tetrachloroethylene, trichloroethylene and either asthma-related effects or allergy/atopy indicators or both. Note that Mendell's previous research had documented an association

between indoor pollutants in schools and poorer student performance (Mendell and Heath, 2005).

In the past, the AOEC list of asthmagens has been found to have limitations when used for product evaluations. Initially this list was developed as a clinical tool to be used by health care providers in diagnosing patients. Increasing attention to the importance of providing guidance on asthma-causing agents in the workplace and in products encouraged AOEC to continue to improve the list. The criteria were amended in 2005 to exclude reactive airways dysfunction syndrome caused by a single exposure, and efforts over the last six years to add and delete chemicals based on application of evidence-based criteria have improved the quality of the list. The criteria for designating substances as asthmagens have been made available for review and are accessible on the AOEC website (Beckett, 2005). A similar list is available as an appendix in *Asthma in the Workplace* (Third Edition, edited by Bernstein IL, Chan-Yeung M, Malo J-L, Bernstein DI).

The AOEC list provides valuable information that is not readily available elsewhere. It is periodically updated through a peer-reviewed process, and new chemicals are added and inaccurate listings are deleted. It has clear criteria, includes the references relied on for listing, is accessible online and oversight is provided by medical professionals with no financial incentive. Thus, it is sufficiently authoritative to address this very important health concern for cleaning products. As a result, this standard shall use the AOEC list to prohibit ingredients that are known to cause asthma. Testing is not needed to meet this requirement.

### **Volatile Organic Compounds: Photochemical Smog, Tropospheric Ozone Production, and Indoor Air Quality**

Volatile organic compounds (VOCs) are carbon-based chemicals characterized by boiling points ranging from about 50-260°C and include alcohols, aldehydes, straight chain and cyclic alkanes, aromatic hydrocarbons, halogenated hydrocarbons, terpenes, ketones, and esters. VOCs are common ingredients in cleaning products and minimization of chemical exposures during cleaning has been recognized as a key indoor air quality strategy (Franke, *et. al.*, 1997).

Poor indoor air quality as a result of VOCs is also one of the biggest contributors to asthma and other respiratory ailments in school aged children. Adverse health responses potentially caused by VOCs in non-industrial indoor environments fall into three categories, namely 1) irritant effect including the perception of unpleasant odors and mucous membrane irritation, 2) systematic effects such as fatigue and difficulty concentrating, and 3) toxic effects such as carcinogenicity (Girman, *Occupational Medicine: State of the Art Reviews*, 1989). Setting appropriate levels of VOC content is essential to minimizing the potential health effects of cleaning products on workers, children, and otherwise vulnerable or sensitive populations.

This criterion specifies the California Air Resources Board method 310 for determining the acceptable levels of VOC content allowed in the various product classes. This method is established and well known. Currently existing exemptions for fragrances and low vapor pressure components of a product allowed under CARB 310 are not allowed under this standard, thus the designated thresholds for each product class consider all VOC content detected under the test method. The exemption of fragrances from the VOC content is inconsistent with existing criteria in this standard that require fragrances be treated similarly to all other chemicals under the standard. Low vapor pressure constituents volatilize more slowly over time and can contribute to the degradation of both outdoor and indoor air. The disallowing of both of these exemptions results in a standard that is more protective of air quality and associated human health impacts, particularly those of children and other sensitive populations.

Thresholds for allowable VOC content for products have been adjusted to restrict unnecessary VOC emissions. Selective testing of existing GS certified products has already demonstrated that the overwhelming majority of products tested in all product classes already comply with the adjusted thresholds, even without the exemptions no longer allowed under CARB 310. However, it is expected that each product will need to supply supporting data. The test is expected to be less than \$400.

### Toxicity to Aquatic Life

This criterion for toxicity to aquatic life applies to a product *as used* because that is the most likely form of the product to be disposed of down the drain, eventually being discharged to surface water.

OECD test methods added and 40 CFR test dropped because OECD methods are now available and international test methods (ISO and OECD) are preferred over national standard methods.

We are not proposing to change the 100 mg/L cutoff. It is supported by the OECD globally harmonized system -- OECD defines three hazard categories for acute aquatic toxicity (OECD, 2001a):

Acute toxicity hazard category	Type of test	Criteria
Acute I	96 hr LC50 (for fish) and/or 48 hr EC50 (for crustacea), and/or 72 or 96 hr ErC50 (for algae or other aquatic plants)	$\leq 1$ mg/L
Acute II		$>1$ to $\leq 10$ mg/L
Acute III		$>10$ to $\leq 100$ mg/L

Based on the OECD criteria, a product with an acute aquatic toxicity above 100 mg/L for would not be classified into an acute toxicity hazard category.

Acute aquatic toxicity is maintained as a distinct criterion, rather than combining with biodegradability and possibly other environmental fate considerations, because compounds can cause toxic effects before they biodegrade. (An exception to the requirement for ready biodegradability is proposed based on acute and chronic aquatic toxicity in the proposed biodegradability criterion.)

Often, available information on ingredients (weighted average of) is used instead of whole-product testing to keep testing requirements and costs down, and reduces the demand for animal testing.

### **Aquatic Biodegradability**

The aquatic biodegradability criterion also applies to a product *as used* because that is the most likely form of the product to be disposed of down the drain, eventually being discharged to surface water.

The test methods cited in the criterion have been increased to include currently-available ISO test methods 9408 and 14593, and OECD test methods 301 A-F and OECD 310.

Biodegradability is maintained as a distinct criterion, rather than combining with toxicity to aquatic life, and possibly other environmental fate considerations, because compounds can cause toxic effects before they biodegrade. However, an exception to the requirement for ready biodegradability is proposed here for organic ingredients with low acute *and* chronic aquatic toxicity, that are not bioaccumulating (using a definition consistent with CCD 146F), and that exhibit inherent, ultimate biodegradability, defined by OECD [2003] as biodegradation rates above 70%, measured as BOD, DOC, or COD.

The ready biodegradation tests are intended for pure chemicals. Some types of cleaning product ingredients are mixtures of structurally similar chemicals, such as surfactant homologues composed of ethoxylated alcohols of varying carbon chain lengths. Because biodegradation of specific chain length compounds would occur sequentially, the 10-day window requirement is waived for those ingredient mixtures (based on OECD guidelines, OECD 2003a).

The criterion applies to specific individual organic ingredients, e.g., as identified by a unique CAS number. If a product raw material is a blend of two or more organic ingredients, each of those organic ingredients must meet the biodegradability criterion.

### **Eutrophication.**

A review of current domestic and international programs indicates no significant change in this criterion is warranted.

## **Combustibility**

The criterion for combustibility remains largely consistent with other Green Seal standards, Canadian standards, and others. The proposed new language is suggested to make the combustibility language more specific and readily accessible. Testing will continue to not be necessary to meet this requirement, as there is often data available.

## **Other Prohibited and Restricted Ingredients**

A list of other prohibited ingredients has been used in the past and in this proposed revision since not all the criteria in the standard can include all the chemicals of concern. This is especially the situation, when considering the protection of health of vulnerable populations. The following list gives a brief indication of the reason for prohibiting new/revising the list of chemicals and chemical classes. More details are available in the cited sections of this document.

- Heavy metals including, lead, hexavalent chromium, or selenium both in the elemental form or compounds – see neurotoxin section of this document
- Phthalates - see fragrance and endocrine disruptor sections of this document
- Nitro-musks (Musk xylene, Musk ketone) – see fragrance section of this document
- Polycyclic musks (HHCb, AHTN) – see fragrance section of this document
- 2-butoxyethanol – see carcinogen and skin absorption section of this document
- Formaldehyde-donors – see carcinogen section of this document

Limonene, pinacea derivatives (e.g. pinene) and other terpene hydrocarbons (e.g. myrcene) are commonly used in cleaning products. However, these ingredients have increasingly raised concerns because their oxidation products (e.g. hydroperoxides, oxides) are well-recognized as potent skin sensitizers and studies suggest that the oxidation products may be respiratory allergens as well. The International Fragrance Association (IFRA) recognize these concerns, and the IFRA standard for limonene notes that products should have a peroxide value of less than 20 millimoles peroxide per liter. For pinacea derivatives, products should have a peroxide value of less than 10 millimoles peroxide per liter. The peroxide value is determined using the Fragrance Materials Association analytical method ([www.ifraorg.org/Enclosures/News/Peroxide%20Method%202001-25-01.pdf](http://www.ifraorg.org/Enclosures/News/Peroxide%20Method%202001-25-01.pdf)).

Furthermore, numerous studies are finding that limonene and other terpenes in indoor air are oxidized by ozone to form secondary organic aerosols and other chemicals known or suspected to be respiratory irritants or allergens. Although the health significance of these secondary air pollutants in indoor air is not well established yet, they may be associated with the many anecdotal and case reports of workers and other who experience respiratory symptoms such as shortness of breath and irritation when using cleaners including these fragrances or solvents.

Limonene is also recognized as an effective functional component in cleansers and degreasers, often an alternative to petroleum-based or hazardous ingredients. The EPA Design for the Environment (DfE) Formulator Program recognizes this use and the above described concerns, and considers products “acceptable” when limonene is present at 20 millimoles (mmol) per liter (or approx. 0.36%) or less in an overall formulation. This is based on the observation that a high percentage of limonene (up to 90%) converts to hydroperoxides by reaction with oxygen and other oxidizers. Another approach could be to ensure limited oxidation of the terpenes, with an effective, standardized antioxidant dose and system. However, antioxidant dosing (to prevent the development of the potentially harmful oxidation products of terpenes) hasn’t been recognized broadly.

Terpenes are limited in the product due to the volatile organic content and other criteria in the standard already. However, since the concerns about terpenes was raised by many stakeholders during the commenting periods through the project to date, the guidance from DfE has been included in the proposed standard for additional comment, along with additional consideration for other terpene hydrocarbons, with a limit to 10 mm per liter.

## **Fragrances**

Fragrance materials have commonly been added to cleaning products to provide a pleasant scent to the product. In some cases, cleaning product formulas have inherent off-odors associated with them and a fragrance must be added to make to product acceptable. However, there are uses of fragrances that should not be encouraged such as the use of fragrances for product identification since it is not as reliable as clear labels or color. A growing trend is the number of products without added fragrances. In 2006, over 50% of Green Seal’s GS-37 certified products did not have added fragrances.

Evidence is growing that shows that many fragrance materials have undesirable health outcomes. In a report summarizing the literature, Bridges (2002) noted many health concerns including skin sensitization, skin irritation, respiratory sensitization, respiratory irritation, neurological, and systemic effects. Further, complex fragrances such as essential oils may contain known carcinogens (Jansson and Loden, 2001). Many of the cited health concerns were linked to air quality issues with fragrances including total VOC's, peroxides, other harmful products, and sub-micron particles. For example, the emission of fragrance materials has been shown to contain materials with documented irritant and neurotoxic properties (Anderson and Anderson, 1998). In addition to these health concerns, many fragrance ingredients are persistent in the environment and have slow aquatic biodegradability.

The International Fragrance Association (IFRA) Code of Practice includes material standards that set use criteria. The criteria can include limits, directions for antioxidant use, and prohibition of materials. In 2006, the Code was amended to change the format of the material standards to follow a Quantitative Risk Assessment (QRA) format (which addresses certain health concerns) for eleven different categories of products based on

potential exposure associated with the product's use (RIFM, 2007). The Research Institute for Fragrance Materials (RIFM) was consulted in 2007 to understand these amendments to the Code. QRA assessment performed by RIFM considers toxic mechanisms including toxicokinetics, it includes dermal absorption, acute toxicity, subchronic toxicity, dermal irritation, mucous membrane irritation, skin sensitization, photoirritation, photoallergy, mutagenicity, developmental and reproductive toxicity, and carcinogenicity. However, the RIFM safety assessment and the QRA does not include assessment of respiratory sensitization or respiratory (sensory) irritation and endocrine disruption, among others (RIFM, 2007, Bickers *et al.*, 2003, Ford *et al.*, 2000). Furthermore, the IFRA Code is currently limited to only those materials that have been evaluated by RIFM, and RIFM does not anticipate completing the evaluation of all fragrance ingredients until 2016. As a result, this Code may not limit the use all materials of concern. As a result, if fragrances are used it is recommended that they should not only follow the IFRA Code, but also pass an evaluation (as with any product ingredient) on respiratory sensitization, respiratory irritation, neurotoxicity, endocrine disruption and contribution to indoor air quality. If these health considerations cannot be adequately included in the standard, it should be considered that fragrances be prohibited.

Disclosure of the fragrance components is required (as it is currently), and explicitly stated in the criterion so Green Seal can evaluate these ingredients. Fragrance components shall continue to be evaluated against all the other criteria in the standard including prohibited ingredients (such as carcinogens and phthalates), emissions and aquatic biodegradability and toxicity. Further, fragrance components will need to meet any new criteria, such as respiratory sensitization/causes of asthma, indoor air emissions, and the formation of sub-micron particles in air and oxidation products that may be respiratory sensitizers/irritants. No additional criteria or testing is being proposed specifically/exclusively for fragrance ingredients. Rather, the recommendations apply for the product as a whole.

Further, some fragrance components have been recommended to be prohibited because they are known to have adverse health or environmental impacts but are not prohibited by the IFRA Code. The class of phthalates has known endocrine disruptor activity including dibutyl phthalate and diethylhexyl phthalate. Diethyl phthalate, which is used as a solvent in fragrance ingredients, has no demonstrated endocrine activity. However, diethyl phthalate isn't commonly used in fragrances ingredients used for cleaners. With other options available, and the documented issues covered in the endocrine disruptor section of this document, the group of phthalates is recommended for prohibition. Nitro-musks (Musk xylene, Musk ketone) and polycyclic musks (HHCB, AHTN), while not common in cleaners, are suggested for prohibition for their persistence and bioaccumulation concerns.

Finally, since some individuals appear to be sensitive to fragrance materials and testing has been unable to identify the particular component responsible for that sensitivity, it is important that any use of fragrance components be disclosed to the public. As a result, it is recommended that the MSDS identify when fragrance ingredients have been added to a

product. Further, a claim verification program will be proposed to further enable communication of products without added fragrances.

### **Neurotoxicity**

Neurotoxicity occurs when an exposure to a toxic substance (neurotoxicant) alters the normal activity of the nervous system. This can eventually disrupt or even kill neurons, key cells that transmit and process signals in the brain and other parts of the nervous system. Symptoms may appear immediately after exposure or be delayed. They may include limb weakness or numbness; loss of memory, vision, and/or intellect; headache; cognitive and behavioral problems; and sexual dysfunction. Some neurotoxic effects are short-lived and reversible; however, neurotoxic effects can be permanent and severely debilitating. ([www.ninds.nih.gov/disorders/neurotoxicity/neurotoxicity.htm](http://www.ninds.nih.gov/disorders/neurotoxicity/neurotoxicity.htm))

Test methods for evaluating neurotoxicity, particularly developmental neurotoxicity, have been developed by the USEPA and the OECD (U.S. EPA, 1998c, OECD, 2007). However, extensive toxicity testing is required and that would be prohibitively expensive and time-consuming to require for all products or their ingredients.

Many chemicals have been demonstrated to produce neurotoxic effects (Anger and Johnson, 1985, Grandjean and Landrigan, 2006). Grandjean and Landrigan list more than 200 specific industrial chemicals that produce neurological effects. Many of the chemicals are not ingredients in cleaning products (e.g. pesticides and many listed organic substances). In general, many of the other criteria in GS-37 have already restricted or prohibited many of the neurotoxicants. The ATSDR MRLs and CA RELs used in the inhalation toxicity criterion may be based on neurotoxic effects. The reduced VOC content required for products under the criterion for photochemical smog and tropospheric ozone production, and indoor air quality will also potentially reduce exposure to possible neurotoxicants. Some neurotoxicants are already listed prohibited ingredients (e.g. metals such as lead and selenium). Benzene is prohibited because it is also a carcinogen. Ethylene glycol monomethyl ether and ethylene glycol monoethyl ether and their acetates are listed as reproductive toxins and therefore prohibited ingredients. At this time, no other known neurotoxicants were identified that need to be restricted or prohibited.

### **Endocrine Disruptors**

About 10 years ago, EPA initiated an Endocrine Disrupter Screening Program (EDSP) to screen and test chemicals for potential endocrine effects ([www.epa.gov/oscpmont/oscpendo/index.htm](http://www.epa.gov/oscpmont/oscpendo/index.htm) [accessed June 20, 2007]). EPA is currently developing and validating screening and testing assays for the Endocrine Disrupter Screening program. A variety of assays are being validated ([www.epa.gov/oscpmont/oscpendo/pubs/assayvalidation/status.htm](http://www.epa.gov/oscpmont/oscpendo/pubs/assayvalidation/status.htm) [accessed June 20, 2007]), but none have achieved regulatory acceptance by EPA.

The Organization for Economic and Cooperation and Development (OECD) has also been working for about 10 years to develop new or revise existing Test Guidelines to detect endocrine disrupters

([www.oecd.org/document/62/0,2340,en\\_2649\\_34377\\_2348606\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/62/0,2340,en_2649_34377_2348606_1_1_1_1,00.html) [accessed June 20, 2007]). Although several test methods are in the final stages of acceptance by the OECD, none has been published as a validated, approved method.

In October 2004, the European Commission accepted a staff working document on implementation of the Community Strategy for Endocrine Disrupters (European Commission, 2004). Part of the strategy entailed a literature review of chemicals that identified those chemicals with evidence of endocrine disruption or potential endocrine disruption in humans or wildlife. Annex 3 of the document includes a listing of “substances with evidence (Category 1) or evidence of potential endocrine disruption (Category 2).”

Dicyclohexyl phthalate and diethyl phthalate were identified as substances with evidence of endocrine disruption (Category 1). NAS (1999) identified several chemicals that might be used in cleaning products to have the potential endocrine: alkylphenol ethoxylates, butyl benzyl phthalate (BBP), dibutyl phthalate (DBP). In 2000, the Canadian Depository Services Program reviewed literature to summarize information about endocrine disrupters and included a list of eight phthalates as “known and suspected hormone disruptors.” In 2004, the Australian CSIRO and Australian Water Association reviewed endocrine disrupting chemicals associated with recycled water, and the report included a list of “suspected/known endocrine disrupting chemicals” that also included the same list of eight phthalates. Because a variety of phthalates have evidence of being endocrine disrupters and because phthalates are not important functional ingredients in cleaning, they should be prohibited ingredients.

Further, prohibition of the broad group of phthalates is currently included in other Green Seal standards, GS-40 and GS-8.

## **PACKAGING REQUIREMENTS**

The existing GS-37 standard does not fully incorporate all aspects of environmental packaging design, many of which have become readily accepted by the cleaning industry due to regulatory and market-based changes. Issues which need to be incorporated, many of which were commented upon by stakeholders in the scoping comment period including: clarifying requirements related to recyclable v. post-consumer recycled content, inclusion of Council of Northeastern Governments’ (CONEG) heavy metal restriction requirements, and potential materials restrictions.

The proposed language for discussion is modeled on requirements of California’s Rigid Plastic Packaging Container Act. The California regulations provide a rigorous series of options for plastic packaging that is reusable, refillable, recyclable, and recycled if the

stated recycling goals for the state are not met. While this mechanism is inappropriate for use in a Green Seal standard, using similar options for environmentally-preferred packaging will provide flexibility in allowing industry to select from those environmental-preferred packaging options.

In addition, language has been developed to provide consistency with the CONEG Toxics in Packaging requirements. These model requirements are broadly accepted in the marketplace, and have been adopted by 19 states as well as providing a basis for parts of the European Union's packaging requirements (94/62/EC).

It is recommended that concentrated products be prohibited from being packaged in ready-to-use forms, including but not limited to, spray-dispenser bottles. This way correct dilution of the product is further encouraged.

Dispensing system concentrate packaging is a novel means to deliver highly concentrated products and provide convenience to users. Several important functions of such packaging systems have been raised including, ensuring that the correct dilution is delivered and that the user cannot have practical access to the undiluted product. As a result, the proposed revision includes several criteria for these systems to ensure such considerations are included.

Aerosol cans have been inherently prohibited by this standard since it allows only for concentrated products. However, with the inclusion of toilet bowl cleaners at ready-to-use concentrations, a prohibition was explicitly added.

Two additional issues were raised by several stakeholders during the scoping comment period: 1) a prohibition on certain materials with known, negative environmental and human health impacts, such as ABS and PVC; and 2) for products which will be used in schools, the inclusion of requirements for child-resistant packaging.

Regarding restricted or prohibited materials, a subsection was added to address phthalates, to bring the standard into conformance with other Green Seal standards. Further, the environmentally-preferred packaging options added to the standard with the proposed revisions will, by default, limit the use of ABS and PVC containers; namely due to the recovered content requirement and recyclable requirement.

Regarding the inclusion of requirements for child-resistant packaging, most discussants felt it was more appropriate to limit access to storage closets where cleaning materials were stored than to require child-resistant packaging. Storage facilities are regulated by other means and thus are not covered in this standard.

## **TRAINING AND LABELING REQUIREMENTS**

### **Training**

The training requirement retains the need for manufacturer's to provide information on the proper use of the product as well as recommended personal protection equipment for each stage of the product or equipment's use. Further, product manufacturers shall make the appropriate product and/or equipment training information, including MSDSs and technical data sheets, available electronically as well as in hard copy..

## **Labeling**

Label requirements include careful communication to users to ensure proper use, dilution, disposal, and use of personal protective equipment. This will need to be done in English and in a way that assists illiterate or non-English speaking personnel, such as inclusion of a another language or a graphical representation or icons.

As mentioned in the document, when a dispensing-system concentrate product requires the allowed exemptions to pass the health criteria in the standard, a qualification designation will be made available on Green Seal's listing of certified products.

## **ADDENDUM**

### **Claim Verification**

Optional claims are being proposed for when an elite company is able to go beyond the leadership level criteria in the standard and establish protocols which provide a greater environmental or social benefit. These types of efforts should also be encouraged, to facilitate greater adoption across the industry. Further, claims are proposed to further enable communication to purchases about traits a purchaser may be specifically looking for in a product (beyond Green Seal certification). Green Seal has proposed a program for such a result, an optional claim verification program. The following claims are proposed:

- No Added Fragrances
- Made with Green Energy
- Made with Zero Waste
- Made with Zero GHG Emissions
- Biobased Product

**APPENDIX****GS-37 Proposed Revised Standard Testing Requirements**

<b>Criterion</b>	<b>Available Data Used</b>	<b>*Testing Secondary Approach</b>	<b>Testing Required</b>	<b>Estimated Cost of Required Testing</b>
Performance			X	\$??
Oral Toxicity	X	X		
Inhalation Toxicity	X	X		
Carcinogens, Mutagens, Reproductive Toxins	X			
Skin and Eye Irritation	X	X		
Skin Sensitization	X	X		
Skin Absorption	X			
Volatile Organic Compounds			X	<\$400
Causes of Asthma	X			
Aquatic Toxicity	X	X		
Aquatic Biodegradability	X	X		
Eutrophication	X			
Combustibility	X			

*\*Testing is needed only if there is not available data or if data suggests the need for additional testing.*

The shaded rows indicate the criteria that require product testing, according to this version of the proposed revised standard. Please refer to the sections in the document for additional information about testing.

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[http://www.oehha.ca.gov/air/acute\\_rels/allAcRELS.html](http://www.oehha.ca.gov/air/acute_rels/allAcRELS.html).

California EPA OEHHA non-cancer chronic Reference Exposure Levels (cRELS)  
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