Notice of Deficiency – Attachment A

This Attachment describes deficiencies identified by the DTSC in the PAA Report for Methylene Chloride-Containing Paint or Varnish Removers prepared by the Halogenated Solvents Industry Alliance on behalf of WM Barr Co. Inc., Benco Sales, Inc., RecoChem, Inc., Sansher Corporation, and Green Products Co. The Responsible Entities (REs) should revise the PAA Report to address the deficiencies and resubmit a revised PAA Report to DTSC.

All code section references are to the Safer Consumer Products (SCP) regulations, found in chapter 55 of title 22 of division 4.5 of the California Code of Regulations.

During DTSC's review, several overarching issues were identified. The submitted PAA Report is incomplete. The SCP regulations require, per section 69505.7(a)(1), that "Preliminary and Final AA Reports […] must include all of the applicable information specified […]." All required sections must be complete and submitted to DTSC to comply with the SCP regulations. Additional information regarding specific missing information is included below.

Further, there is a lack of supporting information and rationale for decisions made. Section 69505.7(a)(2)(A) states "the responsible entity shall include in the AA reports sufficient information for the Department to determine compliance with the substantive and administrative requirements […]." Several statements are made such as "readily available information," "currently available information," "there appears to be," "there is no expectation," and "there is no evidence;" however, these statements do not provide clear rationale and are not sufficient to support decision making.

In addition to a general lack of supporting information and rationale, the PAA Report was built largely on a qualitative narrative, with little quantitative information. This has resulted in a report with inadequate quantitative information to support the justification of relevant factors associated with impacts to public health or ecological receptors, in addition to analysis of exposure pathways. Per section 69505.5(c)(2), "the responsible entity shall use available quantitative information and analytical tools, supplemented by available qualitative information and analytical tools […]." Additional supporting information and decision rationale needs to be provided to DTSC to meet the above requirements, with specific comments discussed below.

Within the PAA Report, there are many internal inconsistencies between the narrative provided, the tables summarizing the information, and the decisions made using the provided supporting information. Decisions, along with the narrative and information provided to support them, must provide a clear, consistent rationale. To ensure consistency and clarity, several sections of this PAA Report will need to be revised, as further discussed below.

I. General Comments:

1. Executive Summary

The information in the Executive Summary must be organized in conformance with the organization of the PAA Report and must include a detailed summary of the information presented for each section of the PAA Report, per section 69505.7(b). Therefore, please include a revised executive summary sufficient to convey a general understanding of the scope of relevant factors and rationale for the AA selection decision.

2. Supply Chain

The supply chain information for each RE must be included in the PAA Report, per section 69505.7(d)(1). Although "sales have been discontinued in California" for all but one RE (p.7), section 69505.7(d)(3) requires supply chain information for all products sold in California in the prior twelve months.

Additionally, the comment in the PAA Report regarding proprietary and confidential business information (p. 7) is not sufficient to satisfy the requirements and this information must be included in the PAA Report. For all trade secret claims, the information claimed as trade secret, as well as a redacted copy of the documentation, must be submitted, per section 69509(c) and section 69505.7(a)(4)(A). Please update the PAA Report to include all necessary supply chain information.

3. Priority Product Information

There are product discrepancies between the PAA Report and the Priority Product Notifications (PPNs) completed by the individual responsible entities:

Benco Sales, Inc. (Benco):

On the submitted PPN for Benco, four paint stripping products that contain methylene chloride were listed, including B1, B2, B4, and B7. The product B2 was not included on the submitted PAA Report. However, several other Benco products not identified in the PPN, were listed in the submitted PAA Report including B5, B6, B12, B12L, B14, B15, and B17. Per the safety data sheet (SDS) documentation included with the PAA Report, these additional products contain methylene chloride and require inclusion on the PPN if sold in the state of California on, or after, January 1, 2019. The submitted PAA Report also listed an additional product, Glaze 'N Seal Paint and Coating Stripper, that matches the name of a Sansher Corporation product, incorrectly as a Benco product.

Sansher Corporation:

On the submitted PPN for Sansher Corporation, four paint stripping products that contain methylene chloride were listed, including Dad's Easy Spray Professional Strength, Dad's Easy Spray Contractor Grade, KBS Coatings KBS Strip, and Glaze 'N Seal Paint and Coating Stripper. Of the products listed on the PPN, only Dad's Easy Spray Professional Strength was included in the PAA report as a Sansher product; however, as stated above, Glaze 'N Seal Paint and Coating Stripper was included as a Benco product.

Sansher Corporation remedied this issue in their July 9, 2019 PAA Report (*Preliminary Stage 1 Paint Remover AA Report.pdf*) However, this issue was not addressed in the other Consortium Preliminary AA Reports (*DTSC Preliminary Stage 1 Paint Remover AA Report incl cover letter.pdf*) submitted by Benco Sales, Inc., WM Barr Co. Inc., RecoChem Inc., and Green Products Co. All consortium reports should be updated to include the additional product information listed in the Sansher Corporation PAA report.

RecoChem Inc.:

Recochem Inc. submitted a PPN for three paint and finish remover products containing methylene chloride which are sold in California: Contractors Plus, Industrial, and Premium paint and finish remover. The Consortium PAA Report listed four RecoChem Inc. paint and finish remover products containing methylene chloride: Furniture Stripper, Industrial Zip Strip, Paint and Varnish Remover and Stripper POR-15 Strip, and Zip Strip Contractors Plus 88000. The PAA Report stated all four Recochem Inc. products will continue to be sold in California.

4. Scope of Relevant Comparison Factors

Section 69505.5(c)(1)(A-B) defines a relevant factor as one that makes a material contribution to adverse impacts and there is a material difference between the Priority Product and the alternatives in the factor's contribution to such adverse impacts.

The PAA Report must identify each factor, exposure pathway, and life cycle segment, if applicable, determined to be not relevant for evaluation and comparison of the Priority Product and its alternatives. The PAA Report must also provide the rationale and explain the pertinent findings of the supporting information for this determination, per section 69505.7(f). Currently, the PAA Report lacks documentation and clear rationale for the determination of irrelevance. Please refer to *Section II Specific Comments* to provide the appropriate supporting information for determining irrelevant factors.

5. Relevant Exposure Pathways

Information associated with chemical quantity and product use patterns is missing from the PAA Report. Please provide available quantitative information pertaining to chemical quantity,

and the frequency, extent, level, and duration of potential exposure for exposure scenarios presented in the PAA Report as per section 69505.5(c)(3).

6. Scope and Comparison of Alternatives

In the PAA Report, section 6.2 (p. 33) provides the rationale for screening out Group 3 through 6 alternatives. A comparison of hazard endpoints of replacement chemicals and Chemicals of Concern (COC) are listed in Tables 5.1 - 5.3 (pp. 48 - 55), performance data based on products are listed in Table 5.4 - 5.5 (pp. 56 - 60), and exposure related data of replacement chemicals and COC are listed in Tables 5.6 - 5.7 (pp. 61 - 64). The PAA Report does not clearly document the methods used to compare multiple factors and the trade-offs considered to screen out alternatives in section 6.2 (p. 33). For example, if the screening criteria is performance, the decision would be better supported by clearly identifying the specific performance requirements. If the screening criteria is hazard and/or exposure, the method used to determine equal or greater adverse impact is not adequately or sufficiently explained in the PAA Report.

Additionally, the RE may decide to limit the alternatives to one option during the Stage 1 phase. However, this not necessary. Considering a broader range of alternatives may be beneficial when going into a Stage 2 AA since the functional requirements of the Priority Product may be fulfilled. If any alternative(s) are found to be not viable, they can be screened out in the Final AA per section 69505.6(d).

7. Methodology

Please describe any analytical tools, models, and software used to conduct the stage 1 AA including qualitative analytical tools and discuss any of their limitations per section 69505.7(h). The PAA Report shall also identify any published methodologies and/or guidelines used, and any deviations from those methodologies and/or guidelines. Please provide a clear explanation on the methodology to develop the qualitative group hazard score in Table 5.3 and the differences/limitations of performance testing methods in Tables 5.4 - 5.5.

8. Supporting Information

Please provide supporting information requested in the Section II Specific Comments, per section 69505.7(i)(1).

9. Selected Alternatives

Please provide clear documentation to explain the rationale of the selection decision, per section 69505.7(j)(1).

II. Specific Comments

1. Functional, Performance and Legal Requirements

Clarification is needed regarding the key performance requirements for the Priority Product (pp. 9-10). Consumers are mentioned as the user throughout the performance section; however, there is no mention of other user groups (commercial, industrial, etc.). Further, additional details are required for the claim that the product must work in a reasonable timeframe. No rationale or data to support the claim (e.g., marketing surveys or consumer requirements) is provided. It is also not clear if this claim is restricted to consumer products or applies to commercial and industrial uses as well. Sufficient information to comply with the substantive requirement of the regulations is required, per section 69505.7(a)(2)(A).

Further, the methodology used to evaluate performance is not discussed in the PAA Report. The RE is required to discuss this methodology per section 69505.7(h). Documentation provided in the PAA Report (p. 29, section 5.2 and Table 5.4) as sources for performance is not readily found/available when using the citations provided in the references section of the PAA Report. Please ensure the supporting documentation for performance is cited correctly and make necessary revisions.

The regulations require the RE to include all legal requirements for the Priority Product, per section 69505.5(a)(1). The legal requirements included in the PAA Report (p.10, section 3.5) are incomplete, as the California Air Resources Board's (CARB's) standard limit for Volatile Organic Compounds (VOCs) from paint strippers (CARB Consumer Product Regulations, Article 2, section 94509(a)) is not included. Please revise the PAA Report to include all legal requirements for the Priority Product.

2. Identification of Alternatives

Rationale for Product Grouping, section 4.5 (p. 15) – The PAA Report needs to provide the definition of "active ingredient" since this defines the short-list of chemicals to be grouped together as a product and screened in the hazard assessment. In reviewing the chemical composition data for the Priority Product (Group 1) and identified product alternatives (Groups 2 through 7) in Appendix B, several chemicals are found in both the Priority Product and an alternative (e.g., acetone, methanol, or toluene are found in Group 1 in addition to Group 2). Defining "active ingredients" will help discern if more chemicals should be included in a product grouping. For clarity, DTSC recommends a summary table of the groups of alternatives early in section 4.4 or 4.5 of the PAA Report. The table should clearly identify chemicals (including CAS numbers) that are alternate examples in that class versus co-formulants in the group. For example, is cyclohexanone used in conjunction with DMF or are they used in separate products? Specifically:

Group 1 – DTSC recommends compiling information only for Priority Products sold in California rather than including all information from all available methylene chloride containing paint and varnish strippers.

Group 3 (dibasic esters; DBE) – Dibasic esters, such as dimethyl glutarate, dimethyl succinate, and dimethyl adipate, should be screened individually rather than using Estasol® (a mixture of DBE). DTSC's concerns with using Estasol® for the hazard screen include: 1) it is not listed as an ingredient in any of the Group 3 compositions (Appendix B); 2) the rationale for its use was not provided; and 3) its use in the hazard screen has resulted in the most data gaps (i.e., 17) for Group A endpoints. Please also see the previous comment concerning "active ingredients" to determine and explain if other chemicals should be assessed under this Grouping. For example, the WM Barr product, Klean Strip Sprayable Stripper is included with the DBE category (Appendix B, p. 7), but does not appear to contain any DBEs.

Group 5 (caustics) – Magnesium hydroxide and potassium hydroxide should be included in the hazard screen since they are listed as active ingredients in caustic paint strippers in Appendix B of the PAA Report. If these are not added, please provide a clear rationale for their exclusion.

Group 7 (Lowell formulation) - The PAA Report contains discrepancies regarding the composition of the UMass Lowell formulation (UMass/Super Remover New Generation Stripper). Per Appendix B of the PAA Report, this formulation includes the ingredient 1,2-Dioxolane; however, "Dioxolane" (1,3-Dioxolane) is referenced in the remainder of the document (Tables 5.1, 5.2, 5.3, 5.6, and 5.7). Please correct as necessary.

There is an extra product group, group 8, in the performance tables (Tables 5.4-5.5, pp. 56 - 60) for an earlier Lowell formulation that is briefly referred to in section 5.2 (p. 30). It is recommended to make group numbers consistent across the PAA Report and executive summary. Please clarify the groupings in section 4.5 (p. 16) and make necessary revisions.

3. Scope and Comparison of Relevant Factors – Adverse Environmental Impacts

A. Adverse Air Quality Impacts

Table 4.1 indicates Toxic Air Contaminants (TACs) are relevant (p. 19). However, the RE does not indicate which chemicals are TACs and which Priority Products contain them. TACs need to be clearly identified for each Priority Product and product category to satisfy section 69505.5(c)(2)(A). Similarly, the RE needs to identify the alternatives (product categories) and Priority Products containing tropospheric ozone-forming compounds and the chemical(s) associated with ground-level ozone generation to satisfy section 69505.5(c)(2)(A). DTSC suggests that these issues are associated with end-of-life, as volatilization of the chemicals marks the end of their utility.

Further, the RE could strengthen their statements by researching and noting whether any specific classes of chemicals listed in the SCP regulations are *directly* involved in the synthesis of the chemical being evaluated. Similarly, for ozone-depleting compounds, an accurately researched statement that no other chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), or halogenated gases, except methylene chloride, are used in these products would better support the RE's position. If that is not the case, then the RE needs to specifically address other volatile halogenated substances.

There were some inconsistencies regarding transportation that should be resolved. As the RE mentioned, carbon dioxide emissions will be influenced by transportation; however, Nitrogen Oxides (NO_X), Sulphur Oxides (SO_X), and particulate matter are also likely to be impacted by transportation unless the RE can demonstrate that production of these pollutants is dominated by other parts of the life cycle. If transportation is, indeed, a relevant factor then emission of these Clean Air Act (CAA) Criteria Pollutants would also need to be reassessed.

B. Ecological Impacts

The RE needs to clarify whether exposure to ecological receptors is potentially complete. There are inconsistencies between Table 4.1 and the conceptual exposure model. Table 4.1 concludes that exposures are "unlikely" since product use and disposal would not "lead to ecological effects." However, the conceptual exposure model shows the pathway is complete. Additional information is needed to support one conclusion or the other. The physicochemical properties and environmental fate parameters requested in section II.6 in this NOD could also be used as supporting information.

The evaluation of adverse ecological impacts in Table 4.1 (p. 20) is incomplete. Section 69501.1(a)(3) defines "adverse ecological impacts," which includes "biological or chemical contamination of soils" (§69501.1(a)(3)(C)) and "any other adverse effect as defined in section 69401.2(a), for environmental hazard traits and endpoints specified in article 4 of chapter 54.[1]" Environmental hazard traits include domesticated animal toxicity, eutrophication, impairment of waste management organisms, loss of genetic diversity, including biodiversity, phytotoxicity, and wildlife impairments to development, growth, reproduction, and survival. Please include these adverse ecological impacts in Table 4.1 and consider these factors for relevance.

C. Adverse Soil Quality Impacts

The RE's rationale that soil quality was irrelevant focused solely on the use phase, stating "[…] the product will not be used in a manner that affects soil characteristics" (Table 4.1 pp. 20-21). However, the RE should consider improper disposal of the products. Factors such as

[1] https://oehha.ca.gov/media/downloads/risk-assessment//gcregtext011912.pdf

K_{OC} and K_{OW} would be helpful to understand potential impacts to soil if the product leaks from a solid waste landfill or if the product is improperly discarded.

The rationale would also be stronger if the RE acknowledged which life-cycle phase is most likely to cause adverse impacts, regardless of whether they are material or not. Most of the chemical feedstocks are based on oil/gas (p. 17); therefore, most of the impacts to soil would likely occur during materials extraction. The RE makes a satisfactory argument that there would not be a material difference between the alternatives since they are all similarly extracted but identifying the most significant life cycle phase would impart more credence to the PAA Report.

D. Adverse Water Quality Impacts

The RE makes the argument that water impacts are not relevant because "[…] the products are not used in a way that would impact groundwater" (Table 4.1, p. 21). Surface water and drinking water must also be considered, as per section 69501.1(a)(9). Priority Pollutants [303(c)] and Total Maximum Daily Load (TMDL) chemicals [303(d)] of the federal Clean Water Act apply more broadly than just to groundwater. Maximum Contaminant Levels (MCLs) and Public Health Goals (PHGs) are parameters for drinking water, which can be sourced from surface or groundwater. The RE needs to revisit the argument pertaining to the irrelevance of water impacts and clarify if it also applies to surface and drinking water.

The PAA Report does not consider incidental discharges to water during manufacturing nor improper disposal at end-of-life, including discharge down the drain or to a storm drain. In addition to improper disposal of the product, it is likely that brushes, rags, and tools may be washed, and residual product allowed to flow down the drain. It is also unclear whether possible discharges to water could occur when the paint-stripper is used on large surfaces in an outdoor environment, such as boats, RVs, ships, and planes. Discharges to water merit further consideration since methylene chloride and toluene are Priority Pollutants. Likewise, because DMSO and other alternatives are more water-soluble and less volatile compared to methylene chloride, water may be a more relevant media. Discharges to water may still represent an incomplete exposure pathway, but evidence is needed to support this based on section 69505.5(c)(2)(A).

The PAA Report also fails to consider improper disposal to a solid waste facility. Disposal in a leaky landfill can lead to contamination of groundwater. Methylene chloride is expected to be mobile in soil. Some of the alternatives are more water soluble and may pose concern for groundwater contamination after improper disposal. Further discussion is warranted based on section 69505.5(c)(2)(A).

4. Scope and Comparison of Relevant Factors – Adverse Public Health Impacts

Please refer to comments on Initial Evaluation and Screening of Alternatives (pp. 16-17 of this Notification).

5. Scope and Comparison of Relevant Factors – Adverse Waste and End-of-Life Effects

In the determination of relevant factors pertaining to Adverse Waste and End-of-Life Effects, there is a discrepancy between the narrative provided and the determination of the factor's relevance (Table 4.1). The PAA Report (p. 18, section 4.3.9) claims "that both the volume and characteristics of paint waste could significantly change if the chosen alternative performs less effectively, requiring multiple applications." The same rationale is provided in Table 4.1 (p. 22) under the Waste and End-of-Life Effects section; however, within the Life Cycle Segments section of Table 4.1 (p. 19), both waste generation and end-of-life disposal are claimed to be irrelevant. This also conflicts with the claim that there may be differences in how the waste streams are managed in end-of-life and is beyond the scope of the Stage 1 AA (sections 4.3.11, p. 18). Please update the PAA Report to clarify the relevance of adverse waste and end-of-life effects.

Further, in Table 4.1 (p. 22), only ideal disposal of the product is considered regarding release into wastewater or the environment. Misuse and/or improper disposal will occur during the Waste and End-of-Life life cycle segments and should be considered. If this is believed to be irrelevant, please provide additional clarification to exclude improper disposal.

6. Scope and Comparison of Relevant Factors – Environmental Fate

Environmental Fate (Table 4.1, p. 23) – Atmospheric oxidation rate and photodegradation are different properties/processes. Although the environmental half-life in air can capture the overall time in the atmosphere, the fate and transport mechanism might be different for each chemical. Please provide further details in the PAA Report regarding the atmospheric oxidation rate and photodegradation.

Physicochemical properties are listed in the PAA Report, however specific values for each property are not presented. DTSC recommends providing all available physicochemical properties and environmental fate parameters for chemical ingredients screened for hazard classification. The fate and transport mechanisms may be different for each chemical, as such, different product alternatives may affect aquatic and/or terrestrial receptors. Currently, only the octanol-water partition coefficient (Log K_{ow}), vapor pressure, the atmospheric half-life, and the dermal permeability coefficient are reported in Tables 5.6 and 5.7.

If measured data are not available, Level III fugacity modeling from EPI Suite™ would be acceptable for use in a Stage 1 AA. All EPI Suite™ modeling outputs should be provided for completeness and transparency. DTSC notes that the inclusion of these parameters is also likely to impact how relative exposure potential is scored for each product group.

7. Scope and Comparison of Relevant Factors – Materials and Resources Consumption Impacts

In section 4.8.2, the PAA Report states that "Based on readily available information, there is no expectation that the inputs of other resources differ materially among the Priority Product and the alternatives." Please explain the rationale and identify and explain the pertinent findings of the supporting information for this determination, per section 69505.7(f).

The statement in section 4.8.2 that "all are based on synthetic chemicals which are likely produced from petroleum-based feedstocks, and thus the energy required for petroleum production and processing would be expected to be similar" is not sufficient to justify non-relevance for nonrenewable resources. Please explain the rationale and identify and explain the pertinent findings of the supporting information for this determination, per section 69505.7(f).

Table 4.1, reports that resource inputs and other resource consumption is not a relevant factor, but that "this should be revisited in more detail in any Stage 2 AA." This is not a justification for determining the factor as not relevant in the first stage of the AA. Information sources and supporting information to justify decisions of non-relevance should be cited if the factor is determined not to be relevant in the first stage of the AA. In the second AA stage, the RE can re-evaluate the identification of factors determined to be relevant in the first AA stage, per section 69505.6(a)(1).

In section 4.8.1 of the PAA Report, it is stated that "caustics contain mineral salts, and their production may have a different environmental impact than petroleum-based products." Clarification is needed to determine whether there is a material difference or to justify non-relevance based on this statement.

7. Scope and Comparison of Relevant Factors – Physical Chemical Hazards

There is insufficient documentation and discussion of collected information on this factor. Please provide clear documentation of supporting information on chemical ingredients and their corresponding flammability information. For the comparison relevant to Priority Products and alternatives, the impact of other ingredients such as additives needs to be considered as well. It is also recommended to provide information on physical states for each chemical.

8. Scope and Comparison of Relevant Factors – Physicochemical Properties

Sections 69505.5(c) (1-2) require the RE to use available, quantitative or qualitative information to determine a factor's relevance – and relevance is, in part, established by evaluating the relative difference between the Priority Product and the alternatives. SCP posits that physicochemical properties should be evaluated, with supporting information, because they allow for prediction of exposure potential and environmental fate. Generally, many of these data are easily obtainable. These properties would provide some of the evidence that is needed elsewhere in the PAA Report to make the case for complete or incomplete exposure pathways and strengthen the case for judging factors as relevant or irrelevant.

In addition, there are also some inconsistencies that should be addressed. K_{OW} in Table 4.1 is deemed not relevant but is subsequently addressed as relevant in Table 5.7 and Section 5.3. The K_{OW} values have two orders of magnitude difference, suggesting a material difference. Similarly, water solubility and Henry's Law constant have four or more orders of magnitude difference between the chemicals and, thus, should be evaluated. Further, mobility in environmental media is listed as a relevant factor (Table 4.1, p. 23, Environmental Fate); but K_{OC}, the coefficient that provides information on partitioning between soil, sediment, and water, is not listed as relevant. DTSC concurs with the evaluation in Environmental Fate. The statement under redox potential should be corrected.

DTSC commends the RE for adding the half-life in air as a relevant factor; this is helpful for evaluating persistence, particularly for TACs. However, photolysis must still be addressed since this is an important pathway for the generation of ground-level ozone. Furthermore, referencing where the information can be found in the PAA Report, e.g., "see Table 5.7" would be helpful.

DTSC suggests that a table of physicochemical properties could be more useful if another column was added to indicate which adverse impacts or exposure concerns are associated with a specific physiochemical property. For example, if the chemical has a high partition coefficient for soil & sediment then it is potentially a concern for that media, or the organisms found there. If it has low sorption properties, then it may be mobile and pose concerns for water resources.

9. Scope and Comparison of Relevant Factors – Life Cycle Segments

In the determination of relevant life cycle segments, there is a discrepancy between the narrative provided in section 4.8 (pp. 16-18) and the summaries of determination of relevance of life cycle segments presented in Table 4.1 (p. 19), specially for manufacturing (section 4.8.4), transportation/distribution (section 4.8.6), waste generation (section 4.8.9), and end-of-life disposal (section 4.8.11). The rationales and implications are inconsistent across these sections and determinations in Table 4.1. For example, in the transportation/distribution section, the RE states that greater volumes of chemicals of less efficacious products may be required, if that is the case, then there may be greater transportation needs and the RE should re-evaluate the relevance based on the weight and volume of product. Furthermore, "[…] the Lowell formulation is currently being produced by a Canadian firm, but it is not clear whether that imposes a differential transportation impact vs. formulators in different locations in the US (or potentially abroad)." The RE needs to reassess this section with the rationale listed for the "Transportation during and between all segments" and "Distribution" in Table 4.1.

SCP regulations section 69505.7(f) requires the AA Report to explain the rationale and identify the supporting information for determining a life cycle segment as irrelevant. Therefore, please provide all the supporting information used in a determination of irrelevance in sections 4.8.1 – 4.8.11, *e.g.*, "readily available information," "currently available information," "there appears to be," "there is no expectation," and "there is no evidence."

Furthermore, the rationale of "all are based on synthetic chemicals which are likely produced from petroleum-based feedstocks" in sections 4.8.1 and 4.8.2 is not a plausible explanation to exclude any life cycle segments in the comparison. If these life cycle segments are deemed irrelevant, please provide supporting information or rationale to support this statement.

10. Scope and Comparison of Relevant Factors – Exposure Pathways

A. Dermal Pathway

Please provide a stronger rationale and analysis for inclusion of the dermal permeability coefficient (K_p) and enhancement of dermal penetration of toluene in section 5.3 (p.31) of the PAA Report. If these parameters are meant to significantly differentiate the exposure potential between the product groupings, then the overall analysis needs to be more complete. For example, since the K_p is a measure of the conductance of skin to a chemical from a particular vehicle, it should clearly report which particular vehicle was used to determine that specific chemical's K_p. Analysis should be specific to a product grouping. As is, this discussion is generally unhelpful to understand how the K_p significantly affects exposure potential. This recommendation should also be applied to the effects of toluene on enhancing dermal penetration.

DTSC was unable to confirm the K_p values in Table 5.6 (p. 62). Please check the values and provide additional information on where these values are cited in the U.S. EPA Risk Assessment Guidance for Superfund (RAGS) Part E (2004).[2] DTSC will accept predicted K_p values as calculated using Equation 3.8 (Empirical Predictive Correlation for Permeability Coefficient of Organics) from U.S. EPA RAGS Part E. The uncertainties associated with using this value should be clearly explained in terms of matrix effects on dermal absorption, i.e., the differences of exposure of a chemical in water versus in sweat on the skin.

DTSC recommends using physicochemical properties, such as lipid solubility, molecular weight, and polarity in the discussion and analysis of dermal exposure for each product grouping. These findings can also be used to support whether these properties are relevant.

In Figure 4.1 (p. 46), please add an arrow connecting Dermal to the "Workers." Regardless of whether the exposure pathway is "negligible due to volatility," it is a potentially complete exposure pathway according to the *Priority Product Profile for Paint Strippers Containing Methylene Chloride* (DTSC 2014).[3] Further, evaporation barriers in the PP reduce volatility and may make the dermal pathway more significant. The PAA Report has not provided information that supports the conclusion of the dermal pathway being "negligible due to volatility."

[2] https://www.epa.gov/sites/production/files/2015-09/documents/part_e_final_revision_10-03-07.pdf
[3] https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/ProfilePaintStripper.pdf

In the Conceptual Model for Product Life Cycle section 4.7.1, (p. 16, 2nd paragraph), please provide information supporting the statement "[…] the overall contribution of dermal exposure to total exposure is expected to be small."

Tables 5.6 and 5.7 (pp. 63-64) have columns "Enhancement of Dermal Penetration of Toluene." Please provide units (percentage, fold, etc.) to these columns.

Please add missing information for dimethyl formamide (CAS # 68-12-12) to Table 5.6. In the footnote, please add information as to why "caustics cannot be studies [sic] for dermal penetration."

Please provide a reference supporting "[…] the general knowledge that DMSO enhances dermal absorption of other chemicals" in Section 5.3, 2nd paragraph of the PAA Report.

B. Comments on the Conceptual Model

Please remove 'Flammability' from Figure 4.2 (p. 46) since this is a physical hazard trait and not an exposure route.

Please add "occupational users" and "occupational non-users" as receptors. In addition, DTSC recommends having consumers defined as "consumer users" and "consumer non-users."

For clarity and consistency with the text, please highlight or differentiate life cycle segments that have been determined to be relevant in Figure 4.1 and Figure 4.2.

C. Other Comments on Exposure Pathways

According to the PAA Report (section 5.3), relative exposure potential was determined by "expert judgement, typically differentiated by orders of magnitude in difference from the base case." However, in Table 5.7, relative exposure potential is "qualitatively based on the median score of whether chemical ingredients were preferable/similar/worse for factors evaluated." Please add the information stated in the footnote of Table 5.7 in the text. Additionally, please add a column stating the "median score" for chemical ingredients with preferable/similar/worse factors.

11. Initial Evaluation and Screening of Alternatives

The PAA Report's method of adding Very High and High concern endpoints is unsound when different numbers of chemicals are included as the active ingredient. First, please provide a clarification and detailed documentation on how GreenScreen® scores from Pharos and data from other sources are used in hazard assessment and decision making in this PAA Report. One recommended approach is to determine an overall hazard score for each chemical ingredient before determining a qualitative hazard score for each product Grouping in Section 5.1 (pp. 28-29). The Pharos Chemical and Material Library (CML) provides GreenScreen® Benchmark scores

(for publicly available assessments) and GreenScreen List Translator™ Scores for individual chemicals. Providing these chemical hazard scores, at least based on Group A endpoints, would improve the approach presented in this PAA Report in producing an overall hazard score for each Product/Alternative Grouping. If this recommendation is accepted, DTSC also recommends considering a second, more conservative approach for product scoring where the highest hazard classification of an ingredient in a product grouping determines the overall product hazard score.

In summarizing the 'Data for Relevant Factors' (Table 5.3), DTSC recommends separating human health from environmental hazard endpoints. This would mean Group A and B human health endpoints to be summarized together. DTSC also notes that physical hazard traits such as flammability would be discussed separately from human health and environmental associated hazard traits. Given the semi-quantitative, non-numeric scoring methodology, this could improve the clarity of decision making based on hazard classification.

Group B hazard endpoints are endpoints not listed using the Pharos tool. To fill in these endpoints, the US National Library of Medicine's Hazardous Substance Data Base (HSDB) was used to determine whether these hazards were mentioned or not. Further analysis beyond this discussed vs. not discussed approach was deemed "outside the scope of responding to the priority product listing." DTSC disagrees with this rationale, and at a minimum, recommends explaining how Group B endpoints are determined to be relevant and explaining the uncertainties with using such an approach during a Stage 1 AA.

Please define/explain Group A and Group B endpoints in Section 5.1, 3rd paragraph (p. 28).

Please provide a description of the Pharos project and how this project classifies hazards. It should be noted here that Pharos is a subscription-based service and not publicly available for free use.

Please define the data gap (dg) designation in this section including its relation to the Pharos tool for classifying hazards.

12. Other Comments on Section 5.1 and Related Tables and Figures

- Neurotoxicity is listed as both a Group A and Group B endpoint in Tables 5.1 and 5.2. Please remove neurotoxicity as a Group B endpoint since this hazard is assessed under the GreenScreen® methodology and therefore is considered a Group A endpoint.
- Update report to include the revised Table 5.1 (received 7/18/2019 by email communication, see attachment B)
- Please provide a different definition of "inconclusive" for hazard scoring since most of the hazard endpoints labeled with this designation only report one source with a hazard concern. The PAA Report currently defines inconclusive as "different sources give different scores." Pharos reports these hazard traits as "potential for concern." Please add this information in section 5.1 and Table 5.1.

- Define the rationale for use of an asterisk (*) in Table 5.1. In the footnoted description, orange is misspelled in the third sentence as “organge.”
- Tables 5.1, 5.2, 5.3, and 5.7 currently list the CAS# for Toluene incorrectly as 100-00-3. Please change the CAS# for toluene to 108-88-3 in these tables.
- Revised Table 5.3 (received 7/18/2019 by email communication, see attachment B) lists neurodevelopmental toxicity as a Group B endpoint. However, GreenScreen® methodology nests this endpoint under Developmental Toxicity. Please explain why this would not be considered a Group A endpoint for this Stage 1 AA.
- For acetone, DTSC recommends changing the ‘nd’ designation in Table 5.2 for Respiratory Toxicity to ‘D’ since upper respiratory tract (nose and bronchial) irritation was mentioned in the HSDB profile for acetone. Under the *Green Chemistry Hazard Traits for California’s Toxics Information Clearinghouse* regulations,[4] respiratory irritation would be a toxicological endpoint for respiratory toxicity.

13. Workplan

In section 7.1 of the PAA Report, *Tasks for Stage 2 AA and Final AA Report*, DTSC recommends providing additional information on the methods and data sources used to “perform a more in-depth evaluation of hazard and exposure potential […] for a more quantitative comparison of alternatives.” A few areas in the PAA Report allude to what would be part of a Stage 2 AA such as “actual studies and comparing doses at which toxicity occurred,” which would be used to determine relevance of hazards for viable candidate alternatives and “more quantitative scoring” for product groups. Please provide some specifics of tasks pertaining to hazard and comparative exposure assessment in section 7.1. This may include how data gaps will be addressed and mention the inclusion of an uncertainty discussion in the Final AA report. The lack of specifics for completing these in the Stage 2 AA may result in significant comments by DTSC during review of the Final AA Report.

III. Additional Information

In this Section, the additional comments and recommendations are provided to help improve certain areas of the AA Report for clarity:

- DTSC notes that the PAA Report states “The SCP regulations (alternative assessment in general) do not allow for the consideration of risk […] in making decisions about selecting alternative products” (Section 5.1, 2nd paragraph, p. 28). This is a generally problematic statement relating to SCP regulations and Alternatives Analysis as the consideration of risk is not prohibited. Alternative Analysis process in the SCP regulations specifically requires considering both hazard and exposure information when selecting alternatives.

[4] Cal. Code Regs., Tit.22, Div.4.5, Ch.54, §69403.16(b)

- In response to the question regarding section 69501.1(a)(4)(E), "An exceedance of CA or federal regulatory standard relating to protection of the environment" is intended to be inclusive of any new, important environmental concern that has emerged since the writing of the SCP regulations. For example, if we learn about a new class of pollutant that causes some highly specific environmental effect, not yet discovered, those would be captured in the SCP Regulations (e.g. CFCs prior to the 1980s).
- In the Alternatives to be Eliminated from Further Consideration section (section 6.2, p. 33), please change the first word of the paragraph from 'Category 3' to 'Group 2' to maintain consistency throughout the report.
- Review of the SDSs included in this report indicates that flammability is a hazard for some Priority Products, depending on the concentration of other ingredients such as methanol and acetone. Please revise the statement (p. 33, section 6.1) that flammability is "a hazard not present in the current Priority Product."
- Please correct the typos for subsection numbers identified for Life Cycle Segments on p.18. They should be sections 4.8.7-11.
- DTSC encourages the use of consistent page numbers including on Figures and Tables.
- The cover letter should be addressed to Meredith Williams, Acting Director of DTSC.

Revised Table 5-1 and Table 5-3 received on July 18, 2019 - Attachment B

Table 5.1 Data for Relevant Factors - Chemical Hazard Data (Group A Endpoints)

Chemical	Acute Mammalian Toxicant	Carcinogenicity	Developmental Toxicity	Reproductive Toxicity	Dermatotoxicity	Endocrine Toxicity	Mutagen	Neurotoxicity	Eye Irritation
Methylene chloride (CAS 75-09-2)	Medium	High	High	Medium	High	Medium	Inconclusive	Medium	High
Acetone (CAS 67-64-1)	Low	Inconclusive	High	Medium	Medium	Medium	DG	Medium	High
Benzyl alcohol (CAS 100-51-6)	Medium	DG	Medium	DG	Inconclusive	DG	DG	Inconclusive	High
Calcium hydroxide (CAS 1305-62-0)	Inconclusive	DG	Medium	DG	Very High	DG	DG	DG	Very High
Cyclohexanone (CAS 108-94-1)	Medium	Medium	DG	Medium	High	Medium	Medium	Inconclusive	High
Dimethyl carbonate (CAS 616-38-6)	DG	DG	DG	Medium	DG	DG	DG	DG	DG
Dimethyl formamide (CAS 68-12-2)	Medium	High	High	High	Medium	Medium	Medium	Inconclusive	High
DMSO (CAS 67-68-5)	DG*	DG*	High*	DG*	Medium	DG	Inconclusive*	DG*	High*
Dioxolane (CAS 646-06-0)	Medium*	DG*	High*	Medium	Medium	DG*	Medium	DG*	High
Estasol (mixture DBE, CAS 95481-62-2)	DG	DG	Medium	DG	DG	DG	DG	DG	DG
Methanol (CAS 67-56-1)	High	DG	High	High	DG	Medium	DG	Inconclusive	High
Methyl acetate (CAS 79-20-9)	Low	DG	Medium	DG	High*	DG	DG	Medium	High*
Sodium hydroxide (CAS 1310-73-2)	Medium	DG	DG	DG	Very High	DG	DG	Inconclusive	Very High
Toluene (CAS 100-00-3)	High	Inconclusive	High	High	High	Medium	DG	Medium	High

Notes:

Hazard Scoring

Very High
High
Medium
Low
Very Low
Inconclusive
DG

All category scores based on GreenScreen scoring system.
DG - data gap.
Inconclusive - different sources give different scores.

All data were obtained via Pharos (Healthy Building Network, 2019) except Clean Air Act (CAA) VOC status and Global Warming Potential. For CAA VOC status, data were taken from 40 CFR Section 51.100. Non-VOC or exempt VOC status was scored green, non-exempt VOC status was scored organge. Chemicals were checked against the IPCC, 5th report list of greenhouse gases (2013). Methylene chloride is listed as having a GWP of 9 (relative to CO2 on a 100 year time horizon) which is minimal compared to greenhouse gases of concern (typically with GWPs >1000).

Table 5.1 Data for Relevant Factors - Chemical Hazard Data (Group A Endpoints)

Chemical	Organ Toxicant	Respiratory Sensitizer	Skin Sensitization	Persistent	Acute Aquatic Toxicant	Chronic Aquatic Toxicant	Terrestrial Ecotoxicant	Global Warming Potential
Methylene chloride (CAS 75-09-2)	Very High	DG	DG	High	Medium	Medium	Medium	Negligible
Acetone (CAS 67-64-1)	High	DG	DG	High	DG	DG	DG	No
Benzyl alcohol (CAS 100-51-6)	DG	DG	High	DG	Medium	DG	Medium	No
Calcium hydroxide (CAS 1305-62-0)	Very High	DG	High	High	Medium	DG	DG	No
Cyclohexanone (CAS 108-94-1)	Very High	DG	High	DG	DG	DG	Medium	No
Dimethyl carbonate (CAS 616-38-6)	Medium	DG	DG	High	Medium	DG	DG	No
Dimethyl formamide (CAS 68-12-2)	Very High	DG	DG	High	DG	DG	Medium	No
DMSO (CAS 67-68-5)	Inconclusive*	DG*	DG*	High*	DG*	DG*	Medium	No
Dioxolane (CAS 646-06-0)	High	DG	DG*	DG	DG*	DG*	Medium	No
Estasol (mixture DBE, CAS 95481-62-2)	DG	DG	DG	DG	DG	DG	DG	No
Methanol (CAS 67-56-1)	Very High	DG	DG	High	DG	DG	Medium	No
Methyl acetate (CAS 79-20-9)	Very High*	DG	DG	High	DG	Inconclusive	DG	No
Sodium hydroxide (CAS 1310-73-2)	Very High	DG	DG	High	Medium	DG	DG	No
Toluene (CAS 100-00-3)	Medium	Medium	DG	High	High	Medium	Medium	No

Notes:

Hazard Scoring

Very High
High
Medium
Low
Very Low
Inconclusive
DG

All category scores based on GreenScreen scoring system.

DG - data gap.

Inconclusive - different sources give different scores.

Table 5.1 Data for Relevant Factors - Chemical Hazard Data (Group A Endpoints)

Chemical	Bioaccumulative	Flammable	Clean Air Act VOC Contributing to Smog Formation
Methylene chloride (CAS 75-09-2)	Inconclusive	vLow	No, exempt
Acetone (CAS 67-64-1)	DG	High	No, exempt
Benzyl alcohol (CAS 100-51-6)	DG	Medium	Yes
Calcium hydroxide (CAS 1305-62-0)	DG	DG	No, inorganic
Cyclohexanone (CAS 108-94-1)	DG	Medium	Yes
Dimethyl carbonate (CAS 616-38-6)	DG	High	No, exempt
Dimethyl formamide (CAS 68-12-2)	DG	Medium	Yes
DMSO (CAS 67-68-5)	DG	Medium	Yes
Dioxolane (CAS 646-06-0)	DG	High	Yes
Estasol (mixture DBE, CAS 95481-62-2)	DG	DG	Yes
Methanol (CAS 67-56-1)	DG	High	Yes
Methyl acetate (CAS 79-20-9)	DG	High	No, exempt
Sodium hydroxide (CAS 1310-73-2)	DG	DG	No, inorganic
Toluene (CAS 100-00-3)	DG	High	Yes

Notes:

Hazard Scoring

Very High
High
Medium
Low
Very Low
Inconclusive
DG

All category scores based on GreenScreen scoring system.

DG - data gap.

Inconclusive - different sources give different scores.

Table 5.3 Data for Relevant Factors - Chemical Hazard Summaries According to Product Group

					Group A							
Product Group	Key Ingredient (s)	Qualitative Group Hazard Score	No. Factors with High/Very High Scores per Group	No. Factors as Data Gaps/Inc.	Acute Mammalian Toxicant	Carcinogenicity	Developmental Toxicity	Repro Toxicity	Dermatotoxicity	Endocrine Toxicity	Mutagen	Neurotoxicity
1	Methylene chloride (CAS 75-09-2)	High	6	4	Medium	High	High	Medium	High	Medium	Inconclusive	Medium
2	Acetone (CAS 67-64-1)	v High	9	8	Low	Inconclusive	High	Medium	Medium	Medium	DG	Medium
	Methanol (CAS 67-56-1)			9	High	DG	High	High	DG	Medium	DG	Inconclusive
	Toluene (CAS 100-00-3)			4	High	Inconclusive	High	High	High	Medium	DG	Medium
3	Estasol (mixture DBE, CAS 95481-62-2)	Medium	2	17	DG	DG	Medium	DG	DG	DG	DG	DG
	Dimethyl carbonate (CAS 616-38-6)			13	DG	DG	DG	Medium	DG	DG	DG	DG
4	Benzyl alcohol (CAS 100-51-6)	Medium	2	11	Medium	DG	Medium	DG	Inconclusive	DG	DG	Inconclusive
5	Sodium hydroxide (CAS 1310-73-2)	High	5	12	Medium	DG	DG	DG	Very High	DG	DG	Inconclusive
	Calcium hydroxide (CAS 1305-62-0)			12	Inconclusive	DG	Medium	DG	Very High	DG	DG	DG
6	Dimethyl formamide (CAS 68-12-2)	v High	8	6	Medium	High	High	High	Medium	Medium	Medium	Inconclusive
	Cyclohexanone (CAS 108-94-1)			7	Medium	Medium	DG	Medium	High	Medium	Medium	Inconclusive
7	Dioxolane (CAS 646-06-0)	High	6	9	Medium*	DG*	High*	Medium	Medium	DG*	Medium	DG*
	DMSO (CAS 67-68-5)			12	DG*	DG*	High*	DG*	Medium	DG	Inconclusive*	DG*
	Methyl acetate (CAS 79-20-9)			10	Low	DG	Medium	DG	High*	DG	DG	Medium
Potentially Relevant Factor?					yes	yes	yes	yes	yes	yes	yes	yes

Notes:

Product Groups

1 = MeCl
2 = No MeCl, ATM
3 = No MeCl, DBE
4 = No MeCl, Benzyl alcohol
5 = Caustic
6 = Miscellaneous, No MeCl, other
7 = Current Lowell formulation

* With the exception of Clean Air Act VOC classification and GWP, all data were obtained via Pharos or HSDB. For endpoints marked with an asterisk, the BizNGO assessment reported different hazard scores obtained via full Green screen assessments. Details of those GreenScreens were not available and GreenScreens were not available for all ingredients. To compare materials on a consistent basis, we relied on Pharos. Hazards of all chemicals in any alternatives carried forward to Stage 2 should be reviewed in more depth.

Scoring for Group A Hazards

Very High	All category scores based on GreenScreen scoring system.
High	DG - data gap.
Medium	Inconclusive - different sources give different scores.
Low	
Very Low	
Inconclusive	
DG	

Scoring for Group B Hazards

D	Data in HSDB implying effect is associated with the chemical at some level.
nd	No mention of effect in HSDB file.

For Clean Air Act (CAA) VOC classification, non-VOC or exempt VOC status was scored green, non-exempt VOC status was scored orange.

Table 5.3 Data for Relevant Factors - Chemical Hazard Summaries According to Product Group

		Group A											
Product Group	Key Ingredient (s)	Eye Irritation	Organ Toxicant	Respiratory Sensitizer	Skin Sensitization	Persistent	Acute Aquatic Toxicant	Chronic Aquatic Toxicant	Terrestrial Ecotoxicant	Global Warming Potential	Bio-accumulative	CAA VOC Contributing to Smog Formation	Flammable
1	Methylene chloride (CAS 75-09-2)	High	Very High	DG	DG	High	Medium	Medium	Medium	Negligible	Inconclusive	No, exempt	vLow
2	Acetone (CAS 67-64-1)	High	High	DG	DG	High	DG	DG	DG	No	DG	No, exempt	High
	Methanol (CAS 67-56-1)	High	Very High	DG	DG	High	DG	DG	Medium	No	DG	Yes	High
	Toluene (CAS 100-00-3)	High	Medium	Medium	DG	High	High	Medium	Medium	No	DG	Yes	High
3	Estasol (mixture DBE, CAS 95481-62-2)	DG	DG	DG	DG	DG	DG	DG	DG	No	DG	Yes	DG
	Dimethyl carbonate (CAS 616-38-6)	DG	Medium	DG	DG	High	Medium	DG	DG	No	DG	No, exempt	High
4	Benzyl alcohol (CAS 100-51-6)	High	DG	DG	High	DG	Medium	DG	Medium	No	DG	Yes	Medium
5	Sodium hydroxide (CAS 1310-73-2)	Very High	Very High	DG	DG	High	Medium	DG	DG	No	DG	No, inorganic	DG
	Calcium hydroxide (CAS 1305-62-0)	Very High	Very High	DG	High	High	Medium	DG	DG	No	DG	No, inorganic	DG
6	Dimethyl formamide (CAS 68-12-2)	High	Very High	DG	DG	High	DG	DG	Medium	No	DG	Yes	Medium
	Cyclohexanone (CAS 108-94-1)	High	Very High	DG	High	DG	DG	DG	Medium	No	DG	Yes	Medium
7	Dioxolane (CAS 646-06-0)	High	High	DG	DG*	DG	DG*	DG*	Medium	No	DG	Yes	High
	DMSO (CAS 67-68-5)	High*	Inconclusive*	DG*	DG*	High*	DG*	DG*	Medium	No	DG*	Yes	Medium
	Methyl acetate (CAS 79-20-9)	High*	Very High*	DG	DG	High	DG	Inconclusive	DG	No	DG	No, exempt	High*
	Potentially Relevant Factor?	yes	yes	unclear	yes	yes	yes	yes	unclear	No	unclear	yes	yes

Notes:

Product Groups

1 = MeCl
2 = No MeCl, ATM
3 = No MeCl, DBE
4 = No MeCl, Benzyl alcohol
5 = Caustic
6 = Miscellaneous, No MeCl, other
7 = Current Lowell formulation

* With the exception of Clean Air Act VOC classification and GWP, all data were obtained via Pharos or endpoints marked with an asterisk, the BizNGO assessment reported different hazard scores obtained v screen assessments. Details of those GreenScreens were not available and GreenScreens were not ava ingredients. To compare materials on a consistent basis, we relied on Pharos. Hazards of all chemicals i carried forward to Stage 2 should be reviewed in more depth.

Scoring for Group A Hazards

Very High	All category scores based on GreenScreen scoring system.
High	DG - data gap.
Medium	Inconclusive - different sources give different scores.
Low	
Very Low	
Inconclusive	
DG	

Scoring for Group B Hazards

D	Data in HSDB implying effect is associated with the chemical at some level.
nd	No mention of effect in HSDB file.

For Clean Air Act (CAA) VOC classification, non-VOC or exempt VOC status was scored green, non-exempt VOC status was scored orange.

Table 5.3 Data for Relevant Factors - Chemical Hazard Summaries According to Product Group

		Group B										
Product Group	Key Ingredient (s)	Respiratory Toxicity	Cardiovascular Toxicity	Epigenetic Toxicity	Hematotoxicity	Reactive in Biol Systems	Hepatotoxicity and Digestive System Toxicity	Immunotoxicity	Musculoskeletal Toxicity	Nephrotoxicity	Neuro-developmental Toxicity	Ototoxicity
1	Methylene chloride (CAS 75-09-2)	D	D	nd	D	nd	D	nd	nd	D	D	D
2	Acetone (CAS 67-64-1)	nd	nd	nd	D	nd	D	D	nd	D	D	nd
	Methanol (CAS 67-56-1)	D	D	nd	D	nd	D	nd	nd	D	D	nd
	Toluene (CAS 100-00-3)	D	D	nd	nd	nd	D	D	nd	D	nd	nd
3	Estasol (mixture DBE, CAS 95481-62-2)	Not reviewed in HSDB										
	Dimethyl carbonate (CAS 616-38-6)	nd	nd	nd	nd	nd	nd	D	nd	nd	D	nd
4	Benzyl alcohol (CAS 100-51-6)	D	nd	nd	nd	nd	nd	nd	D	nd	D	nd
5	Sodium hydroxide (CAS 1310-73-2)	D	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Calcium hydroxide (CAS 1305-62-0)	D	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
6	Dimethyl formamide (CAS 68-12-2)	D	D	nd	nd	nd	D	D	nd	D	nd	nd
	Cyclohexanone (CAS 108-94-1)	D	nd	nd	nd	nd	D	nd	nd	D	D	nd
7	Dioxolane (CAS 646-06-0)	D	nd	nd	nd	nd	D	D	nd	D	D	nd
	DMSO (CAS 67-68-5)	nd	nd	nd	D	nd	D	D	nd	nd	D	nd
	Methyl acetate (CAS 79-20-9)	D	nd	nd	D	nd	nd	nd	nd	nd	D	nd
	Potentially Relevant Factor?	yes	yes	No	yes	No	yes	yes	yes	yes	yes	yes

Notes:

Product Groups

1 = MeCl
2 = No MeCl, ATM
3 = No MeCl, DBE
4 = No MeCl, Benzyl alcohol
5 = Caustic
6 = Miscellaneous, No MeCl, other
7 = Current Lowell formulation

* With the exception of Clean Air Act VOC classification and GWP, all data were obtained via Pharos or endpoints marked with an asterisk, the BizNGO assessment reported different hazard scores obtained v screen assessments. Details of those GreenScreens were not available and GreenScreens were not ava ingredients. To compare materials on a consistent basis, we relied on Pharos. Hazards of all chemicals i carried forward to Stage 2 should be reviewed in more depth.

Scoring for Group A Hazards

Very High	All category scores based on GreenScreen scoring system.
High	DG - data gap.
Medium	Inconclusive - different sources give different scores.
Low	
Very Low	
Inconclusive	
DG	

Scoring for Group B Hazards

D	Data in HSDB implying effect is associated with the chemical at some level.
nd	No mention of effect in HSDB file.

For Clean Air Act (CAA) VOC classification, non-VOC or exempt VOC status was scored green, non-exempt VOC status was scored orange.