RESPONSE TO COMMENTS ON PROPOSED
ENVIRONMENTAL STANDARD FOR FLOOR-CARE PRODUCTS

General

1. We believe the criteria you have recommended to be strict but achievable.

2. I would be very interested in helping in the process of setting the Green Seal Standard for Floor Care products. After reviewing the documents, I would agree the difficulty would be to assess the floor finish's performance. For years the industry has tried, unsuccessfully, to formulate finishes without the use of Zn or other heavy metals with the same performance profile as those that use this cross-linking mechanism. This is captured well in the Section 2 paragraph 1 (under performance). What are the next steps for this process? When is the industry-sponsored LCA going to be completed and how do you see this information affect the standard? Who is the key contact for this standard?

3. The standard is well written, comprehensive, and reflects a tremendous effort on the part of the authors.

4. The standard could be improved by including a table summarizing the criteria and levels for an acceptable Green Seal product.

   Response: A summary table of the criteria is not included in the standard in order to avoid any change in wording that could lead to differing interpretations of the criteria.

Please note: Supporting information presented in Sections 1 through 3 of the proposed standard document will not be revised or re-issued; however, the comments on those sections have been taken into account in revising the standard itself. In organizing the comments, we refer to the relevant section headings in the proposed standard document by name, and to the relevant sections of the final standard by section number.

Overview Of Floor Finishes and Strippers

5. In paragraph 2 we agree that technology in the zinc free polymer chemistry is improving from the earlier polymer offerings of 1990; however, we disagree that the durability of zinc free floor finishes are on par to the durability of the high performance zinc metal crosslinked floor finishes that are on the market today. The customers who we supply our zinc- free product to are buying it because of regulatory concerns, not based on product performance over zinc-containing products.

   Response: Please see the response to comments on Zinc and Other Heavy Metals and Prohibited Ingredients (Zinc).

6. As to paragraph 3 it is true that a systems approach is the best value for the end-use customer. But the VOC discussion is misleading. Strippers that contain high levels of VOC in the concentrate are diluted to a level of 3 - 12 percent prior to use. The Consumer Specialty Products Association presented data to the California Air Resources Board that resulted in the VOC content of floor finish stripper to be regulated to no more than 3% VOC content at the normal use levels and up to 12% for heavy build-up areas. To keep product efficiency at a level that will satisfy large floor area users, Green Seal should adopt the CARB rule as it now stands. Below is the exact text of the CARB VOC rule for floor finish strippers:

   (i) *Requirements for Floor Wax Strippers.* After an effective date of January 1, 2002, no person shall sell, supply, offer for sale, or manufacture for use in California any floor wax stripper unless the following requirements are met:

   (1) The label of each non-aerosol floor wax stripper must specify a dilution ratio for light or medium build-up of polish that results in an as-used VOC concentration of 3 percent by weight or less.

(2) If a non-aerosol floor wax stripper is also intended to be used for removal of heavy build-up of polish, the label of that floor wax stripper must specify a dilution ratio for heavy build-up of polish that results in an as-used VOC concentration of 12 percent by weight or less.

(3) The terms "light build-up"; "medium build-up" or "heavy build-up" are not specifically required, as long as comparable terminology is used.

This is not only compliant with the most stringent and carefully reviewed standard for VOC emissions; it also encourages the use of concentrated product, which diminishes packaging waste. In addition, CARB has recently completed a review of data submitted by industry that demonstrates the low volatility of solvent materials and volatile organic amines from the wax stripper solution results in a highly efficient removal of them from the floor after which they are dumped into a sewage system that can efficiently convert the VOC to CO_2 and water by aerobic digestion.

Response: Although it is lower than CARB's limit of 12% for heavy buildup, Green Seal believes 7% VOCs by weight is a feasible upper limit for the strongest recommended product concentration, based on our survey of currently available floor stripper products. The proposed standard did not address the lower VOC limit for strippers. The standard's criterion for VOC content (Section 4.6) will be revised to read as follows:

The product as used shall not contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality. Therefore, the volatile organic content of the finish product, as used, shall not exceed 7% by weight, and the volatile organic content of the stripper product, as used, shall not exceed 3% by weight at the greatest recommended amount of dilution (suitable for light to medium buildup), and shall not exceed 7% by weight for the least recommended amount of dilution (suitable for heavy buildup). Total VOC content shall be determined according to California Air Resources Board Method 310.

Basic Characteristics of Finishes

7. Review of Table one shows that most of the ingredients used to make floor finishes have been captured, but there are some ingredients that are missing.

8. One word of caution though on the use of MSDS as reliable sources for total ingredient disclosure: most companies disclose ingredients of a product that are contained in the product at a concentration greater than or equal to 1.0%, while some do not disclose those they feel are not hazardous as defined by OSHA or are considered confidential business information or proprietary knowledge. OSHA does not require all ingredients to be listed or even the CAS number.

9. Floor finishes and strippers are complicated formulas made up of many levels of ingredients. Floor finishes contain raw materials each of which may contain multiple chemicals. It is incumbent upon Green Seal to ensure they are requiring Floor Care submissions to require full chemical disclosure down to 0.01% for all floor finish raw materials including residual monomers and polymerization surfactants. However, we suggest that the 0.01% de minimus reporting level be applied only to particularly hazardous components, such as Prop 65-listed or SARA 313-listed chemicals. Otherwise we feel that the reporting level should be the same as the federal standard for MSDS preparation (1 % or more). We feel strongly that polymer suppliers would not want to disclose any relatively innocuous components at levels below 1 %, even to a neutral third party (such as Green Seal), as many of these are closely guarded secrets, even within a company.

Response: Table 1 was shortened to show only those ingredients that were reported on two or more product MSDSs out of a total of 62 floor finish products surveyed. Green Seal agrees that MSDSs do not necessarily provide complete product information. However, review of available MSDSs is a useful first step in identifying the typical ingredients, especially the hazardous components, used in a product class.

Green Seal will keep the level of an ingredient at 0.01% to promote a higher level of performance than that required by OSHA (1% for hazardous components, 0.1% for carcinogens). Several states have more stringent reporting requirements under their right-to-know laws. For example, California's Proposition 65 requires reporting of hazardous substances that are present above any detectable amount. Massachusetts requires extraordinarily hazardous substances be reported if they are present at a level of 0.0001% or greater. The Pennsylvania right-to-know law requires special hazardous substances be reported at a 0.01% level or greater.

10. When referring to VOCs in strippers it is crucial to be consistent with definitions. For example, please consistently specify that "6% VOC" applies to stripper use dilutions.

    Response: The air quality criterion in the proposed standard limits the VOC content in stripper products "as used". Based on additional comments, the standard's criterion for VOC content (Section 4.6) will be revised to read as follows:

    The product as used shall not contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality. Therefore, the volatile organic content of the finish product, as used, shall not exceed 7% by weight, and the volatile organic content of the stripper product, as used, shall not exceed 3% by weight at the greatest recommended amount of dilution (suitable for light to medium buildup), and shall not exceed 7% by weight for the least recommended amount of dilution (suitable for heavy buildup). Total VOC content shall be determined according to California Air Resources Board Method 310.

11. Along with nonpolymer ingredients, floor finishes are composed of intermediate components such as emulsions that contain the floor finish polymer. Therefore, the definition of ingredients and ingredient disclosure in this Standard should require disclosure of ingredients that are contributed by emulsion, down to the Green Seal assigned limit of 0.01% in the final finish formulation. For example, emulsion intermediates may contain Green Seal prohibited ingredients (such as APEOs) at levels which, in some products, could exceed 0.01% in the final finish formulation.

    Response: Green Seal requires identification of all ingredients (i.e., any constituent that comprises at least 0.01% by weight of the product) as part of the certification process.

Solids

12. The solids range may not be all inclusive of the products currently on the market, but it captures most of them. Include wax and resins in list of solids.

    Response: The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

13. Remove urethane and replace with polyurethane (urethane is a carcinogen).

    Response: Green Seal agrees that polyurethane is the correct term.

Polymer Emulsions

14. Again the commenter would dispute that zinc free floor finishes have the same durability as that of zinc containing finished. Large retail stores that can get 18 - 36 months between strip outs with zinc containing finishes would find that if they switched to zinc free finishes their strip out cycle would most likely fall between 6-18 months, thereby doubling the strip out cycles and doubling the use of products needed to strip and refinish the floors. As to why there are zinc and zinc free products on the market today and the regulatory channels that exist, we refer Green Seal to the CSPA white paper, "Position Paper on the Use of Zinc in Floor Finishes" which is attached to this letter [available as part of the public record].

Response: Please see the response to comments on Zinc and Other Heavy Metals and Prohibited Ingredients (Zinc).

15. Remove leveling from list of polymer properties. This is not a general polymer characteristic. We recommend that durability measurements should be replaced with toughness or modulus. Durability is a broad term with many meanings and no specific criteria are listed within to define durability. In addition, please delete plastics from discussion; it is not relevant and may confuse the reader.

    Response: The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

Other Components of Floor Finishes

16. In the first sentence of the paragraph remove the words 'high-speed'. These ingredients are needed for all types of sealers and floor finishes, not just those designed for high-speed. Most sealers and some floor finishes do not contain alkali soluble resins, so change the range from '(5-15 percent) to (0-15 percent)'.

17. Why is it pointed out that the resins are solublized with ammonia or other amines? Most polymer emulsions also contain some level of ammonia to keep the zinc in solution. Ammonia levels in floor finishes are at such low levels as to not be of a health concern to humans, animals or plant life that may be in the area.

    Response: Products must meet the criteria for acute toxicity to humans and aquatic organisms. However, the standard does not specifically prohibit ammonia.

18. Remove urethane and replace with polyurethane (urethane is a carcinogen and most likely not used by any company). Polyurethanes are generally used to enhance a feature and are generally not required to achieve a feature. In addition, please add optical brighteners to list of other ingredients used in floor finishes.

    Response: Green Seal agrees that polyurethane is the correct term. Optical brighteners are addressed in response to comments on Prohibited Ingredients (Other Ingredients).

Basic Characteristics of Strippers

19. Paragraph 1 Table 2 shows 30 MSDS, yet in the last sentence it states 29 MSDS; one of these figures needs to change to be consistent.

    Response: The correct number is 30.

20. Green Seal should include mention that strippers are typically diluted prior to use. Further, the mechanism of stripping is not correctly described in the Standard. The stripper solvents cause floor finish polymer swelling and concurrently will re-emulsify the polymer in a basic amine water solution containing the polymer, resin, plasticizer and wax (i.e., it does not reliquify the finish).

    Response: Green Seal appreciates the commenter's correction clarifying stripper mechanics. The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

21. It is absolutely crucial to understand that selection of floor finishes and strippers that are mutually incompatible will result in higher chemical and energy use than using a “matched” system of floor finish and effective stripper. ASTM test methods need to be inserted in this standard to avoid certification of mutually incompatible floor finishes and strippers.

    Response: Green Seal agrees with the need for compatibility, and the Scope section of the standard emphasizes its importance. Regarding test methods, please see the response to comments under Other Performance Measures and Additional Performance Requirements (Reserved).

Amines

22. The health concerns about MEA as stated are true, but misleading when how MEA is used in strippers. Strippers are used by professionals who follow good work procedures, and have safety equipment that significantly reduce eye and dermal exposure. As to inhalation concerns, only if MEA is heated to near its boiling point can vapors be generated to make inhalation a real problem. Also as noted above, the low level of MEA in an aqueous solution diminishes the partial pressure of MEA due to its affinity for water.

    Response: Green Seal believes the best approach is to avoid hazardous ingredients rather than to rely on safety procedures or equipment for the user's safety. Regardless, ingredient hazards should be clearly communicated to product users.

Alkaline Builders

23. You may want to add tetra sodium EDTA to this list.

    Response: Comment noted. The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

Surfactants

24. Other surfactants such as anionics like sodium dodecylbenzenesulfonate are also used.

    Response: Comment noted. The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

Performance

25. Paragraph 2. You should honestly state that environmentally preferable products may require more product and labor to achieve the same results as the high performance products they may currently be using. Any purported gain in environmental benefit should be adjusted for that increased amount of product, possible increased energy requirements for scrubber and hot water and for the possible increase in frequency of maintenance and replacement of finish.

26. Paragraph 3. It states in this paragraph that an industry lead study is under way to do a life cycle analysis comparing zinc free finishes with zinc containing finishes. The commenters are unaware of any such study. Please disclose who is running this study so those of us who will be most affected by it can have input into the study.

27. Performance is critical to evaluating the environmentally impact of floor care products. A safe and effective floor care program must use a systems approach that employs a mutually compatible floor finish and stripper; in addition, the floor cleaner used in the floor care program should also be compatible with the selected floor finish. To understand product performance objectively, a battery of product evaluation tests carried out both in a laboratory setting and the customer environment must be used. These tests determine whether a floor care system will be truly sustainable in the marketplace long-term by delivering maximum possible benefits.

28. As noted in more detail in comments provided below, the commenter strongly recommends that ASTM test methods be conducted as part of the process of certification. No systematic study exists to help determine if zinc-free finishes have lower overall environmental impact than zinc-containing finishes. Further, insufficient information exists to assume that zinc-containing finishes have higher environmental impact potential than zinc-free finishes. Therefore, to improve understanding, system performance measurements consistent with the above ASTM tests will be included in a Life-Cycle Assessment (LCA) study to be conducted this year by JDI in collaboration with the University of Pittsburgh. The overall LCA study objective will be to compare the environmental impacts associated with application and maintenance of

zinc-free and zinc-containing floor finishes. Additional LCA measures will include those related to energy use, emissions, and water consumption.

Response: The industry-sponsored LCA is not yet available, but will be taken into consideration when the LCA results are made available. Performance is addressed below under Product Specific Performance Requirements.

Specific Ingredient Concerns

Glycol Ethers

29. Diethylene glycol monoethyl ether is one of the most widely used solvents in floor finishes and seals that the industry uses. In Table 5 it is reported that this solvent has a vapor pressure of 0.126 mmHg @25°C. CARB defines the requirements for an LVP (low vapor pressure) VOC as a chemical having a vapor pressure of 0.1 mmHg @ 20°C. Dow Chemical in their MSDS for Diethylene glycol monoethyl ether reports the vapor pressure to be 0.07 mmHg @ 20°C. To keep this standard and the CARB rules from being different Table 5 should reflect that the vapor pressures for use in this standard be at 20°C. A copy of the Dow MSDS is attached to this letter. [Available in the public record.] The actual language that CARB uses in defining LVP compounds is as follows:

    Low Vapor Pressure (LVP) Compounds as defined in the "Regulations for Reducing Volatile Organic Compound Emissions from Consumer Products" means any compound which contains at least one carbon atom and has either of the following: (1) a vapor pressure less than 0.1 mm Hg at 20°C, or (2) more than 12 carbon atoms, if the vapor pressure is unknown.

    Response: The criterion for air quality limits VOCs to total levels as determined by California Air Resources Board Method 310.

Urethane and Styrene Polymers

30. Is the restriction level for styrene necessary for this document to be effective? Is the level of styrene of 0.01% by weight an accurate representation of the levels currently found in floor finishes, zinc or non-zinc containing products?

31. Remove urethane and replace with polyurethane throughout the discussion. Reporting the use of polyurethanes in other coatings is not relevant to this criteria document and these references should be removed. Furthermore, discussing the attributes of a chemical (e.g., TDI) not found in your evaluations is not relevant and should be removed.

32. Styrene and polystyrene are different chemicals and this needs to be clearly stated (different CAS #'s). Styrene is not the same as styrene acrylic copolymer, styrene acrylic emulsion or styrene acrylic polymer. Styrene is a small molecule (monomer) that is used to make the polymers discussed in this section. We suggest that "styrene polymers" should be replaced with styrene-derived polymers. Residual styrene monomer may be present in all polymers or copolymers made using styrene. Monostyrene should be replaced with styrene, as monostyrene is not a known chemical. We agree with the suggested limits and stress the importance that all residual monomers of >0.01 percent by weight need to be disclosed.

    Response: The proposed standard does not specifically restrict styrene, but prohibits any potential, possible, probably, reasonably anticipated, or known human carcinogens as product ingredients (which includes styrene based on its IARC classification as possibly carcinogenic to humans). Green Seal believes that it is necessary to restrict carcinogens. Actual levels of styrene monomer in floor finish products are not known at this time, but would be required for certification review. Discussion of toluene diisocyanate (TDI) is relevant to the life cycle of products containing polyurethane, and the discussion of polyurethane in general was included to explain why the proposed standard does not specifically prohibit polyurethane, while it is prohibited by others (CCD-147). Green Seal agrees that polyurethane, rather than urethane; and styrene, rather than monostyrene, are the correct terms.

Training and Labeling

33. All of the hazard assessment addressed by Green Seal should be discounted by exposure since risk to workers and the public should be considered in determining any meaningful differences. For instance, products that offer safety in packaging and dispensing should be given credit. Appropriate labeling and training programs should also be factored in and reduced exposure times that can be correlated to product performance should also be considered.

    Response: Green Seal believes the best approach is to avoid hazardous ingredients rather than to rely on safety procedures or equipment for the user's safety. Appropriate labeling and training are addressed by the standard (Section 4.12 and Section 5). Human health criteria for products with packaging designed for safer dispensing/dilution (dispensing system concentrates) are evaluated as used rather than in their undiluted form. Regardless of safety measures, inherent ingredient hazards should be clearly communicated to product users.

Existing Health and Environmental Performance Standards

Nordic Ecolabelling

34. It will be hard to find floor finishes or sealers that do not contain some sort of preservative because these types of products are in a pH range and contain nutrients that micro bacterium love to thrive in.

35. Making floor finish strippers that would not be corrosive will result in products that are less effective and will require multiple applications to totally remove the finish or seal from the floor.

36. Restriction of ingredients, including EDTA…. Does the restriction on EDTA account for the diminished performance that can be expected in the performance and rinsing of the stripper solution**?** Additional water will likely need to be consumed in the stripping process without the use of rinse additives such as EDTA. The prohibition of ingredients of polymers of styrene, ammonia, and various glycol ethers severely handicaps the formulation of floor care products and resulting stability of the products during their life cycle. Obtaining proper film formation presently requires the use of coalescing agents, of which the glycol ethers are more efficient. Ammonia is necessary for product stability during shipment, storage, handling and ultimate use.

37. Consistent with the approach used by California DGS, Nordic Swan uses a score-based system for chemical selection. With scores, high impact substances and properties drive product selection, whereas lower impact substances and properties can still be used to differentiate one product over another. It is significant to note that use of zinc will not cause a floor care product to be eliminated form consideration under Nordic Swan, possibly because the background levels of zinc in wastewater from other sources will far exceed that contributed by floor finishes.

    Response: Comments are noted. The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

Environmental Choice Program

38. It will be hard to find floor finishes or sealers that do not contain some sort of preservative because these types of products are in a pH range and contain nutrients that micro bacterium love to thrive in.

39. Making floor finish strippers that are not corrosive will result in products that are less effective and will require multiple applications to totally remove the finish or seal from the floor.

40. Making floor finishes that did not contain a small amount, less than 0.1%, of fluorinated surfactants would result in products that have extremely poor leveling properties. The commenter did comment on this program during the comment period making these and other issues known.

41. Finalized criteria from ECP should be included.

    Response: Comments are noted. The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

Massachusetts RFR

42. Floor Finishes: Developing floor finishes with no solvent (glycol ethers) to coalesce the film is, at this time, technically not feasible.

43. Floor Finish Strippers: As stated earlier, floor finish strippers that are formulated to have a pH of less than 12 and do not contain at least 3% VOC content at dilution and contain no glycol ethers will not perform to the level expected by most major customers in the I&I market.

44. Desirable composition of floor strippers to be made without glycol ethers, lower VOC content, no ammonia and a pH value less than 12 greatly reduces the effectiveness of the stripper and would require a higher volume of alternative material that could ultimately create a greater environmental hazard. Biodegradability of the organic ingredients under Green Seal GS-37 statement, would this include the polymeric portions of the floor care products, and if so, it would require the polymers, waxes and resins to be biodegradable. At this point, those ingredients are ballast.

    Response: Comments are noted. The report will not be revised or re-issued, but comments will be taken into account in revising the standard.

Recommended Standard
Scope (Section 1)

45. Include removable Floor Sealers since the composition of these products is very similar to Floor Finishes. Therefore, these products are very likely to contain zinc cross-linking agents if not expressly prohibited. Also include Spray Buffing products and Floor Maintainers, Restorers, and Enhancers in the standard. These products commonly contain film-forming agents and, therefore, are likely to contain zinc cross-linking agents if not expressly prohibited. Spray Buffing products and Floor Maintainers, Restorers, and Enhancers that are not film-forming agents should be included in the standard – or perhaps in GS-37 – because of their common and frequent use in floor care.

46. View floor care products as a comprehensive system of products comprised of a coating, sealer, stripper, cleaner, and maintainer/enhancer/restorer/spray buff to produce the maximum benefit for the environment and people. Such a position would preclude manufacturers from surrounding a Green Seal certified floor finish and stripper with products that could not in any way be considered environmentally friendly or responsible. Such business practices – especially if the manufacturers use the same family name for all the products – could easily mislead end-users into a false sense of security regarding environmental impact as well as their own safety.

    Response: Floor cleaners are included within the scope of GS-37. With advances in finish formulations, sealers are not often required. With respect to maintainers, enhancers, restorers, spray buff products, etc., given the limited resources available for standard development, Green Seal focused this floor-care standard on the major product components, which are floor finishes and strippers.

Definitions (Section 2)

47. Reporting all components in a floor-care product down to the level of 0.01 % by weight is far too strict a reporting requirement. Apply the 0.01% *de minimis* reporting level only to particularly hazardous components, such as Prop 65-listed or SARA 313-listed chemicals. Otherwise the reporting level should be the same as the federal standard for MSDS preparation (1% or more). Polymer suppliers would not want to disclose any relatively innocuous components at levels below 1%, even to a neutral third party (such as Green Seal), as many of these are closely guarded secrets, even within a company.

48. Due to the complex nature of floor finishes and strippers, it is important to stress that any constituent of a product and constituents of all intermediates are reviewed to a level of 0.01%.

    Response: As stated earlier, Green Seal requires identification of all ingredients (i.e., any constituent that comprises at least 0.01% by weight of the product) as part of the certification process. Green Seal will keep the level of an ingredient at 0.01% to promote a higher level of analysis than that required by OSHA (1% for hazardous components, 0.1% for carcinogens).

Product-Specific Performance Requirements (Section 3)

Slip Resistance (Section 3.1)

49. Section 2.1.1, Paragraph 1: add to the list in parenthesis improper use of throw rugs and the fact that some times older people fall because their bone broke first causing the fall, and older women still using high heals when their sense of balance is less than ideal.

50. Slip resistance is an important attribute of a floor finish. A slip is technically different than a fall and should not be confused when reporting statistical type information. It is not relevant to this criteria document to discuss comparisons to falls or deaths from drowning. Same level falls are not the same as slip and this type of information is very misleading to the average I&I customer and should be removed.

51. Section 2.1.1, Paragraph 2: amend to reflect that Sidney James of UL invented the James Machine and it is his work that the floor finish industry used to develop ASTM D 2047 for use by companies that wanted to self certify their products as to slip resistant properties. The consensus process used by the ASTM allows for non-industry input.

52. Section 2.1.1, Paragraph 3: Water or other contaminant on any smooth walking surface, coated with a floor finish or not, should be considered a hazard to pedestrians. Acrylic floor finishes are more slippery that natural wax originally used in floor wax preparations of old. The ADA is being revised and the 0.6 and 0.8 reference in Appendix B are being removed. The 0.5 criteria as measured by the James Machine is being added.

53. I would like to suggest a minor change in Section 2.1.1. The last sentence in the fourth paragraph reads "NFSI has a grant from the Consumer Product Safety Commission..." Actually we do not have a grant but rather are working with the CPSC on their proposed educational campaign. Also, since this standard was proposed a few changes have taken place and I have taken the liberty to re-write the paragraph. The paragraph reads:

    > "The National Floor Safety Institute (NFSI) has developed what many consider a more up-to-date, accurate, portable test method for use on floor coverings, polishes, cleaners, and treatments. This "Universal" test method relies on the use of a state-of-the-art robotic tester called the Universal Walkway Tester (UWT) which can accurately measure both wet and dry SCOF values. The NFSI has established an industry first wet test method which replicates the most common cause of slips and falls that being a wet floor. Under the NFSI1 01-A standard, materials that meet a wet SCOF value of 0.6 or higher are certified by the NFSI as "High-Traction". The use of NFSI Certified products will serve to reduce the growing number of slips and falls to which several governmental agencies are considering adopting. The NFSI is serving in an advisory role to the Consumer Product Safety Commission (CPSC)

which plans to introduce an educational campaign aimed at reducing elderly slip and fall accidents and will highlight the use of NFSI Certified products."

54. Remove NSFI standard UWT-I0IA. Any reference to NFSI should be stricken from the proposed standard. The NSFI standard UWT-101A is not peer reviewed, remains an unproven method across the floor care industry, and should not be included. The NFSI method is still being considered by several floor finish manufacturers and trade organizations. You may be overstating in paragraph 5 that the NSFI 101-A is a stricter standard. The Universal Walkway Tester may be measuring actually a floor that is 0.5 by the James Machine, but the meter is set to read 0.6, which would mean there is no real difference. The Universal Walkway Tester is fundamentally not a static test instrument and simply a variation of the Tortus slip tester, (which was later transformed into the Sellmeir slip tester). There are no slip resistance standards for wet walking surfaces. The attempt to designate a value of 0.6 for wet surfaces has no relevance to floor safety as no definition of "wetness" has been established. Wet floors provide the potential for hydroplaning and should not be drawn into the standard without a thorough understanding of surface topography, fluid dynamics and the biomechanics required for safe ambulation. The NFSI practice of certifying wet floors as safe misleads the consumer and can create a hazardous condition. Industry testing of this standard using the UWT has shown that contaminated surfaces that are known to be slippery and, therefore, hazardous to pedestrians, pass the NFSI test standard of 0.6 handily. Thus, users of the NFSI standard may put pedestrians at greater risk rather than less risk of slipping on a wet surface. Using test methods and procedures that are not accepted by organizations such as ASTM, CSPA, or ANSI is questionable.

55. The only meaningful slip resistance standard remains ASTM D-2047, the dry floor standard promulgated by the CSPA. It is the defining standard for determining whether a walking surface is slip resistant. ASTM D2047 and UL Method 410 established the value of 0.5 SCOF based upon years of study and experiential data using the James Machine, (developed by UL). The choice of utilizing 0.5 SCOF only in conjunction with the James Machine (and dry surfaces) would be the more prudent selection, regardless of whether the test is conducted via UL Method 410 or ASTM D-2047. ASTM D-21 is the right body for evaluating new slip standards since it allows for a broader representation than "industry" while still including industry representatives. ASTM method D2047 is widely accepted and should be included as the performance criteria. Floor finishes that meet a static coefficient of friction of 0.5 for a dry surface are widely accepted in the industry. [Require that] the floor finish product shall have a static coefficient of fraction of at least 0.5 as measured by either ASTM D2047-99 or UL method 410.

    Response: Green Seal relies on industry and other stakeholders in determining appropriate performance requirements. ASTM D2047-99 or UL Method 410 appear to be the only widely-accepted methods currently available to measure slip resistance. The NSFI standard will be removed from the Green Seal standard. The revised criterion for slip resistance will read:

    Floor finish products shall have a static coefficient of friction [SCOF] of at least 0.5 as measured by either ASTM D2047-99 or UL Method 410.

Other Performance Measures, Additional Performance Requirements (Section 3.2)

56. A series of ASTM test methods are available to help characterize the performance of floor finishes and strippers in a lab setting. A number of the ASTM methods are comparative. For these test methods, we recommend that Green Seal work with various manufacturers to identify an acceptable benchmark floor finish formula that is readily available to all parties interested in achieving Green Seal certification. For example, the Japanese Floor Polish Association has set a standard benchmark floor polish formulation that is used for all comparative tests based on a Rohm & Haas emulsion that is readily available in Japan. Benchmark products are available from well-accepted sources, and we offer to provide Green Seal additional information on use of those product benchmarks. We recommend the following battery of tests be included in the criteria as methods to benchmark the performance of a Green Seal product vs. a non-Green Seal product:

Removal: Removal of the floor finish is critical to the performance of a floor care program. Floor finishes that are intrinsically difficult to remove traditionally require harsher chemicals and more energy, water, and labor. ASTM D 1792-82 (2002), "Standard Test Method for Long-Term Removability Properties of Emulsion Floor Finishes," can be used to evaluate the removability of a floor finish and the effectiveness of a floor stripper. The floor finish should be completely removed by >50 oscillations but <100 oscillations that corresponds to a removal ease rating of "good" using a Green Seal stripper. If a Green Seal certified stripper is not sold by the manufacturer, use of the ASTM stripper solution is allowable as measured by ASTM D 1792-82 (2002). The stripper product shall have an ease of removal rating equal to "good" using a Green Seal floor finish or a standard floor formula defined by Green Seal of the same maintenance program if a Green Seal finish is not sold by the manufacture as measured by ASTM D 1792-82 (2002).

Detergent resistance: Resistance of a floor finish to damage during normal cleaning operations is critical to the performance of a floor care program. An overly aggressive cleaner can dull a finish and require additional energy and labor to restore the appearance. ASTM D 3207-92 (2002), "Standard Test Method for Detergent Resistance of Floor Polish Film," can be used to evaluate the resistance to deterioration from detergents. The floor finish should demonstrate minimal deterioration (<10%) after 200 cycles using the ASTM cleaning solution and GS-37 floor cleaner at highest dilution rate listed on packaging and achieve a rating of "very good". The floor finish product shall have a deterioration rating of "very good" using a Green Seal cleaner or the cleaner specified in ASTM D 3207-92 if a Green Seal cleaner is not sold by the manufacturer as measured by ASTM D 3207-92.

Soil Resistance: Soil resistance of a floor finish is critical to the performance of a floor care program. Floor finishes that soil easily will require additional cleaning procedures and thus require more water, chemicals, and energy. ASTM D3206-92 (2002), "Standard Test Method for Soil Resistance of Floor Polish," is a comparison test that evaluates the potential for poor soil resistance. This test method is comparative. The floor finish product shall demonstrate equal soil resistance to a standard floor finish formula as defined by Green Seal of the same type maintenance program as measured by ASTM D 3206-92 (2002) (e.g., a dry-bright finish should be compared to a dry-bright standard formula that Green Seal has defined).

Application Properties: Gloss, water spotting resistance, sediment, and accelerated aging properties are also important performance properties of a floor care program. ASTM lists a number of methods for measuring these properties, including ASTM D1793-92 (2002), D 1455-87 (2002), D1290 – 82 (2002) and D 1791-93 (1998). These test methods are comparative in nature and the floor finish should perform equal to a standard floor finish formula defined by Green Seal of the same type maintenance program (e.g., an "ultra-high-speed" finish should be compared to another ultra-high-speed standard formula that Green Seal has defined). The floor finish product shall demonstrate equal performance with respect to gloss build, water spotting resistance, sediment, and accelerated ageing to standard floor finish formula defined by Green Seal of the same type maintenance program as measured by ASTM D 1793-92 (2002), ASTM D 1455-87 (2002), D 1290-82 (2002) and D 1791-93 (1998).

57. Commenter recommends the following ASTM test methods:
    - ASTM D 3206 Test Method for Soil Resistance of Floor Polishes
    - ASTM D 1455 Test Method for 60° Gloss of Emulsion Floor Polish
    - ASTM D 1792 Test Method for Long-Term Removability Properties of Floor Polishes
    - ASTM D 3207 Test Method for Detergent Resistance of Floor Polish Films
    - ASTM D 2048 Test Method for Powdering of Floor Polishes

58. The CSPA has a collection of test methods that we have collected over the years. CSPA would be willing to share these methods with Green Seal. As to the test methods that should be of interest, the following methods would be useful in determining if the floor finish being considered is of a quality grade:
    - ASTM D 523 Gloss Measurements, to determine how glossy or how much shine the floor finish will provide.

- ASTM D1792 Long Term Removability Test, to determine how hard the floor finish will be when it needs to be removed.
- ASTM D 1793 Water Spot Resistance, to determine if standing water will harm the floor finish after the water has been removed.
- ASTM D 2047 Slip Resistance Test Using the James Machine, to determine if the floor finish meets the Static Coefficient of Friction requirement of 0.5 or greater for a safe walk way surface. UL classification under their test method 410 will also serve this purpose.
- ASTM D 2048 Powdering Test. To determine if the floor finish will create a power residue during traffic, or when buffing or burnishing the floor.
- ASTM D 2834 Nonvolatile Matter Content, to determine the solids content of the floor finish for those wanting to make sure they are getting what they ordered.
- ASTM D 3206 Soil Resistance, to determine if the floor finish attracts dirt and when compared to other finishes is it better or worse than other finishes it was compared to.
- ASTM D3207 Detergent Resistance, to determine how well the floor finish resists cleaning without causing harm to the film.
- ASTM D 3208 Freeze-Thaw Resistance, to determine if the product is frozen will it still be acceptable for use.
- ASTM D 3440 Preparing a Specification for Water-Based Floor Finishes, to help an end-user to prepare a document for vendors to use to compare their product to the customer's requirement for a floor finish.

59. It is recommended that Floor Finish certified under this standard perform in such a way that it does not require Stripping and Recoating more than 2 times in a 12-month period. It is also recommended that Floor Finish certified under this standard perform in such a way that Recoating is not required more frequently than 4 weeks since the last recoating. The exception would be the first Recoating that is typically done within 1 week after a full Strip and Recoat. These factors require that a manufacturer engineer Floor Finishes with sufficient durability and cleanability to ensure maximum favorable environmental impact. They would also preclude the use of highly alkaline daily cleaners that act to clean soft finishes by performing partial strips which defeats the purpose of minimal use of chemical products. While performance tests would be difficult if not impossible for Green Seal to perform, a statement from the manufacturer avowing to such recoating frequency would be of value to the end-user.

60. There is a large range of desirable floor finish attributes for the current market. Therefore, as the desirable range is so wide, recommending minimum requirements isn't feasible.

    Response: Green Seal agrees that there is a wide range of floor finish attributes, and also that many floor finish attributes vary by the user's needs or aesthetic preferences. However, given the level of concern for performance of non-zinc finishes, Green Seal believes it is necessary to specify a minimal set of performance requirements. As a starting point, ASTM D 3440-01 (Standard guide for preparing specifications for water-emulsion floor polishes) lists eight standard performance tests: removability, D 1792; resistance to soiling, D 3206; water spotting, D 1793; recoatability, D 3153; powdering, D 2048; standard coefficient of friction, D 2047; detergent resistance, D 3207; and gloss, D 1455. Green Seal relies on industry and other stakeholders in determining appropriate performance requirements. Commenters most consistently recommended the following standard test methods pertaining to performance:

    - ASTM D 2047, Standard coefficient of friction (addressed above in discussion of slip resistance);
    - ASTM D 1792 Long-term removability properties of floor polishes;
    - ASTM D 3206 Soil resistance of floor polishes; and
    - ASTM D 3207 Detergent resistance of floor polish films.

    The standard (Section 3.2) will be revised to read as follows:

    Each product shall perform effectively, as measured by the following standard test methods:

- *Removability: The floor finish and compatible stripper shall achieve a removal ease rating of "good" as measured by ASTM D 1792-82, Standard Test Method for Long-Term Removability Properties of Floor Polishes. In the case of a floor finish and stripper proposed for certification together, they should be tested together, with the candidate stripper replacing the ASTM standard-defined stripper. In the case of a floor finish alone proposed for certification, it should be tested with a Green Seal-certified stripper, with the Green Seal-certified stripper replacing the ASTM standard-defined stripper. In the case of a stripper alone proposed for certification, it should be tested with a Green Seal-certified finish, with the candidate stripper replacing the ASTM standard-defined stripper.*
- *Soil Resistance: The floor finish shall perform as well as a nationally recognized product of its type in its category as measured by ASTM D 3206-92, Standard Test Method for Soil Resistance of Floor Polishes.*
- *Detergent Resistance: The floor finish shall demonstrate minimal deterioration by achieving a detergent resistance rating of "very good", as measured by ASTM D 3207-92, Standard Test Method for Detergent Resistance of Floor Polish Films. The floor finish shall be tested using a GS-37 certified floor cleaner at the recommended dilution rate for routine floor maintenance as listed on packaging, or the ASTM cleaning solution specified in ASTM D 3207-9.*

Products shall be tested as used, and if diluted products shall be diluted with water from the cold tap at no more than 50 ºF.

Human Health Hazards; Product-Specific Health And Environmental Requirements (Section 4)

61. It should be noted that many of the varying criteria cited from different jurisdictions have been harmonized under the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals to be implemented in the next few years. Official GHS text can be found on the United Nations website at http://www.unece.org/trans/danger/publi/ghs/officialtext.html. Since Green Seal has an affinity for criteria developed by international organizations, then the GHS criteria should be referenced.

    Response: OECD's *Harmonized Integrated Classification System for Human Health and Environmental Hazards of Chemical Substances and Mixtures* (OECD 2001) – part of the *Globally Harmonized System for the Classification and Labeling of Chemicals*, or GHS – is cited in Section 2.2.1, and is the basis for the acute oral and inhalation toxicity criteria proposed in the standard.

62. Harmonize with, or exceed, the specifications of the European Union ecological criteria for the Community eco-label for all-purpose cleaners (http://europa.eu.int/comm/environment/ecolabel/pdf/all-purpose_cleaners/all_pupose_cleaners_en.pdf), which are more health protective than the proposed GS-37 [sic] standard in a number of ways, for example by:
    * Prohibiting EDTA, NTA, quaternary ammonium compounds, and glutaraldehyde.
    * Prohibiting ingredients in a variety of categories, including those that may impair fertility, cause harm to the unborn child, or cause heritable genetic damage, according to the EU classification of chemicals.
    * Prohibiting substances that may cause sensitization by inhalation or contact.
    Green Seal should incorporate the lists and chemical classifications the EU has produced by using these standards in all cases when harmonization would increase the health protectiveness of the Green Seal label.

    Response: Green Seal prefers to prohibit individual ingredients only when the impacts of concern cannot be adequately measured by standard test methods. EDTA does not biodegrade rapidly enough to meet OECD/ISO criteria for ready or inherent biodegradability. OSHA and NTP classify NTA as a possible carcinogen, and reasonably anticipated to be a carcinogen, respectively. Glutaraldehyde is a skin sensitizer. Therefore, the biodegradability, carcinogen, and skin sensitization criteria exclude EDTA, NTA, and glutaraldehyde from products, without adding specific ingredient prohibitions for these substances.

    Quaternary ammonium compounds are very toxic to aquatic life. For example, alkyldimethylbenzyl-ammonium chloride has a Daphnia LC50 of 0.039 mg/L (HSDB, ECOTOX). In order to meet the aquatic

toxicity criterion, alkyldimethylbenzyl-ammonium chloride could only be present in a product at less than 0.04% by weight. Therefore, the aquatic toxicity criterion effectively limits quaternary ammonium compounds in floor-care products.

The proposed standard does prohibit reproductive toxins, including those that may impair fertility or cause harm to the unborn child, and skin sensitizers. Respiratory sensitizers are discussed further in Section 4.4.4.

Green Seal agrees that it is important to prohibit known mutagens in products. The GHS provides 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. To address mutagens, the standard will be revised to read as follows:

> *Carcinogens, Mutagens, and Reproductive Toxins*
> *The undiluted product shall not contain any ingredients that are carcinogens, mutagens, or reproductive toxins.*
>
> Carcinogens are defined as those chemicals listed as known, probable, or possible human carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), the U.S. Environmental Protection Agency, or the Occupational Health and Safety Administration. Mutagens are defined as chemicals that meet the criteria for Category 1: Chemicals known to induce heritable mutations or to be regarded as if they induce heritable mutations in the germ cells of humans, under the Harmonized System for the Classification Of Chemicals Which Cause Mutations in Germ Cells (UN, 2003). Chemicals known to cause reproductive toxicity are defined as those listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et seq.).

63. Many of the discussions around components discuss the toxicity of the neat materials. The discussion focus is on the hazards of these materials in their neat form. However, it must be emphasized that risk is based upon both hazard and exposure. Thus, it is possible for a relatively toxic component to be used safely if the exposure is controlled or in quantities below which the hazards would manifest. Some limits are presented for some components; this should be expanded to all components. The overall bias of the discussions is toward hazard rather than taking a risk approach. This is a very conservative approach and tends to eliminate chemistries that can provide great benefit to products at safe use levels.

    Response: Chemical data from published scientific literature are used to avoid the impractical requirement that each unique product be tested directly for all human health, ecological toxicity, and environmental fate attributes. The scientific literature typically reports data for chemicals individually, rather than in mixtures. Ingredient concentration in a product will be taken into account in evaluating the product's overall acute toxicity, based on the assumption that risks are additive. Exposure is also taken into account where the standard exempts non-volatile ingredients (vapor pressure less than or equal to 1 mm Hg) from the inhalation toxicity data requirement because inhalation exposure is considered to be unlikely or negligible for those ingredients.

    The human and environmental criteria come from international, national, and government agency cutoffs for toxic compounds, based on the best available science. In developing this standard, Green Seal is identifying the attributes of products that demonstrate environmental leadership; products that do not meet the standard do not necessarily pose a health or environmental risk.

64. The standard appropriately differentiates between monomeric and polystyrene, and establishes a limit for free styrene in a floor care product. This approach should be extended to other flagged components.

    Response: The limit for free styrene established in the standard (<0.01%) is based on the definition of *ingredient*. That same limit exists for all prohibited components.

65. The comments in the standard and a Green Seal press article seem contradictory. A limit should be set that allows for safe levels of ammonia (risk based limit). A range of 0.1 - 0.2 % is considered acceptable.

    Response: Products must meet the criteria for acute toxicity to humans and aquatic organisms. However, the standard does not specifically prohibit ammonia.

66. Require full ingredient disclosure on Material Safety Data Sheets (MSDSs). MSDSs are, in general, notoriously inaccurate and difficult to read. To contribute to the expansion of consumer right-to-know and the information available to public health professionals trying to trace the causative agent of occupational disease, Green Seal should require accurate and complete MSDSs. Certify only products where the manufacturer lists every ingredient on the Material Safety Data Sheet. The high prevalence of inaccurate and/or incomplete MSDSs, coupled with an increasing lack of ready access to MSDSs on the internet, are substantial barriers to selecting environmentally-preferable products. It is not possible to make an informed decision about the relative safety of various products without ready access to accurate and complete MSDSs. Moreover, incomplete and/or inaccurate MSDSs seriously erode a worker's right to know what they are being exposed to and how to use the product safely, undermining the assurance implied by the Green Seal training requirement (Section 4.4.12). Illustrative of this problem is that among the 236 cases of work-related asthma associated with cleaning chemicals identified by SENSOR, more than a third of the cases could not identify the specific product or ingredient that was associated with their symptoms.

67. Require accurate and complete MSDSs. Certify only products where Green Seal has reviewed the MSDS and determined that it is accurate based on the information Green Seal has about the product. Green Seal is in a position to verify the information on a product's MSDS because Green Seal must be provided with complete information about a product in order to certify the product. We believe that making readily available, complete and accurate MSDS a Green Seal requirement would substantially enhance the integrity of the Green Seal label. Specifically, criteria for Green Seal certification should be that a product's MSDS is accurate and complete based on:
    - A comparison of the information provided to Green Seal from the product manufacturer to the information provided by the manufacturer to the public on the MSDS;
    - The inclusion on the MSDS of the most health protective (i.e., lowest) Permissible Exposure Levels (PELs) issued by a state or federal occupational health and safety, environmental, or other regulatory agency. For example, the PELs set by Cal-OSHA may be lower than exposures permitted by other states. Workers and consumers should be informed of the most restrictive levels;
    - The inclusion on the MSDS of Recommended Exposure Levels issued by the National Institute for Occupational Safety and Health, and the Threshold Limit Values issued by the American Conference of Governmental Industrial Hygienists;
    - The inclusion of a statement on the MSDS that the absence of a regulatory or recommended exposure limit does not imply that the product does not have the potential to cause adverse health effects;
    - The inclusion of a recommendation that individuals who experience symptoms associated with the use of the product report their symptoms to a health care provider and, in the case of workers, to their employer; and
    - The inclusion of clear statements about what is not known about the chemical because of a lack of data. For example, for chemicals that lack data on chronic effects such as cancer and reproductive/developmental effects, an MSDS could state: " tests for long-term health effects are not available" (or have not been conducted or something to that effect).

68. Green Seal should require that the product's MSDS be available on line (on the Internet) for easy access.

69. Include the option of full disclosure of all chemical constituents of a product. We believe the integrity of a Green Seal label is undermined by a lack of disclosure of every chemical constituent in a product bearing the Green Seal label. The present and unfortunate reality is that complete health data are lacking for the vast majority of chemicals in use. Adequate data about a chemical should include an assessment of effects on the developing nervous, endocrine and immune systems, however, very few chemicals have been tested for these effects. Therefore decision makers are faced with the untenable choice between products that include ingredients that have known deleterious health effects with alternative products with yet unknown effects.

Although we support Green Seal's efforts to eliminate certain recognized hazards from products bearing the Green Seal label, we are concerned that Green Seal has no requirement to address the issue of what is not known about the alternatives used. We believe that without some mechanism to address the problem of the limitations of the available data, Green Seal certification will in effect reward ignorance. We recognize that a complete remedy to this problem is well beyond the scope of Green Seal. However, an optional requirement of full disclosure of all product constituents, coupled with accurate and complete MSDSs, would be critical and feasible first steps in addressing this shortcoming. We recognize that the obstacle to full disclosure is the manufacturers' concerns about the release of proprietary information ("trade secrets") to the public. However, workers and consumers who do not know what they are being exposed to cannot fairly judge the relative risks among products, cannot take the necessary steps to prevent their exposure, and cannot link potential adverse health impacts with their exposure. In some contexts, the lack of full disclosure may represent a more serious potential health hazard than the safe use of a product known to have the potential to cause health impacts. Green Seal should at a minimum disclose to workers and consumers which manufacturers are providing the public with the names of all the chemical constituents in their products. For example, there could be a "Green-Seal Plus" designation, indicating that all product constituents, and all known toxicological or other health information that the chemical manufacturer may have about these chemicals, have been disclosed to workers and the public on the MSDS. This would allow manufacturers the option of full disclosure, and purchasers the option of buying products based on complete information about what is in the product.

70. Require that all ingredients at 1% or greater be disclosed on the product MSDS.

    Response: MSDS content is beyond the scope of the standard. The identity and relevant toxic properties of all ingredients ($\geq$0.01%) are required in product certification review.

71. Add neurotoxicity to Section 4.4 as a product specific health requirement. The acute toxicity tests conducted on animals and human data are usually the basis for identifying a chemical as a neurotoxicant. The Occupational Safety and Health Administration Permissible Exposure Limits (PELs) provide incomplete but nevertheless helpful guidance for neurotoxicity as a health endpoint. A number of the PELs are protective for acute neurotoxic effects. The organic solvents are probably the best examples. In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) booklet lists those chemicals for which neurotoxicity is the basis for the TLV. We recommend that this list be used to incorporate neurotoxicity as a product-specific health endpoint. See www.acgih.org/TLV/PolicyStmt.htm.

    Response: Green Seal agrees that neurotoxicity is an important health consideration. Where there is good evidence that neurotoxicity is an issue with a chemical it can be excluded under the general provision regarding harm. However, the standard cannot rely on PEL or TLV data for determining whether a chemical would result in neurotoxicity at the levels and in the form present in a floor-care product. ACGIH's Policy Statement on the Uses of TLVs® and BEIs® includes the following note to users:

    > "These values are intended for use in the practice of industrial hygiene as guidelines or recommendations to assist in the control of potential workplace health hazards *and for no other use*. These values are not fine lines between safe and dangerous concentrations and should not be used by anyone untrained in the discipline of industrial hygiene." [Emphasis added.] (www.acgih.org/TLV/PolicyStmt.htm.)

Acute Toxicity; Toxic Compounds (Section 4.1)

72. This paragraph is acceptable to the commenters as long as these values are for the formulated product and not imposed on the ingredients as they stand-alone. The health risk is on the formulated product not the ingredient itself. Dose makes the poison. If a person drinks enough water they can upset the salt balance in their body and can die.

Response: Values are for product as formulated, or, if whole-product data are not available, then for each individual ingredient considering its weight percent in the formulated product. The acute toxicity criteria for human health do not consider product dilution for use.

73. The proposed Global Harmonization Category 5 should be dropped. There is no requirement that any of the countries have to accept all 5 categories; the toxicology testing should be left with CPSC, EPA, TSCA, OSHA, and DOT. There has been no evidence that Category 5 is safer than Category 4.

    Response: Green Seal prefers relevant international standards to national standards. In addition, the toxicity criteria developed over the years by the CPSC, EPA, TSCA, OSHA, and DOT are not consistent across agencies. For example, under the CPSC, any substance with an oral LD50 between 50 and 5,000 mg/kg is considered "toxic," while OSHA considers a substance with an LD50 between 50 and 500 mg/kg to be "toxic". Under TSCA, a substance with an LD50 between 500 and 5,000 is "moderately toxic" and above 5,000 mg/kg is "slightly toxic". EPA has established different definitions, depending on the regulatory or program context. Acute LD50 and LC50 tests are direct measurements of acute toxic potency. Therefore, assuming identical exposures, a substance in Category 4 is expected to be more toxic than a substance in Category 5. The acute toxicity criteria will remain as written in the proposed standard.

74. Green Seal's definition of "ingredient" should apply here, as done in GS-37

    Response: Agreed. The standard states: "To demonstrate compliance with this requirement, a mixture need not be tested if existing toxicological information demonstrates that each *ingredient* complies." Therefore, the acute toxicity criterion applies either to the product as a whole or to each of the ingredients, as ingredient is defined in Section 4.2. For clarity, the last sentence of Section 4.4.1 will be revised to read as follows:

    Inhalation toxicity will not be required for any ~~compound~~ <u>ingredient</u> with a vapor pressure of 1 mmHg or less at room temperature.

75. More differentiation should be made between the mono- and diethylene glycol ethers. The floor care industry has avoided the mono glycol ethers for some years due to toxicity issues. The diethylene glycol ethers do not have the same issues and there are members of this class that are safe to use.

    Response: The standard does not specifically prohibit any glycol ethers. However, products must meet the criteria for acute toxicity, reproductive toxicity, VOC content, etc.

Carcinogenicity; Reproductive Toxicity; Carcinogens and Reproductive Toxins (Section 4.2)

76. Of the 6 categories only the last 4 should be used to restrict a chemical's use. Over the years I have seen chemicals put on the lower categories only to have further studies performed that indicate the chemical is not of carcinogenic concern. Therefore, chemicals should not be restricted for use unless they meet the probably, reasonably anticipated, or known human carcinogen categories.

    Response: Consistent with the precautionary principle, Green Seal believes it is appropriate to restrict possible carcinogens. Green Seal does not believe that this restriction places an undue burden on manufacturers, as it is not necessary to formulate floor care products with those chemicals.

77. In referring to carcinogens and reproductive toxicants, the Standard's definition of "ingredient" should be used. This should be consistent with Section 4.4.2 and in reference to carcinogens, use the definition of ingredient by replacing "products do not contain any potential…" with "products do not contain any ingredient known to be a potential …"

    Response: Comment noted. The report will not be revised or re-issued, but comments will be taken into account in revising the standard. The proposed standard's criterion read as follows:

The undiluted product shall not contain any ingredients that are carcinogens or that are known to cause reproductive toxicity.

78. In looking at the revised GS-37 and the new floor care standard together, I noticed that the latter includes EPA as an agency that lists carcinogens while GS-37 does not. Quoting the floor care draft standard: "Carcinogens are defined as those chemicals listed as known, probable, or possible human carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), the U.S. Environmental Protection Agency, or the Occupational Health and Safety Administration." I suggest that you use the same wording for both standards, and that if you include EPA then cite the website or other address for where EPA publishes its findings about carcinogenicity.

    Response: The floor care standard and the current version of GS-37 are consistent in their definition of carcinogens. Section 4.2 of GS-37 includes the following sentence: "Carcinogens are defined as those chemicals listed as known, probable, or possible human carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), the U.S. Environmental Protection Agency, or the Occupational Health and Safety Administration." The Internet link to EPA's IRIS database is: www.epa.gov/iris, where EPA provides their established cancer weight-of-evidence classifications. However, the standard documents do not typically provide Internet links to readily-available sources of data. It would be difficult to do so consistently for all data requirements pertaining to all of the criteria.

79. Reproductive Toxicants. In addition to the chemicals listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986, Green Seal should consider prohibiting chemicals determined to be reproductive or developmental toxins by the National Toxicology Program's Center for the Evaluation of Risks to Human Reproduction. The Center provides scientifically-based, uniform assessments of the potential for adverse effects on reproduction and development caused by agents to which humans may be exposed. This is accomplished through rigorous evaluations of the scientific literature by independent panels of scientists. We recommend that the findings of CERHR's expert panels on reproductive and developmental toxicity for chemicals should be added to the definition of "chemicals known to cause reproductive toxicity." A list of chemicals that have been or will be evaluated with their reports is available at http://cerhr.niehs.nih.gov/CERHRchems/index.html. Evaluated chemicals that have been determined by the NTP's Center for the Evaluation of Risks to Human Reproduction to be likely to cause human reproductive or developmental toxicity and that are not listed by California or otherwise prohibited by Green Seal's proposed standard include 1-bromopropane, which is used as a solvent for waxes or resins.

    Response: According to the Proposition 65 regulations (Title 22, California Code of Regulations, section 12306), a chemical is known to the state to cause reproductive toxicity if the lead agency determines that an authoritative body has formally identified the chemical as causing reproductive toxicity. The authoritative bodies recognized by the Proposition 65 legislation include NTP's Center for the Evaluation of Risks to Human Reproduction. In fact, a Notice of Intent to List 1-Bromopropane (1-BP) as a reproductive toxin was issued by the State of California on October 8, 2004. Because of the authoritative bodies mechanism included in Proposition 65, the proposed standard implicitly incorporates final judgments as to reproductive toxicity by the NTP; that portion of the standard need not be revised.

80. We also recommend that the definition of carcinogens be extended to include: (1) chemicals listed by the State of California, Environmental Protection Agency, Office of Environmental Health Hazard Assessment under the Safe Drinking Water and Toxic Enforcement Act of 1986. See www.oehha.ca.gov/prop65/prop65_list/files/070904list.html and (2) chemicals listed as carcinogens under Title 8 California Code of Regulations Article 110 Sections 5200 et. seq, which states, "Regulated carcinogen means a recognized cancer causing substance, compound, mixture, or product regulated by sections 1529, 1532, 1535, 8358, or Article 110 sections 5200-5220". See www.dir.ca.gov/title8/5203.html and www.dir.ca.gov/title8/5209.html.

    Response: Consistent with ISO 14020 and 14024, Green Seal prefers chemical cancer determinations developed by international and national organizations over state agencies.

Damage to Skin and Eyes; Corrosiveness (Section 4.3)

81. The recommendation for utilizing synthetic skin should be reconsidered unless a viable number of testing facilities are available to conduct these tests with confidence in the results obtained for reproducibility and repeatability.

    Response: Green Seal wants to discourage animal testing. As noted in the proposed standard's provision on animal testing, non-animal (in-vitro) test results may be accepted, providing that the test methods are referenced in peer-reviewed literature and the manufacturer provides the reasons for selecting the particular test method.

82. The pH of the strippers should be reconsidered, as a relatively high pH value is required for adequate saponification of the exposed acid groups on the polymer chain during the removal process. The added pH value offsets the need for additional solvents. The pH value alone will not always predict skin or eye irritation.

83. A pH range of 2.0 to 13.5 would be more reasonable. Or you could use the U.S. Department of Transportation classification of corrosive packaging requirements which are: PG I causes corrosion to the skin in less than 3 minutes, PG II causes corrosion to the skin between 3 minutes and 1 hour, and PG III causes corrosion to the skin between 1 hour and 4 hours. If you chose this definition then only allow strippers in their concentrated form that meet either PG II or PG III.

84. pH is a poor measure of actual potential for skin or eye burns; it is whether the material is indicated as being "corrosive" by the manufacturer on the label or MSDS that has far more merit in defining this characteristic. Some high-performance strippers have high pH but are proven with standard testing not to be corrosive. In standard toxicological testing, products with a pH less than 2 can be non-irritating and non-toxic.

    Response: Green Seal agrees that skin and eye corrosion are the effects we are trying to prevent, and that pH is only a potential indicator of these effects. Therefore, the criterion concerning pH range is unnecessary. However, at high levels of pH, the possibility of corrosion increases, and so Green Seal will require that products above a certain pH level be tested for the whole product mixture rather than using data for individual ingredients. The revised criterion will read as follows:

    *The <u>undiluted</u> product shall not be corrosive to the skin or eyes. Dispensing-system concentrates shall be tested as used. The undiluted cleaning product shall not be corrosive to the skin, as tested using the Human Skin Construct systems (Liebsch et al. 2000; Fentem et al. 1998). The undiluted product shall also not be corrosive to the eye as tested using the bovine opacity and permeability test (BCOP) (Sina et al. 1995) after a 10-minute exposure. Green Seal will also accept the results of other peer-reviewed or standard in vitro or in vivo test methods demonstrating that the product mixture is not corrosiv*e.

    If the pH of the product exceeds 11.5, the whole product shall be tested for corrosiveness. The pH is measured using a pH meter and Method 9040 in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846.

85. Indicate that this section refers to strippers.

    Response: This section refers to both floor finishes and strippers.

86. Green Seal's proposed pH range of 2.0 to 11.5 should be for the diluted material only. To restrict the concentrated product to this range would result in products that would not work effectively on floors that have been high speed burnished, or floors with excessive amount of floor finish on them, or when a sealer, that are sometimes present on floors, needs to be removed. Personnel doing this type of work are trained to use these types of products, and injuries reported by the use of corrosive strippers are extremely small. In

my 30 years in the business I would say I am aware of only 5 reported injuries involving floor finish strippers.

Response: The corrosiveness criteria apply to undiluted products, except for dispensing system concentrates, because janitors may come in contact with undiluted product. Regardless of training, many janitors are injured each year from the cleaning products that they use. As noted above, the limitation on pH per se will be removed from the standard.

87. It is recommended that the pH of strippers not exceed 11.0. Linoleum and similar flooring material are damaged by high pH stripper solutions.

    Response: As noted above, the limitation on pH per se will be removed from the standard, but the criterion on corrosiveness remains.

Skin Sensitization (Section 4.4)

88. Allow the use of literature data of individual ingredients instead of testing the product as a whole.

    Response: The proposed standard does allow for ingredient data, as stated in Section 4.4.14, Animal Testing.

89. Consider a product as a whole to be a skin sensitizer when it contains a known skin sensitizer at a concentration of >0.1%. This is 10 times lower than Green Seal's proposed concentration for this attribute, and is in accordance with the Globally Harmonized System for Classification and Labeling of Chemicals (GHS), published by the United Nations in 2003. The GHS states that "the mixture should be classified as a respiratory or skin sensitizer when at least one ingredient has been classified as a respiratory or skin sensitizer and is present at or above the appropriate cut-off value /concentration limit...." The concentration limit listed for a product to require labeling as a skin sensitizer is 0.1%. The specific section related to skin sensitizers is in Part 3, "Health and Environmental Hazards," and is available at www.unece.org/trans/danger/publi/ghs/ghs_text-pdf/GHS-PART-3e.pdf. The entire document (all Parts) can be downloaded at www.unece.org/trans/danger/publi/ghs/officialtext.html. A US perspective on the GHS initiative is available from the US Department of Transportation HazMat Safety Program at http://hazmat.dot.gov/globharm.htm. A threshold concentration of 0.1% would also be consistent with the level set to protect against skin sensitization in the Formaldehyde Standard.

    Response: Agreed. That part of the standard will be revised to read as follows:

    ... If a product contains a known skin sensitizer at or above a concentration of 0.1%, then the product as a whole shall be considered a skin sensitizer, except where explicit data demonstrate that it is not a skin sensitizer.

90. The first portion of this section is consistent with the GS-37 criteria. Further, the added 1% trigger level for sensitizers is also consistent with the European Union Conventional Method for determination of the Classification of Hazardous Preparations. Sensitization information from European format Safety Data Sheets should also be considered acceptable by Green Seal as part of the certification submission package. When classifying a product, individual fragrance components are taken into consideration for the Europe's classification of "R43" (sensitizer). When fragrance's components are not classified as sensitizers, fragrances can be present in the product at greater than 1%, and the product itself will not be classified as a sensitizer on its European Safety Data Sheet. Therefore, European Safety Data Sheets should be accepted by Green Seal in the certification process as reasonable evidence of an ingredient not being a sensitizer.

    Response: Green Seal would accept defensible European data pertaining to skin sensitization, provided that the whole product, or each of its ingredients, is shown not to cause skin sensitization.

91. Incorporate consideration of asthma-causing agents and the occupational respiratory risk of these products. Monoethanolamine, a common ingredient in floor strippers, has been shown to cause asthma. One case report involved a cleaner exposed to monoethanolamine via cleaning chemicals. (Savonius B, et al., "Occupational asthma caused by ethanolamines," Allergy 1994:49:877-881.) Triethanolamine has also been shown to cause asthma, although in a different occupational setting (see same Savonius paper). Because at least one floor stripper is available without either of these chemicals (see Envirostar stripper at www.pioneer-eclipse.com/products/chemical/pdf/Green/513%20Green%20Floor%20Stripper.pdf), it seems reasonable to reduce this risk of occupational asthma by prohibiting mono- and tri-ethanolamine in Green Seal-certified strippers and finishes. Alternatively, at least require Green-Seal certified strippers and finishes to notify users on the label of the presence of a chemical known to cause occupational asthma, such as those listed as asthmagens by the Association of Occupational and Environmental Clinics at www.aoec.org/aoeccode.htm.

92. Expand Section 4.4.4 Skin Sensitization to Skin and Respiratory Sensitization. As Green Seal states in the proposed floor care products standard, "a person can become sensitized to a chemical by inhaling it or from dermal exposure" (page 15). We recommend the inclusion of respiratory sensitization in the certification criteria and standard by prohibiting the use of ingredients known to cause asthma as listed on the Association of Occupational and Environmental Health Clinics Occupational Asthmagens on the AOEC List of Exposure Codes, see www.aoec.org/aoeccode.htm#Asthma-Criteria, and/or on Asthmapro, a web server for occupational asthma, table of agents and substances which can cause asthma, see www.remcomp.com/asmanet/asmapro/asmawork.htm. Of 30 floor stripper products reviewed by Green Seal, 26 (87%) contained monoethanolamine (ethanolamine), a chemical known to cause asthma, in a concentration of 1-30% by weight. Asthma is a chronic respiratory disease of critical public health importance in the United States. The prevalence of asthma has been rising at an alarming rate, with a 75% increase of self-reported asthma between 1980 and 1994. Current estimates show that 17 million people in the U.S. have asthma, including 15.1 million adults. Asthma is associated with significant morbidity and economic costs. The total cost associated with asthma in the U.S. in 1998 was estimated to be $12.7 billion. The same asthma trends have also been documented in California. As the largest state, where one out of eight people in the U.S. lives and works, California bears a significant portion of the nation's asthma burden. The potential for cleaning products to cause or aggravate asthma is substantial although not widely recognized. Between 1993-1997, the SENSOR program identified a total of 1915 confirmed cases of work-related asthma in four states. Of the 1915 cases of asthma, 236 (12%) were associated with cleaning products. Over half (55%) of the asthma cases associated with cleaning products occurred in janitors, cleaners, housekeepers, nurses, nurses aides and clerical workers. Floor strippers/waxes were linked to 16 of the 236 cases of cleaning agent-related asthma. These documented cases of asthma related to floor-strippers and other cleaning agents likely understate the health risks because there are significant barriers to illness reporting. Moreover, workers who become sensitized may be unable to continue to work at their job. The most effective way to prevent these cases of asthma is to eliminate the agents that cause asthma from floor care and other cleaning products.

93. Consider the potential of ingredients to cause respiratory sensitization and asthma, which has even more serious consequences than dermal sensitization, which currently is included. An article by Rosenman et al. reported that 12% of all confirmed cases of work-related asthma reported to the sentinel event notification systems in California, Massachusetts, Michigan and New Jersey, 1993-1997, were associated with cleaning products. In Massachusetts, cleaning products were the second most frequently reported exposure associated with work-related asthma cases reported to the MDPH (1993-2002). These sentinel systems provide a conservative estimate of the true burden of work-related asthma and may be an underestimate of the contribution of cleaning chemicals to the development of work-related asthma. Asthma is a serious, chronic, widespread respiratory disease recognized as a critical clinical and public health problem in the U.S. An estimated 16 million (7.5%) U.S. adults have asthma. Prevalence, morbidity and mortality associated with asthma increased from 1980-1999. Rates of outpatient and emergency department visits for asthma have continued to increase. In 1998 in the US, asthma accounted for more than 2 million emergency department visits, an estimated 423,000 hospitalizations and 5,438 deaths. Direct and indirect medical expenditures for asthma were estimated at $12.7 billion. Children have the highest prevalence of asthma and have experienced the highest rate of increase; the majority of asthma-sufferers are adults. Children and

adults will benefit from attention to this issue. The identification of cleaning products as asthmagens and as asthma triggers provides a valuable opportunity for intervention. Massachusetts's OSD has included a requirement for disclosure about asthmagens in their submission for product approval. OSD relied on chemicals designated as asthmagens on the list of chemicals maintained by the Association of Occupational and Environmental Clinics, with funding from the National Institute for Occupational Safety and Health. Among the ingredients in floor care systems are rosins, epoxies, acrylic polymers, and phthalates, which should be considered for respiratory sensitizing potential. It is absolutely necessary to have accurate and complete material safety data sheets (MSDS) for these materials.

Response: Green Seal agrees that respiratory sensitization is a serious issue. However, the lists of respiratory sensitizers that have been proposed were not intended for this purpose. The lists do not address the form or concentration of the ingredients, and include a large number of plant and animal products (e.g., "plant material, not otherwise specified"), which would make the lists impractical for use in screening product ingredients. According to the AOEC, "The AOEC Exposure code system is intended for use in coding epidemiological data. It is not intended for use as a tool in formulating products nor have we the resources to determine dose/response relationships." (K. Kirkland, AOEC, personal communication, 9/28/04). According to the GHS (UN, 2003), "At present recognized animal models for the testing of respiratory hypersensitivity are not available." Some substances induce symptoms of asthma by irritation only and should not be considered respiratory sensitizers. The European Chemicals Bureau (ECB) classification and labeling requirements specify criteria for substances that "may cause sensitization by inhalation" (R42) and the database contains 78 chemicals with this classification. To illustrate the uncertainty in available data on respiratory sensitizers, in this EU database, ethanolamine is not classified as a respiratory sensitizer. (http://ecb.jrc.it/classification-labelling/CLASSLAB_SEARCH/classlab/subDetail.php?indexNum=603-030-00-8&subLang=EN). One additional consideration is that ethanolamine is preferable to ammonia, which it has replaced in many floor stripper formulations.

Flammability (Section 4.5)

94. This needs a correction. GS-37 correctly refers to combustibility, whereas this criterion refers to flammability. Flammability traditionally refers to materials that ignite easily and spread rapidly, whereas combustibility defines whether a material will burn, regardless of ease of ignition.

    Response: Definitions of flammability and combustibility vary from source to source. For that reason, the criterion is based on flash point, rather than classification as a flammable or combustible liquid.

Ozone depletion; Volatile Organic Compounds; Air Quality (Section 4.6)

95. Ozone-depleting compounds (ODCs) listed under the Clean Air Act should continue to be banned in all products to help avoid their inadvertent or known use in new products submitted to Green Seal for certification.

    Response: Agreed. ODCs will be added to the list of prohibited ingredients. The revised criterion of the standard (Section 4.11) will read as follows:

    The product shall not contain the following ingredients:

    - *Alkylphenol ethoxylates*
    - *Phthalates*
    - *Zinc or other heavy metals, including arsenic, lead, cadmium, cobalt, chromium, mercury, nickel, selenium.*
    - *Optical brighteners*
    - *Ozone depleting compounds (ODCs)*

96. Not all VOCs react the same, and have different reactivity values, which is not reflected in this specification.

    Response: CARB Method 310, cited in the criterion for the determination, does exclude certain low-reactivity VOCs, such as acetone and perchloroethylene.

97. VOC limits on strippers may impact stripper removal of floor finishes requiring more water, energy and chemicals. To restrict the VOC content differently than what is the current level acceptable to the State of California CARB rules will result in products that will not work in large retail stores and some schools that use high speed burnishing procedures to maintain their floors. The lower VOC content will require these customers to double strip or use non-high speed buffing programs, which will result in more frequent stripping that will ultimately negate any positive effect of lowering the VOC content. Consider an LCA approach to insure that the standard's recommendations are consistent with the principles of sustainable development. Current VOC limits also limit future technology, e.g., if a higher solids floor polish is developed that requires fewer coats, but has a higher VOC than currently permitted for resilient floor application (7%), it could not be marketed, even though its eco burden would be less (less packaging used, less overall VOCs released). If a floor polish can be made at a higher solids level, this would translate into less packaging waste, less energy consumption, lower VOC emissions, but if the VOC level needed to get the higher solids and to be a level somewhat higher than 7%, then this product could not be commercialized and the environmental benefits realized. Likewise with floor strippers, if a finish has to be removed by 2-3 stripping processes with a VOC compliant product, versus for one that can removed in one stripping process, but has a VOC content higher than 12%, then its environmental benefits could not be realized.
98. Reduce VOC requirements for strippers. Green Seal should limit the VOC content of strippers to 3% VOC, to match the limit specified by the California Air Resources Board for products sold in California. The current proposed Green Seal standard limits both strippers and finishes to 7% VOC content. However, the California Air Resources Board limits the VOC content of strippers to 3%. (See Article 2, Consumer Products, Section 94509(j), Title 17, California Code of Regulations, page 33, downloadable at http://www.arb.ca.gov/consprod/regs/Cpreg.pdf.) This California regulation went into effect in 2002, so it is clear that strippers with 3% VOC are widely available and used. Because the California Air Resources Board limits the VOC content of "waxes" for "flexible flooring" (equivalent to finishes for resilient flooring) to 7%, we support the limit of 7% VOC content for finishes only in the Green Seal standard.

99. Be at least as stringent as the California Air Resources Board regulations. The proposed standard states "the volatile organic content [VOC] of the stripper product, as used, shall not exceed 7% by weight …" On page 17 of the proposed standard, Green Seal states that the California Air Resources Board (CARB) regulations for consumer products limits the VOC content of floor wax stripper for light or medium buildup to no more than 3%. We recommend that the Green Seal standard be at least as low as the CARB regulation. We fully support the reduction of VOCs in these products based on air quality impacts (ozone and photochemical smog). However, we note that airborne contaminant levels are also relevant to indoor air quality concerns for both occupational and non-occupational exposures, and that consideration of these levels has not been incorporated into the standard. We recognize that one barrier to such consideration is the difficulty in implementing airborne contaminant level criteria in a practical way into the standard. However, we recommend that Green Seal give attention to this matter as the label evolves and improves over time.

100. When referring to Green Seal limits for VOCs, it is not understood where the 7% limit for stripper was derived and therefore the limit appears arbitrary and over simplified. Green Seal should not certify products that are not compliant with CARB. CARB uses lower limits than 7% for stripper use dilutions; a limit of 3% VOC for stripper use dilutions is stipulated by CARB for products that are designed and labeled for stripping of light to medium floor finish build-up. Therefore, we recommend following CARB rules for establishing VOC limits for floor strippers and floor finishes, thereby establishing limits in a well-accepted and consistent manner. If Green Seal proposes a limit different than CARB for strippers, then for consistency it should also propose a limit different than CARB for floor finishes.

    Response: Although it is lower than CARB's limit of 12% for heavy buildup, Green Seal believes 7% VOCs by weight is a feasible upper limit for the strongest recommended product concentration, based on

our survey of currently available floor stripper products. The proposed standard did not address the lower VOC limit for strippers. The standard's criterion for VOC content will be revised to read as follows:

> *The product as used shall not contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality. Therefore, the volatile organic content of the finish product, as used, shall not exceed 7% by weight, and the volatile organic content of the stripper product, as used, shall not exceed 3% by weight at the greatest recommended amount of dilution (suitable for light to medium buildup), and shall not exceed 7% by weight for the least recommended amount of dilution (suitable for heavy buildup). Total VOC content shall be determined according to California Air Resources Board Method 310.*

Aquatic toxicity; Toxicity to Aquatic Life (Section 4.7)

101. Acrylic polymers are of molecular weight of over one million, thereby rendering them practically nontoxic. Fate studies have shown that acrylic polymers tend to adsorb to organics in wastewater, rendering them nonbioavailable.

Response: Although high molecular weight indicates a low tendency for absorption into an aquatic organism, molecular weight alone does not guarantee that a substance is non-toxic. For instance, some surface-active chemicals, such as cationic polymers with molecular weights greater than 1,000,000, are highly toxic to aquatic organisms (Clements et al., 1996). A case for low aquatic toxicity based on molecular weight, or other considerations based on chemical structure, would require further chemical-specific data. Green Seal does not consider reduced bioavailability due to reversible adsorption processes, which may occur in wastewater, to be relevant to the inherent aquatic toxicity of a product or its ingredients.

102. Many customers who require high performance floor finishes will want the zinc containing products over the non-zinc containing products. Some provision should be considered to allow zinc-containing product until such time the industry can bring the non-zinc containing products to a level of performance that these customers need.

Response: This issue is addressed under Prohibited Ingredients (Zinc).

Phosphorus (Eutrophication) (Section 4.8)

103. There currently is no universal replacement for tributoxy ethyl phosphate in floor finishes and sealers. The proposed limit of 0.5% phosphorus will allow most if not all current products to pass this requirement. Any movement to lower this requirement could place a great burden on the industry with little benefit. Any life cycle assessment should include the relative performance and environmental impacts of alternatives. The net environmental impact of regular maintenance of a tBEP containing finish is extremely low.

104. The restriction on the level of phosphorus / tributoxy ethyl phosphate could compromise the performance of current formulations available for market. A higher acceptable level should be considered.

Response: Based on Green Seal's review of available product MSDSs, several products currently on the market could meet the limit of 0.5% by weight as phosphorus (P), which is equivalent to limiting tributoxy ethyl phosphate to 6.4%. This criterion, which is consistent with GS-37, will not be changed.

Ready Biodegradability; Aquatic Biodegradability (Section 4.9)

105. Tributoxyethyl phosphate (CAS 78-51-3), included as an ingredient of floor finishes – Table 4, is not readily biodegradable; the 28d ThOD of this ingredient is 51%.

Response: In our survey of finish product MSDSs, 29 out of 62 did not report this ingredient. The biodegradability criterion will not be changed.

106. There may be ingredients that are needed to formulate floor finishes to a level of performance that our customers have come to expect and demand that may not pass this requirement such as the fluorinated surfactants.

Response: Green Seal believes the biodegradability criterion is important, especially with chemicals that are toxic to aquatic life, as with many of the fluorocarbon compounds. The standard does not specifically prohibit fluorocarbons. However, products must meet the criteria for aquatic toxicity and biodegradation. Green Seal does not believe that this requirement places an undue burden on product manufacturers.

107. Green Seal should state clearly which OECD test methods it would like to see chemicals tested against for compliance with the standard.

108. The definition should be consistent with GS-37. All organic ingredients that are present at > 0.01% as formulated in the total finish must be readily biodegradable by the OECD definition, with the exception of polymer, resin, and wax. ISO/OECD test methods should be cited in the Standard. These methods include: OECD 301A-F, ISO 9439 carbon dioxide (CO2) evolution test, ISO 10708 (two-phase closed bottle test), or ISO 7827 (dissolved organic carbon removal). As indicated in GS-37: acceptable OECD protocols include ready biodegradability OECD 301A-F, or 303A with > 90% removal.

Response: The standard (Section 4.9) will be revised to include specific OECD Test Guidelines, as follows:

> *… Biodegradability shall be measured by one of the following methods: OECD TG 301A-F, ISO 9439 carbon dioxide (CO_2) evolution test, ISO 10708 (two-phase closed-bottle test), ISO 10707 (closed bottle test), or ISO 7827 (dissolved organic carbon removal). …*

109. Require each organic ingredient in the ready-to-use form of the product to be readily biodegradable.

Response: "Ingredient" is already defined in the proposed standard as: *Any constituent of a product that is intentionally added or known to be a contaminant that comprises at least 0.01% by weight of the product.* Biodegradation is reviewed on ingredients in the product as used. This will be clarified in the revised criterion as follows:

> *Each of the organic ingredients in the product as used shall exhibit ready biodegradability…*

Packaging (Section 4.10)

110. Regarding the exception for flexible packaging, the manufacturer should demonstrate a significant reduction in the environmental impact through reduction in material compared to rigid containers and life-cycle analysis.

111. It is recommended that the recyclability of flexible packaging such as pouches or bags be measured with respect to the total package before such packaging is offered as an alternative. Since plastic pouches and bags cannot be used unsupported and still meet DOT shipping requirements, there is the obvious consideration of the support material that is typically corrugated paper plus the labeling plus the pouch valve. This construction makes it difficult to separate the paper and plastic materials, which is at least a demotivation for recycling if not a significant detriment.

Response: Green Seal has reviewed several studies submitted by manufacturers that compared the same size product (e.g., 1 gallon) packaged in a rigid container and packaged in a flexible pouch package. Some of the flexible packages have demonstrated environmental benefits compared to the equivalent rigid container across several parameters, including:

- Weight
- Manufacturing energy required

- Amount of overall plastic material
- Evacuation efficiency
- Transportation savings (e.g., less energy to transport empty pouches, more filled pouches in the same amount of cargo space)

An exception for products packaged in non-recyclable flexible packaging will be made only where a manufacturer can demonstrate a significant environmental benefit compared to the rigid container for the same size product.

112. It is recommended that product-labeling systems to assist non-English or illiterate personnel be defined.

Response: The requirement allows flexibility for manufacturers to avoid English-only labels. It would be overly prescriptive to specify an appropriate language or languages in a nationwide standard because this can vary from region to region.

113. Require stripper to be sold as a concentrate. To ensure accuracy, safety, and reduce waste, concentrate to be diluted through a dispensing system. No free hand or visual measurement of dilution permitted. Minimum dilution ratio of 1:4.

Response: Most stripper products are sold as concentrates. However, due to variation in recommended dilution levels, no uniform dilution level will be specified in the standard.

114. Concentrated product to be freeze/thaw stable

Response: Green Seal does not believe that this attribute is necessarily relevant to an environmental leadership standard. Where it is necessary, manufacturers are likely to meet this requirement.

Zinc and Other Heavy Metals; Prohibited Ingredients (Zinc) (Section 4.11)

115. Use a clearer definition of 'heavy metal' since this is a vague term. Better verbiage might be "Zinc or other toxic heavy metal compounds as defined by the SARA list (EPA 550-B-98-017, Title III List of Lists)."

116. Avoid nonscientific “hype” and instead refer to zinc singularly as a cross-linking component in floor finishes. The association of zinc with “other heavy metals” is highly misleading. If a general classification is to be assigned to zinc, it should be described as a transition metal, which has a clear and universally recognized scientific definition. Further, as indicated by International Union of Pure and Applied Chemistry (IUPAC), the internationally recognized authority on chemical classification: “The term "heavy metal" has never been defined by any authoritative body such as IUPAC. Over the 60 years or so in which it has been used in chemistry, it has been given such a wide range of meanings by different authors that it is effectively meaningless. No relationship can be found between density (specific gravity) or any of the other physicochemical concepts that have been used to define heavy metals and the toxicity or ecotoxicity attributed to heavy metals. Understanding bioavailability is the key to assessment of the potential toxicity of metals and their compounds.” PAC 74(5), 793-807 (2002). Poisonous metals such as arsenic, lead and cadmium are not used in floor care systems and therefore are clearly not relevant to mention in Green Seal’s Floor Care Standard. Mentioning poisonous metals alongside zinc incorrectly implies, merely by association, that zinc is as poisonous as arsenic, lead and cadmium.

Response: Green Seal agrees that there is no scientific consensus on the definition of “heavy metal.” Various overlapping but inconsistent lists of toxic and/or heavy metals have been promulgated by EPA (e.g., the SARA list) and others. However, Green Seal believes that the term heavy metal is generally understood to refer to commonly-used toxic metals, and that the term is sufficient when followed by a list of metals of concern. One important characteristic of metals, as opposed to organic compounds, is that although they may change form, they do not degrade in the environment. Although zinc is only toxic to humans at high doses, it can be toxic to aquatic life at very low levels. Green Seal agrees that bioavailability is an important

factor in metal toxicity; however, the bioavailability of a metal can change depending on the surrounding environmental chemistry. Therefore, the inherent toxicity of a metal is of more concern (i.e., how toxic a metal can be in its most available form).

117. The commenter does not support Green Seal's proposed position on zinc. The commenter agrees that zinc is recognized as an aquatic toxicant. As noted by WHO, acute toxicity values of dissolved zinc to freshwater invertebrates range from 0.07 mg/litre for Daphnids to 575 mg/litre for an isopod. Acute toxicity values for marine invertebrates range from 0.097 mg/litre for a mysid to 11.3 mg/litre for a grass shrimp. Acutely lethal concentrations for freshwater fish are in the range 0.066–2.6 mg/litre; the range for marine fish is 0.19–17.66 mg/litre. Wastewater treatment regulations have been developed to control zinc emissions to sensitive aquatic and estuarine environments. However, with its high potential to adsorb to organics, zinc is far less toxic than metals such as cadmium, and instead is comparable in toxicity to copper, another common residual element in tap water.

The commenter strongly supports the goals of Green Seal to include reduction of materials of concern, when those reductions will have a scientific basis and/or potential for measurable environmental and/or human health improvements. For example, by eliminating all established reproductive toxicants, carcinogens and other materials with serious health hazards. However, even on the basis of assuming (i) 100% bioavailability and (ii) extreme product use conditions that were described in an aquatic risk assessment available to Green Seal (abstract attached [available in public comment file]), no effect concentrations (PNEC) for soil, wastewater treatment sludge, fresh water, and marine compartments were substantially lower than the predicted effect concentrations (PECs) for sensitive species. That assessment used highly protective assumptions because actual bioavailability of zinc is altered by test organism age and size, prior exposure (tolerance), water hardness, pH, dissolved organic carbon and water temperature. The total concentration of an essential element such as zinc is not alone a good predictor of its potential toxicity. Nonetheless, the assessment showed no indication for concern.

Peer-reviewed literature indicates that far more substantial sources of zinc exist than floor finishes. More appropriate scientific perspective is needed to understand the relative risk of zinc from floor finishes, simply because zinc is highly ubiquitous in the environment. WHO has indicated that the largest natural emission of zinc to water is from erosion -- most rocks and many minerals contain forms of zinc. The main industrial sources of zinc to water and air are mining, zinc production facilities, iron and steel production, corrosion of galvanized structures, coal and fuel combustion, waste disposal and incineration, and the use of zinc-containing fertilizers and pesticides. Most household zinc emissions reaching wastewater treatment plants (WWTPs) are from background levels in tap water as well as food waste, feces, galvanized water pipes, cosmetics, and detergents.

The commenter recommends that the elimination of zinc should be regarded as a far lower priority by Green Seal than elimination of materials of greater human health and/or environmental significance. The zinc load from households alone (not including natural sources indicated above and industrial discharges) was estimated to be 8.1 g per person per year, of which 53% originated from food consumption (estimated from feces), 25% from drinking-water, and 22% from consumer products. We have estimated the relative contribution of zinc from the stripping of floor finishes to be at least 500-fold less than that estimated total household zinc load. If compared to total loading of all sources of zinc to WWTPs, that factor will be much higher than 500-fold. Therefore, assuming all floor finishes with zinc were eliminated from commerce, no measurable effect on environmental health will be realized.

The commenter would support the proposal of Green Seal to reduce use of zinc in floor finish products if zinc presented a toxicity profile of concern. However, the acute oral toxicity is consistently low in laboratory animals exposed to various salt forms of zinc. Further, zinc and its salts are not regarded as reproductive toxicants: only very high levels of zinc are toxic to pregnant laboratory animals. In humans, the safety of soluble zinc materials is well known. Inhalation effects associated with zinc have occurred, only at high levels of exposure. In fact, the human health effects associated with zinc deficiency are more pronounced than reports of toxicity. Zinc deficiency can include neurologic damage, oligospermia, growth retardation, delayed wound healing, immune disorders and dermatitis. Significantly, WHO has concluded

that "…the essential nature of zinc, together with its relatively low toxicity in humans and the limited sources of human exposure, suggests that normal, healthy individuals not exposed to zinc in the workplace are at potentially greater risk from the adverse effects associated with zinc deficiency than from those associated with normal environmental exposure to zinc."

The commenter asks Green Seal to consider the scientific evidence that all plausible emissions of zinc from floor finishes will not be associated with significant health risk to the environment or to human health. While scientific and regulatory concerns regarding zinc emissions are recognized by us, there is no scientific evidence to suggest that floor finishes alone should be eliminated from consideration by Green Seal on the basis of zinc content. Achieving goals of measurable environmental and human health improvements will not be realized; instead, concern about zinc in floor finishes will be raised to an inappropriate level.

For consideration by Green Seal, the commenter offers three alternatives to an outright ban of zinc in Green Seal-certified floor finishes:

> Option 1: A protective approach that is consistent with all published Green Seal Standards, including GS-37: require aquatic toxicity testing of the zinc-containing floor finish. If the product's determined LC50 value based on OECD accepted test methods is less than 100 mg/L as product, then the product would be considered to have unacceptable hazard under the Standard. In that manner, Green Seal will both recognize the aquatic toxicity of zinc and take a highly protective approach.
>
> Option 2: Given the LCA being conducted with the University of Pittsburgh, we recommend that an outright ban of zinc in Green Seal certified floor finishes be deferred pending the results of that and other objective studies.
>
> Option 3: A score-based approach, as used by Nordic Swan and other eco-labeling programs (see below) to certify floor care products, is a powerful approach to certify floor care products. Attached is an example scoring spreadsheet [available in the public comment file] that is particularly relevant for floor care products. The spreadsheet is based on the methods used by the Real Estate Services Division of California's Department of General Services (DGS). More details on the DGS approach is outlined below.

In summary: the commenter recognizes that zinc can harm aquatic systems, and that overall zinc discharges are regulated by EPA and other authorities. However, banning an ingredient in a product should be based on scientific and/or regulatory information that the product is contributing sufficient load of the ingredient to the environment to cause measurable harm. Zinc -- from floor finishes -- makes up less than 0.1% of total zinc discharged to municipal wastewater in the US. Therefore, removal of zinc from floor finishes will not have a measurable effect on total zinc loading to wastewater. Therefore, the presence of zinc should not be used to ban a given floor finish from Green Seal certification, when instead the floor finish can be shown by the manufacturer to meet, or exceed, all other safety and environmental benefits as defined by Green Seal in its Standard.

A successful floor care system requires the use of mutually compatible cleaners, strippers and floor finishes. Chemically more complex than cleaners and degreasers, floor care products include ingredients that range from nonhazardous to substantially hazardous.

A score-based approach offers an improved opportunity for Green Seal to (i) review products on the basis of the overall environmental performance, and more importantly (ii) to add improved scientific perspective into the overall certification approach -- while not ignoring environmental concerns associated with individual ingredients such as zinc.

118. Although metal-free technology exists, this technology does not currently match the performance properties of current zinc cross-linked polymers for all maintenance environments. By eliminating zinc it will make it very difficult to compete with conventional finishes on burnished floors, which are usually in high volume locations. Many customers who require high performance floor finishes will want the zinc

containing products over the non-zinc containing products. Some provision should be considered to allow zinc-containing product until such time the industry can bring the non-zinc containing products to a level of performance that these customers need. The standard may be too limiting by requiring metal-free.

119. There is very little history of using non-zinc high speed burnishing finishes and we may find that it is not an issue or will be overcome.

120. Consider life cycle analysis to determine if the absence of zinc will result in even greater quantities of finish, strippers and other cleaning chemicals being used, which would perhaps be worse than having zinc. Zinc free finishes are currently not as durable as zinc containing finishes and would require most retailers and some schools and universities to strip and refinish more often, thereby requiring more chemicals to be used to keep the floors looking in an acceptable manner. Zinc containing polymers are more durable than current non-zinc polymer systems, so less product would need to be reapplied with the zinc containing polymers than with the non-zinc. Hence, more VOC's released, more packaging used, etc. Zinc-free polymers have been less durable finishes because of their tendency to powder, either after high wear or when the end user tries to follow a high or ultra-high speed burnishing program. The lack of durability of the zinc-free polymers causes one to top scrub or strip and recoat the floor more often. Therefore, using a zinc-free polymer decreases the life span of the finish and increases the amount of chemicals that are introduced into the environment. It also increases the energy usage needed to maintain the floor. Metal-free systems may require more frequent stripping and application, thus from a Life Cycle Analysis (LCA) point of view, may consume more energy, water, and chemicals to achieve the same performance of a metal containing finish. If a floor finish with zinc shows lower energy and water (cleaning) needs than a zinc-free finish, then wouldn't that be better for the environment? A huge/great opportunity for Green Seal to insert LCA thinking (i.e., use of LCA) would be lost, if an outright ban on zinc is instituted by Green Seal. USGBC in contrast is promoting LCA thinking.

121. The commenter refers Green Seal to the CSPA Potion Paper On the Use of Zinc in Floor Finishes [available in the public comment file].

122. An absolute ban is not presently supported by published science. On zinc, we recommend an approach consistent with what has been published this year by the U.S. Green Building Council (USGBC). In place of making an absolute ban on zinc, USGBC indicates instead a preference for zinc-free finishes only if environmental and/or local regulatory advantages of zinc-free can be determined. Zinc-containing floor finishes should not be absolutely "prohibited" by Green Seal guidance documents on the basis that:

- Presently there is no published study that shows that zinc at the levels found from floor stripping has an impact on the operation of wastewater treatment plants and on environmental health; the concern with zinc is driven by far higher loadings of zinc from industrial operations.
- Our environmental risk assessment promised earlier and completed this month indicates that there is no measurable impact of zinc on the environmental from stripping of zinc-containing floor finishes.
- Life-Cycle Assessment (LCA) information is a known tool that could be used to qualify floor finishes with zinc, on the contingency that those floor finishes continue to have measurable environmental advantages such as lower energy, labor, or water consumption during their application and/or disposal.

Our collective technical opinion is that the "zinc ban" is far too marketing-driven.

Response: Green Seal acknowledges that the proposed prohibition on zinc in finishes has been the most challenging issue in developing this standard. In addressing the zinc issue, Green Seal has given long and serious consideration to the highly informed and well-reasoned comments disputing the proposed prohibition. Most compelling, in Green Seal's view, are the following two arguments: 1) That zinc is ubiquitous in the environment, and other anthropogenic sources vastly outweigh the amount that could come from floor stripping, even in the most extreme scenarios, so that the latter is not only trivial but also, according to risk assessment, generally below levels of concern; and 2) That zinc-free finishes do not perform at the same level as zinc-containing finishes, and therefore have to be applied and stripped more frequently, which has the contrary effect of introducing more toxic substances into the environment.

One commenter, in making the first argument, proposed that a finish be tested directly for aquatic toxicity, since we have argued that zinc can be toxic to aquatic life at very low levels, although it is toxic to humans only at high doses. Such a requirement is already in the proposal, but the thought can be usefully pursued. Extrapolating from laboratory test data, a product could contain no more than 0.07% zinc, as used (and assuming the product contains no other aquatic toxins), in order to meet the aquatic toxicity criterion.

Moreover, while Green Seal agrees that bioavailability is an important factor in metal toxicity, the bioavailability of a metal can change depending on the surrounding environmental chemistry. Green Seal would expect a floor finish with zinc to be less toxic than the same amount of zinc in plain water because the polymers in a finish would tie it up and reduce its bioavailability. However, the speciation and bioavailability of zinc in a floor finish could be very different from that in a mixture of floor finish and stripper, which could also be different from the speciation and bioavailabilty of zinc after it passes through a POTW and is ultimately discharged to surface water. Since the stripper is designed to solubilize zinc cross-linked polymers, a stripper/finish solution would be expected to contain a more available (and therefore a more toxic) form of zinc than the floor finish alone. However, testing a stripper/finish mixture directly for aquatic toxicity would still not address the issue of changing bioavailability following sewage treatment and release to surface water. Thus, it is not clear in what form or condition it would make the most sense to test the finish (or finish/stripper combination) to determine the likely toxicity due to zinc.

Green Seal agrees that many other sources contribute significant amounts of zinc to the environment. As mentioned in the report, zinc ranks seventh out of all Toxics Release Inventory (TRI) chemicals for releases to surface water (RTKNET, 2004). However, one important characteristic of metals, as opposed to organic compounds, is that although they may change form, they do not degrade in the environment. This heightens the potential problem of emitting potentially toxic substances into the environment, and relates not only to the core principle of pollution prevention – stopping the spread of toxic substances at their source by designing them out of the system – but also to the fundamental precautionary principle, both of which underlie environmental product standards and the practice of green procurement, among other things. If there are suitable substitute ingredients that do not pose the potential problems of zinc in the environment, the precautionary principle exhorts us to use those substitutes in lieu of the more toxic substance. The focus of this standard is on floor-care products, and it is with this category that we are concerned to apply best practices to eliminate current and future problems. That the contribution of zinc may be relatively small from this source is not relevant if we are adding to the overall burden of zinc in the environment; like the tragedy of the commons, each contribution, however small, leads to ultimate degradation. As purchasers, specifiers, or manufacturers, it is our responsibility to do what can be done in our areas to prevent environmental degradation, with the hope that other sources will similarly be reduced in the future.

Green Seal agrees that performance is an important consideration in regard to this issue: the key to the previous argument is that "suitable substitute ingredients" exist for zinc-containing finishes. At this time there is no definitive evidence either way: no objective, comparative performance studies have been found, from industry or others, to compare zinc versus non-zinc finishes. Green Seal is aware of anecdotal evidence on both sides of the issue: that non-zinc finishes are of comparable durability under most normal applications and uses; that non-zinc finishes do not fare as well in high-use areas with daily burnishings; that non-zinc finishes last just as long as zinc finishes; that non-zinc finishes can be expected to last only two-thirds as long; etc. For now we can only require that each certified product demonstrate good performance, as determined by standardized laboratory tests developed by recognized organizations like ASTM. This does not address or resolve the issue of comparative performance between zinc-free and zinc-containing finishes, but it does ensure that the former are performing at a reasonable level.

One commenter revealed that it is sponsoring a life-cycle-based study of the comparative performance of zinc-free and zinc-containing finishes. Conducted by the University of Pittsburgh, the study will look at the above considerations in real test situations over a period of up to a year. Certainly, this industry-sponsored study will be considered when the results are made available. We hope that all relevant life-cycle considerations will be addressed in the analysis. That is, even if zinc-free finishes do not on average last as long, the question then is whether the incremental application of finish and stripper in the zinc-free suite is still not more protective than the less frequent application of more toxic products. For example, there are

important concerns about the use of ethanolamine in strippers and the corrosiveness of strippers, and it generally appears that harsher strippers are required to remove a zinc-containing finish than a non-zinc finish.

With the comparative performance issue not resolved, Green Seal favors applying the core principles of green procurement to the issue. Therefore, the zinc prohibition for floor-care products is maintained in the final standard and will remain so unless or until compelling quantitative evidence is made available that indicates that the overall human health and environmental burden is greater for non-zinc finishes than for zinc-containing finishes.

Other Ingredients (Section 4.11)

123. Prohibit optical brighteners, just as they are in the proposed amendment to the GS-37 standard. It is clear that floor finishes without optical brighteners are readily available. The reasons for prohibiting optical brighteners in this product category are the same as given by Green Seal for prohibiting them in GS-37: "The Environmental Protection Agency's Design for the Environment (DfE) Program has cited concerns about biodegradability issues and potential developmental and reproductive effects associated with optical brighteners. Broadly, they are also associated with aquatic toxicity and potential skin and eye reactions..."

Response: Optical brighteners will be added to the list of prohibited ingredients in the standard (Section 4.11).

124. Prohibit added fragrances from these products. There is no product efficacy need for adding fragrances, and fragrances may potentially mask important warning properties of the chemicals used, thereby increasing the potential for exposure. Individuals may be sensitive not only to fragrances but to the chemicals that are used as fragrance carriers. In addition, full disclosure of the chemicals in a product should be a goal of Green Seal certification, and specific fragrance ingredients are not required in the U.S. to be listed on the product label. An increasing number of people are sensitive not only to fragrances but to the chemicals that are used as fragrance carriers. For many asthmatics, fragrance is a trigger for an asthma attack. At the very least Green Seal could consider incorporating a fragrance requirement similar to the Ecological Criteria for the Award of the European Community Eco-Label to All-Purpose Cleaners and Cleaners for Sanitary Facilities (attached and available at http://europa.eu.int/comm/environment/ecolabel/producers/pg_allpurposecleaners.htm). This EU standard prohibits the presence of nitro-musks and polycyclic musks, which are thought to be bioaccumulating, requires particular fragrances to which many are allergic to be identified on the container, and requires that any fragrance be manufactured and/or handled following the code of the International Fragrance Association.

Response: Green Seal agrees that fragrances are not required for product performance, and that individuals may be sensitive to some fragrance ingredients. On the other hand, fragrances may help workers identify products or distinguish between products, which may be useful for safety reasons. Green Seal agrees that fragrances and fragrance-related ingredients should be identified in products. Green Seal will also require that fragrances meet the same criteria as other product ingredients, and will require manufacturers to follow the code of practice developed by the International Fragrance Association to reduce the potential harm posed by fragrances while allowing manufacturers flexibility in their formulations. The following criterion will be added to the standard (Section 4.13):

4.13 Fragrances
Manufacturers shall identify any fragrances on their material safety data sheets (MSDSs). Any ingredient added to a product as a fragrance must follow the Code of Practice of the International Fragrance Association.

125. Prohibit chemicals included on the OSPAR List of Chemicals for Priority Action (Update 2002), developed by the Convention for the Protection of the Marine Environment of the North-East Atlantic. This list was developed with special attention to problems of water quality in the Atlantic Ocean. Because of the

way floor finishes and strippers are used, their ingredients tend to end up in wastewater. This wastewater is eventually discharged to water bodies. Because these chemicals have been identified as problematic to water quality, it is important to consider these chemicals in any standard for strippers and finishes. The list is available at www.ospar.org/eng/doc/ANNEX05_updated%20priority%20list.doc. More information about the OSPAR convention is available at www.ospar.org.

Response: Chemicals on the OSPAR List not otherwise restricted by the proposed standard are not typically used in floor finishes or strippers.

126. Prohibit chemicals known to be neurotoxicants. The American College of Government Industrial Hygienists (ACGIH) has developed a list of chemicals for which they have established Threshold Limit Values, or TLVs. Some of these chemicals are listed as known neurotoxicants in the ACGIH publication 2004 TLVs® and BEIs® (publication #0104) available at www.acgih.org/store/ProductDetail.cfm?id=1669. This information is also available in electronic form in the ACGIH publication 2004 Chemical Substances TLVs® and BEIs®, Diskette (publication #0104Disk) available at www.acgih.org/store/ProductDetail.cfm?id=1671. Green Seal should prohibit chemicals listed in this publication as neurotoxicants.

Response: Green Seal agrees that neurotoxicity is an important health consideration. However, a criterion addressing neurotoxicity would require a reliable, peer-reviewed list of neurotoxins or database of neurotoxicity test results, which is not currently available. In addition, neurotoxicity and other systemic toxic effects often exhibit a threshold dose below which there is no effect, unlike carcinogens, mutagens, and reproductive toxins. Sufficient information is not currently available to consistently set appropriate ingredient concentration limits to address these types of effects.

127. Eliminating tributoxy ethyl phosphate (TBEP) from the formulation reduces the phosphate going down the drain during stripping applications, but it makes it very difficult to eliminate phthalates from the formulation. TBEP and phthalates are both permanent plasticizers that are left behind with the polymer, polyethylene, and alkali soluble resin in order to form a film. In many cases TBEP is used along with other surfactants or plasticizers to replace phthalates. Also, some very durable polymers perform better with elevated levels of TBEP. Without the use of TBEP, once again, floor finishes will powder and be less durable. The decreased durability will then shorten the life span of the finished floor. You may want to eliminate phosphate, with the exception of TBEP.

Response: TBEP is not specifically prohibited in the standard, although a product must meet criteria for total phosphate, biodegradability, etc.

128. Prohibit ammonia in product.

Response: The standard does not specifically prohibit ammonia. However, products must meet the criteria for acute toxicity to humans and aquatic organisms, which effectively limits the amount of aqueous ammonia that may be present.

129. Prohibit fluorocarbon chains C8 or longer.

Response: The standard does not specifically prohibit fluorocarbons. However, products must meet the criteria for aquatic toxicity and biodegradation. These properties worsen as fluorocarbon chain length increases.

Training (Section 4.12)

130. The product manufacturer, its distributor, or a third party should offer both training as well as training materials in the proper use of the product.

Response: Green Seal believes that requiring both would place an undue burden on manufacturers, especially on smaller-sized manufacturers.

131. Require training materials that are explicit in stating the proper selection, use and maintenance of industrial hygiene control measures that will protect all exposed populations. We strongly agree with Green Seal's statement, "It can't be over-emphasized that a floor maintenance professional must know the proper use and potential hazards of the floor care products they are using" (page 24). We believe that this is yet another reason to ensure worker and consumer right to know. We also strongly agree with the Green Seal precaution "to ensure adequate ventilation when using these products", and the assertion that "some building occupants may be sensitive to the vapors or residues from floor-care products". However, we disagree with the Green Seal recommendation to "do your stripping work at night, on weekends, or during holidays". First, this is not a practical recommendation for institutions that operate 24/7. More important, this recommendation is contrary to the Green Seal precaution to ensure adequate ventilation, as nights, weekends and holidays are the least likely time periods to encounter adequate building ventilation. Ventilation systems are often turned off or operating at reduced levels during these time periods, a situation compounded by the fact that is not possible to open windows in many buildings. Workers are included in the population of building occupants that may be more sensitive to these products, and worker exposure must also be controlled by engineering or other control measures so that all exposed populations will be protected.

Response: Green Seal agrees that proper ventilation and indoor air quality is important for janitorial personnel as well as other building occupants. The standard (Section 4.12) will be revised to require include proper ventilation as part of training or training materials, as follows:

> *The product manufacturer, its distributor, or a third party shall offer training or training materials in the proper use of the product. These shall include step-by-step instructions for the proper dilution, use, disposal, the use of equipment, and proper ventilation. Manufacturers shall have product-labeling systems to assist non-English-speaking or illiterate personnel.*

Labeling Requirements (Section 5)

132. Require rather than recommend dilution from the cold tap. No reference to the actual temperature (e.g., 50ºF) should be specified since "cold" tap water can be over 70ºF in the summer in some locations. The preferred term may simply be "unheated water from a cold water tap".

Response: The standard requires that a product label clearly direct to use water from the cold tap. Green Seal agrees that temperatures may vary, and, therefore, the standard does not require product labels to specify water temperature. However, "water from the cold tap" is sufficiently clear without requiring labels to state "unheated water from a cold water tap". The first sentence of Section 5 will be revised to read as follows:

> *Where dilution is required, the manufacturer's label shall clearly and prominently direct the user to dilute with water from the cold tap and shall state the recommended level of dilution. …*

For performance testing (not product labeling), the maximum temperature of the dilution water shall be 50ºF. The following will be included with the performance criterion Section 3.2):

> *Products shall be tested as used, and if diluted products shall be diluted with water from the cold tap at no more than 50 ºF.*

133. Require that strippers be concentrated with a minimum dilution of 1:8, which is well within the scope of current technology.

Response: Most stripper products are sold as concentrates. However, due to variation in recommended dilution levels, no uniform dilution level will be specified in the standard.

Animal Testing (Section 4.14)

134. The standard takes a very enlightened stance on animal testing. However, it must be emphasized that not all routes of exposure have acceptable and validated non-animal test methods.

135. Currently there are no alternatives to animal testing from oral and inhalation toxicity.

Response: Agreed.

References

Clements, R.G., J.V. Nabholz, M. Zeeman. 1996. Estimating Toxicity of Industrial Chemicals to Aquatic organisms using structure-activity relationships. USEPA Environmental Effects Branch, Health and Environmental Review Division, OPPT, Washington, DC.

Langezaal, I. 2002. The Classification and Labelling of Carcinogenic, Mutagenic, Reprotoxic, and Sensitising Substances. Ispra, October.

[OECD] Organization for Economic Cooperation and Development. 2001. Harmonized Integrated Classification System for Human Health and Environmental Hazards of Chemical Substances and Mixtures. OECD Series on Testing and Assessment Number 33. ENV/JM/MONO(2001)6.

[UN] United Nations, 2003. Globally Harmonized System of Classification and Labelling of Chemicals (GHS). New York and Geneva. www.unece.org/trans/danger/publi/ghs/ghs_text-pdf/GHS-PART-3e.pdf