Supporting Information for Low-Priority Substance Propanol, Oxybis-
(CASRN 25265-71-8)
(Dipropylene Glycol)
Final Designation

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1. Introduction

The Lautenberg amendments to the Toxic Substances Control Act (TSCA) require EPA to designate chemical substances as either High-Priority Substances for risk evaluation, or Low-Priority Substances for which risk evaluations are not warranted at this time (section 6(b)(1)(B) and implementing regulations (40 CFR 702.3)). A high-priority substance is defined as a chemical substance that the Administrator concludes, without consideration of costs or other non-risk factors, may present an unreasonable risk of injury to health or the environment because of a potential hazard and a potential route of exposure under the conditions of use, including an unreasonable risk to potentially exposed or susceptible subpopulations identified as relevant by the Administrator. If the Administrator concludes, based on information sufficient to establish, without consideration of costs or other non-risk factors, that the high-priority standard is not met, then the substance must be designated as a low-priority substance. Propanol, oxybis-, referenced as dipropylene glycol for the remainder of this document, is one of the 40 chemical substances initiated for prioritization as referenced in a March 21, 2019 notice (84 FR 10491)[1] and one of the 20 proposed as low-priority substances in an August 15, 2019 notice (84 FR 41712).[2]

As described under EPA's regulations at 40 CFR 702.9[3] and pursuant to section 6(b)(1)(A) of the statute, EPA generally used reasonably available information to screen the chemical substance under its conditions of use against the following criteria and considerations:

- the hazard and exposure potential of the chemical substance;
- persistence and bioaccumulation;
- potentially exposed or susceptible subpopulations;
- storage near significant sources of drinking water;
- conditions of use or significant changes in the conditions of use of the chemical substance;
- the chemical substance's production volume or significant changes in production volume; and
- other risk-based criteria that EPA determines to be relevant to the designation of the chemical substance's priority.

Designation of a low-priority substance is not a finding that the chemical substance does not present an unreasonable risk, but rather that the chemical does not meet the statutory criteria for a high-priority substance and that a risk evaluation is not warranted at the time. As explained in the preamble to the Prioritization Rule, "low-priority substance designations give the public notice of chemical substances for which the hazard and/or exposure potential is anticipated to be low or nonexistent and provides some insight into which chemical substances are likely not to need additional evaluation and risk management under TSCA." 82 FR 33753 at 33755. EPA is not precluded from later revising the designation based on reasonably available information, if warranted. 40 CFR 702.13; 702.15.

[1] https://www.federalregister.gov/documents/2019/03/21/2019-05404/initiation-of-prioritization-under-the-toxic-substances-control-act-tsca

[2] https://www.federalregister.gov/documents/2019/08/15/2019-17558/proposed-low-priority-substance-designation-under-the-toxic-substances-control-act-tsca-notice-of

[3] The prioritization process is explained in the *Procedures for Prioritization of Chemicals for Risk Evaluation Under the Toxic Substances Control Act* (82 FR 33753).

The screening review is not a risk evaluation, but rather a review of reasonably available information on the chemical substance that relates to the specific criteria and considerations in TSCA section 6(b)(1)(A) and 40 CFR 702.9. This paper documents the results of the screening review which supports the final designation of dipropylene glycol as a low-priority substance. EPA has also prepared a general response to comments and, as applicable, chemical-specific responses to comments.

This risk-based, screening-level review is organized as follows:

- *Section 1 (Introduction):* This section explains the requirements of the Lautenberg amendments to the Toxic Substances Control Act (TSCA) and implementing regulations – including the criteria and considerations -- pertinent to prioritization and designation of low-priority substances.

- *Section 2 (Background on the Low-Priority Substance):* This section includes information on attributes of the chemical substance, including its structure, and relates them to its functionality.

- *Section 3 (Physical-Chemical Properties):* This section includes a description of the physical-chemical properties of the chemical substance and explains how these properties lead to the chemical's fate, transport, and exposure potential.

- *Section 4 (Relevant Assessment History):* This section includes an overview of the outcomes of other governing entities' assessments of the chemical substance.

- *Section 5 (Conditions of Use):* This section presents the chemical substance's known, intended, and reasonably foreseen conditions of use under TSCA.

- *Section 6 (Hazard Characterization):* This section summarizes the reasonably available hazard information and screens the information against low-concern benchmarks.

- *Section 7 (Exposure Characterization):* This section includes a qualitative summary of potential exposures to the chemical substance.

- *Section 8 (Summary of Findings):* In this section, EPA presents information pertinent to prioritization against each of the seven statutory and regulatory criteria and considerations, and makes a conclusion based on that evidence.

- *Section 9 (Final Designation):* In this section, EPA presents the final designation for this chemical substance.

- *Appendix A (Conditions of Use Characterization):* This appendix contains a comprehensive list of TSCA and non-TSCA uses for the chemical substance from publicly available databases.

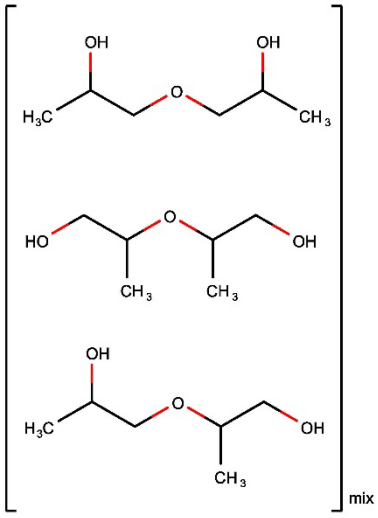
- *Appendix B (Hazard Characterization):* This appendix contains information on each of the studies used to support the hazard evaluation of the chemical substance.

- *Appendix C (Literature Search Outcomes):* This appendix includes literature search outcomes and rationales for studies that were identified in initial literature screening but were found to be off-topic or unacceptable for use in the screening-level review.

- *Appendix D (Summary of Public Comments):* This appendix includes sources of information for the chemical substance that the public recommended to EPA during a 90-day comment period.

2. Background on Dipropylene Glycol

Table 1 below provides the CAS number, synonyms, and other information on dipropylene glycol.

Table 1: Dipropylene Glycol at a Glance	
Chemical Name	Dipropylene Glycol
CASRN	25265-71-8
Synonyms	Oxypropyl ether; 1-(1-hydroxypropoxy)propan-1-ol; Oxybispropanol; Propanol, oxybis-
Trade Name(s)	DPG; DPG LO+
Molecular Formula	$C_6H_{14}O_3$
Representative Structure	
Source(s): Kim et al. (2016); The Dow Chemical Company (2009a; 2009b); Synapse Information Resources (n.d.); NLM (2018a)	

Dipropylene glycol is a mixture of three branched isomers of bis(hydroxypropyl) ether. Dipropylene glycol is produced as a byproduct or coproduct in of the manufacture of propylene glycol. Dipropylene glycol is a colorless, nearly odorless, and slightly viscous liquid with a high boiling point. It is completely soluble in water, and can also dissolve oils. In addition, dipropylene glycol is hygroscopic and acts as a humectant, which means it absorbs water and increases hydration in products. Dipropylene glycol also functions as a plasticizer and as a plasticizer intermediate in the

formation of polyurethane polyols to improve flexibility and increase resistance to cracking at low temperatures. A plasticizer is a substance that is added to a material to alter its physical properties, mainly to increase flexibility or decrease viscosity. These properties make dipropylene glycol a multifunctional ingredient used in a variety of applications and product sectors. Section 5 includes conditions of use for this chemical.

3. Physical-Chemical Properties

Table 2 lists physical-chemical properties for dipropylene glycol. A chemical's physical-chemical properties provide a basis for understanding a chemical's behavior, including in the environment and in living organisms. These endpoints provide information generally needed to assess potential environmental release, exposure, and partitioning as well as insight into the potential for adverse toxicological effects.

Table 2: Physical Chemical Properties for Dipropylene Glycol

Source/Model	Data Type	Endpoint	Endpoint value	Notes
Sigma Aldrich 2019; SIDS 2001	Experimental	Physical state at room temp (based on melting point)	Liquid (-20°C at 101.3 hPa (76 mmHg)) Liquid (-39°C)	Commercial mixture of CASRN 108-61-2; 110-98-5 and 106-62-7
Reported to the ECHA database 2019; HSDB, 2016; Kirk-Othmer, 2006	Experimental	Molecular Weight	134 g/mol	
EPISuite v.4.11[4]	Calculated	Molecular Weight	134.18 g/mol	EPISuite was run for two isomers. The only difference in the predicted values is in the atmospheric oxidation model.
Lyman 1990	Experimental	Molar Volume	166 cm^3/mol	
Reported to the ECHA database 2019	Experimental	Water Solubility	1000000 mg/L (100% vol) at 20 °C and pH 7.4	Value measured according to EU Method A.6, flask method.
HSDB 2016; SIDS 2001	Experimental	Water Solubility	1000000 mg/L (miscible)	
EPISuite v.4.11	Estimated	Water Solubility	$6.96x10^5$ mg/L	
Reported to the ECHA database 2019; HSDB 2016	Experimental	Water Solubility	7.45 mol/L	
Reported to the ECHA database 2019	Experimental	Log P	-0.462 at 21.7°C and pH 6	Value measured according to EU Method A.8, shake flask.
HSDB 2016	Experimental	Log K_{ow}	-1.07	
SIDS 2001	Experimental	Log K_{ow}	-1.486; -0.687	
EPISuite v.4.11	Estimated	Log K_{ow}	-0.64	
EPISuite v.4.11	Estimated	Log K_{oa}	6.37	

[4] EPI Suite Physical Property Inputs – Boiling Point = 230.5 deg C, MP = 0 deg C, Vapor Pressure = 0.0319 mm Hg, Water Solubility = 1000000 mg/L, Log P = -0.46, SMILES: OC(C)COC(C)CO

Table 2: Physical Chemical Properties for Dipropylene Glycol				
Source/Model	**Data Type**	**Endpoint**	**Endpoint value**	**Notes**
EPISuite v.4.11	Estimated	Log K_{oc}	0 (MCI); -0.24 (K_{ow})	
Reported to the ECHA database 2019	Experimental	Vapor Pressure	0.00975 mm Hg (1.3 Pa) at 25°C	Value measured according to EU Method A.4
HSDB 2016	Experimental	Vapor Pressure	0.0319 mm Hg at 25°C	
Kirk-Othmer 2006	Experimental	Vapor Pressure	0.016 mm Hg (0.0021 kPa) at 25°C	
ChemID 2019	Experimental	Vapor Pressure	0.0319 mm Hg at 25°C	
SIDS 2001	Experimental	Vapor Pressure	< 0.075 mm Hg (0.01 hPa) at 20 °C; < 0.01 torr (0.013 hPa) at 20 °C; 0.04 torr (0.05 hPa) at 21 °C	
Chadwick 1988	Experimental	Vapor Pressure	<0.0075 mm Hg (0.001 kPa) at 20 °C	
EPISuite v.4.11	Estimated	Vapor Pressure	7.30×10^{-3} mm Hg	
Reported to the ECHA database 2019	Experimental	Vapor Pressure	34.6×10^{-12} cm^3/molecule-sec	
SIDS 2001	Experimental	Vapor Pressure	3.72 (half-life, hours)	
EPISuite v.4.11	Estimated	Henry's Law	<1E-8 atm-m^3/mol	
EPISuite v.4.11	Estimated	Volatilization	5000 days (river) 55000 days (lake)	
EPISuite v.4.11	Estimated	Photolysis (Indirect)	4.1 hours ($T_{1/2}$)	
EPISuite v.4.11	Estimated	Photolysis (Indirect)	3.72 hours	• OH rate constant 3.46 E-11 cm^3/molecule-second (12 hour day; 1.5E6 OH/cm^3) • No ozone reaction
EPISuite v.4.11	Estimated	Hydrolysis	Rate constants cannot be estimated	No hydrolyzable functional groups
EPISuite v.4.11	Estimated	Biodegradation potential	Ready prediction: Yes	
EPISuite v.4.11	Estimated	Wastewater treatment plant removal	80.7% Total Removal (80.2% biodegradation, 0.5% sludge, 0% air)	Input parameters: BioP = 10, BioA = 2.5 and BioS = 2.5 based on 83.6% degradation after 6 weeks (DOC removal) in OECD 302A test
EPISuite v.4.11	Estimated	BAF	0.9	
EPISuite v.4.11	Estimated	BCF	3.16	Based on regression equation

Based on its reported physical form and measured melting point, dipropylene glycol is a liquid under ambient conditions (Sigma Aldrich, 2019). Exposure through direct dermal contact with the substance is possible, but concern is lessened because this chemical is a slow skin penetrant (discussed in Section 6.1.1) and likely to be minimally absorbed through skin based on its molecular weight, water solubility and log K_{ow}. Because of its measured vapor pressure (Reported to the ECHA database, 2019), dipropylene glycol is expected to be volatile when present in neat form or as an undiluted substance at ambient temperatures. As a result, exposure to dipropylene glycol is possible through inhalation of vapors or aerosols if they are generated. Based on measured solubility data (OECD SIDS, 2001), dipropylene glycol is considered water soluble, indicating the potential for this substance to dissolve in water and form an aqueous solution. Water soluble substances have an increased potential for absorption through the lungs; therefore, if inhalation of vapors or aerosols occurs, absorption through the lungs is likely. Exposure potential changes if dipropylene glycol is present in diluted form. The estimated Henry's Law constant for dipropylene glycol (EPI Suite, 2019) indicates volatilization from water and aqueous solutions would be minimal; therefore, exposure through breathing vapor from a dilute form is expected to be minimal. Absorption and sequestration in fatty tissues are unlikely, as reflected in the estimated BAF and BCF values for this compound (EPI Suite, 2019). The estimated log K_{oc} (EPI Suite, 2019) indicates this substance is highly mobile in soils, increasing its potential for leaching into groundwater, including ground water sources of drinking water. If oral exposure occurs via ingestion of contaminated drinking water, including well water, absorption through the gastrointestinal tract is likely based on experimental evidence (discussed in Section 6.1.1). Concern for presence in drinking water is reduced in part by dipropylene glycol's expected low persistence (discussed in Section 6.3.1) and low-hazard findings from toxicological studies of organisms exposed to dipropylene glycol in drinking water (discussed in Section 6.1). Experimental data indicate it is readily biodegradable in aerobic environments, meaning that it has the potential to break down in the environment into carbon dioxide and water (Reported to the ECHA database, 2007, 4940427).

3.1 References

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Hazardous Substance Database (HSDB). (2016). Dipropylene glycol. Retrieved from https://toxnet.nlm.nih.gov/

Kirk-Othmer. (2006). Kirk-Othmer Encyclopedia of Chemical Technology.

Lyman, Warren J., Reehl, W. F., Rosenblatt, D. H. (1990). Handbook of chemical property estimation methods: environmental behavior of organic compounds. American Chemical Society

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U.S. EPA. (2019). Estimation Programs Interface Suite, v 4.11. United States Environmental Protection Agency, Washington, DC, USA

4. Relevant Assessment History

EPA assessed the toxicological profile of dipropylene glycol and added the chemical to the Safer Choice Program's Safer Chemical Ingredients List (SCIL) in September 2012 under the functional class of solvents. The SCIL[5] is a continuously updated list of chemicals that meet low-concern Safer Choice criteria.[6]

To better understand the hazard and exposure profile of certain chemical substances, EPA promulgated the Preliminary Assessment Information Rule (PAIR) under TSCA in June 1992 to require manufacturers and importers to submit a standardized reporting form for each site at which they were manufacturing or importing a listed chemical substance to collect general volume, end use, and exposure-related information. The chemical substances chosen for PAIR were those with possibly high exposure potential or for which information about toxicity had been previously obtained. In January 1994, EPA added dipropylene glycol to PAIR because of regulatory interest to the Occupational Safety and Health Administration (OSHA) given the chemical's lack of dermal absorption test data. Inclusion of dipropylene glycol in the PAIR rule is not indicative of current EPA concern about this chemical because of data that is now available on dermal absorption (see Section 6.1.1), and EPA's high confidence in the chemical's low-hazard profile.

EPA also reviewed international assessments of dipropylene glycol. EPA identified assessments by the Organisation for Economic Co-operation and Development (OECD), and government agencies in Canada, Australia, Germany, New Zealand, and Japan.

The OECD Screening Information Datasets (SIDS) Initial Assessment Meeting (SIAM) discussed the SIDS Initial Assessment Report (SIAR) on dipropylene glycol (mixed isomers and dominant isomer), in January 2001. The SIAM determined this chemical to be "low priority for further work" for human health and the environment.[7]

The Canadian Government, through an assessment of toxicity and exposure as part of its categorization of the Domestic Substance List, found that dipropylene glycol did not meet its criteria for further attention.[8]

The Australian Government's Department of Health National Industrial Chemicals Notification and Assessment Scheme (NICNAS) determined dipropylene glycol to not pose an unreasonable risk to the health of workers and public health on the basis of the Tier I Inventory Multi-tiered Assessment and Prioritisation (IMAP) assessment.[9]

[5] https://www.epa.gov/saferchoice/safer-ingredients

[6] https://www.epa.gov/sites/production/files/2013-12/documents/dfe_master_criteria_safer_ingredients_v2_1.pdf

[7] https://hpvchemicals.oecd.org/ui/handler.axd?id=40da06b1-a855-4c0c-bc21-bbc856dca725

[8] https://canadachemicals.oecd.org/ChemicalDetails.aspx?ChemicalID=1044BC0C-01F2-4BC4-99B3-DEFF37D7B966

[9] https://www.nicnas.gov.au/chemical-information/imap-assessments/imap-assessments/human-health-assessments

The German Environment Agency (UBA) designated dipropylene glycol as "low hazard to waters" in August 2017 based on an assessment of ecotoxicity and environmental fate.[10]

New Zealand's Environmental Protection Authority lists dipropylene glycol in its Chemical Classification and Information Database (CCID), which includes hazard and physical information about single chemicals for use in hazard classifications and safety information. It has a classification description as "mildly irritating to the skin" and "irritating to the eye."[11] Sections 6.1.11 and 6.1.12 of this screening review contain a summary of the reasonably available information on these endpoints and an explanation of why EPA does not believe irritation is a concern for this chemical.

Japan's National Institute of Technology and Evaluation (NITE) categorized dipropylene glycol as hazard class 4 for ecological effect in 2017, which is the lowest concern hazard ranking assigned.[12]

[10] https://webrigoletto.uba.de/rigoletto/public/searchDetail.do?kennummer=3419

[11] https://www.epa.govt.nz/database-search/chemical-classification-and-information-database-ccid/view/2785

[12] https://www.nite.go.jp/chem/jcheck/detail.action?cno=25265-71-8&mno=2-0413&request_locale=en

5. Conditions of Use

Per TSCA section 3(4), the term "conditions of use" means the circumstances, as determined by the Administrator, under which a chemical substance is intended, known, or reasonably foreseen to be manufactured, processed, distributed in commerce, used, or disposed of. EPA assembled information on all uses of dipropylene glycol (Appendix A) to inform which uses would be determined conditions of use.[13] One source of information that EPA used to help determine conditions of use is 2016 Chemical Data Reporting (CDR). The CDR rule (previously known as the Inventory Update Rule, or IUR), under TSCA section 8, requires manufacturers (including importers) to report information on the chemical substances they produce domestically or import into the U.S., generally above a reporting threshold of 25,000 lb. per site per year. CDR includes information on the manufacturing, processing, and use of chemical substances with information dating to the mid-1980s. CDR may not provide information on other life-cycle phases such as the chemical substance's end-of-life after use in products (i.e., disposal).

According to CDR, dipropylene glycol is manufactured domestically and imported. It is used in processing (incorporation into formulation, mixture or reaction and incorporation into article for textiles, apparel, leather manufacturing, lubricants and lubricant additives, cleaning compounds, toilet preparation manufacturing, and other applications); it is also used as a reactant in plastic material and resin manufacturing; and for repackaging lubricant and lubricant additives, among other applications. Examples of industrial uses include oil and gas drilling, extraction and support activities, and construction and building materials covering large surface areas. Consumer and commercial uses include cleaning and furnishing care products; ink, toner, and colorant products; laundry and dishwashing products; paints and coatings, air care products; and finger paints and toys, among others. Based on the known manufacturing, processing, and uses of this chemical substance, EPA assumes distribution in commerce. According to CDR, dipropylene glycol was reported as recycled by at least one site. No information on disposal is found in CDR or through EPA's Toxics Release Inventory (TRI) Program[14] because dipropylene glycol is not a TRI-reportable chemical. Although reasonably available information did not specify additional types of disposal, for purposes of this prioritization designation, EPA assumed end-of-life pathways that include releases to air, wastewater, surface water, and land via solid and liquid waste based on the conditions of use (e.g., incineration, landfill).

To supplement CDR, EPA conducted research through the publicly available databases listed in Appendix A (Table A.2) and performed additional internet searches to clarify conditions of use or find additional occupational[15] and consumer uses. This research improved the Agency's understanding of the conditions of use for dipropylene glycol. Although EPA identified uses of dipropylene glycol in personal care products, the screening review covered TSCA conditions of use for the chemical substance and personal care products were not considered in EPA's assessment. Exclusions to TSCA's regulatory scope regarding "chemical substance" can be found at TSCA section 3(2). Table 3 lists the conditions of use for dipropylene glycol considered for chemical

[13] The prioritization process, including the definition of conditions of use, is explained in the *Procedures for Prioritization of Chemicals for Risk Evaluation Under the Toxic Substances Control Act* (82 FR 33753).

[14] https://www.epa.gov/toxics-release-inventory-tri-program

[15] Occupational uses include industrial and/or commercial uses

substance prioritization, per TSCA section 3(4). Table 3 reflects the TSCA uses determined as conditions of use listed in Table A.3 (Appendix A).

Table 3: Conditions of Use for Dipropylene Glycol			
Life Cycle Stage	**Category**	**Subcategory of Use**	**Source**
Manufacturing	Domestic manufacture	Domestic manufacture	EPA (2017b)
	Import	Import	
Processing	Processing- incorporation into formulation, mixture or reaction	Finishing agents - textiles, apparel, and leather manufacturing	EPA (2017b), Sherlock (2019)
		Lubricants and lubricant additives - all other chemical product and preparation manufacturing	
		Pigments and dyes-paper manufacturing	
		Solvents (which become part of product formulation or mixture)- soap, cleaning compound, and toilet preparation manufacturing; All other basic organic chemical manufacturing; Paint and coating manufacturing; Plastics product manufacturing; Printing ink manufacturing; Rubber product manufacturing;	
		Odor agents- soap, cleaning compound, and toilet preparation manufacturing	
		Finishing agents-textiles, apparel, and leather manufacturing	
		Agricultural chemicals (non-pesticidal)- agriculture, forestry, fishing and hunting	
		Process regulators- petrochemical manufacturing, petroleum refineries	
		Functional fluids (closed systems)- transportation equipment manufacturing	
		Intermediates- all other basic organic chemical manufacturing	
	Processing—incorporation into article	Finishing agents- textiles, apparel, and leather manufacturing	
		Surface active agents- soap, cleaning compound, and toilet preparation manufacturing	
	Processing as a reactant	Intermediates- plastic material and resin manufacturing; All other basic organic chemical manufacturing; Petrochemical manufacturing; Plastic material and resin manufacturing	
		Catalyst- construction	
		Paint additives and coating additives not described by other categories- paint and coating manufacturing	
		Accelerator- plastic material and resin manufacturing	
		Processing aids, not otherwise listed- carbon black manufacturing	

Table 3: Conditions of Use for Dipropylene Glycol			
Life Cycle Stage	**Category**	**Subcategory of Use**	**Source**
	Processing – repackaging	Lubricants and lubricant additives- lubricants and lubricant additives	
	Industrial manufacturing	Automotive manufacturing; basic metal manufacturing; building material manufacturing; communication equipment manufacturing; computer and electronic manufacturing; fabricated metal products manufacturing; food manufacturing; furniture manufacturing; iron metal manufacturing; leather product manufacturing; metals manufacturing; non-metallic mineral product manufacturing; perfume manufacturing; soap manufacturing; windmill manufacturing; wood manufacturing	CPCat (2019); Reported to the ECHA database (2018b)
	Pesticide, fertilizer, and other agricultural chemical manufacturing	Crop and animal production; fertilizers	
	Recycling	Recycling	EPA (2017b)[16]
Distribution	Distribution	Distribution	EPA (2017b)
Industrial	Use—non-incorporative activities	Surface active agents- wholesale and retail trade	EPA (2017b)
	Other	Mining; test drilling and boring; coloring agents; printing; sewage treatment;	CPCat (2019); Reported to the ECHA database (2018b)
	Oil and gas drilling, extraction, and support activities	Motor vehicle maintenance and repair; oil and gas exploration/production; automotive fuel; crude petroleum and natural gas extraction; fracking, fuel additive	
	Construction and building materials covering large surface areas	Brick-layering; building construction; building glass; demolition; plumbing installation; floor and wall covering; ship building	
Industrial/ commercial/ consumer		Water treatments including softeners and lime deposit removers	CPCat (2019); Reported to the ECHA database (2018b)
Industrial/ commercial	Industrial cleaning	Paints and coatings	CPCat (2019)

[16] According to CDR reports, at least one manufacturer indicates that the chemical substance is recycled onsite. No other information is available to indicate that other recycling is taking place. Reasonably available information did not specify types of disposal, but EPA assumes these releases based on the conditions of use.

Table 3: Conditions of Use for Dipropylene Glycol			
Life Cycle Stage	**Category**	**Subcategory of Use**	**Source**
Commercial/ consumer	Cleaning and furnishing care products; laundry and dishwashing products;	Bathroom cleaner, boat cleaner; carpet and upholstery cleaner; drain cleaner; floor cleaner; floor polish; furniture polish; general purpose cleaner; glass cleaner; granite cleaner and polish, hard surface cleaner; kitchen cleaner; oven/grill cleaner; shower cleaner; stain remover; toilet bowl cleaner; dishwasher cleaner; dishwasher detergent; fabric freshener; fabric softener; laundry detergent; laundry detergent scent additive; prewash stain remover	EPA (2017b); Reported to the ECHA database (2018b); DeLima Associates (2013c); CPCat (2019), DeLima Associates (2015f); DeLima Associates (2014c); DeLima Associates (2015m); GoodGuide (2011a); DeLima Associates (2015o); DeLima Associates (2015j); DeLima Associates (2015d); DeLima Associates (2015k); DeLima Associates (2017a); DeLima Associates (2015c); DeLima Associates (2015b); DeLima Associates (2015h); DeLima Associates (2015e); DeLima Associates (2015i); DeLima Associates (2016b); DeLima Associates (2014e); Synapse Information Resources (n.d.)
	Paints and coatings	Paint and varnish remover; polishing agents	
	Automotive care	Car wax	CPCat (2019)
	Anti-free and de-icing products		
	Lubricants and greases	Hydraulic fluids	Reported to the ECHA database (2018b)
	Ink, toner, and colorant products	Ink and toner	CPCat (2019); Synapse Information Resources (n.d.); Reported to the ECHA database (2018b)
	Adhesives and sealants	Non-structural caulking compounds and sealants; adhesives	GoodGuide (2011a)
	Other	Degreasers; rust remover; pet litter; photographic	CPCat (2019); Reported to the ECHA database 2018b)

Table 3: Conditions of Use for Dipropylene Glycol			
Life Cycle Stage	**Category**	**Subcategory of Use**	**Source**
Commercial	Agricultural products (non-pesticidal)		EPA (2017b); CPCat (2019); Dow (2009b); Sherlock (2019)
	Other	Catalysts	
	Dry cleaning		
	Building/construction materials not covered elsewhere		
	Golf and sports turf		
	Lubricants and greases		
	Paper products; plastic and rubber products not covered elsewhere;		
	Urethane intermediate		
	Cleaning and furnishing care products		
	Other	Descaling agent	Reported to the ECHA database (2018b)
Consumer	Air care products	Air freshener; candle	DeLima Associates (2013a); GoodGuide (2011a); CPCat (2019); Reported to the ECHA database (2018b); DeLima Associates (2015g)
		Absorbents/adsorbents; casting and molding; welding and soldering; whiteboard marker	DeLima Associates (2013b); GoodGuide (2011a); CPCat (2019); Descartes Datamyne (2018), Reported to the ECHA database (2018b)
	Toys, playground, and sporting equipment	Finger paints; toys	Reported to the ECHA database (2018b); CPCat (2019)
Unknown		Food and beverage service activities; anti-foaming agent	CPCat (2019)

Table 3: Conditions of Use for Dipropylene Glycol			
Life Cycle Stage	**Category**	**Subcategory of Use**	**Source**
Disposal	Releases to air, wastewater, solid and liquid wastes		Though not explicitly identified, releases from disposal were assumed to be reasonably foreseen[17]

[17] See Section 5 for a discussion on why releases were assumed to be reasonably foreseen for purposes of this prioritization designation.

6. Hazard Characterization

EPA reviewed primary literature and other data sources to identify reasonably available information on hazard for dipropylene glycol. This literature review approach[18] is tailored to capture the reasonably available information associated with low-hazard chemicals. EPA also used this process to verify the reasonably available information for reliability, completeness, and consistency. EPA reviewed the reasonably available information to identify relevant, quality studies to evaluate the hazard potential for dipropylene glycol against the endpoints listed below. EPA's New Chemicals Program has used these endpoints for decades to evaluate chemical substances under TSCA[19] and EPA toxicologists rely on these endpoints as key indicators of potential human health and environmental effects. These endpoints also align with internationally accepted hazard characterization criteria, such as the Globally Harmonized System of Classification and Labelling of Chemicals[20] as noted above in Section 4 and form the basis of the comparative hazard assessment of chemicals.

Human health endpoints evaluated: Acute mammalian toxicity, repeated dose toxicity, carcinogenicity, mutagenicity/genotoxicity, reproductive and developmental toxicity, neurotoxicity, skin sensitization, respiratory sensitization, immunotoxicity and eye and skin irritation.

Environmental fate and effects endpoints evaluated: Aquatic toxicity, environmental persistence, and bioaccumulation.

The low-concern criteria used to evaluate both human health and environmental fate and effects are included in Table 4 below.

Table 4: Low concern Criteria for Human Health and Environmental Fate and Effects

Human Health				
Acute Mammalian Toxicity[21]	**Very High**	**High**	**Moderate**	**Low**
Oral LD50 (mg/kg)	≤ 50	> 50 – 300	> 300 - 2000	> 2000
Dermal LD50 (mg/kg)	≤ 200	> 200 – 1000	> 1000 - 2000	> 2000
Inhalation LC50 (vapor/gas) (mg/L)	≤ 2	> 2 – 10	> 10 - 20	> 20
Inhalation LC50 (dust/mist/fume) (mg/L)	≤ 0.5	> 0.5 - 1.0	> 1.0 - 5	> 5

[18] Discussed in the document "Approach Document for Screening Hazard Information for Low-Priority Substances Under TSCA," which can be found at https://www.regulations.gov/document?D=EPA-HQ-OPPT-2019-0450-0002.

[19] https://www.epa.gov/sustainable-futures/sustainable-futures-p2-framework-manual

[20] https://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev07/English/ST_SG_AC10_30_Rev7e.pdf

[21] Values derived from GHS criteria (*Chapter 3.1: Acute Toxicity.* 2009, United Nations).

Table 4: Low concern Criteria for Human Health and Environmental Fate and Effects				
Repeated Dose Toxicity, Neurotoxicity, and Immunotoxicity (90-day study)[22]		**High**	**Moderate**	**Low**
Oral (mg/kg-bw/day)		< 10	10 - 100	> 100
Dermal (mg/kg-bw/day)		< 20	20 - 200	> 200
Inhalation (vapor/gas) (mg/L/6h/day)		< 0.2	0.2 - 1.0	> 1.0
Inhalation (dust/mist/fume) (mg/L/6h/day)		< 0.02	0.02 - 0.2	> 0.2
Reproductive and Developmental Toxicity[23]		**High**	**Moderate**	**Low**
Oral (mg/kg/day)		< 50	50 - 250	> 250
Dermal (mg/kg/day)		< 100	100 - 500	> 500
Inhalation (vapor, gas, mg/L/day)		< 1	1 - 2.5	> 2.5
Inhalation (dust/mist/fume, mg/L/day)		< 0.1	0.1 - 0.5	> 0.5
Mutagenicity/ Genotoxicity[24]	**Very High**	**High**	**Moderate**	**Low**
Germ cell mutagenicity	GHS Category 1A or 1B: Substances known to induce heritable mutations or to be regarded as if they induce heritable mutations in the germ cells of humans.	GHS Category 2: Substances which cause concern for humans owing to the possibility that they may induce heritable mutations in the germ cells of humans.	Evidence of mutagenicity support by positive results *in vitro* OR *in vivo* somatic cells of humans or animals	Negative for chromosomal aberrations and gene mutations, or no structural alerts.
Mutagenicity and Genotoxicity in Somatic Cells		OR Evidence of mutagenicity supported by positive results in *in vitro* AND		

[22] Values from GHS criteria for Specific Target Organ Toxicity Repeated Exposure (*Chapter 3.9: Specific Target Organ Toxicity Repeated* Exposure. 2009, United Nations).

[23] Values derived from the US EPA's Office of Pollution Prevention & Toxics criteria for HPV chemical categorizations (*Methodology for Risk-Based Prioritization Under ChAMP*), and the EU REACH criteria for Annex IV (2007).

[24] From GHS criteria (*Chapter 3.5: Germ Cells Mutagenicity.* 2009, United Nations) and supplemented with considerations for mutagenicity and genotoxicity in cells other than germs cells.

Table 4: Low concern Criteria for Human Health and Environmental Fate and Effects				
		in vivo somatic cells and/or germ cells of humans or animals.		
Carcinogenicity[25]	**Very High**	**High**	**Moderate**	**Low**
	Known or presumed human carcinogen (GHS Category 1A and 1B)	Suspected human carcinogen (GHS Category 2)	Limited or marginal evidence of carcinogenicity in animals (and inadequate[26] evidence in humans)	Negative studies or robust mechanism-based SAR
Sensitization[27]		**High**	**Moderate**	**Low**
Skin sensitization		High frequency of sensitization in humans and/or high potency in animals (GHS Category 1A)	Low to moderate frequency of sensitization in human and/or low to moderate potency in animals (GHS Category 1B)	Adequate data available and not GHS Category 1A or 1B
Respiratory sensitization		Occurrence in humans or evidence of sensitization in humans based on animal or other tests (equivalent to GHS Category 1A or 1B)	Limited evidence including the presence of structural alerts	Adequate data available indicating lack of respiratory sensitization
Irritation/ Corrosivity[28]	**Very High**	**High**	**Moderate**	**Low**
Eye Irritation/ Corrosivity	Irritation persists for >21 days or corrosive	Clearing in 8-21 days, severely irritating	Clearing in 7 days or less, moderately irritating	Clearing in less than 24 hours, mildly irritating
Skin Irritation/ Corrosivity	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

[25] Criteria mirror classification approach used by the IARC (*Preamble to the IARC Monographs: B. Scientific Review and Evaluation: 6. Evaluation and rationale.* 2006*)* and incorporate GHS classification scheme (*Chapter 3.6: Carcinogenicity.* 2009, United Nations).

[26] EPA's approach to determining the adequacy of information is discussed in the document "Approach Document for Screening Hazard Information for Low-Priority Substances Under TSCA", also released at proposal.

[27] Incorporates GHS criteria (*Chapter 3.4: Respiratory or Skin Sensitization.* 2009, United Nations).

[28] Criteria derived from the Office of Pesticide Programs Acute Toxicity Categories (US EPA. *Label Review Manual.* 2010).

Table 4: Low concern Criteria for Human Health and Environmental Fate and Effects			
Environmental Fate and Effects			
Acute Aquatic Toxicity Value (L/E/IC50)[29]	**Chronic Aquatic Toxicity Value (L/E/IC50)**[29]	**Persistence (Measured in terms of level of biodegradation)**[30]	**Bioaccumulation Potential**[31]
May be low concern if ≤10 ppm…	…and ≤1 ppm…	…and the chemical meets the 10-day window as measured in a ready biodegradation test…	…and BCF/BAF < 1000.
Low concern if >10 ppm and <100 ppm…	…and >1 ppm and <10 ppm…	…and the chemical reaches the pass level within 28 days as measured in a ready biodegradation test	
Low concern if ≥100 ppm…	…and ≥ 10 ppm…	… and the chemical has a half-life < 60 days…	

6.1 Human Health Hazard

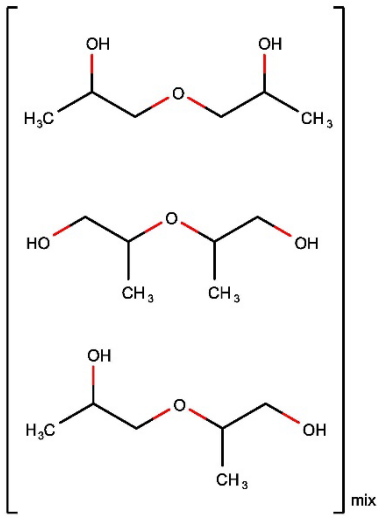
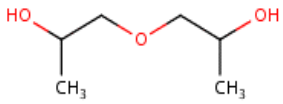
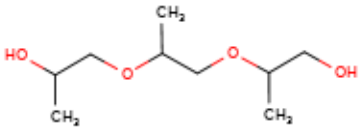
Below is a summary of the reasonably available information that EPA included in the hazard evaluation of dipropylene glycol. In many cases, EPA used analogous chemicals to make findings for a given endpoint. Where this is the case, use of the analog is explained. If the chemical studied is not named, the study is for dipropylene glycol. Appendix B contains more information on each study.

Dipropylene glycol is a mixture of three branched isomers of bis(hydroxypropyl) ether generated as byproducts or coproducts in the manufacture of propylene glycol when some of the propylene glycol formed reacts with unreacted propylene oxide (methyl oxirane) feedstock. The positions of the methyl substituents are unspecified. Both analogs used to inform EPA's understanding of this chemical are oligomeric propylene glycols like dipropylene glycol. The first analog, 1,1'-dimethyldiethylene glycol, is a specific isomer of dipropylene glycol and is a component of dipropylene glycol. The second analog, tripropylene glycol, is similar to dipropylene glycol, and has an additional propylene oxide unit. As shown in Table 5, EPA used best professional judgement to select analogs for dipropylene glycol, based on similarity in structure, physical-chemical properties, and functionality, with the assumption that these substances will have similar environmental transport and persistence characteristics, and bioavailability and toxicity profiles. Differences in the methyl group positions in these chemicals are not expected to significantly affect their chemical and hazard profiles.

[29] Derived from GHS criteria (*Chapter 4.1: Hazards to the Aquatic Environment.* 2009, United Nations), EPA OPPT New Chemicals Program (*Pollution Prevention (P2) Framework,* 2005*)* and OPPT's criteria for HPV chemical categorization (*Methodology for Risk Based Prioritization Under ChAMP. 2009).*

[30] Derived from OPPT's New Chemicals Program and DfE Master Criteria, and reflects OPPT policy on PBTs (*Design for the Environment Program Master Criteria for Safer Chemicals, 2010)*.

[31] Derived from OPPT's New Chemicals Program and Arnot & Gobas (2006) [Arnot, J.A. and F.A. Gobas, *A review of bioconcentration factor (BCF) and bioaccumulation factor (BAF) assessments for organic chemicals* in aquatic organisms. Environmental Reviews, 2006. 14: p. 257-297.]

Table 4: Dipropylene Glycol and Analog Structures		
CASRN	**Name**	**Structure**
25265-71-8	Dipropylene glycol (mixed isomers)	 Representative structure
110-98-5	1,1'-Dimethyldiethylene glycol	 Representative structure
24800-44-0	Tripropylene glycol (mixed isomers)	

6.1.1 Absorption, Distribution, Metabolism, and Excretion

Absorption

To assess absorption, EPA relied on experimental studies on dipropylene glycol and tripropylene glycol. In a dog study, dipropylene glycol was rapidly absorbed from the gastrointestinal tract and was no longer detectable in blood 24 hours after an oral exposure (BUA, 1996). These data indicate dipropylene glycol is rapidly absorbed after oral exposures.

In vitro studies were used to assess the potential for dermal absorption by dipropylene glycol. Excised abdominal skin from human cadavers demonstrated dipropylene glycol is a slow penetrant, with the results indicating a permeability coefficient of 3.85 x 10^{-5} cm/hour (Fasano et al., 2011; Reported to the ECHA database, 2007b; Fasano, 2007).

Based on its low molecular weight and high water solubility (discussed in Section 3), dipropylene glycol is expected to be absorbed from the lungs if inhaled.

Distribution

Dipropylene glycol is considered water soluble based on its physical-chemical properties (Section 3) and is likely to be distributed mainly in aqueous compartments in an organism. This prediction is supported by experimental evidence on the analog tripropylene glycol. Rats exposed to tripropylene glycol by oral gavage displayed radiolabeled tripropylene glycol in the tissues and the carcass 24 hours following exposure. Specifically, tripropylene glycol was reported in the liver at 0.20%, kidneys at 0.09%, carcass at 0.06%, blood at 0.03%, and skin, brain, muscle, and fat at less than 0.03% (as percent of the administered dose per gram of tissue) (OECD, 2001; Reported to the ECHA database, 1995a). These data indicate tissue distribution of tripropylene glycol was rapid, especially to the liver and kidney after dosing and provide evidence that dipropylene glycol will be rapidly distributed following oral absorption.

Metabolism

To assess the metabolism of dipropylene glycol, EPA relied on experimental evidence from tripropylene glycol. Oral administration of tripropylene glycol to rats resulted in rapid metabolism to dipropylene glycol, then to propylene glycol, which is converted to lactic and pyruvic acids or excreted in the urine. Lactate and pyruvate may be further metabolized through the citric acid cycle to yield carbon dioxide and water or may be stored as glycogen (OECD, 2001; Reported to the ECHA database, 1995a). Rats exposed to ^{14}C-tripropylene glycol by oral gavage excreted approximately 13% as free or conjugated tripropylene glycol, approximately 8.4% as free and conjugated dipropylene glycol, and approximately 3.9% as free and conjugated propylene glycol (OECD, 2001; Reported to the ECHA database, 1995a). These data indicate that dipropylene glycol will be metabolized.

Excretion

To assess excretion, EPA relied on experimental evidence from tripropylene glycol. Following the oral administration of tripropylene glycol to rats, 52% was recovered in urine, 21% in exhaled CO_2, and 5% in the feces after 24 hours (OECD, 2001; Reported to the ECHA database, 1995a). These data indicate that dipropylene glycol will be excreted from the body, as opposed to accumulating in tissues, following exposure.

6.1.2 Acute Toxicity

EPA assessed the mammalian toxicity potential for acute exposure from dipropylene glycol using results from oral, inhalation, and dermal studies. Rats exposed to dipropylene glycol by oral gavage demonstrated no mortality at the single dose tested (5010 mg/kg), resulting in an LD_{50} greater than 5010 mg/kg in rats (Reported to the ECHA database, 1995d). Another study in rats exposed by oral gavage reported a LD_{50} of 16,000 mg/kg (OECD, 2001; Reported to the ECHA database, 1980). These results provide sufficient information to indicate low concern for acute toxicity with expected LD_{50}s above the low-concern benchmark of 2000 mg/kg for oral exposures.

A study on rabbits exposed to dipropylene glycol dermally reported no adverse effects at the single dose tested (5010 mg/kg), resulting in an LD_{50} greater than 5010 mg/kg (Reported to the ECHA

database, 1995b). These results provide sufficient information to indicate low concern for acute toxicity with expected LD_{50}s above the low-concern benchmark of 2000 mg/kg for dermal exposures.

A study on rats exposed to a dipropylene glycol aerosol reported no adverse effects at the single dose tested, 2.34 mg/L (Reported to the ECHA database, 1995c). Given that the single dose of the inhalation study indicated no adverse effects at a dose below the low concern benchmark of 5 mg/L for aerosols, EPA incorporated experimental evidence on tripropylene glycol to inform a weight of the scientific evidence decision. A study on rats exposed to a single concentration (0.083 mg/L) of tripropylene glycol in saturated vapor for eight hours and then observed for two weeks reported no mortalities (Reported to the ECHA database, 1974). Based on tripropylene glycol's vapor pressure of 0.00195 torr, the expected saturation concentration is around 0.02 mg/L at room temperature, which is below the study concentration of 0.083 mg/L, indicating no adverse effects are expected at the complete air saturation concentration. Based on the chemical's physical-chemical properties and available experimental data, these results provide sufficient information to indicate low concern for acute toxicity from inhalation exposures based on no adverse effects reported at expected air saturation.

6.1.3 Repeated Dose Toxicity

EPA assessed the potential for mammalian toxicity from repeated exposures to dipropylene glycol using studies in mice and rats. Mice exposed to dipropylene glycol in drinking water for 13 weeks demonstrated a no observed adverse effect level (NOAEL) of 2620 mg/kg-day and a lowest observed adverse effect level (LOAEL) of 4790 mg/kg-day based on increased liver weight (Reported to the ECHA database, 2004g; NTP, 2004). Rats exposed to dipropylene glycol in drinking water for 14 weeks demonstrated a NOAEL of 435 mg/kg-day and a LOAEL of 890 mg/kg-day based on relative liver weight (Reported to the ECHA database, 2004f; NTP, 2004). EPA also assessed the potential for toxicity from chronic exposures. A two-year study on mice exposed to dipropylene glycol in drinking water demonstrated a NOAEL of 1040 mg/kg-day and a LOAEL of 1950 mg/kg-day based on decreased mean body weight (Reported to the ECHA database, 2004e; NTP, 2004). Rats exposed to dipropylene glycol for two years in drinking water demonstrated a NOAEL of 115 mg/kg-day and a LOAEL of 470 mg/kg-day based on incidence of nephropathy, focal histiocytic and focal granulomatous inflammation in male livers (Reported to the ECHA database, 2004b, d; NTP, 2004). These results provide sufficient information to indicate low concern for toxicity resulting from repeated exposures by exceeding the low-concern benchmark of 100 mg/kg-day for a 90-day study.

6.1.4 Reproductive and Developmental Toxicity

EPA assessed the potential for reproductive toxicity using read-across from an analog, tripropylene glycol. In a combined repeated dose, reproductive, and developmental study, rats were exposed to tripropylene glycol via oral gavage for 49 days, beginning 14 days prior to mating and through lactation day 3 for females. The authors reported no reproductive (mating, fertility, and estrus cycle) or developmental effects (external examinations of the pups and pup body weight gain) at the highest dose tested (1000 mg/kg-day). The NOAEL for this study was 1000 mg/kg-day (OECD, 1994; Reported to the ECHA database, 1993b). These analog results provide sufficient information to indicate low concern for reproductive toxicity in the target chemical by exceeding the 250 mg/kg-day benchmarks.

To further assess the potential for developmental toxicity, EPA evaluated two oral gavage studies on dipropylene glycol. A study on pregnant rats exposed during gestational day (GD) 6-15 reported a developmental NOAEL of 2000 mg/kg-day and a LOAEL of 5000 mg/kg-day based on decreased fetal weight (OECD, 2001; BUA, 1996; Bates et al., 1992b; Reported to the ECHA database, 1990b). A study on rabbits exposed to dipropylene glycol during GD 6-19 reported no adverse effects at the highest dose tested (1200 mg/kg-day), resulting in a NOAEL of 1200 mg/kg-day (OECD, 2001; Bates et al., 1992a; Reported to the ECHA database, 1990a). These results provide sufficient information to indicate low concern for developmental toxicity by exceeding the 250 mg/kg-day benchmark.

6.1.5 Genotoxicity

EPA assessed experimental studies on genotoxicity as a potential indicator of genotoxic carcinogenicity. Three *in vitro* gene mutation studies resulted in negative findings from dipropylene glycol exposure with and without metabolic activation in *Salmonella typhimurium* (Reported to the ECHA database, 2004c; NTP, 2004; Reported to the ECHA database, 1992a) and in mouse lymphoma cells (Reported to the ECHA database, 1988). Further, a mouse *in vivo* study indicated negative results for chromosomal aberrations in the form of micronucleated polychromatic erythrocytes (OECD, 2001; Reported to the ECHA database, 1999). These results provide sufficient information to indicate low concern for genotoxicity.

6.1.6 Carcinogenicity

EPA assessed the potential for dipropylene glycol to cause carcinogenicity in mice and rats. Rats exposed to dipropylene glycol in drinking water for 2 years demonstrated no dose-related increase in cancer incidence and no cancer-related effects (i.e., neoplasms) at the highest dose tested (3040 mg/kg-day in males, 2330 mg/kg-day in females), resulting in a negative finding for carcinogenicity (Reported to the ECHA database, 2004a, b; NTP, 2004). Similarly, mice exposed to dipropylene glycol in drinking water for two years also found no adverse effects at the highest dose tested (2390 mg/kg-day in males, 1950 mg/kg-day in females), resulting in a negative finding for carcinogenicity (Reported to the ECHA database, 2004a; NTP, 2004). These negative results provide sufficient information to indicate low concern for carcinogenicity.

6.1.7 Neurotoxicity

While no traditional neurotoxicity studies were available for dipropylene glycol or closely-related analogs, EPA assessed the potential for neurotoxicity using relevant endpoints measured in acute and repeated dose studies and using accepted new approach methodologies (NAMs), such as U.S. EPA's ToxCast.[32]

Several repeated dose studies in rats and mice exposed to dipropylene glycol orally reported no effects on the limited neurological endpoints that were evaluated (i.e., brain histopathology only). Dipropylene glycol did not produce histopathological brain lesions in rats at oral doses up to 12,800 mg/kg-day for 3 months or up to 3,040 mg/kg-day for 2 years. Similarly, no brain lesions were observed at oral doses up to 14,700 mg/kg-day for 3 months or up to 2,390 mg/kg-day for 2 years in mice (Reported to the ECHA database, 2004b, d; NTP, 2004). Rats acutely exposed to dipropylene

[32] https://comptox.epa.gov/dashboard . Chemical specific assay list can be found at https://comptox.epa.gov/dashboard/dsstoxdb/results?search=DTXSID0027856

glycol by oral gavage noted decreased locomotor activity and ataxia for a few hours after exposure to the high dose of 5010 mg/kg, but the effects subsided by the first day of the observation period (Reported to the ECHA database, 1995d).

ToxCast results for dipropylene glycol included 27 assays related to neurological functions. Bioactivity was not induced by dipropylene glycol in any assay.[33]

These data provide sufficient information to indicate there is low concern for neurotoxicity associated with dipropylene glycol. This finding is also supported by the low-hazard findings for other human health hazard endpoints, including toxicity from acute exposures, reproductive toxicity, and developmental toxicity.

6.1.8 Skin Sensitization

EPA assessed the potential for dipropylene glycol to cause skin sensitization using available experimental studies. A study on guinea pigs (Reported to the ECHA database, 1995j) and two studies on humans (Reported to the ECHA database, 1995g; Johansen et al., 1995; Leberco Labs, 1994) reported negative results, providing sufficient information to indicate low concern for skin sensitization by dipropylene glycol.

6.1.9 Respiratory Sensitization

Experimental data determined to be of adequate quality[34] on dipropylene glycol or closely related analogs were not reasonably available for the assessment of respiratory sensitization potential for dipropylene glycol, EPA used NAMs, such as the QSAR Toolbox, version 4.2 models[35] for keratinocyte gene expression; protein binding potency h-CLAT; protein binding potency cysteine; protein binding potency lysine; and respiratory sensitization. No structural alerts were identified for dipropylene glycol. The results from NAMs and weight of the scientific evidence provides sufficient information to indicate low concern for respiratory sensitization.

6.1.10 Immunotoxicity

EPA reviewed the literature for immunotoxicity endpoints such as lymphoid organ weight, histopathology, and immune function. Specific endpoints included immune system function (e.g., T-cell dependent antibody response), immunophenotyping (e.g., changes in cell types), natural killer cell activity, host resistance assays, macrophage neutrophil function, and cell-mediated immunity

[33] EPA reviewed reasonably available information in the ToxCast database for neurological functions. Reference: Chushak Y., Shows H., Gearhart J., Pangburn H. 2018. In silico identification of protein targets for chemical neurotoxins using Toxcast in vitro data and read-across within the QSAR toolbox. Toxicology Research issue 3. Supplemental files: https://pubs.rsc.org/en/content/articlelanding/2018/tx/c7tx00268h#!divAbstract.

[34] The literature search and review process to determine studies of adequate quality for inclusion in the screening review is further discussed in the document "Approach Document for Screening Hazard Information for Low-Priority Substances under TSCA." https://www.regulations.gov/document?D=EPA-HQ-OPPT-2019-0450-0002.

[35] The OECD QSAR Toolbox is one of EPA's listed new approach methodologies under TSCA 4(h)(2), available at https://www.epa.gov/sites/production/files/2019-12/documents/alternative_testing_nams_list_first_update_final.pdf

assays. Experimental data determined to be of adequate quality[36] on dipropylene glycol or closely related analogs were not reasonably available for the assessment of immunotoxicity potential.

Repeated dose testing is designed to be comprehensive in nature and is intended to address a wide range of possible impacts, including, but not limited to immunotoxicity. The testing required to address repeated dose toxicity typically includes routine clinical observations, hematology and clinical biochemistry, body weight/food and water consumption, as well as both gross necropsy and histopathology involving organs and organ systems. For example, repeated dose studies can evaluate changes to the spleen or thymus, which with accompanying histological changes or changes in hematological parameters can indicate potential for immunological toxicity. Where immune system-related endpoints were measured in repeated dose studies, any adverse effects would be incorporated into the lowest observed adverse effect level used against the low-concern benchmarks. Therefore, EPA relied on this information from repeated dose studies when it was reasonably available. For dipropylene glycol, the included repeated dose studies did not report changes in lymphoid organ weights (thymus, spleen, lymph nodes), with accompanying histopathology, or hematological changes due to exposure to this chemical substance in mammals. These results provide sufficient information to indicate low concern for immunotoxicity potential from dipropylene glycol.

6.1.11 Skin Irritation

EPA assessed dermal irritation using experimental results on rabbits and humans. Three studies demonstrated dipropylene glycol was negative for dermal irritation in rabbits (Reported to the ECHA database, 1995b, i; Leberco Labs, 1994). Further, a study on skin-sensitive humans demonstrated negative results for dermal irritation by dipropylene glycol (Reported to the ECHA database, 1997), while another study on humans indicated mild erythema in 4 of the 33 subjects at the 24-hour scoring (Reported to the ECHA database, 1995e). These results provide sufficient information to indicate dipropylene glycol is of low concern for skin irritation.

6.1.12 Eye Irritation

To assess potential for eye irritation, EPA used the results of two studies on rabbits. Rabbits exposed to dipropylene glycol displayed conjunctival redness and a subset displayed chemosis after one hour, but these results were fully reversible by 24 hours, leading to a negative result for eye irritation (Reported to the ECHA database, 1995f). These results are supported by another rabbit study with negative results (Leberco Labs, 1994). These results provide sufficient information to indicate low concern for eye irritation.

6.1.13 Hazards to Potentially Exposed or Susceptible Subpopulations

The above information supports a low human health hazard finding for dipropylene glycol based on low-concern criteria. This finding includes considerations such as the potential for developmental toxicity, reproductive toxicity, and acute or repeated dose toxicity that may impact potentially exposed or susceptible subpopulations. Based on the hazard information discussed in Section 6, EPA did not identify populations with greater susceptibility to dipropylene glycol.

[36] The literature search and review process to determine studies of adequate quality for inclusion in the screening review is further discussed in the document "Approach Document for Screening Hazard Information for Low-Priority Substances under TSCA." https://www.regulations.gov/document?D=EPA-HQ-OPPT-2019-0450-0002.

6.2 Environmental Hazard

To review environmental hazard endpoints without adequate quality[36] experimental data, EPA used widely accepted new approach methodologies (NAMs), such as modeling and estimation tools often based on physical-chemical properties, which provided information sufficient to fill these endpoints and form the basis for designation. EPA assessed environmental hazard for dipropylene glycol based on available experimental data and estimated toxicity values using the Ecological Structure Active (ECOSAR) Predictive Model.[37] Appendix B contains a summary of the reasonably available environmental hazard data.

6.2.1 Acute Aquatic Toxicity

EPA assessed environmental hazard from acute exposures to dipropylene glycol using experimental studies on dipropylene glycol and tripropylene glycol. No adverse effects were observed in aquatic invertebrates exposed to dipropylene glycol at the highest dose tested (100 mg/L), resulting in a NOAEL of 100 mg/L (Reported to the ECHA database, 2002, 1995h). EPA used read-across from tripropylene glycol to assess toxicity to aquatic vertebrates and algae. No effects were observed in aquatic vertebrates exposed to tripropylene glycol, resulting in an LC_{50} greater than 1000 mg/L (Reported to the ECHA database, 1994a; OECD, 1994). Similarly, no effects were observed in algae exposed to tripropylene glycol, resulting in an LC_{50} greater than 1000 mg/L (OECD, 1994). These aquatic toxicity studies provide sufficient information to indicate low concern for acute aquatic exposure by exceeding the low-concern benchmark of 100 mg/L.

6.2.2 Chronic Aquatic Toxicity

EPA estimated environmental hazard from chronic aquatic exposures using ECOSAR. Chronic toxicity values estimated for aquatic vertebrates, aquatic invertebrates, and algae were 1,300 mg/L, 420 mg/L, and 370 mg/L, respectively. These toxicity values provide sufficient information to indicate that dipropylene glycol is expected to have low environmental hazard based on the low-concern criteria chronic aquatic toxicity benchmark of 10 mg/L.

6.3 Persistence and Bioaccumulation Potential

6.3.1 Persistence

Varied results are observed in the experimental ready test data presented in Appendix B. Because of the differences in the test conditions of the OECD ready test methods, some of this variability is likely a result of performance under different test designs rather than an inherent limitation of the biodegradability of the test substance. Given the varied results, EPA relied on studies on dipropylene glycol and tripropylene glycol to make a weight of the scientific evidence conclusion. An explanation of ready and inherent biodegradation tests is provided below.

Ready biodegradation tests are stringent test methods in which a high concentration of test substance is evaluated using a non-adapted inoculum. Passing this type of test indicates that a chemical is likely to biodegrade in the environment and have low potential for persistence. However, not passing the ready criteria is not necessarily an indication that a chemical is recalcitrant or that it will be persistent in the environment. In contrast, inherent biodegradability tests use more favorable conditions to

[37] https://www.epa.gov/tsca-screening-tools/ecological-structure-activity-relationships-ecosar-predictive-model

promote a high expected capacity for degradation, including the use of prolonged exposure periods and a low ratio of test substance to inoculum biomass. Passing this type of test indicates that a substance is inherently biodegradable but does not provide evidence for ready biodegradation. The available data included tests for both ready biodegradation and inherent biodegradation.

An aerobic BOD5 test indicates dipropylene glycol is not rapidly biodegradable, with limited biodegradation observed (as O_2 consumption) after 5 days (Meshako et al., 1999). Additionally, tripropylene glycol was tested in three ready tests (OECD Guidelines 301C, OECD 301B and OECD 301D) that reported < 5% degradation over 28-day incubation periods, indicating that it is not readily biodegradable (OECD, 1994; Reported to the ECHA database, 1993a, 1991b). However, in another OECD Guideline 301D test, tripropylene glycol reached 69% O_2 consumption after 28 days and just missed the 10-day window criterion at 59% in 11 days under aerobic conditions (Reported to the ECHA database, 1991a). In addition, both dipropylene glycol and tripropylene glycol reached ≥ 81% O_2 consumption after 28 days in the OECD Guideline 301F test, meeting the criteria for ready biodegradation but not meeting the 10-day window under aerobic conditions (Reported to the ECHA database, 2007a, c, 1994b). These data suggest that dipropylene glycol is biodegradable and may be readily biodegradable under the right conditions. Results from additional aerobic studies, including the inherent biodegradability test (OECD Guideline 302A) and a seawater biodegradability test (OECD Guideline 306), provide further support that dipropylene glycol has the capacity to biodegrade under environmental conditions (Reported to the ECHA database, 2007d, 1994b). Furthermore, microbial inhibition tests indicate that these substances are non-toxic to microbial populations found in sewage treatment plants (Reported to the ECHA database, 2010, 1992b).

Based on the weight of the scientific evidence, the data suggest dipropylene glycol is expected to biodegrade under aerobic conditions. Although under some test conditions this chemical may not meet the benchmark for ready biodegradation, both primary and ultimate biodegradation of this substance has been demonstrated using a variety of standard and non-standard test methods.

Experimental data determined to be of adequate quality[38] on dipropylene glycol or closely related analogs were not reasonably available for the assessment of anaerobic biodegradation potential. Though BIOWIN modeling did not predict this chemical to anaerobically biodegrade quickly, these results do not indicate this chemical would not anaerobically biodegrade. The method used in the BIOWIN model is the ISO 11734 anaerobic test which measures methanogenic anaerobic biodegradation, one of several known pathways in anoxic environments. Other pathways include manganese and iron reduction, sulfate-reducing microorganisms, and halorespiring bacteria (Ghattas et al. 2017[39]). For dipropylene glycol, the chemical contains degradable functional groups such as primary alcohols and propylene glycol. For example, based on evidence for propylene glycol, EPA expects dipropylene glycol could anaerobically biodegrade via methanogenic fermentation following a disproportionation reaction, forming propionate and n-propanol. These fermentation products would then be degraded via well-documented anaerobic oxidation reactions. In a serum bottle test using

[38] The literature search and review process to determine studies of adequate quality for inclusion in the screening review is further discussed in the document "The Approach Document for Screening Hazard Information for Low-Priority Substances under TSCA." https://www.regulations.gov/document?D=EPA-HQ-OPPT-2019-0450-0002.

[39] Ghattas, A.K., Fischer, F., Wick, A., and Ternes, T. (2017) Anaerobic biodegradation of (emerging) organic contaminants in the aquatic environment. *Water Research*, 116 (1): 268-295. Available at: https://www.sciencedirect.com/science/article/pii/S0043135417300763

acclimated sludge, propylene glycol completely degraded to methane after 45 days (Veltman et al., 1998[40]). Additionally, the primary alcohol functional groups could convert to carboxylic acid under methanogenic conditions (Ghattas et al., 2017). While EPA cannot be certain of the rate at which these anerobic pathways may occur, this information supports the potential for dipropylene glycol to anaerobically biodegrade. In addition, dipropylene glycol's low-hazard results for environmental and mammalian toxicity and evidence of aerobic biodegradation provide sufficient information to indicate low concern for this chemical if present in anaerobic environments.

No degradation products of concern were identified for this chemical substance. The available biodegradation results meet the low-concern benchmark and provide sufficient information to indicate this chemical has low persistence.

6.3.2 Bioaccumulation Potential

Based on the estimated bioaccumulation factor (BAF) value of 0.9 using the Estimation Programs Interface (EPI) Suite models,[41] EPA has sufficient information to indicate dipropylene glycol has low potential for bioaccumulation in the environment based on the low-concern benchmark of less than 1000.

[40] Veltman, S., Schoenberg, M., and Switzenbaum, M.S. (1998) Alcohol and acid formation during the anaerobic decomposition of propylene glycol under methanogenic conditions. Biodegradation, 9 (2): 113-118. Available at: https://link.springer.com/article/10.1023%2FA%3A1008352502493#citeas.

[41] https://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program-interface

7. Exposure Characterization

EPA considered reasonably available information on exposure for dipropylene glycol. In general, there is limited information on exposure for low-hazard chemicals. EPA consulted sources of exposure and use information that include CDR and other databases and public sources. EPA used these sources (described in Table A.2) to inform intended, known, or reasonably foreseen uses.

Dipropylene glycol is a solvent used in processing (incorporation into an article and into a formulation, mixture, or product) in the industrial printing ink manufacturing sector and as a reactant in plastic and resin manufacturing. It is used in a variety of industrial, consumer, and commercial uses, as shown in Table 3. Non-TSCA uses, including those excluded under TSCA section 3(2), are beyond the scope of this assessment (See Table A.3).

Under the conditions of use identified in Table 3, EPA assessed the potential exposure to the following categories: the environment, the general population, and potentially exposed or susceptible subpopulations including workers, consumers, and children.

7.1 Production Volume Information

Production volume information for dipropylene glycol is based on an analysis of CDR data reported from 1986-2015.[42] In reporting years 1986, 1990, and 1994, aggregate production volume for dipropylene glycol was between 50,000,000 and 100,000,000 lbs., and in reporting years 1998, 2002, and 2006 aggregate production volume was between 100,000,000 and 500,000,000 lbs. Between reporting years 2012 and 2015, aggregate production volume for dipropylene glycol was between 100,000,000 and 250,000,000 lbs. The exact amount is available for one year, 2011, in which 201,501,161 lbs. of dipropylene glycol was manufactured or imported. In general, since 2011, production volume has remained relatively stable.

7.2 Exposures to the Environment

EPA expects most exposures to the environment to occur during the manufacture, import, processing, and industrial, commercial, and consumer uses of dipropylene glycol. Exposure is also possible from other conditions of use, such as distribution and disposal. These activities could result in releases of dipropylene glycol to media including surface water, landfills, and air.

EPA expects high levels of removal of dipropylene glycol during wastewater treatment (either directly from the facility or indirectly via discharge to a municipal treatment facility or Publicly Owned Treatment Works (POTW), see Table 2). Further, dipropylene glycol is expected to have low persistence (aerobic biodegradation is discussed in Section 6.3.1) and has the potential to break down in the environment to carbon dioxide and water. Therefore, any release of this chemical is expected to break down, reducing exposure to aquatic organisms in the water column and groundwater sources of drinking water, including well water. Based on the estimated log K_{oc} (Table 2 of Section 3), dipropylene glycol is expected to have negligible adsorption to sediment, reducing the potential for

[42] The CDR requires manufacturers (including importers) to report information on the chemical substances they produce domestically or import into the U.S. above 25,000 lb. per site per year.

toxicity to benthic organisms. Dipropylene glycol's biodegradability during treatment processes will reduce the exposure potential to aquatic organisms.

If disposed of in a landfill, this chemical is expected to degrade under aerobic conditions (aerobic biodegradation is discussed in Section 6.3.1).

If incineration releases during manufacturing and processing occur, EPA expects significant degradation of dipropylene glycol to the point that it will not be present in air.

7.3 Exposures to the General Population

EPA expects the general population is unlikely to be exposed to dipropylene glycol from the potential environmental releases described above. Air exposure is unlikely from incineration. If dipropylene glycol is present in the air from volatilization, it is expected to be reduced because of its short atmospheric half-life of 4 hours (see Table 2 in Section 3).With the exception of time immediately following a release, dipropylene glycol is unlikely to be present in surface water because it will degrade (discussed in Section 6.3.1), reducing the potential for the general population to be exposed by oral ingestion or dermal exposure. Given the low bioaccumulation or bioconcentration potential of dipropylene glycol, oral exposure to dipropylene glycol via fish ingestion is unlikely.

7.4 Exposures to Potentially Exposed or Susceptible Subpopulations

EPA identified workers, children, and consumers as potentially exposed or susceptible subpopulations based on greater exposure to dipropylene glycol than the general population during manufacturing, processing, distribution, use and disposal. EPA identified children (including any adults working closely with children) as a population that may experience greater exposure to dipropylene glycol than the general population during use of finger paints and toys. EPA also identified consumers as a population that may experience greater exposure to dipropylene glycol than the general population through use of ink, toner, and colorant products; laundry and dishwashing products; and cleaning and furnishing care products, for example.

7.4.1 Exposures to Workers

Based on its reported physical form and measured melting point (Table 2), dipropylene glycol is a liquid under ambient conditions. Based on dipropylene glycol's conditions of use (Table 3), workers may be exposed to liquids through direct dermal contact with the substance and inhalation of aerosols if they are generated. Based on its measured vapor pressure (Table 2), dipropylene glycol is expected to be volatile at ambient temperatures, and therefore workers may be exposed through inhalation of vapors. If dipropylene glycol is in a dilute form, the estimated Henry's Law constant for dipropylene glycol suggests volatilization from water and aqueous solutions is expected to be minimal. Workers may be exposed to dipropylene glycol in manufacturing, processing, distribution, use and disposal.

7.4.2 Exposures to Consumers

Consumers may be exposed to dipropylene glycol through the use of cleaning and furnishing care products, laundry and dishwashing products, and ink, toner, and colorants products, for example. For all these uses, if dermal contact does occur, dipropylene glycol is expected to have minimal absorption through the skin based on its molecular weight, water solubility and partitioning coefficients (Section 3) and experimental data (Section 6.1.1). If the chemical is in an aerosol product

and inhalation exposure occurs, dipropylene glycol's absorption from the lungs is likely. EPA does not include intentional misuse, such as people drinking products containing this chemical, as part of the known, intended or reasonably foreseen conditions of use that could lead to an exposure (82 FR 33726). Thus, oral exposures will be incidental (meaning inadvertent and low in volume). Dipropylene glycol is expected to be metabolized and excreted, further reducing the duration of exposure.

7.4.3 Exposures to Children

Children may be exposed to dipropylene glycol through use of finger paints. Given the molecular weight, water solubility, and partitioning coefficients in Table 2 and the absorption data in Section 6.1.1, this chemical is expected to be poorly absorbed through the skin. Dipropylene glycol is likely to be present in a water-based solution in finger paints. Based on the predicted Henry's Law constant (Section 3), dipropylene glycol's volatilization from water and aqueous solutions is expected to be minimal from these products, reducing inhalation exposures from volatilization to children. While using these products, children may rub their eyes or incidentally ingest the product.

Children may also be exposed to dipropylene glycol when playing with wooden toys. A 2005 survey of chemical substances in consumer products conducted by the Danish Ministry of the Environment detected the chemical in one of 15 wooden toys (Danish EPA, 2005). The study identified chemicals in the wooden toys by soaking the toys in artificial saliva. While the study then estimated risk for a subset of the chemicals detected in the wooden toys, such estimates were not calculated for dipropylene glycol due to the chemicals low hazard profile. Additionally, based on the information in Section 3 and Section 6.1.1, children's exposure via dermal pathways is expected to be minimal, and ingestion is expected to result in metabolism and excretion.

7.5 References

Danish EPA. (2005). Migration and health assessment of chemical substances in surface treated wooden toys. Retrieved from https://www2.mst.dk/Udgiv/publications/2005/87-7614-712-6/pdf/87-7614-713-4.pdf

8. Summary of Findings

EPA has used reasonably available information on the following statutory and regulatory criteria and considerations to screen dipropylene glycol against each of the priority designation considerations in 40 CFR 702.9(a), listed below and discussed individually in this section, under its conditions of use:

- the hazard and exposure potential of the chemical substance (See Sections 6 and 7);
- persistence and bioaccumulation (See Section 6.3);
- potentially exposed or susceptible subpopulations (See Section 7.4);
- storage near significant sources of drinking water (See Section 8.4);
- conditions of use or significant changes in the conditions of use of the chemical substance (See Section 5);
- the chemical substance's production volume or significant changes in production volume (See Section 7.1); and
- other risk-based criteria that EPA determines to be relevant to the designation of the chemical substance's priority.

EPA conducted a risk-based, screening-level review based on the criteria and other considerations above and other relevant information described in 40 CFR 702.9(c) to inform the determination of whether the substance meets the standard of a high-priority substance. High-priority substance means a chemical substance that EPA determines, without consideration of costs or other non-risk factors, may present an unreasonable risk of injury to health or the environment because of a potential hazard and a potential route of exposure under the conditions of use, including an unreasonable risk to potentially exposed or susceptible subpopulations identified as relevant by EPA (40 CFR 702.3). Designation of a low-priority substance is not a finding that the chemical substance does not present an unreasonable risk, but rather that the chemical does not meet the statutory criteria for a high-priority substance and that a risk evaluation is not warranted at the time. This section explains the basis for the final designation and how EPA applied statutory and regulatory requirements, addressed rationales and reached conclusions.

8.1. Hazard and Exposure Potential of the Chemical Substance

Approach: EPA evaluated the hazard and exposure potential of dipropylene glycol. EPA used this information to inform its determination of whether dipropylene glycol meets the statutory criteria and considerations for final designation as a low-priority substance.

- **Hazard potential:**

For dipropylene glycol's hazard potential, EPA gathered information for a broad set of human health and environmental endpoints described in detail in Section 6 of this document. EPA screened this information against the low-concern benchmarks. EPA found that dipropylene glycol is of low concern for human health and environmental hazard across the range of endpoints in this low-concern criteria.

- **Exposure potential:**

To understand exposure potential, EPA gathered information on physical-chemical properties, production volumes, and the types of exposures likely to be faced by workers, the general population,

consumers, and children (discussed in Sections 3 and 7). EPA also gathered information on environmental releases. EPA identified workers, the general population, consumers, children, and the environment as most likely to experience exposures. EPA determined that while the general population, consumers, children and workers may be exposed to dipropylene glycol, exposure by the dermal pathway is limited by dipropylene glycol's physical-chemical properties. If ingestion occurs, dipropylene glycol is expected to be quickly metabolized and excreted, reducing the duration of exposure. Inhalation of dipropylene glycol from dilute products is expected to be minimal; however, workers may be exposed to vapors of neat dipropylene glycol. If dipropylene glycol is released into the environment, its exposure potential will be reduced through biodegradation under aerobic conditions.

Rationale: EPA determined that while workers, consumers, and children could be exposed to dipropylene glycol during processing, manufacturing, distribution, use, or disposal, these exposures do not pose a significant risk because of the chemical's low-hazard results across a range of endpoints (discussed in Section 6). In summary, the concern for exposure is mitigated by the low-hazard profile of this chemical.

Conclusion: Based on an initial analysis of reasonably available hazard and exposure information, EPA concludes that the risk-based, screening-level review under 40 CFR 702.9(a)(1) does not support a finding that dipropylene glycol meets the standard for a high-priority substance. The reasonably available hazard and exposure information described above provides sufficient information to support this finding.

8.2. Persistence and Bioaccumulation

Approach: EPA has evaluated both the persistence and bioaccumulation potential of dipropylene glycol based on a set of EPA and internationally accepted measurement tools and benchmarks that are indicators of persistence and bioaccumulation potential (described in Section 6). These endpoints are key components in evaluating a chemical's persistence and bioaccumulation potential.

Rationale: EPA review of experimental data indicates dipropylene glycol is biodegradable under aerobic conditions (discussed in Section 6.3.1). EPA's EPI Suite models indicate a low potential for bioaccumulation and bioconcentration.

Conclusion: Based on an initial screen of reasonably available information on persistence and bioaccumulation, EPA concludes that the screening-level review under 40 CFR 702.9(a)(2) does not support a finding that dipropylene glycol meets the standard for a high priority substance. The reasonably available persistence and bioaccumulation information described above provides sufficient information to support this finding.

8.3. Potentially Exposed or Susceptible Subpopulations

Approach: TSCA Section 3(12) states that the "term 'potentially exposed or susceptible subpopulation' means a group of individuals within the general population identified by the Administrator who, due to either greater susceptibility or greater exposure, may be at greater risk than the general population of adverse health effects from exposure to a chemical substance or mixture, such as infants, children, pregnant women, workers, or the elderly." EPA identified workers engaged in the manufacturing, processing, distribution, use and disposal of dipropylene glycol as a potentially

exposed or susceptible subpopulation (described in more detail in Section 7). EPA also identified children as a population that may experience greater exposure to dipropylene glycol than the general population during use of finger paints and toys. Consumers are also a potentially exposed subpopulation because of their use of products such as ink, toner, and colorant products and laundry and dishwashing products, as shown in Table 3.

Rationale: EPA did not identify hazard effects for this chemical that would make any population susceptible. EPA expects workers, consumers, and children to have a higher exposure to dipropylene glycol than the general population. Higher exposure to children (and adults working closely with children) could result from use of finger paints containing dipropylene glycol, which might lead to inadvertent eye contact. Children could also be exposed to dipropylene glycol via ingestion while playing with wooden toys. Because of the chemical's low-concern hazard properties, this exposure does not pose a significant increase in risk.

Conclusion: Based on the Agency's understanding of the conditions of use and expected users such as potentially exposed or susceptible subpopulations, EPA concludes that the screening-level review under 40 CFR 702.9(a)(3) does not support a finding that dipropylene glycol meets the standard for a high-priority substance. The conditions of use could result in increased exposures to certain populations. Even in light of this finding, the consistently low-concern hazard profile of dipropylene glycol provides sufficient evidence to support a finding of low concern. The reasonably available information on conditions of use, hazard, and exposure described above provides sufficient information to support this finding.

8.4. Storage near Significant Sources of Drinking Water

Approach: In Sections 6 and 7, EPA explains its evaluation of the elements of risk relevant to the storage of dipropylene glycol near significant sources of drinking water. For this criterion, EPA focused primarily on the chemical's potential human health hazards, including to potentially exposed or susceptible subpopulations, and environmental fate properties, and explored a scenario of a release to a drinking water source. EPA also investigated whether the chemical was monitored for and detected in a range of environmental media. The requirement to consider storage near significant sources of drinking water is unique to prioritization under TSCA Section 6(b)(1)(A).

Rationale: In terms of health hazards, dipropylene glycol is expected to present low concern to the general population, including susceptible subpopulations, across a spectrum of health endpoints. In the event of an accidental release into a surface drinking water source, dipropylene glycol is expected to be water soluble (see Section 3) and not expected to persist (see Section 6) in the drinking water supply. In the event of an accidental release to land, the estimated log K_{oc} indicates this substance is highly mobile in soils, increasing its potential for leaching into groundwater, including well water. The fate and transport evaluation indicates dipropylene glycol is unlikely to partition into sediment, predicted to biodegrade under aerobic conditions (see Section 3), and unlikely to bioaccumulate (see Section 6), minimizing the likelihood that the chemical would be present in sediment or groundwater to pose a longer-term drinking water contamination threat. Further, as explained in section 6.1.3, repeated exposures of mice and rats to dipropylene glycol through the drinking water exposure pathway indicate low concern for exposure through drinking water to this chemical.

A sudden release of large quantities of the chemical near a drinking water source could have immediate effects on the usability of a surface drinking water source. If such a release were to occur, two primary factors would operate together to reduce concern. First, the chemical would be expected to present low concern to the general population, including susceptible subpopulations, across a spectrum of health endpoints (see Section 6). Second, dipropylene glycol would degrade in an aerobic environment (see Section 6). Together, these factors mean that any exposures to this chemical through drinking water sources would be short-lived, and that if ingestion were to take place, concern for adverse health effects would be low.

EPA also explored whether the chemical had been identified as a concern under U.S. environmental statutes in the past. EPA searched lists of chemicals and confirmed that dipropylene glycol does not appear on these lists. The lists reviewed include EPA's List of Lists (https://www.epa.gov/sites/production/files/2015-03/documents/list_of_lists.pdf). EPA also searched the lists of chemicals included in the National Primary Drinking Water Regulations and the Unregulated Contaminant Monitoring Rule (UCMR) under the Safe Drinking Water Act (SDWA).

Conclusion: Based on a qualitative review of a potential release near a significant source of drinking water, EPA concludes that the screening-level review of dipropylene glycol under 40 CFR 702.9(a)(4) does not support a finding that dipropylene glycol meets the standard for a high-priority substance. The reasonably available information on storage near significant sources of drinking water described above provides sufficient information to support these findings.

8.5. Conditions of Use or Significant Changes in Conditions of Use of the Chemical Substance

Approach: EPA evaluated the conditions of use for dipropylene glycol and related potential exposures.

Rationale: EPA evaluated the conditions of use of dipropylene glycol (see Section 5 and Appendix A) and found it to have a broad range of conditions of use. EPA expects that even if the conditions of use were to expand beyond activities that are currently known, intended, and reasonably foreseen, the outcome of the screening review would likely not change and would not alter the Agency's conclusion of low concern. EPA bases this expectation on dipropylene glycol's consistently low-concern hazard characteristics across the spectrum of hazard endpoints and regardless of a change in the nature or extent of its use and resultant increased exposures.

Conclusion: EPA's qualitative evaluation of potential risk does not support a finding that dipropylene glycol meets the standard for a high-priority substance based on its low-hazard profile under the current conditions of use. EPA concludes that even if conditions of use broaden, resulting in an increase in the frequency or amount of exposures, the analysis conducted to support the screening-level review under 40 CFR 702.9(a)(5) would not change significantly. In particular, the analysis of concern for hazard, which forms an important basis for EPA's findings, would not be impacted by a change in conditions of use. Therefore, such changes would not support a finding that dipropylene glycol meets the standard for a high-priority substance. The reasonably available information on conditions of use, or significant changes in conditions of use, described above provides sufficient information to support this finding.

8.6. The Volume or Significant Changes in Volume of the Chemical Substance Manufactured or Processed

Approach: EPA evaluated the current production volumes of dipropylene glycol (Section 7.1) and related potential exposures (Section 7.2 through 7.4).

Rationale: EPA used reasonably available information on production volume (see Appendix A) in considering potential risk. It is reasonably foreseeable that designation of dipropylene glycol as a low-priority substance could result in increased use and higher production volumes. EPA expects, however, that any changes in dipropylene glycol's production volume would not alter the Agency's assessment of low concern given the low-hazard profile of the chemical. EPA bases this expectation on dipropylene glycol's consistently low-concern hazard characteristics across the spectrum of hazard endpoints and regardless of a significant change in the volume of the chemical manufactured or processed and resultant increased exposures.

Conclusion: Based on this screening criteria under 40 CFR 702.9(a)(6), EPA concludes that even if production volumes increase, resulting in an increase in the frequency or level of exposures, dipropylene glycol does not meet the standard for a high-priority substance. The reasonably available information on production volume, or significant changes in production volume, described above provides sufficient information to support this finding.

8.7. Other Considerations

EPA did not identify other considerations for the screening review to support the final designation of dipropylene glycol as a low-priority substance.

9. Final Designation

Based on a risk-based screening-level review of the chemical substance and relevant information received from the public and other information as appropriate and consistent with TSCA section 26(h), (i) and (j), EPA concludes that dipropylene glycol does not meet the standard for a high-priority substance. The reasonably available information described above provides sufficient information to support this finding. Accordingly, EPA is designating dipropylene glycol as a low-priority substance.

Appendix A: Conditions of Use Characterization

EPA gathered information on and related to conditions of use including uses of the chemical, products in which the chemical is used, types of users, and status (e.g., known, regulated).

A.1. CDR Manufacturers and Production Volume

The Chemical Data Reporting (CDR) rule (previously known as the Inventory Update Rule, or IUR), under TSCA section 8, requires manufacturers (including importers) to report information on the chemical substances they produce domestically or import into the U.S., generally above a reporting threshold of 25,000 lb. per site per year. According to the 2016 Chemical Data Reporting (CDR) database, 55 companies manufactured or imported dipropylene glycol at 56 sites for reporting year 2015. Individual production volumes were withheld but may be available in later releases of the 2016 data.

Table presents the historic production volume of dipropylene glycol from the CDR (previously known as the Inventory Update Rule, or IUR) from 1986-2015. In reporting years 1986, 1990, and 1994, aggregate production volume for dipropylene glycol was between 50,000,000 and 100,000,000 lbs., and in reporting years 1998, 2002, and 2006 aggregate production volume was between 100,000,000 and 500,000,000 lbs. Between reporting years 2012 and 2015, aggregate production volume for dipropylene glycol was between 100,000,000 and 250,000,000 lbs. The exact amount is available for one year, 2011, in which 201,501,161 lbs. of dipropylene glycol was manufactured or imported. In general, since 2011, production volume has remained relatively stable without significant increases or decreases.

Table A.1: 1986-2015 National Production Volume Data for Dipropylene glycol (Non-Confidential Production Volume in Pounds)

1986	1990	1994	1998	2002	2006	2011	2012	2013	2014	2015
>50M - 100M	>5M - 10M	>50M - 100M	>100M - 500M	>100M - 500M	100M - <500M	201,501,161	100M - 250M	100M - 250M	100M - 250M	100M - 250M

Source(s):
EPA (2018a; 2017b; 2006; 2002)

Note(s):
M = Million

A.2. Uses

A.2.1 Methods for Uses Table

Section A.1 provides a list of known uses of dipropylene glycol, organized by category of use. To compile the uses, EPA searched publicly available databases listed in Table A.2 and conducted additional internet searches to clarify uses. Search terms differed among databases because of different search term requirements for each database (i.e., some databases search by CASRN while others search by chemical name).

Table A.2: Sources Searched for Uses of Dipropylene Glycol

Title	Author and Year	Search Term(s)	Found Use Information? [1]
Sources searched for all use reports			
California Links to Pesticides Data	California Dept of Pesticide Regulation (2013)	25265-71-8	Yes
Canada Chemicals Management Plan information sheets	Government of Canada (2018)	Dipropylene glycol; DPG	No
Chemical and Product Categories (CPCat)	CPCat (2019)	25265-71-8	Yes
ChemView [2]	EPA (2018a)	25265-71-8	Yes
Children's Safe Product Act Reported Data	Washington State Dept. of Ecology (2018)	25265-71-8	No
Consumer Product Information Database (CPID)	DeLima Associates (2018)	25265-71-8	Yes
Danish surveys on chemicals in consumer products	Danish EPA (2018)	N/A, there is no search but report titles were checked for possible information on the chemical	No
Datamyne	Descartes Datamyne (2018)	Dipropylene glycol	Yes
DrugBank	DrugBank (2018b)	25265-71-8	Yes
European Chemicals Agency (ECHA) Registration Dossier	ECHA (2018a; 2018b)	25265-71-8	Yes
eChemPortal [2]	OECD (2018)	25265-71-8	Yes
Envirofacts [2]	EPA (2018b)	25265-71-8	No
Functional Use Database (FUse)	EPA (2017a)	25265-71-8	Yes
Kirk-Othmer Encyclopedia of Chemical Technology	Kirk-Othmer (2006)	Dipropylene glycol	No
Non-Confidential 2016 Chemical Data Reporting (CDR)	EPA (2017b)	25265-71-8	Yes
PubChem Compound	Kim et al. (2016)	25265-71-8	Yes
Safer Chemical Ingredients List (SCIL)	EPA (2018d)	25265-71-8	Yes

Table A.2: Sources Searched for Uses of Dipropylene Glycol			
Title	**Author and Year**	**Search Term(s)**	**Found Use Information? [1]**
Synapse Information Resources [2]	Synapse Information Resources (2009)	Dipropylene glycol	Yes
Resource Conservation and Recovery Act (RCRA)	EPA (2018c)	Dipropylene glycol	No
Scorecard: The Pollution Information Site	GoodGuide (2011b)	25265-71-8	Yes
Skin Deep Cosmetics Database	EWG (2018a, 2018b)	Uses for CAS RN 110-98-5, with the chemical name listed as "Dipropylene Glycol." EWG did not have search results for CAS RN 25265-71-8 or "1,1'dimethyldiethylene glycol."	
Toxics Release Inventory (TRI)	EPA (2018e)	25265-71-8	No
TOXNET [2]	NLM (2018a)	25265-71-8	Yes
Ullmann's Encyclopedia of Industrial Chemistry	Ullmann's (2000)	Dipropylene glycol	No
Additional Sources Identified from Reasonably Available Information			
Boscia	Boscia (2018)	Incidentally identified while researching details of this chemical's uses and products.	Yes
Cetaphil	Cetaphil (2018)		
CVS	CVS (2018)		
Dove	Dove (2018)		
The Dow Chemical Company	Dow (2009)		
Medline	Medline.com (2009)		
National Archives and Records Information	National Archives and Records Administration (2018)		
National Pesticide Information Retrieval System (NPIRS)	NPIRS (2018)		
Neutrogena	Neutrogena (2018a)		
Shiseido	Shiseido (2018)		
Skinfood	Skinfood (2018)		

Note(s):

1. If use information was found in the resource, it will appear in Table A.3 unless otherwise noted.
2. This source is a group of databases; thus the exact resource(s) it led to will be cited instead of the database as whole.

The U.S. Patent and Trademark Office has an online database that shows 41,147 patents referencing "dipropylene glycol" (USPTO 2018a). Although patents could be useful in determining reasonably foreseen uses, it is difficult to confirm whether any of the patented technologies are currently in use. Uses inferred from patents containing dipropylene glycol were not included in Table A.3. Note that the uses in Table A.3 that are covered under TSCA are included in Section 5, Table 3 of this document.

A.2.2 Uses of Dipropylene Glycol

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
TSCA Conditions of Use: Air Care Products CDR reports use of liquid dipropylene glycol in consumer air care products at concentrations of less than 30 percent and at least 90 percent by weight (EPA 2017b).		
Air freshener	Consumer	DeLima Associates (2013a); GoodGuide (2011a); CPCat (2019); Reported to the ECHA database (2018b) Pollution Scorecard identifies use of dipropylene glycol in non-aerosol air fresheners. CPCat lists the use of dipropylene glycol in air fresheners, deodorizers, air cleaners and anti-odor agents not including filters. CPID lists the use of dipropylene glycol in air fresheners, including car air fresheners. The ECHA registration dossier indicates the use of dipropylene glycol in air care products available for consumer use. Expected users are consumer based on inclusion in CPID and GoodGuide's consumer uses.
Candle	Consumer	DeLima Associates (2015g); CPCat (2019) CPCat lists the use of dipropylene glycol in décor candles and candle holders. CPID generally includes products for consumer use; therefore, the expected user is a consumer.
TSCA Conditions of Use: Cleaning and Furnishing Care Products CDR reporting shows use of liquid dipropylene glycol in consumer and commercial cleaning and furnishing care products at concentrations of less than 30 percent by weight (EPA 2017b).		
Automotive care	Consumer, commercial	CPCat (2019) CPCat lists the use of dipropylene glycol in car care and cleaning products. Expected users are not listed but are assumed to be consumer and commercial for automotive care.
Bathroom cleaner	Consumer	DeLima Associates (2015n) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Boat cleaner	Commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in professional boat cleaners. Expected users are commercial based on inclusion in ECHA's uses by professional workers.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Carpet and upholstery cleaner	Consumer, commercial	DeLima Associates (2013c); Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in professional carpet cleaners. CPID generally includes products for consumer use; therefore, the expected user is a consumer. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Car wax	Commercial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in car wax (polishing agents) for automotive care. The ECHA registration dossier indicates the use of dipropylene glycol in professional car wash and dewaxing products. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Degreasers	Consumer, commercial	CPCat (2019) CPCat lists the use of dipropylene glycol in degreasers, including cold-degreasing, de-waxing, and de-polishing. Expected users are not listed but are expected to be consumer and commercial for degreasers.
Descaling agent	Commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in professional descaling agents. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Drain cleaner	Commercial	DeLima Associates (2015f); CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in drain cleaners. The ECHA registration dossier indicates the use of dipropylene glycol in professional drain cleaners. CPID lists this product for professional use; therefore, the expected users are commercial.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Floor cleaner	Consumer, commercial	DeLima Associates (2014c); Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in professional floor cleaners and floor strippers. CPID lists this product for professional and general use; therefore, the expected users are consumer and commercial.
Floor polish	Consumer, commercial	DeLima Associates (2015m); GoodGuide (2011a); CPCat (2019) Pollution Scorecard identifies use of dipropylene glycol in floor polish. CPCat lists the use of wax and polishing agents for floors. Expected users are consumer based on inclusion in CPID and GoodGuide's consumer uses. Expected users are consumer and commercial based on inclusion in ECHA's uses by professional workers.
Furniture polish	Consumer, commercial	DeLima Associates (2008a) CPID generally includes products for consumer use; therefore, the expected users are consumer and commercial.
General purpose cleaner	Commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in general purpose cleaner. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Glass cleaner	Consumer, commercial	DeLima Associates (2015o); CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use dipropylene glycol in glass and window cleaner/ polish. The ECHA registration dossier indicates the use of dipropylene glycol in glass cleaner. CPID generally includes products for consumer use; therefore, the expected user is a consumer. Expected users are also commercial based on inclusion in ECHA's uses by professional workers.
Granite cleaner and polish	Consumer	DeLima Associates (2015j) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Hard surface cleaner	Consumer, commercial	DeLima Associates (2015d) CPID lists this product for professional and general use; therefore, the expected users are consumer and commercial.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Industrial cleaning	Commercial, industrial	CPCat (2019) CPCat lists the use dipropylene glycol in industrial, specialized cleaning and washing activities, including for commercial clients. Expected users are commercial and industrial based on CPCat's user classification.
Kitchen cleaner	Commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in kitchen cleaners. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Oven/ grill cleaner	Commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in professional oven and grill cleaner. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Rust removers	Consumer, commercial	CPCat (2019) CPCat lists the use of dipropylene glycol in rust removers and corrosion inhibitors. Expected users are not listed but are expected to be consumer and commercial for rust removers.
Shower cleaner	Consumer	DeLima Associates (2015k) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Soap, cleaning compound, and toilet preparation manufacturing	Industrial	EPA (2017b); Dow (2009) CDR reports show use of dipropylene glycol as a solvent, surface active agent, and odor agent in the manufacture of soap, cleaning compound, and toilet preparations. Dow identifies use in industrial soaps. Expected users are industrial based on CDR's Industrial Processing and Use report.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Stain remover	Consumer	DeLima Associates (2017a) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Toilet bowl cleaner	Consumer	DeLima Associates (2015c); CPCat (2019) CPCat lists the use of dipropylene glycol in sanitation agents for cleaning and washing of toilets. CPID generally includes products for consumer use; therefore, the expected user is a consumer.
TSCA Conditions of Use: Construction		
Brick-layering	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in bricklaying. Expected users are industrial based on CPCat's user classification.
Building construction	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the construction of buildings and civil engineering works, and in construction materials, including filling, padding and insulation materials (including to protect from noise, cold, electric) Expected users are industrial based on CPCat's user classification.
Building glass	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in glass building material, with use as a colorant detected. Expected users are industrial based on CPCat's user classification.
Demolition	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in "demolition and wrecking of buildings." Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Floor and wall covering	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in floor and wall covering for building. Expected users are industrial based on CPCat's user classification.
Plumbing installation	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in plumbing, heat and air-conditioning installation. Expected users are industrial based on CPCat's user classification.
Ship building	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the building and repairing of pleasure and sporting boats, ships and other floating structures. Expected users are industrial based on CPCat's user classification.
TSCA Conditions of Use: Energy and Resources		
Automotive fuel	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the retail sale of automotive fuel in specialized stores. Expected users are industrial based on CPCat's user classification.
Crude petroleum and natural gas extraction	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the extraction of crude petroleum and natural gas. Expected users are not stated but expected to be industrial for fracking.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Fracking	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in resource extraction of gas through fracking. Expected users are not stated but expected to be industrial for fracking.
Fuel additive	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol as a fuel additive. Expected users are not stated but expected to be industrial for fuel additives.
Mining	Industrial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in mining support service activities. The ECHA registration dossier indicates the use of dipropylene glycol in mining. Expected users are industrial based on CPCat's user classification.
Test drilling and boring	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in test drilling and boring. Expected users are industrial based on CPCat's user classification.
TSCA Conditions of Use: Food and Beverages		
Food and beverage service activities[1]	Unknown	CPCat (2019) CPCat lists the use of dipropylene glycol in food and beverage service activities. Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
TSCA Conditions of Use: Industrial Uses		
Coloring agents	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in industrial colorants, color agents, dyestuff, and color pigments. Expected users are industrial, based on CPCat's user classification.
Motor vehicle maintenance and repair	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the maintenance and repair of motor vehicles, including in bodywork repair and painting. Expected users are industrial based on CPCat's user classification.
Oil and gas exploration/ production	Industrial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in oil and glass exploration or production products. Expected users are industrial based on inclusion in ECHA's uses at industrial sites.
Printing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in printing and reproduction of recorded media, printing. Expected users are industrial based on CPCat's user classification.
Sewage treatment	Industrial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in "sewage and refuge disposal, sanitation and similar activities." The ECHA registration dossier indicates the use of dipropylene glycol in sewage treatment. Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Surfactant	Industrial	EPA (2017b); CPCat (2019); Reported to the ECHA database (2018b) CDR reports show use of dipropylene glycol as a surfactant in wholesale and retail trade. CPCat lists the use of dipropylene glycol as a surfactant in detergents and cleaning and washing agents. The ECHA registration dossier indicates the use of dipropylene glycol as a surfactant in industrial sites. Expected users are industrial based on CDR's Industrial Processing and Use report.
TSCA Conditions of Use: Laundry and Dishwashing Products CDR reports show use of liquid dipropylene glycol in consumer and commercial laundry and dishwashing products. CDR identifies concentrations (by weight) of less than one percent in consumer products and at least one percent but less than 30 percent in consumer and commercial products (EPA 2017b).		
Dishwasher cleaner	Consumer	DeLima Associates (2015b); CPCat (2019) CPCat lists the use of dipropylene glycol in cleaning and washing agents for dishwashing machines. CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Dishwasher detergent	Consumer, commercial	DeLima Associates (2015a); Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in dish wash and rinse products for commercial use. CPID generally includes products for consumer use; therefore, the expected user is a consumer. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Dry cleaning	Commercial	CPCat (2019) CPCat lists the use of dipropylene glycol in washing and dry cleaning of textile and fur products. Expected users are not listed but are expected to be commercial for dry cleaning.
Fabric freshener	Consumer	DeLima Associates (2015h) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Fabric softener	Consumer	DeLima Associates (2015e) CPID generally includes products for consumer use; therefore, the expected user is a consumer.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Laundry detergent	Consumer, commercial	DeLima Associates (2015i); Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in laundry products including laundry detergents and laundry aids for commercial use. CPID generally includes products for consumer use; therefore, the expected user is a consumer. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
Laundry detergent scent additive	Consumer	DeLima Associates (2016b) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Prewash stain remover	Consumer, commercial	DeLima Associates (2014e); Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in pre-spotter/ stain remover. CPID generally includes products for consumer use; therefore, the expected user is a consumer. Expected users are commercial based on inclusion in ECHA's uses by professional workers.
TSCA Conditions of Use: Manufacturing Synapse Information Resources (Synapse Information Resources (2009)) lists the use of dipropylene glycol in polyester and alkyd resins, reinforced plastics, plasticizers, solvents and fragrance, which are used in the manufacturing sectors listed below.		
Automotive manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of motor vehicles, trailers, and semi-trailers, and other transport equipment. Expected users are industrial based on CPCat's user classification.
Basic metal manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of basic metals. Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Building material manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of "builders' carpentry and joinery." Expected users are industrial based on CPCat's user classification.
Chemical manufacturing	Industrial	EPA (2017b); CPCat (2019); Reported to the ECHA database (2018b) CDR reports show use of dipropylene glycol as an intermediate and solvent (incorporated into the formulation, mixture, or reaction product) in the manufacture of basic organic chemicals and other chemical products and preparations. CPCat lists the use of dipropylene glycol in the manufacture of chemicals and chemical products. The ECHA registration dossier indicates the use of dipropylene glycol in the manufacture of fine chemicals. Expected users are industrial based on CDR's Industrial Processing and Use report.
Communication equipment manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the "manufacture of radio, television, and communication equipment." Expected users are industrial based on CPCat's user classification.
Computer and electronic manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of computer, electronic, optical products, and in electrical equipment, machinery and components (including valves, tubes, electronic boards, etc.). Expected users are industrial based on CPCat's user classification.
Fabricated metal products manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of "fabricated metal products, except machinery." Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Food manufacturing[1]	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of food products and beverages, and other food services. Expected users are industrial based on CPCat's user classification.
Furniture manufacturing	Industrial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in the manufacture of furniture, including "office and shop furniture." The ECHA registration dossier indicates that dipropylene glycol has been used in the manufacture of furniture. Expected users are industrial based on CPCat's user classification.
Iron metal manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of iron and metal products. Expected users are industrial based on CPCat's user classification.
Leather product manufacturing	Consumer, commercial, industrial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in the manufacture of leather, leather apparel, bags, footwear and related products, including use in leather tanneries and as an impregnation material. The ECHA registration dossier indicates that dipropylene glycol has been used in leather treatment product. Expected users are industrial based on CPCat's user classification, and consumer/ commercial due to inclusion in ECHA's consumer uses and uses by professional workers.
Metals manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of steel tubes, and structural metal products, including as cooling agent for metal processing. CPCat also lists use in treatment and coating of metals. Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Non-metallic mineral product manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of non-metallic mineral products. Expected users are industrial based on CPCat's user classification.
Paint manufacturing	Industrial	EPA (2017b); CPCat (2019) CDR reports show use of dipropylene glycol as a solvent and general paint/coating additive added during paint and coating manufacturing. CPCat lists the use of dipropylene glycol in the "manufacture of paints, varnishes, and similar coatings, print." Expected users are industrial based on inclusion in CDR's Industrial Processing and Use report.
Paper manufacturing	Industrial	EPA (2017b); CPCat (2019); Reported to the ECHA database (2018b) CDR reports show use of dipropylene glycol as a pigment and dye in paper manufacturing. CPCat lists the use of dipropylene glycol in the manufacture of paper, pulp, paper products and paperboard, including use as a surface treatment for paper, and cardboard and impregnation materials for paper. The ECHA registration dossier indicates the use of dipropylene glycol, including as a solvent, in the manufacture of pulp, paper and paper products. Expected users are industrial based on inclusion in CDR's Industrial Processing and Use report.
Perfume manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of perfumes. Expected users are industrial based on CPCat's user classification.
Petrochemical manufacturing	Industrial	EPA (2017b); CPCat (2019) CDR reports show use of dipropylene glycol as an intermediate and process regulator in petrochemical manufacturing. CDR also reports use as a processing aid in the manufacture of carbon black. CPCat lists the use of dipropylene glycol in the manufacture of petrochemical manufacturing. Expected users are industrial based on CDR's Industrial Processing and Use report.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Plastic and rubber manufacturing	Industrial	EPA (2017b); Dow (2009); CPCat (2019) CDR reports show use of dipropylene glycol as a solvent in rubber product manufacturing and as an accelerator and intermediate in the manufacture of plastic products, material and resin. Dow identifies use of dipropylene glycol as a high-volume plasticizer, reactant in unsaturated polyurethane resins, initiator in urethane polyols, and reactive diluent in radiation-cured resins and coatings. CPCat lists the use of dipropylene glycol in the manufacture of plastics, rubber, plastic packing goods, plastics materials and resins, with functions including as an intermediate, hardener, and softener. Expected users are industrial based on CPCat's user classification.
Soap manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of soaps and detergents, cleaning compounds, and cleaning and polishing. Expected users are industrial based on CPCat's user classification.
Textiles, apparel, and leather manufacturing	Consumer, commercial, industrial	EPA (2017b); CPCat (2019); Reported to the ECHA database (2018b) CDR reports show use of dipropylene glycol as a finishing agent in textile, apparel, and leather manufacturing. CPCat lists the use of dipropylene glycol in the manufacture of textiles, including finishing of textiles, textile impregnation agents, and in upholstery of chairs and seats. The ECHA registration dossier indicates the use of dipropylene glycol in consumer textile dyes and impregnating products, manufacturing and industrial use of textile dyes and finishing products. Expected users are industrial based on CDR's Industrial Processing and Use report, and consumer/ commercial based on inclusion in ECHA's consumer uses and uses by professional workers.
Transportation equipment manufacturing	Industrial	EPA (2017b) CDR reports show use of dipropylene glycol as a functional fluid in closed systems for transportation equipment manufacturing. Expected users are industrial based on CDR's Industrial Processing and Use report.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Windmill manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the "manufacture of windmills and parts of windmills." Expected users are industrial based on CPCat's user classification.
Wood manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the "manufacture of wood and products, of wood and cork" and wood building material including for the impregnation of wood, sawmilling, and wood preserving agents. Expected users are industrial based on CPCat's user classification.
TSCA Conditions of Use: Pesticides and Agriculture		
Crop and animal production[2]	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in "crop and animal production, hunting and related service activities," including in the growing of perennial and non-perennial crops. Other uses in agricultural, including pesticides are listed elsewhere. Expected users are industrial based on CPCat's user classification.
Fertilizers	Consumer, commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in fertilizers and plant protection products. Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
TSCA Conditions of Use: Miscellaneous		
Absorbents and adsorbents	Consumer	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in adsorbents and adsorbents. No further information could be found on this use. The ECHA registration dossier indicates the use of dipropylene glycol in adsorbents. Expected users are consumer based on inclusion in ECHA's consumer.
Adhesives	Consumer, commercial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in adhesives, binding agents, and glues, including in paints. The ECHA registration dossier indicates that dipropylene glycol is used in adhesives and sealants. Expected users are consumer and commercial due to inclusion in ECHA's consumer uses and uses by professional workers.
Agricultural products	Commercial, industrial	EPA (2017b) CDR reports show use of liquid dipropylene glycol in commercial and industrial non-pesticide agricultural chemicals. CDR identifies concentrations of less than one percent by weight in commercial agricultural products. Expected users are commercial based on CDR's consumer/commercial classification and industrial based on CDR's Industrial Processing and Use report.
Anti-foaming agent	Unknown	CPCat (2019) CPCat lists the use of dipropylene glycol in anti-foaming agent, foam-reducing agents. Expected users are unknown, due to the limited availability of information.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Anti-freeze and de-icing products	Consumer, commercial	EPA (2017b); GoodGuide (2011a); CPCat (2019); Reported to the ECHA database (2018b) CDR reports show use of liquid dipropylene glycol in anti-freeze and de-icing products. Pollution Scorecard identifies use in consumer de-icing agents. CPCat lists the use of dipropylene glycol in anti-freeze and de-icing products. The ECHA registration dossier indicates the use of dipropylene glycol in anti-freeze and deicing products. Expected users are consumer and commercial based on CDR's consumer/commercial classification.
Building/construction materials	Commercial, industrial	EPA (2017b) CDR reports show use of liquid dipropylene glycol in commercial building and construction materials not covered elsewhere, at concentrations of less than one percent by weight. CDR also reports use as a catalyst in industrial construction applications. Expected users are commercial based on CDR's consumer/commercial classification and industrial based on CDR's Industrial Processing and Use report.
Casting and molding	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol as a casting agent in casting materials and molding compounds. Expected users are consumer.
Finger paints	Consumer, commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene in finger paints. Uses in other paints is listed elsewhere. This product is likely to be used by children. Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.
Golf and sports turf	Commercial	EPA (2017b) CDR reports show use of liquid dipropylene glycol in golf and sports turf at concentrations of at least 90 percent by weight. Expected users are commercial based on CDR's consumer/commercial classification.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Hydraulic fluids	Consumer, commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in hydraulic fluids. Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.
Ink and toner	Consumer, commercial, industrial	EPA (2017b); CPCat (2019); Synapse Information Resources (2009); Reported to the ECHA database (2018b) CDR reports show use of liquid dipropylene glycol in ink, toner, and colorant products. CDR identifies concentrations (by weight) of at least one percent but less than 30 percent and at least 60 percent but less than 90 percent in reported products. CDR also reports use as a solvent in the manufacture of printing ink. CPCat lists the use of dipropylene glycol in print, inks, colorants, and toners. Synapse Information Resources lists the use of dipropylene glycol in printing inks. The ECHA registration dossier indicates the use of dipropylene glycol in ink ands and toners for consumer, commercial and industrial use. Expected users are consumer and commercial based on CDR's consumer/commercial classification and industrial based on CDR's Industrial Processing and Use report.
Intermediates	Commercial, industrial	EPA (2017b); Reported to the ECHA database (2018b) CDR reports show use of liquid dipropylene glycol in urethane intermediates at concentrations of at least 90 percent by weight. The ECHA registration dossier indicates the use of dipropylene glycol as an intermediate at industrial sites, there is no further information on current use as an intermediate for industrial users in the United States. Expected users are commercial based on CDR's consumer/commercial classification, and industrial based on inclusion in ECHA's uses at industrial sites.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Lubricants and greases	Consumer, commercial, industrial	EPA (2017b); Dow (2009); CPCat (2019); Reported to the ECHA database (2018b) CDR reports show use of liquid dipropylene glycol in commercial lubricants and greases at concentrations of less than one percent by weight. CDR also reports use as a lubricant and lubricant additive in industrial non-oil and gas mining and support activities. Dow identifies use of dipropylene glycol in cutting oils (often used in metalworking applications). CPCat lists the use of dipropylene glycol in lubricants and greases. The ECHA registration dossier indicates the use of dipropylene glycol in lubricants, greases and release products for consumer and industrial use. Expected users are commercial based on CDR's consumer/commercial classification and industrial based on CDR's Industrial Processing and Use report, and consumer based on inclusion in ECHA's consumer uses.
Paints and coatings	Consumer, commercial	EPA (2017b); GoodGuide (2011a); CPCat (2019); Synapse Information Resources (2009); Reported to the ECHA database (2018b) CDR reports show use of liquid dipropylene glycol in paints and coatings at concentrations of at least one percent but less than 30 percent by weight. Pollution Scorecard identifies use in paints and primers for vehicles and machinery refinish as well as interior water-thinned coatings. CPCat lists the use of dipropylene glycol in paint, lacquers, varnish, and primers, including for decorative, protective, interior and exterior use. Synapse Information Resources lists the use of dipropylene glycol in lacquer, paints and shellac varnishes. The ECHA registration dossier indicates the use of dipropylene glycol in coatings, paints, and thinners. Expected users are consumer and commercial based on CDR's consumer/commercial classification.
Paint and varnish remover	Consumer	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol as a solvent in paint and varnish removers. The ECHA registration dossier indicates the use of dipropylene glycol in paint removers. Expected users are consumer based on inclusion in ECHA's consumer uses.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Paper products	Consumer, commercial	EPA (2017b); Reported to the ECHA database (2018b) CDR reports show use of liquid dipropylene glycol in commercial paper products at concentrations of less than one percent by weight. The ECHA registration dossier indicates that dipropylene glycol has been used in paper and board treatment products. Expected users are commercial based on CDR's consumer/commercial classification, and consumer based on ECHA's consumer uses.
Pet litter	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in pet litter available for retail use. Expected users are consumer based on CPCat's user classification.
Photographic	Consumer	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use dipropylene glycol in reprographic agents and photo-chemicals. The ECHA registration dossier indicates the use of dipropylene glycol in photo-chemicals. Expected users are consumer based on inclusion in ECHA's consumer uses.
Plastic and rubber products	Commercial	EPA (2017b); CPCat (2019) CDR reports show use of liquid, pellet, and large crystal dipropylene glycol in commercial plastic and rubber products not covered elsewhere at concentrations of at least one percent but less than 60 percent by weight. CPCat lists the use of dipropylene glycol in plastic and rubber products. Expected users are commercial based on CDR's consumer/commercial classification.
Polishing agents	Consumer, commercial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use dipropylene glycol in polishing agents. The ECHA registration dossier indicates the use of dipropylene glycol in polishes and wax blends Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Sealants	Consumer	GoodGuide (2011a) Pollution Scorecard identifies use of dipropylene glycol in nonstructural caulking compounds and sealants. Expected users are consumer based on inclusion in GoodGuide's consumer uses.
Toys	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in consumer toys, listed for child use, including fragrances and pool supplies. Expected users are consumer based on CPCat's user classification.
Water treatments	Consumer, commercial, industrial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in water treatment including softeners and lime deposit (calcium) remover. The ECHA registration dossier indicates the use of dipropylene glycol in water treatment chemicals. Expected users are based on inclusion in ECHA's consumer uses, uses by professional workers, and uses at industrial sites.
Welding and soldering	Consumer	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in welding and soldering agents, including soldering paste. The ECHA registration dossier indicates the use of dipropylene glycol in welding and soldering products. Expected users are consumer based on inclusion in ECHA's consumer uses.
Whiteboard marker	Consumer	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in whiteboard markers. Expected users are consumer based on inclusion in ECHA's consumer uses.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Non-TSCA Uses		
Additive	Unknown	CPCat (2019) CPCat lists the use of dipropylene glycol in food additives, including in salt, spices and seasonings.[43] Expected users are unknown, due to the limited availability of information.
Animal insecticide	Consumer	DeLima Associates (2014a) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Antiperspirant	Consumer	DeLima Associates (2013b); GoodGuide (2011a); CPCat (2019) GoodGuide identifies use of dipropylene glycol in deodorants. CPCat lists the use of dipropylene glycol in deodorants and antiperspirants. Expected users are consumer based on inclusion in CPID and GoodGuide's consumer uses.
Bactericides	Unknown	CPCat (2019) CPCat lists the use of dipropylene glycol in bactericides which function to kill bacteria, and bacteriostats, which function to stop bacteria from reproducing. Expected users are unknown, due to the limited availability of information.
Bath accessories	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in bath accessories for personal use and in bath products meant for use by babies. Expected users are not listed but expected to be consumer for personal care bath accessories.

[43] EPA notes that Federal Drug Administration (FDA) has a process to assess chemicals that are used as food additives.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Body cleanser	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in body cleansers. Expected users are not listed but expected to be consumer for body cleansers.
Body oil	Consumer	DeLima Associates (2011a); CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Body wash	Consumer	DeLima Associates (2015l) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Cuticle treatment	Consumer	DeLima Associates (2011a) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Disinfectants	Unknown	CPCat (2019) CPCat lists the use of dipropylene glycol in disinfecting agents and other sanitation agents. Expected users are unknown, due to the limited availability of information.
Facial masks	Consumer, commercial	Drugbank (2018a) DrugBank lists the use of liquid dipropylene glycol in topical facial masks listed as currently available for over-the-counter use in the United States. Expected users are consumer and commercial, as the products is available for over-the-counter purchase.
First aid spray	Consumer	DeLima Associates (2014b) CPID generally includes products for consumer use; therefore, the expected user is a consumer.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Fragrance	Consumer	CPCat (2019); Descartes Datamyne (2018); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol as an odor agent in fragrances for cosmetic and personal care use. Datamyne reports the export of "dipropylene glycol fragrance" from the U.S. to foreign countries. The specific products or use of the exported fragrance is unknown. The ECHA registration dossier indicates the use of dipropylene glycol in perfumes and fragrances. Expected users are consumer based on inclusion in ECHA's consumer uses.
Hair conditioner	Consumer	DeLima Associates (2016c) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Hair dye	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in hair dye colorants. Expected users are not listed but expected to be consumer for hair dyes.
Hair shampoo	Consumer, commercial	DeLima Associates (2016a); P&G (2015) Dipropylene glycol is listed as an ingredient in a hair shampoo product intended for professional use. CPID generally includes products for consumer use; therefore, the expected user is a consumer. Expected users are commercial as the product is listed for professional use.
Hair straightener	Consumer	DeLima Associates (2011b) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Hair styling	Consumer	DeLima Associates (2013b); CPCat (2019) CPCat lists the use of dipropylene glycol in hair styling products. CPID generally includes products for consumer use; therefore, the expected user is a consumer.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Hair toner	Consumer	DeLima Associates (2017b) CPID generally includes products for consumer use; therefore, the expected user is a consumer.
Hand cream and lotion	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in hand creams and lotions. Expected users are not listed but expected to be consumer for hands creams and lotions.
Hand sanitizers	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in hand sanitizers. Expected users are not listed but expected to be consumer for hand sanitizers.
In-can preservatives	Unknown	CPCat (2019) CPCat lists the use of dipropylene glycol in in-can food preservatives. Expected users are unknown, due to the limited availability of information.
Insecticide	Consumer, commercial	CPCat (2019); Reported to the ECHA database (2018b) CPCat lists the use of dipropylene glycol in insecticides which function specifically to kill insects. The ECHA registration dossier indicates the use of dipropylene glycol in insecticides, repellents and other biocidal products. Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.
Medical devices	Commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in professional medical devices, Expected users are commercial based on inclusion in ECHA's uses by professional workers.

Table A.3: Uses of Dipropylene Glycol		
Use	**Expected Users**	**Description of Use and References**
Pesticides	Commercial, industrial	California Dept of Pesticide Regulation (2018); NPIRS (2018); GoodGuide (2011a); CPCat (2019); Reported to the ECHA database (2018b) The California Department of Pesticide Regulation (Cal DPR) identifies four companies that use dipropylene glycol as an active ingredient in pesticides. Cal DPR also reports 14 companies that use dipropylene glycol as an inactive ingredient in pesticides. NPIRS identifies two companies that use dipropylene glycol in federally active pesticides. Pollution Scorecard identifies use of dipropylene glycol in deodorizing and sanitizing pesticides. CPCat lists the use of dipropylene glycol in non-agricultural and agricultural pesticides, including as an inert or active ingredient, antimicrobial, and some listings indicating use in food. The ECHA registration dossier indicates the use of dipropylene glycol in biocidal products. Expected users are consumer due to inclusion in ECHA's consumer uses, and industrial due to its use in pesticide manufacturing.
Pharmaceutical uses	Consumer, commercial	Reported to the ECHA database (2018b) The ECHA registration dossier indicates the use of dipropylene glycol in pharmaceuticals. Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.
Razors	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in razors as tools for hair removal. Expected users are not listed but expected to be consumer for razors.
Shampoo manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of hair shampoo. Expected users are industrial based on CPCat's user classification.

Table A.3: Uses of Dipropylene Glycol		
Use		**Description of Use and References**
Shaving cream	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in shaving cream. Expected users are not listed but expected to be consumer for shaving cream.
Skin cleanser	Consumer	CPCat (2019) CPCat lists the use of dipropylene glycol in skin cleansers which broadly includes person care soaps, shower gels, and hand cleansing creams. Expected users are not listed but expected to be consumer for skin cleansers.
Toothpaste manufacturing	Industrial	CPCat (2019) CPCat lists the use of dipropylene glycol in the manufacture of toothpaste. Expected users are industrial based on CPCat's user classification.
Children's Products CDR reports show use of liquid dipropylene glycol in consumer and commercial children's personal care products; further sources report use of dipropylene glycol in body wash, toys, and finger paints intended for use by children.		
Recycling and Disposal In the 2016 CDR, one facility, Proviron Inc., reported that dipropylene glycol was recycled (recycled, remanufactured, reprocessed, or reused). Thirty-eight facilities reported that the chemical was not recycled, while ten facilities withheld this information and seven facilities reported this information as CBI (EPA 2017b).		
Note(s): 1. TSCA product based on the assumption that the chemical is used in the manufacturing of products and not intended to be a component of food. 2. Assumed to be a mix of TSCA and non-TSCA products. It is expected that more specifically defined uses in the table are representative of the uses that fall into this category.		

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Appendix B: Human Hazard Characterization

Table B.1: Human Health Hazard

ADME

Source	Exposure Route	Species & Strain (if available)	Duration	Doses and Replicate Number	Effect	Study Details
3041958	Intravenous and oral	Dog	24 hours	**Dose:** 5000 mg/kg oral and 2000 mg/kg IV **Replicates:** 2 dogs	The test material is no longer detectable in blood after 24 hours	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • GLP compliance not reported
4940456, 4940388	Oral (gavage)	Fischer 344 rats	Single exposure, 24 hour observation	**Doses**: 48.2 mg/kg **Replicates:** 5 male rats	The test material is rapidly absorbed and distributed, and primarily excreted through urine. It is also extensively metabolized to dipropylene and monopropylene glycol and further oxidized to CO2.	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity: 99.8% • GLP compliant **Results:** • Absorption: 91.4 ± 2.07 % of the dose administered was recovered indicating tripropylene glycol is rapidly absorbed • Distribution: The liver and kidney had the greatest amounts of tripropylene glycol • Metabolism: Tripropylene glycol is extensively metabolized. 5.8% of the dose was recovered as unmetabolized parent compound. Tripropylene glycol is metabolized to dipropylene and monopropylene glycol and further oxidized to CO_2 • Excretion: Dipropylene glycol was excreted primarily in the urine (52.3 ± 3.54%) and in exhaled breath (20.7±0.59%)

Table B.1: Human Health Hazard						
4940508, 4940301, 3039551	Dermal *(in vitro)*	Human cadaver skin	24 hours	**Dose:** 768 µL undiluted test substance **Replicates:** 7 samples from 4 cadavers	The test material was considered a slow penetrant	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.9% • OECD Guideline 428 • GLP compliant **Results:** Steady state penetration was 39.3 µg/cm^2-hour and the permeability coefficient was 3.85x10^{-5} cm/hour
Acute Mammalian Toxicity						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940457	Oral (gavage)	Sprague-Dawley rats	Single exposure, observed for 14 days	**Dose:** 5010 mg/kg **Replicates:** 5 per sex	**LD_{50}** > 5010 mg/kg	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-1 • GLP compliant **Results:** • No mortality • Decreased locomotor activity reported in 2/5 males, the remaining 3 males and 5 females were ataxic • 4 males and 1 female had yellow perineal staining after 5 hours
4940464, 4940388	Oral (gavage)	Wister rats	Single exposure, observed for 14 days	**Doses:** 8.6, 10.4, 12.4, 14.9, and 17.9 ml/kg **Replicates:** 5 per sex per dose	**LD_{50}**:15.8 mL/kg (or 16,000 mg/kg)	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • Similar to OECD 401 (acute oral toxicity) • Not GLP compliant **Results:** • 8.6 mL/kg: 0/5 males or females • 10.4 mL/kg: 2/5 males and 0/5 females

Table B.1: Human Health Hazard						
						• 12.4 mL/kg: 0/5 males or females • 14.9 mL/kg: 2/5 males and females • 17.9 mL/kg 4/5 males and females
4940453	Dermal	New Zealand white rabbits	24 hour exposure, observed for 14 days	**Dose:** 5010 mg/kg **Replicates:** 5 per sex	**LD_{50}** > 5010 mg/kg	**Methods:** • Test substance: CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-2 • GLP compliant
4940443	Inhalation (aerosol)	Sprague-Dawley rats	4 hours, observed for 14 days	**Dose:** 2.34 mg/L **Replicates:** 5 per sex	**LC_{50}** > 2.34 mg/L	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-3 • GLP compliant
4940517	Inhalation	Rats	8 hour exposure, observed for 14 days	**Dose:** 0.083 mg/L **Replicates:** 6 animals	**LD_{50}** > 0.083 mg/L	**Methods:** • Test substance CASRN 24800-44-0 • Purity not reported • Pre-GLP compliance
Repeated Dose Toxicity						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**

4940466, 4940384	Oral (drinking water)	B6C3F1 mice	13 weeks	**Doses:**
				Males: 0, 715, 1350, 2620, 4790 and 11,000 mg/kg-day
				Females: 0, 1230, 2140, 4020, 7430 and 14700 mg/kg-day
					NOAEL: 2620 mg/kg-day (male)
					LOAEL: 4790 mg/kg-day (male), based on increased liver weight
						Methods:
						• Test substance reported as CASRN 25265-71-8
						• Purity: 99%
						• NTP guideline
						• GLP compliant
						Results:
						• Mortality
						  ○ 7,430 mg/kg-day females: (1/10) hypothermia
						  ○ 11,000 mg/kg-day males: (3/10) dehydration

Table B.1: Human Health Hazard						
				Replicates: 10 per sex per dose		○ 14,700 mg/kg-day females: (1/10) dehydration
4940384, 4940462	Oral (drinking water)	F344/N rats	14 weeks (3 months)	**Doses:** Males: 0, 425, 890, 1840, 3890, and 12,800 mg/kg-day Females: 0, 460, 920, 1690, 3340, and 8950 mg/kg-day **Replicates:** 10 per sex per dose	**NOAEL:** 425 mg/kg-day **LOAEL:** 890 mg/kg-day based on relative liver weight	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • GLP compliance not reported
4940384, 4940445	Oral (drinking water)	B6C3F1 mice	2 years	**Doses:** Males: 0, 735, 1220, 2390 mg/kg-day Females: 0, 575, 1040, and 1950 mg/kg-day **Replicates:** 50 per sex per dose	**NOAEL:** 1040 mg/kg-day **LOAEL:** 1950 mg/kg-day based on decreased mean body weight	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • NTP Guideline • GLP compliant
4940384, 4940465, 4940455	Oral (drinking water)	F344/N rats	2 years	**Doses:**	**NOAEL:** 115 mg/kg-day	**Methods:** • Test substance: CASRN 25265-71-8 • Purity: 99% • GLP compliance not reported

Table B.1: Human Health Hazard						
				Males: 0, 115, 470, and 3040 mg/kg-day Females: 0, 140, 530, and 2330 mg/kg-day **Replicates:** 50 per sex per dose	**LOAEL:** 470 mg/kg-day based on increased incidence of nephropathy, focal histiocytic, and focal granulomatous inflammation in male livers	
Reproductive Toxicity						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940389, 4940514	Oral (gavage)	Sprague-Dawley rats	Male: 2 weeks prior to mating, 49 days total Females: 2 weeks prior to mating up to day 3 of lactation	**Doses:** 0, 8, 40, 200, and 1000 mg/kg-day **Replicates:** 12 per sex per group	**NOAEL:** 1000 mg/kg-day	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity > 98% • OECD Guideline 422 • GLP compliant
Developmental Toxicity						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940450, 4440869, 4940388, 3041958	Oral (gavage)	Pregnant Sprague-Dawley rats	GD6-15	**Doses:** 0, 800, 2000, and 5000 mg/kg-day **Replicates:** 20-27 per dose	**NOAEL:** 2000 mg/kg-day **LOAEL:** 5000 mg/kg-day based on decreased fetal body weight	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity > 96% • NTP • GLP compliance

Table B.1: Human Health Hazard						
4440871, 4940459, 4940388	Oral (gavage)	New Zealand white rabbit	GD6-19	**Doses:** 0, 200, 400, 800, and 1200 mg/kg-day **Replicates:** 24 per group	**NOAEL:** 1200 mg/kg-day	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity > 96% • NTP protocol NTP-90-CTER-126 • GLP compliant
Cancer						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940448, 4940455, 4940384	Oral (drinking water)	Fischer 344 rats	2 years	**Doses:** Males: 0, 115, 470 and 3,040 mg/kg-day Females: 0, 140, 530 and 2,330 mg/kg-day **Replicates:** 50 per sex per dose	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • NTP Guideline • GLP compliant
4940384, 4940448	Oral (drinking water)	B6C3F1 mice	2 years	**Doses:** Males: 735, 1220, 2390 mg/kg-day Females: 575, 1040, 1950 mg/kg-day **Replicates:** 50 per sex per dose	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • NTP Guideline • GLP compliant

Table B.1: Human Health Hazard						
Genotoxicity						
Source	**Test Type & Endpoint**	**Species & Strain (if available)**	**Metabolic Activation**	**Doses and Controls**	**Results**	**Study Details**
4940446, 4940384	Gene mutation (*in vitro)*	Salmonella typhimurium strains TA 97, TA98, TA100, TA 1535, TA 1538	With and without	**Doses:** 0, 100, 333, 1000, 3333 and 10000 µg/plate	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity >99%. • NTP Guideline • GLP compliant
4940463	Gene mutation (*in vitro)*	Mouse lymphoma L5178Y v\cells	With and without	**Doses:** 50, 100, 300, 500, 700, 1000, 2500 and 5000 µg/mL	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • OECD Guideline 476 • GLP compliant
4940467	Gene mutation (*in vitro)*	Salmonella typhimurium strains TA98, TA100, TA 1535, TA1537, TA 1538	With and without	**Doses**: 0.100, 0.316, 1.00, 3.16, 10.0, 31.6 and 100 µL/plate	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.9% • OECD Guideline 471 • GLP compliant
4940451, 4940388	Chromosomal aberrations (*in vivo)*	Mouse	N/A	**Doses:** 0, 500, 1000, and 2000 mg/kg **Replicates:** 6 per group	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.9% • OECD Guideline 474 • GLP Compliant

Table B.1: Human Health Hazard						
Neurotoxicity						
Source	**Test Type & Endpoint**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940466, 4940384	Oral (drinking water)	B6C3F1 mice	13 weeks	**Doses:** Males: 0, 715, 1350, 2620, 4790 and 11,000 mg/kg-day Females: 0, 1230, 2140, 4020, 7430 and 14700 mg/kg-day **Replicates:** 10 per sex per dose	**NOAEL:** 14700 mg/kg-day (male)	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • NTP guideline • GLP compliant **Results:** • No brain lesions identified from histopathology
4940384, 4940462	Oral (drinking water)	F344/N rats	14 weeks (3 months)	**Doses:** Males: 0, 425, 890, 1840, 3890, and 12,800 mg/kg-day Females: 0, 460, 920, 1690, 3340, and 8950 mg/kg-day **Replicates:** 10 per sex per dose	**NOAEL:** 12800 mg/kg-day	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • GLP compliance not reported **Results:** • No brain lesions identified from histopathology

Table B.1: Human Health Hazard						
4940384, 4940445	Oral (drinking water)	B6C3F1 mice	2 years	**Doses:** Males: 0, 735, 1220, 2390 mg/kg-day Females: 0, 575, 1040, and 1950 mg/kg-day **Replicates:** 50 per sex per dose	**NOAEL:** 2390 mg/kg-day	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99% • NTP Guideline • GLP compliant
4940384, 4940465, 4940455	Oral (drinking water)	F344/N rats	2 years	**Doses:** Males: 0, 115, 470, and 3040 mg/kg-day Females: 0, 140, 530, and 2330 mg/kg-day **Replicates:** 50 per sex per dose	**NOAEL:** 3040 mg/kg-day	**Methods:** • Test substance: CASRN 25265-71-8 • Purity: 99% • GLP compliance not reported
4940457	Oral (gavage)	Sprague-Dawley rats	Single exposure, observed for 14 days	**Dose:** 5010 mg/kg **Replicates:** 5 per sex	**LOAEL:** 5010 mg/kg	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-1 • GLP compliant **Results:** • Decreased locomotor activity reported in 2/5 males, the remaining 3 males and 5 females were ataxic

Table B.1: Human Health Hazard						
Sensitization						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940444, 4946133	Dermal patch	Human	2 day exposure, observed 7 days	Study 1 **Doses:** 1%, 2%, 5%, and 10% **Replicates:** 34 patients Study 2 **Dose:** 10% **Replicates:** 503 volunteers 212 Males 291 Females	Equivocal	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity > 96% • GLP compliance not reported **Results:** • 1 person had positive reaction (only to standard grade dipropylene glycol) • 488 subjects showed no reaction and 13 subjects showed equivocal reaction to standard grade substance • 480 subjects showed no reaction and 17 subjects showed equivocal reaction to cosmetic grade substance • Irritation was indicated in 2 analytical grade and 5 cosmetic grade volunteers
4940460	Dermal	Guinea pigs	6 hour exposure, induction repeated 3 times during 2 weeks	**Dose:** 0.5 mL **Replicates:** 10 animals (7 Males 3 Females)	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-6 • GLP compliant **Results:** • 1 animal displayed slight patchy erythema 24 hours after
3118622	Dermal patch	Humans	24 hour exposure, scored after 48 hours; repeated for 9 applications	**Dose:** 0.4 mL **Replicates:** 42 volunteers	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • Modified Draize Method • GLP compliance not reported

Table B.1: Human Health Hazard						
Irritation						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses**	**Effect**	**Study Details**
4940447	Dermal	Humans	Daily for 14 days	**Doses:** 0.2 mL of 50% or 100% **Replicates:** 26 skin-sensitive volunteers	Negative	**Methods:** • Test substance: CASRN 25265-71-8 • Purity not reported • GLP compliance not reported **Results:** • One volunteer had a mildly irritating response (erythema) to 100% substance before day 4
4940461	Dermal	New Zealand white rabbit	4 hour exposure, observed for 72 hours	**Dose:** 0.5 mL **Replicates:** 3 per sex	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-5 • GLP compliant **Results:** • Very slight erythema observed in 1/6 animals within 45 minutes, but all test areas were normal for the remaining observation periods
4940458	Dermal patch	Human	24 hour exposure	**Dose:** 0.2 mL of 25% **Replicates:** 33 subjects	Mildly irritating	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • GLP compliance not reported **Results:** • At the 24-hour scoring, 4/33 subjects displayed mild erythema
3118622	Dermal	Albino rabbit	24 hour exposure, observed for 72 hour	**Dose:** 0.5 mL **Replicates:** 3 rabbits per group	Negative	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • Draize Method • GLP compliance not reported

Table B.1: Human Health Hazard						
4940453	Dermal	New Zealand white rabbit	24 hour exposure, observed for 14 day	**Dose:** 5010 mg/kg **Replicates**: 5 per sex	Negative	**Methods:** • Test substance: CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-2 • GLP compliant **Endpoints:** • Very slight irritation was observed in 5/10 animals 45 minutes after removal of patch, but all effects were fully reversible by 48 hours
4940449	Ocular	New Zealand white rabbit	Single exposure, 72 hour observation	**Dose:** 0.1 mL **Replicates:** 3 per sex	Negative	**Method:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA OPP 81-4 • GLP compliant **Endpoint:** • 6/6 animals had conjunctival redness and 2/6 animals displayed chemosis after 1 hour, but these results were fully reversible by 24 hours
3118622	Ocular	Rabbits	Single exposure, observed for 7 days	**Dose:** 0.1 mL **Replicates:** 3 rabbits per group	Negative	**Method:** • Test substance: CASRN 25265-71-8 • Purity not reported • Draize Method • GLP compliance not reported **Results:** • Eye irritation did not differ between vehicle control and test material

Table B.2: Environmental Hazard					
Aquatic Toxicity: Experimental					
Source	**Species & strain (if available)**	**Duration**	**Doses and Replicate Number**	**Effect**	**Study Details**
4940438	*Daphnia magna*	48 hours	**Dose:** 100 mg/L	**EC_{50}** > 100 mg/L	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 100% • EPA 540/9-82-024, EPA-540/9-85-005 and ASTM Standards E729-88a • GLP compliant
4940439	*Daphnia magna*	48 hours	**Doses:** 0, 12.5, 25, 50, and 100 mg/L	**EC_{50}** > 100 mg/L	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.6% • OECD Guideline 202 • GLP compliant
4940389, 4940442	*Oryzias latipes*	96 hours	**Doses:** 5 concentrations between 95 mg/L and 1000 mg/L (nominal)	**LC_{50}** >1000 mg/L	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity: 97% • OECD Guideline 203 • Not GLP compliant
4940389	*Selenastrum capricornutum*	72 hours	**Doses:** 5 concentrations between 95 mg/L and 1000 mg/L (nominal)	**EC_{50}** > 1000 mg/L	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity: 97% • OECD Guideline 201 • Not GLP compliant
Aquatic Toxicity: Estimated					
Model	**Duration**	**Species**	**Predicted Effect Level**	**Notes**	
ECOSAR v2.0 (Class: Neutral Organics)	96 hours	Aquatic Vertebrates	**EC_{50}**: 18000 mg/L	Physical properties used for estimation Log K_{ow} -0.46 (exp); water solubility 1000 mg/L; melting point -40°C (exp) SMILES: O(CC(O)C)CC(O)C	
ECOSAR v2.0 (Class: Neutral Organics)	72 hours	Green Algae	**EC_{50}**: 2400	Physical properties used for estimation Log K_{ow} -0.46 (exp); water solubility 1000 mg/L; melting point -40°C (exp) SMILES: O(CC(O)C)CC(O)C	
ECOSAR v2.0 (Class: Neutral Organics)	ChV	Aquatic Vertebrates	1300 mg/L	Physical properties used for estimation Log Kow -0.46 (exp); water solubility 1000 mg/L; melting point -40°C (exp) SMILES: O(CC(O)C)CC(O)C	

Table B.2: Environmental Hazard				
ECOSAR v2.0 (Class: Neutral Organics)	ChV	Daphnia	420 mg/L	Physical properties used for estimation Log K_{ow} -0.46 (exp); water solubility 1000 mg/L; melting point -40°C (exp) SMILES: O(CC(O)C)CC(O)C
ECOSAR v2.0 (Class: Neutral Organics)	ChV	Green Algae	370 mg/L	Physical properties used for estimation Log K_{ow} -0.46 (exp); water solubility 1000 mg/L; melting point -40°C (exp) SMILES: O(CC(O)C)CC(O)C

Table B.3: Fate					
Environmental Fate: Experimental					
Source	**Endpoint**	**Duration**	**Doses and Number of Replicates**	**Results**	**Study Details**
4940427	O_2 consumption, CO_2 evolution, DOC removal	28 days	**Dose:** 100 mg/L	Readily biodegradable	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.9% • OECD Guideline 301F • GLP compliant **Endpoints:** • O_2 consumption: 58.7% after 10 days, 84.4% after 28 days. • CO_2 evolution: 64.5% after 28 days. • DOC removal: 93.4% after 28 days.
1763085	BOD	N/A	**Doses:** 14- 6816 mg/L	Insufficient 0_2 consumption	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • Standard methods (APHA 195) • GLP compliance not reported **Endpoints:** • BOD < 0.001 g/g using microbial seed from supernatant of settled raw sewage. Insufficient 0_2 consumption
4940429	DOC removal using activated sludge inoculum	6 weeks	**Dose:** 18.5 mg/L	DOC removal 83.6% after 6 weeks	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity > 99.9% • OECD Guideline 301F or OECD Guideline 302A • GLP compliant **Endpoints:** • DOC removal 83.6% after 6 weeks • Biodegradation from days 10-42 of 82.5-84.7%

Table B.3: Fate					
4940432	O_2 consumption, CO_2 consumption, DOC removal	28 days	**Dose:** 100 mg/L	Readily biodegradable	**Method:** • Test substance CASRN 24800-44-0 • Purity: 99.9% • OECD Guideline 301F • GLP compliant **Results:** • 81.9% O_2 consumption, 61% CO_2 consumption, 91.7% DOC removal after 28 days • 55.3% biodegradation within 10-day window
4940424	CO_2 evolution and BOD removal	64 days	**Dose:** 50.3 mg/L	DOC removal showed 23.6+/-0.3% degradation after 64 days CO_2 evolution showed 17.3+/-2.6% degradation after 62 days	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.4% • OECD Guideline 306 • GLP compliance not reported
4940389	BOD	28 days	**Dose**: 100 mg/L	Not readily biodegradable	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity not reported • OECD Guideline 301C • GLP compliant **Results:** • 0% degradation by TOC and 0-3% by GC after 28 days • 1-2% BOD degradation after 28 days
4940425	CO_2 evolution	28 days	NA	Not readily biodegradable	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity: 95% • OECD Guideline 301B • GLP compliant **Results:** • 0% degradation by DOC after 28 days • 4-5% degradation by CO_2 evolution after 28 days
4940426	O_2 consumption	28 days	NA	69% degradation after 28 days	**Method:**

Table B.3: Fate					
					• Test substance reported as CASRN 24800-44-0 • Purity: 99.43% • OECD Guideline 301D • GLP compliant **Results:** • 59% in 11 days • 69% degradation after 28 days
4940431	O_2 consumption	28 days	NA	Not readily biodegradable	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity: 99.43% • OECD Guideline 301D • GLP compliant **Results:** • 0% degradation by O_2 consumption after 28day (below detection limit of <2.5% ThOD)
4940437	Toxicity to microorganisms	3 hours	**Doses**: 10, 32, 100, 320 and 1000 mg/L	**NOEC** > 1000 mg/L	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity: 99.9% • OECD Guideline 209 • GLP compliant **Results:** • EC50 >1000 mg/L (nominal)
4940441	Toxicity to microorganisms	18 hours	**Doses:** Range Finding: 0.1,1, 100, and 1000 mg/ L Main study: 1.95, 3.91, 7.81, 15.63, 31.25, 62.5, 125, 250, 500, and 1000 mg/L	**EC_{10}** > 1000 mg/L	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity: 99.9% • GLP compliant
Environmental Fate: Modelled					
Model	**Data Type**	**Endpoint**	**Predicted Endpoint**	**Notes**	
EPISuite v.4.11	Estimated	BAF	0.9		
EPISuite v.4.11	Estimated	BCF	3.16		

Table B.3: Fate				
EPISuite v.4.11 (BIOWIN 7)	Estimated	Anaerobic biodegradation	Not predicted to biodegrade quickly under anaerobic conditions	Probability of 0.4055. Fragment representation is valid. Fast degradation is defined as predicted probability >0.5.
EPI Suite Reference			For purposes of the EPI estimates, the melting point was entered as -40 °C and the Log K_{ow} was taken from the ICSC entry.	EPI Suite (Physical Property Inputs - BP = 232.8 deg C, MP = -40 deg C, VP = 0.03 mm Hg, WS = 1000000 mg/L, Log P = -0.7 SMILES: OC(C)COCC(C)O

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Reported to the ECHA (European Chemicals Agency) database. (1980). Oxydipropanol: acute toxicity: oral: 002 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/3/2/?documentUUID=1e77b88a-8c76-433b-993f-acc62594e680

Reported to the ECHA (European Chemicals Agency) database. (1988). Oxydipropanol: genetic toxicity: in vitro: 002 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/7/2/?documentUUID=389098d4-4996-4c60-a762-d2b60df89dcc

Reported to the ECHA (European Chemicals Agency) database. (1990a). Oxydipropanol: developmental toxicity/teratogencity: 002 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/9/3/?documentUUID=996f3dc0-f578-45ab-9a89-b92637f28c00

Reported to the ECHA (European Chemicals Agency) database. (1990b). Oxydipropanol: developmental toxicity/teratogenicity: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/9/3

Reported to the ECHA (European Chemicals Agency) database. (1991a). [(methylethylene)bis(oxy)]dipropanol: biodegradation in water: screening tests: 004 supporting | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/5/3/2/?documentUUID=caad96d0-3b36-4255-9bd2-0e2da25ee91e

Reported to the ECHA (European Chemicals Agency) database. (1991b). [(methylethylene)bis(oxy)]dipropanol: biodegradation in water: screening tests: 005 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/5/3/2/?documentUUID=00f8fa90-fc45-491e-b488-434e42981995

Reported to the ECHA (European Chemicals Agency) database. (1992a). Oxydipropanol: genetic toxicity: in vitro: 003 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/7/2/?documentUUID=9d24f12e-1bf0-4481-8ae5-e7640975e049

Reported to the ECHA (European Chemicals Agency) database. (1992b). Oxydipropanol: toxicity to microorganisms. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/6/2/8

Reported to the ECHA (European Chemicals Agency) database. (1993a). [(methylethylene)bis(oxy)]dipropanol: biodegradation in water: screening tests: 003 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/5/3/2/?documentUUID=10b66ef0-9fbb-4f6e-8371-693280a318d1

Reported to the ECHA (European Chemicals Agency) database. (1993b). [(methylethylene)bis(oxy)]dipropanol: repeated dose toxicity: oral: 002 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/6/2/?documentUUID=814b4a8c-4620-4c5c-bf90-b3f8622b63f6

Reported to the ECHA (European Chemicals Agency) database. (1994a). [(methylethylene)bis(oxy)]dipropanol: short-term toxicity to fish: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/6/2/2/?documentUUID=dd8cb796-a0f9-4d90-8fb2-57a6fe859ffa

Reported to the ECHA (European Chemicals Agency) database. (1994b). Oxydipropanol: biodegradation in water: screening tests: 003 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/5/3/2/?documentUUID=4d16933c-e52a-4975-8416-9c9534d5ea19

Reported to the ECHA (European Chemicals Agency) database. (1995a). [(methylethylene)bis(oxy)]dipropanol: basic toxicokinetics: in vivo. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/2/2

Reported to the ECHA (European Chemicals Agency) database. (1995b). Oxydipropanol: acute toxicity: dermal. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/3/4

Reported to the ECHA (European Chemicals Agency) database. (1995c). Oxydipropanol: acute toxicity: inhalation. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/3/3

Reported to the ECHA (European Chemicals Agency) database. (1995d). Oxydipropanol: acute toxicity: oral: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/3/2/?documentUUID=c8ac7136-0238-420c-bdcb-57a927cc6023

Reported to the ECHA (European Chemicals Agency) database. (1995e). Oxydipropanol: exposure related observation in humans: other data: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/11/6

Reported to the ECHA (European Chemicals Agency) database. (1995f). Oxydipropanol: eye irritation: in vivo. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/4/3

Reported to the ECHA (European Chemicals Agency) database. (1995g). Oxydipropanol: sensitisation data (human). Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/11/5

Reported to the ECHA (European Chemicals Agency) database. (1995h). Oxydipropanol: short-term toxicity to aquatic invertebrates: 002 supporting | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/6/2/4/?documentUUID=22a63c82-fa1a-4621-9cf5-2fb6efdfc6a3

Reported to the ECHA (European Chemicals Agency) database. (1995i). Oxydipropanol: skin irritation/corrosion: in vivo. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/4/2

Reported to the ECHA (European Chemicals Agency) database. (1995j). Oxydipropanol: skin sensitisation: in vivo (non-LLNA). https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/5/2

Reported to the ECHA (European Chemicals Agency) database. (1997). Oxydipropanol: exposure related observations in humans: other data: 002 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/11/6/?documentUUID=d0571cec-5afe-40b6-86f9-d57d1ef9c2f2

Reported to the ECHA (European Chemicals Agency) database. (1999). Oxydipropanol: genetic toxicity: in vivo. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/7/3

Reported to the ECHA (European Chemicals Agency) database. (2002). Oxydipropanol: short-term toxicity to aquatic invertebrates: 001 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/6/2/4

Reported to the ECHA (European Chemicals Agency) database. (2004a). Oxydipropanol: carcinogenicity: oral. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/8/?documentUUID=22067ce9-4d3f-474a-a0eb-e0466eaa8a37

Reported to the ECHA (European Chemicals Agency) database. (2004b). Oxydipropanol: carcinogenicity: oral: 001 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/8

Reported to the ECHA (European Chemicals Agency) database. (2004c). Oxydipropanol: genetic toxicity: in vitro: 001 key | experimental result. Helsinki, Finland.

https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/7/2/?documentUUID=74e59391-4529-4883-958e-083d1a25594e

Reported to the ECHA (European Chemicals Agency) database. (2004d). Oxydipropanol: repeated dose toxicity: oral: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/6/2

Reported to the ECHA (European Chemicals Agency) database. (2004e). Oxydipropanol: repeated dose toxicity: oral: 002 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/6/2/?documentUUID=9b888e96-d05d-4451-9709-64fabae21fbc

Reported to the ECHA (European Chemicals Agency) database. (2004f). Oxydipropanol: repeated dose toxicity: oral: 003 supporting | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/6/2/?documentUUID=9796c071-d039-468a-b2f1-0493582fdc50

Reported to the ECHA (European Chemicals Agency) database. (2004g). Oxydipropanol: repeated dose toxicity: oral: 004 supporting | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/7/6/2/?documentUUID=aeb50875-5f7d-41e6-802b-de9b618599ec

Reported to the ECHA (European Chemicals Agency) database. (2007a). [(methylethylene)bis(oxy)]dipropanol: biodegradation in water: screening tests: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/5/3/2/?documentUUID=bf8b2f2f-7880-495b-ad1e-7a003f2c96c7

Reported to the ECHA (European Chemicals Agency) database. (2007b). [(methylethylene)bis(oxy)]dipropanol: dermal absorption in vitro/ex vivo. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/2/3

Reported to the ECHA (European Chemicals Agency) database. (2007c). Oxydipropanol: biodegradation in water: screening tests: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/5/3/2

Reported to the ECHA (European Chemicals Agency) database. (2007d). Oxydipropanol: biodegradation in water: screening tests: 002 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/16016/5/3/2/?documentUUID=62502e63-7f7b-4797-aaba-87666cb57def

Reported to the ECHA (European Chemicals Agency) database. (2010). [(methylethylene)bis(oxy)]dipropanol: toxicity to microorganisms: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/6/2/8/?documentUUID=95e7699a-1ff8-4acc-a8f6-fba87bb72c52

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OECD (Organisation for Economic Co-operation and Development). (1994). SIDS Initial Assessment Report for SIAM 2 (Paris, 4-6 July 1994)Tripropylene glycol: CAS No: 24800-440. https://hpvchemicals.oecd.org/UI/handler.axd?id=00205ec6-f694-448b-bbb2-be4121e9a7fe

OECD (Organisation for Economic Co-operation and Development). (2001). Dipropylene glycol (mixed isomers and dominant isomer Cas No: 25265-71-8 and 110-98-5). http://www.inchem.org/documents/sids/sids/25265-71-8.pdf

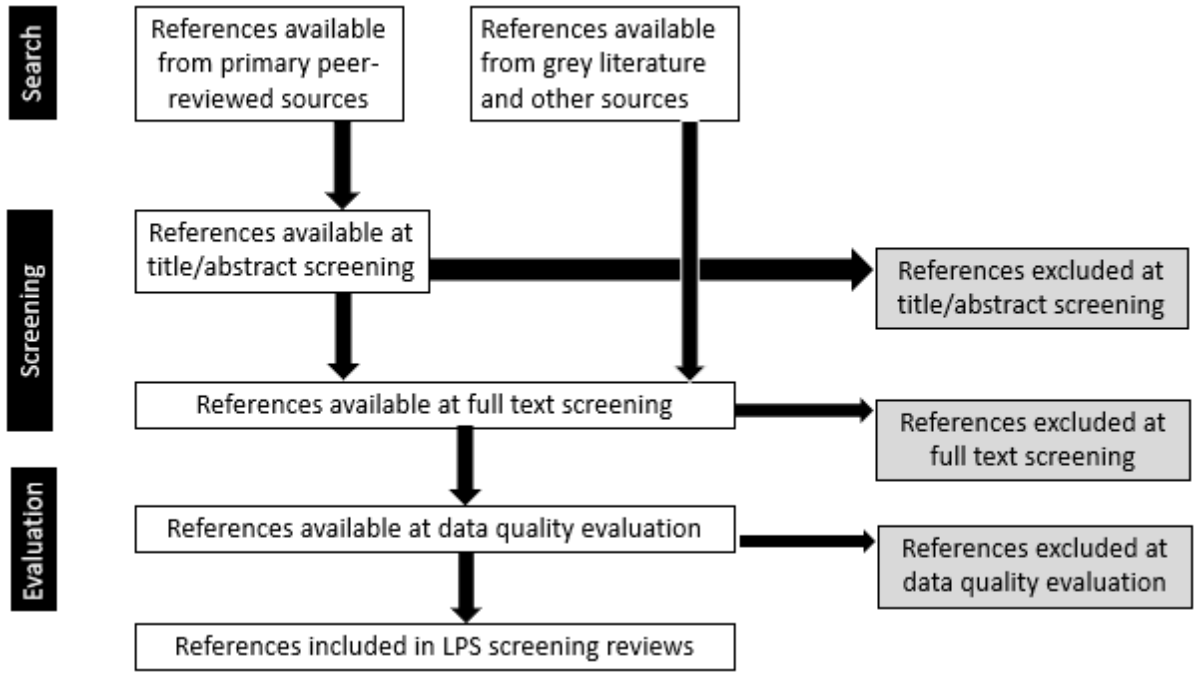
Appendix C: Literature Search Outcomes

C.1 Literature Search and Review

This section briefly describes the literature search and review process, search terms, and search outcomes for the hazard screening of dipropylene glycol. Search outcomes and reference details are provided on the candidate's HERO[44] project page.

EPA created a fit-for-purpose process to transparently document the literature search and review[45] of available hazard and fate information for low-priority substance (LPS) candidates. References from peer-reviewed primary sources, grey sources,[46] and other sources were identified, screened at the title/abstract and full text level, and evaluated for data quality based on discipline-specific criteria. An overview of the literature search and review process is illustrated in Figure C1.

Figure C.1: Overview of the Literature Search and Review Process



[44] The HERO low-priority substance candidate project pages are accessible to the public at https://hero.epa.gov/hero/.

[45] Discussed in the document "Approach Document for Screening Hazard Information for Low-Priority Substances Under TSCA."

[46] Grey literature and additional sources are the broad category of studies not found in standard, peer-reviewed literature database searches. This includes U.S. and international government agency websites, non-government organization (NGO) websites, and data sources that are difficult to find, or are not included, in the peer-reviewed databases, such as white papers, conference proceedings, technical reports, reference books, dissertations, and information on various stakeholder websites.

C.1.1 Search for Analog Data

To supplement the information on the candidate chemical, dipropylene glycol, the following LPS candidates were used as analogs for read-across: 1,1'-dimethyldiethylene glycol (CASRN 110-98-5) and tripropylene glycol (CASRN 24800-44-0). For more details and justification on analogs, see section 6.1.1. Analogs were used to fill data gaps on endpoints for which dipropylene glycol lacked quality data, such as reproductive toxicity, and to add to the weight of the scientific evidence. Analog references were searched, screened and evaluated using the same process as references on dipropylene glycol described above.[45] Dipropylene glycol and the two analogs mentioned above fall under the glycol cluster in HERO.

C.1.2 Search Terms and Results

EPA began the literature review process for the hazard screening of dipropylene glycol by developing search terms. To gather publicly available information, specific search terms were applied for each discipline and across databases and grey literature sources. Table C.1.1 lists the search terms used in the database search of peer -reviewed literature for the glycol cluster including dipropylene glycol. For grey literature and other secondary sources, Table C.1.2 lists the search terms used for the glycol cluster.

Table C.1: Search Terms Used in Peer Reviewed Databases

Discipline	Database	Search terms
Human Health	PubMed	25265-71-8[rn] OR 110-98-5[rn] OR 24800-44-0[rn] OR "((1-methyl-1,2-ethanediyl)bis(oxy))bispropanol"[tw] OR "((Methylethylene)bis(oxy))dipropanol"[tw] OR "1,1'-Dimethyldiethylene glycol"[tw] OR "1,1'-Oxybis(2-propanol)"[tw] OR "1,1'-Oxybis-2-propanol"[tw] OR "1,1'-Oxydi-2-propanol"[tw] OR "1,1'-Oxydipropan-2-ol"[tw] OR "2,2'-Dihydroxydipropyl ether"[tw] OR "2-(2-(2-Hydroxypropoxy)propoxy)-1-propanol"[tw] OR "2-Propanol, 1,1'-oxybis-"[tw] OR "2-Propanol, 1,1'-oxydi-"[tw] OR "4-Oxa-2,6-heptandiol"[tw] OR "4-Oxaheptane-2,6-diol"[tw] OR "ADK DPG-RF"[tw] OR "Bis(2-hydroxypropyl) ether"[tw] OR "Bis(3-hydroxypropyl)ether"[tw] OR "Diisopropylene glycol"[tw] OR "Dipropylene glycol"[tw] OR "DIPROPYLENEGLYCOL"[tw] OR "DIPROPYLENGLYKOL"[tw] OR "Dowanol DPG"[tw] OR "DPG-FC"[tw] OR "DPG-RF"[tw] OR "NIAX catalyst D-19"[tw] OR "oxidipropanol"[tw] OR "Oxybispropanol"[tw] OR "Oxydipropanol"[tw] OR "Propanol, ((1-methyl-1,2-ethanediyl)bis(oxy))bis-"[tw] OR "Propanol, oxybis-"[tw] OR "Tripropylene glycol"[tw]
	Toxline	(25265-71-8[rn] OR 110-98-5[rn] OR 24800-44-0[rn] OR "((1-methyl-1,2-ethanediyl)bis(oxy))bispropanol" OR "((Methylethylene)bis(oxy))dipropanol" OR "1,1'-Dimethyldiethylene glycol" OR "1,1'-Oxybis(2-propanol)" OR "1,1'-Oxybis-2-propanol" OR "1,1'-Oxydi-2-propanol" OR "1,1'-Oxydipropan-2-ol" OR "2,2'-Dihydroxydipropyl ether" OR "2-(2-(2-Hydroxypropoxy)propoxy)-1-propanol" OR "2-Propanol, 1,1'-oxybis-" OR "2-Propanol, 1,1'-oxydi-" OR "4-Oxa-2,6-heptandiol" OR "4-Oxaheptane-2,6-diol" OR "ADK DPG-RF" OR "Bis(2-hydroxypropyl) ether" OR "Bis(3-hydroxypropyl)ether" OR "Diisopropylene glycol" OR "Dipropylene glycol" OR "DIPROPYLENEGLYCOL" OR "DIPROPYLENGLYKOL" OR "Dowanol DPG" OR "DPG-FC" OR "DPG-RF" OR "NIAX catalyst D-19" OR "oxidipropanol" OR "Oxybispropanol" OR "Oxydipropanol" OR "Propanol, ((1-methyl-1,2-ethanediyl)bis(oxy))bis-" OR "Propanol, oxybis-" OR "Tripropylene glycol") AND (ANEUPL [org] OR BIOSIS [org] OR CIS [org] OR DART [org] OR EMIC [org] OR EPIDEM [org] OR FEDRIP [org] OR HEEP [org] OR HMTC [org] OR IPA [org] OR RISKLINE [org] OR MTGABS [org] OR NIOSH [org] OR NTIS [org] OR PESTAB [org] OR PPBIB [org]) AND NOT PubMed [org] AND NOT pubdart [org]

Table C.1: Search Terms Used in Peer Reviewed Databases		
	TSCATS 1	(25265-71-8 [rn] OR 110-98-5 [rn] OR 24800-44-0 [rn]) AND (TSCATS [org]) AND NOT PubMed [org] AND NOT pubdart [org]
	WOS	TS=("25265-71-8" OR "110-98-5" OR "24800-44-0" OR "((1-methyl-1,2-ethanediyl)bis(oxy))bispropanol" OR "((Methylethylene)bis(oxy))dipropanol" OR "1,1'-Dimethyldiethylene glycol" OR "1,1'-Oxybis(2-propanol)" OR "1,1'-Oxybis-2-propanol" OR "1,1'-Oxydi-2-propanol" OR "1,1'-Oxydipropan-2-ol" OR "2,2'-Dihydroxydipropyl ether" OR "2-(2-(2-Hydroxypropoxy)propoxy)-1-propanol" OR "2-Propanol, 1,1'-oxybis-" OR "2-Propanol, 1,1'-oxydi-" OR "4-Oxa-2,6-heptandiol" OR "4-Oxaheptane-2,6-diol" OR "ADK DPG-RF" OR "Bis(2-hydroxypropyl) ether" OR "Bis(3-hydroxypropyl)ether" OR "Diisopropylene glycol" OR "Dipropylene glycol" OR "DIPROPYLENEGLYCOL" OR "DIPROPYLENGLYKOL" OR "Dowanol DPG" OR "DPG-FC" OR "DPG-RF" OR "NIAX catalyst D-19" OR "oxidipropanol" OR "Oxybispropanol" OR "Oxydipropanol" OR "Propanol, ((1-methyl-1,2-ethanediyl)bis(oxy))bis-" OR "Propanol, oxybis-" OR "Tripropylene glycol") Indexes=SCI-EXPANDED, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, CCR-EXPANDED, IC Timespan=All years
Environmental Hazard	WOS	Same as human health strategy synonyms only
	Toxline	Same as human health strategy synonyms only
	TSCATS 1	Same as human health strategy CASRN only
	Proquest	TITLE=("25265-71-8" OR "1,1'-Oxybis 2-propanol" OR "1,1'-Oxybis-2-propanol" OR "1,1'-Oxydi-2-propanol" OR "1,1'-Oxydipropan-2-ol" OR "2-Propanol, 1,1'-oxybis-" OR "Bis 2-hydroxypropyl ether" OR "Dipropylene glycol" OR "DIPROPYLENEGLYCOL" OR "Propanol, oxybis-" OR "Tripropylene glycol") ABSTRACT=("25265-71-8" OR "1,1'-Oxybis 2-propanol" OR "1,1'-Oxybis-2-propanol" OR "1,1'-Oxydi-2-propanol" OR "1,1'-Oxydipropan-2-ol" OR "2-Propanol, 1,1'-oxybis-" OR "Bis 2-hydroxypropyl ether" OR "Dipropylene glycol" OR "DIPROPYLENEGLYCOL" OR "Propanol, oxybis-" OR "Tripropylene glycol") SUBJECT=("25265-71-8" OR "1,1'-Oxybis 2-propanol" OR "1,1'-Oxybis-2-propanol" OR "1,1'-Oxydi-2-propanol" OR "1,1'-Oxydipropan-2-ol" OR "2-Propanol, 1,1'-oxybis-" OR "Bis 2-hydroxypropyl ether" OR "Dipropylene glycol" OR "DIPROPYLENEGLYCOL" OR "Propanol, oxybis-" OR "Tripropylene glycol") ("110-98-5" OR "24800-44-0" OR "1-methyl-1,2-ethanediyl bis oxy bispropanol" OR "Methylethylene bis oxy dipropanol" OR "1,1'-Dimethyldiethylene glycol" OR "2,2'-Dihydroxydipropyl ether" OR "2- 2- 2-Hydroxypropoxy propoxy -1-propanol" OR "2-Propanol, 1,1'-oxydi-" OR "4-Oxa-2,6-heptandiol" OR "4-Oxaheptane-2,6-diol" OR "ADK DPG-RF" OR "Bis 3-hydroxypropyl ether" OR "Diisopropylene glycol" OR "DIPROPYLENGLYKOL" OR "Dowanol DPG" OR "DPG-FC" OR "DPG-RF" OR "NIAX catalyst D-19" OR "oxidipropanol" OR "Oxybispropanol" OR "Oxydipropanol" OR "Propanol, 1-methyl-1,2-ethanediyl bis oxy bis-")
Fate	WOS	Same as human health strategy synonyms only

Table C.2: Search Terms Used in Grey Literature and Additional Sources	
Chemical	**Search terms**
Glycol cluster (1,1'-Dimethyldiethylene glycol; dipropylene glycol, tripropylene glycol)	Searched as a string or individually depending on resource: "25265-71-8" OR "110-98-5" OR "24800-44-0" OR "Dipropylene glycol" OR "Dipropyleneglycol" OR "Propanol, oxybis-" OR "Tripropylene glycol"

After the search terms were applied, more than 620 references were returned by all search efforts across peer-reviewed databases and grey literature sources. The total number of references include database results, additional strategies, and analog searches. All references from the search efforts were screened and evaluated through the LPS literature search and review process.[45] Of these, 71 references were included for data evaluation and used to support the designation of dipropylene glycol as LPS. The included hazard and fate references are listed in the bibliography of Appendix B.

C.2 Excluded Studies and Rationale

This section lists the excluded references, by HERO ID, found to be off-topic or unacceptable for use in the hazard screening of dipropylene glycol. The excluded references are organized by discipline (human health hazard, environmental hazard, and fate), presented along with a rationale based on exclusion criteria. The criteria[45] was used to determine off-topic references in the title/abstract or full text screening and to determine unacceptable references in the data quality evaluation are provided in the form of questions.

C.2.1 Human Health Hazard Excluded References

For the screening review of dipropylene glycol, EPA excluded a total of 539 references when assessing human health hazard. Off-topic references (e.g., studies that did not contain information relevant to human health) were excluded at either title/abstract screening (see Table C.3), or full-text screening (see Table C.4). Unacceptable references (e.g., studies that did not meet data quality metrics) were excluded at full-text screening (see Tables C.5 and C.6). Off-topic and unacceptable references are displayed next to the corresponding exclusion criteria.

Table C.3: Off-Topic References Excluded at Title/Abstract Screening for Human Health Hazard									
Reference excluded (HERO ID) because the reference did NOT contain information needs[47] relevant to human health hazard									
33975	4949055	4948960	4947155	4705492	1201178	4949084	4948984	4948886	4946188
44187	4949056	4948961	4947156	4706833	1204953	4949085	4948985	4948887	4946189
404898	4949058	4948962	4947159	4738360	1249186	4949086	4948986	4948890	4946190
628230	4949060	4948963	4947160	4738993	1254062	4949087	4948988	4948891	4946193
628727	4949061	4948964	4947161	4742957	1314113	4949089	4948989	4948892	4946194

[47] The information needs for human health hazard includes a list of study characteristics pertaining to the study population/test organism, types of exposures and routes, use of controls, type and level of effects. A complete list of the information needs is provided in Table A1 of the "Approach Document for Screening Hazard Information for Low-Priority Substances Under TSCA". These information needs helped guide the development of questions for title/abstract and full-text screening.

Table C.3: Off-Topic References Excluded at Title/Abstract Screening for Human Health Hazard									
635083	4949063	4948965	4947175	4828940	1316100	4949090	4948990	4948893	4946210
744085	4949064	4948966	4947177	4828943	1321888	4949092	4948991	4948894	4946247
789593	4949065	4948967	4947178	4847997	1458307	4949094	4948992	4948895	4946257
789651	4949066	4948968	4947179	4853443	1496934	4949095	4948993	4948896	4946258
926985	4949067	4948969	4947182	4909646	1549118	4949096	4948994	4948898	4946259
992939	4949068	4948970	4947185	4940595	1580047	4949098	4948995	4948899	4946263
1058389	4949070	4948971	4947187	4940694	1611582	4949099	4948996	4948900	4946320
1058433	4949071	4948972	4947189	4940855	1612753	4949100	4948997	4948902	4946322
1112905	4949072	4948974	4947194	4941419	1615034	4949102	4948998	4948904	4946324
1124442	4949074	4948975	4947200	4945941	1689217	4949103	4948999	4948905	4946329
1124901	4949075	4948977	4947201	4946008	1763085	4949104	4949000	4948906	4946359
1142139	4949076	4948978	4947202	4946061	1763087	4949105	4949001	4948909	4946360
1153582	4949078	4948979	4947203	4946132	1763125	4949106	4949002	4948911	4946361
1156301	4949080	4948980	4947204	4946147	1763137	4949108	4949003	4948912	4946374
1167387	4949081	4948981	4947223	4946178	1763157	4949109	4949004	4948913	4946375
1201159	4949082	4948982	4947224	4946179	1781960	4949110	4949005	4948914	4946376
1201176	4949083	4948983	4948885	4946180	1808388	4949111	4949006	4948915	4946380
3036899	4949156	4949040	4948950	4947131	1808755	4949112	4949007	4948916	4946387
3037885	4949157	4949042	4948951	4947132	1865871	4949113	4949009	4948918	4946408
3038973	4949158	4949044	4948952	4947135	1955931	4949116	4949010	4948919	4946410
3039406	4949159	4949045	4948953	4947136	1967450	4949117	4949011	4948920	4946411
3039791	4951048	4949046	4948954	4947137	1970619	4949118	4949012	4948921	4946419
3041527	4951050	4949047	4948955	4947138	2231679	4949119	4949013	4948922	4946423
3041622	4951055	4949049	4948956	4947140	2232056	4949120	4949015	4948923	4946506
3041638	4951170	4949051	4948958	4947141	2232422	4949121	4949016	4948925	4946513
3041935	4951176	4949052	4948959	4947154	2232425	4949122	4949017	4948926	4946538
3047394	4951181	4949053	4339757	4576534	2232427	4949123	4949018	4948927	4946547
3051635	4951206	4949054	4376725	4579583	2232444	4949126	4949020	4948928	4946614
3051709	4951208	3753956	4388064	4583202	2232562	4949128	4949021	4948930	4946615
3103598	4951228	3823035	4391261	4656492	2273142	4949129	4949022	4948931	4946617
3114932	4428638	3830342	4395587	4660346	2292715	4949130	4949023	4948932	4946619
3115961	4428838	3830898	4398518	4704876	2302957	4949131	4949024	4948933	4946620
3119596	4433785	3846566	4399866	3577212	2530089	4949132	4949026	4948934	4946621
3225794	4436364	3847436	4400649	3577235	2563138	4949134	4949027	4948935	4946623
3374286	4436864	3874693	4404349	3590105	2692340	4949135	4949028	4948936	4947105

Table C.3: Off-Topic References Excluded at Title/Abstract Screening for Human Health Hazard									
3402924	4438060	4146480	4408404	3619406	2745927	4949138	4949029	4948938	4947106
3445046	4438415	4148076	4420372	3625221	2824290	4949140	4949030	4948940	4947107
3476490	4425601	4148079	4420932	4275583	2875983	4949141	4949031	4948942	4947108
3477473	4426820	4168926	4420947	4276472	2883990	4949142	4949032	4948943	4947109
3491334	3559324	4173202	4421954	4423539	2887419	4949149	4949033	4948944	4947110
3539276	3562800	4222683	4948949	4947130	2892020	4949150	4949034	4948946	4947111
3009070	4949153	4949037	4948948	4947115	2978028	4949152	4949035	4948947	4947113
3036268	4949154	4949039							
Reference excluded (HERO ID) because the reference primarily contained *in silico* data									
N/A.									

Table C.4: Screening Questions and Off-Topic References Excluded at Full Text Screening for Human Health Hazard		
Question	**Off-topic if answer is:**	**References excluded (HERO ID)**
Does the reference contain information pertaining to a low-priority substance candidate?	No	1322754 1629162 1776453 1875316 2301122 2301139 3041082 4219489 4862648 4940454 4941418 4946053 4947114 4951209 61412 824457 1744616 1744618 3039593 4441664 4442235 4862648 4940287 4940288 4940320 4940383 4940385 4940387 4940395 4940392 4946053 4948456

Table C.4: Screening Questions and Off-Topic References Excluded at Full Text Screening for Human Health Hazard		
Question	**Off-topic if answer is:**	**References excluded (HERO ID)**
		4949088 4951173 4951178
What type of source is this reference?	Review article or book chapter that contains only citations to primary literature sources	1004739 3038211 4940386 4946377 628176 3036785
What kind of evidence does this reference primarily contain?	*In silico* studies that DO NOT contain experimental verification	N/A.
The following question apply to HUMAN evidence only		
Does the reference report an exposure route that is or is presumed to be by an inhalation, oral, or dermal route?	No	N/A.
Does the reference report both test substance exposure(s) AND related health outcome(s)?	No	N/A.
If the reference reports an exposure to a chemical mixture, are measures of the test substance or related metabolite(s) reported independently of other chemicals? Note: If the paper does not pertain to mixtures, choose "Not Applicable".	No	4951213
The following question apply to ANIMAL evidence only		
Does the reference report an exposure route that is by inhalation, oral, or dermal route?	No	N/A.
Does the reference report both test substance-related exposure(s) AND related health outcome(s)?	No	N/A.
Does the reference report the duration of exposure?	No	N/A.
Does the reference report an exposure to the test substance only (i.e. no mixtures with the exception of aqueous solutions and reasonable impurities and byproducts)?	No	4951261 4951218 4951185 1230541
Does the paper report a negative control that is a vehicle control or no treatment control?	No[48]	4951261

[48] Except for acute mammalian toxicity and skin and eye irritation studies, where the use of a negative control may not be required (e.g., OECD 403 Acute Inhalation Toxicity Guidelines).

Table C.4: Screening Questions and Off-Topic References Excluded at Full Text Screening for Human Health Hazard		
Question	**Off-topic if answer is:**	**References excluded (HERO ID)**
The following questions apply to MECHANISTIC/ALTERNATIVE TEST METHODS evidence only		
Does the reference report a negative control that is a vehicle control or no treatment control?	No	3036587
Does the reference report an exposure to the test substance only (i.e. no mixtures with the exception of aqueous solutions and reasonable impurities and byproducts)?	No	N/A.
For genotoxicity studies only: Does the study use a positive control?	No	3036587

Table C.5: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Human Health Hazard – Animal		
Data Quality Metric	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 1: Test Substance Identity	The test substance identity cannot be determined from the information provided (e.g., nomenclature was unclear and CASRN or structure were not reported). **OR** For mixtures, the components and ratios were not characterized or did not include information that could result in a reasonable approximation of components.	N/A.
Metric 2: Negative and Vehicle Controls	A concurrent negative control group was not included or reported. **OR** The reported negative control group was not appropriate (e.g., age/weight of animals differed between control and treated groups).	N/A.
Metric 3: Positive Controls	When applicable, an appropriate concurrent positive control (i.e., inducing a positive response) was not used.	N/A.
Metric 4: Reporting of Doses/Concentrations	Doses/concentrations were not reported and could not be calculated using default or reported estimates of body weight and diet/water intake (e.g., default intake values are not available for pregnant animals).	1763148 3041958 4940388 4940524 4940510
Metric 5: Exposure Duration	The duration of exposure was not reported. **OR**	4940388 4940389 4941420

Table C.5: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Human Health Hazard – Animal		
Data Quality Metric	**Unacceptable if:**	**References excluded (HERO ID)**
	The reported exposure duration was not suited to the study type and/or outcome(s) of interest (e.g., <28 days for repeat dose).	4946133
Metric 6: Test Animal Characteristics	The test animal species was not reported. **OR** The test animal (species, strain, sex, life-stage, source) was not appropriate for the evaluation of the specific outcome(s) of interest (e.g., genetically modified animals, strain was uniquely susceptible or resistant to one or more outcome of interest).	4941420 1763148 4940389 4940388 3041958 4946133
Metric 7: Number of Animals Per Group	The number of animals per study group was not reported. **OR** The number of animals per study group was insufficient to characterize toxicological effects (e.g., 1-2 animals in each group).	N/A.
Metric 8: Outcome Assessment Methodology	The outcome assessment methodology was not sensitive for the outcome(s) of interest (e.g., evaluation of endpoints outside the critical window of development, a systemic toxicity study that evaluated only grossly observable endpoints, such as clinical signs and mortality, etc.).	1763148 2282271 4940388 4940389 4941420 4946133
Metric 9: Reporting of Data	Data presentation was inadequate (e.g., the report does not differentiate among findings in multiple exposure groups). **OR** Major inconsistencies were present in reporting of results.	4940388 4940524 4941420 2282271 4442235 4940303 4940394 4946044 4940452

Table C.6: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Human Health Hazard – In Vitro		
Data Quality Metric	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 1: Test Substance Identity	The test substance identity or description cannot be determined from the information provided (e.g., nomenclature was unclear and CASRN or structure were not reported). **OR**	3039551

Table C.6: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Human Health Hazard – In Vitro		
Data Quality Metric	**Unacceptable if:**	**References excluded (HERO ID)**
	For mixtures, the components and ratios were not characterized or did not include information that could result in a reasonable approximation of components.	
Metric 2: Negative Controls	A concurrent negative control group was not included or reported. **OR** The reported negative control group was not appropriate (e.g., different cell lines used for controls and test substance exposure).	N/A.
Metric 3: Positive Controls	A concurrent positive control or proficiency group was not used.	N/A.
Metric 4: Assay Type	The assay type was not reported. **OR** The assay type was not appropriate for the study type or outcome of interest (e.g., *in vitro* skin corrosion protocol used for *in vitro* skin irritation assay).	N/A.
Metric 5: Reporting of Concentration	The exposure doses/concentrations or amounts of test substance were not reported.	N/A.
Metric 6: Exposure Duration	No information on exposure duration(s) was reported. **OR** The exposure duration was not appropriate for the study type and/or outcome of interest (e.g., 24 hours exposure for bacterial reverse mutation test).	4940521 4940522 4940389 2282271
Metric 7: Metabolic Activation	No information on the characterization and use of a metabolic activation system was reported. **OR** The exposure duration was not appropriate for the study type and/or outcome of interest (e.g., 24 hours exposure for bacterial reverse mutation test).	N/A.
Metric 8: Test Model	The test model was not reported **OR** The test model was not routinely used for evaluation of the specific outcome of interest.	N/A.

Table C.6: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Human Health Hazard – In Vitro		
Data Quality Metric	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 9: Outcome Assessment Methodology	The outcome assessment methodology was not reported. **OR** The assessment methodology was not appropriate for the outcome(s) of interest (e.g., cells were evaluated for chromosomal aberrations immediately after exposure to the test substance instead of after post-exposure incubation period).	4940451 4940388

C.2.2 Environmental Hazard

For the screening review of LPS candidate dipropylene glycol, EPA excluded a total of 547 references when assessing environmental hazard. Off-topic environmental hazard references excluded at title/abstract screening are listed in Table C.7, and those excluded at full-text screening are listed in Table C.8. References in Table C.9 represent unacceptable studies based on specific data quality metrics for environmental hazard. Off-topic and unacceptable references are displayed next to the corresponding exclusion criteria.

Table C.7: Off-Topic References Excluded at Title/Abstract Screening for Environmental Hazard									
Reference excluded (HERO ID) because the reference did NOT contain information needs[49] relevant to environmental hazard									
44187	4440871	4949112	4948988	4946374	2892020	4738993	1744618	4949052	4948891
404898	4441664	4949113	4948989	4946375	2978028	4742957	1763125	4949053	4948892
635083	4442235	4949116	4948990	4946376	3009070	4828940	1763137	4949054	4948893
744085	4940392	4949117	4948991	4946377	3036268	4828943	1763148	4949055	4948894
789593	4940395	4949118	4948992	4946380	3036587	4847997	1763157	4949056	4948895
789651	4941420	4949119	4948993	4946387	3036785	4853443	1776453	4949058	4948896
824457	4944882	4949120	4948994	4946408	3036899	4862648	1808755	4949060	4948898
926985	4946008	4949121	4948995	4946419	3037885	4909646	2112816	4949061	4948899
1058389	4946016	4949122	4948996	4946513	3038211	4940595	2301122	4949063	4948900
1058433	4946044	4949123	4948997	4946538	3038973	4940694	2301139	4949064	4948902
1112905	4946053	4949126	4948998	4946547	3039406	4940855	2745927	4949065	4948904
1124442	4946054	4949128	4948999	4946614	3039551	4941418	3041082	4949066	4948905
1124901	4946055	4949129	4949001	4946615	3039791	4941419	3041527	4949067	4948906
1142139	4946135	4949130	4949002	4946617	3041935	4945941	3041622	4949068	4948909
1153582	4946142	4949132	4949003	4946619	3114932	4946061	3041638	4949070	4948911
1156301	4946194	4949134	4949004	4946620	3115961	4946132	3103598	4949071	4948912
1167387	4946244	4949135	4949005	4946623	3225794	4946133	3118622	4949072	4948913
1201159	4946247	4949138	4949006	4947105	3374286	4946147	4222683	4949074	4948914

[49] The information needs for environmental hazard includes a list of study characteristics pertaining to the test organism/species, type and level of effects, and use of controls. A complete list of the information needs is provided in Table A2 of the "Approach Document for Screening Hazard Information for Low-Priority Substances Under TSCA". These information needs helped guide the development of questions for title/abstract and full-text screening.

Table C.7: Off-Topic References Excluded at Title/Abstract Screening for Environmental Hazard									
1201176	4946261	4949140	4949007	4947107	3402924	4946178	4259576	4949075	4948915
1201178	4946314	4949141	4949009	4947108	3445046	4946179	4440869	4949076	4948916
1204953	4946316	4949142	4949010	4947109	3476490	4946180	4948954	4949078	4948918
1249186	4946333	4949149	4949011	4947110	3477473	4946188	4948955	4949080	4948919
1321888	4946334	4949150	4949012	4947111	3491334	4946189	4948956	4949081	4948920
1458307	4946361	4949152	4949013	4947113	3539276	4946190	4948958	4949082	4948921
1496934	4946362	4949153	4949015	4947114	3559324	4946191	4948959	4949083	4948922
1549118	4946363	4949154	4949016	4947115	3562800	4946193	4948960	4949084	4948923
1611582	4946410	4949156	4949017	4947130	3577212	4946210	4948961	4949085	4948925
1612753	4946411	4949157	4949018	4947131	3577235	4946257	4948962	4949086	4948926
1615034	4946412	4949158	4949020	4947132	3590105	4946258	4948963	4949087	4948927
1689217	4946414	4949159	4949021	4947135	3619406	4946259	4948964	4949088	4948928
1781960	4946416	4951181	4949022	4947136	3625221	4946263	4948965	4949089	4948930
1808388	4946420	1763085	4949023	4947137	3753956	4946322	4948966	4949090	4948931
1865871	4946423	1763087	4949024	4947138	3830342	4946324	4948967	4949092	4948932
1875316	4946424	4946320	4949026	4947140	3830898	4946329	4948968	4949094	4948933
1955931	4946506	4949131	4949027	4947141	3846566	4946359	4948969	4949095	4948934
1967450	4946511	992939	4949028	4947155	3847436	4946360	4948970	4949096	4948935
1970619	4946541	3051635	4949029	4947156	3874693	4420932	4948971	4949098	4948936
2231679	4946621	3051709	4949030	4947159	4088550	4420947	4948972	4949099	4948938
2232056	4947224	4951048	4949031	4947160	4146480	4421954	4948974	4949100	4948940
2232422	4948456	2282271	4949032	4947161	4148076	4423539	4948975	4949102	4948942
2232425	4949000	33975	4949033	4947175	4148079	4425601	4948977	4949103	4948943
2232427	4951050	61412	4949034	4947177	4168926	4426820	4948978	4949104	4948944
2232444	4951055	628176	4949035	4947182	4173202	4428638	4948979	4949105	4948946
2232562	4951170	628230	4949037	4947185	4275583	4428838	4948980	4949106	4948947
2273142	4951173	628727	4949039	4947189	4276472	4433785	4948981	4949108	4948948
2292715	4951176	1004739	4949040	4947201	4339757	4436364	4948982	4949109	4948949
2302957	4951185	1230541	4949042	4947202	4376725	4436864	4948983	4949110	4948950
2563138	4951207	1254062	4949044	4947203	4388064	4438060	4948984	4949111	4948951
2692340	4951209	1314113	4949045	4947204	4391261	4438415	4948985	4579583	4948952
2824290	4951213	1316100	4949046	4948885	4395587	4576534	4948986	4583202	4948953
2875983	4951218	1322754	4949047	4948886	4398518	4404349	4705492	4660346	4420372
2883990	4951261	1580047	4949049	4948887	4399866	4408404	4706833	4704876	4400649
2887419	4738360	1629162	4949051	4948890					
Reference excluded (HERO ID) because the reference did NOT present quantitative environmental hazard data									
N/A.									

Table C.8: Screening Questions and Off-Topic References Excluded at Full Text Screening for Environmental Hazard		
Question	**Off-topic if answer is:**	**References excluded (HERO ID)**
Does the reference contain information pertaining to a low-priority substance candidate?	No	1580138 4731313 4851358 4951178 1744616 4940286 4951206 4951228

Table C.8: Screening Questions and Off-Topic References Excluded at Full Text Screening for Environmental Hazard		
Question	**Off-topic if answer is:**	**References excluded (HERO ID)**
		4940436 4947106 4951208
What type of source is this reference?	Review article or book chapter that contains only citations to primary literature sources	4219489
Is quantitative environmental hazard data presented?	No	N/A.
Is this primarily a modeling/simulation study? [Note: select "No" if experimental verification was included in the study]	Yes	N/A.
Is environmental hazard data presented for standard or non-standard aquatic or terrestrial species (fish, invertebrates, microorganisms, non-mammalian terrestrial species)?	No	N/A.
Is exposure measured for the target substance or is the test substance a mixture (except for reasonable impurities, byproducts, and aqueous solutions) or formulated product?	Mixture	N/A.
	Formulated Product	N/A.
Does the reference report a duration of exposure?	No	N/A.
Does the reference report a negative control that is a vehicle control or no treatment control?	No	7504 4940435 4940366 4940397
Does the reference include endpoints in the information needs?	No	N/A.

Table C.9: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Environmental Hazard		
Question	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 1: Test Substance Identity	The test substance identity or description cannot be determined from the information provided (e.g., nomenclature was unclear, CASRN or structure were not reported, substance name/ description does not match CASRN). **OR** For mixtures, the components and ratios were not characterized or did not include information that could result in a reasonable approximation of components.	N/A.
Metric 2: Negative Controls	A concurrent negative control group was not included or reported.	4951174 4951208

Table C.9: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Environmental Hazard		
Question	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 3: Experimental System	The experimental system (e.g., static, semi-static, or flow-through regime) was not described.	4940436 4940440 4951174 4940388 3041958
Metric 4: Reporting of Concentrations	Test concentrations were not reported.	4951174 4951208
Metric 5: Exposure Duration	The duration of exposure was not reported. **OR** The reported exposure duration was not suited to the study type and/or outcome(s) of interest (e.g., study intended to assess effects on reproduction did not expose organisms for an acceptable period of time prior to mating).	4951208 4951174
Metric 6: Test Organism Characteristics	The test species was not reported. **OR** The test species, life stage, or age was not appropriate for the outcome(s) of interest.	N/A.
Metric 7: Outcome Assessment Methodology	The outcome assessment methodology was not reported.	N/A.
Metric 8: Reporting of Data	Data presentation was inadequate. **OR** Major inconsistencies were present in reporting of results.	4940388 3041958

C.2.3 Fate

For the screening review of LPS candidate dipropylene glycol, EPA excluded a total of 453 references when assessing environmental fate. Off-topic fate references excluded at title/abstract screening are listed in Table C.10, and those excluded at full-text screening are listed in Table C.11. References in Table C.12 represent unacceptable studies based on specific data quality metrics for fate. Off-topic and unacceptable references are displayed next to the corresponding exclusion criteria.

Table C.10: Off-Topic References Excluded at Initial Screening for Fate									
Reference excluded (HERO ID) because the reference did NOT contain information needs[50] relevant to environmental fate									
44187	4949033	4948959	4946621	4146480	2232444	4949089	4949005	4948895	4847997
404898	4949034	4948960	4946623	4148076	2232562	4949090	4949006	4948896	4853443
635083	4949035	4948961	4947105	4148079	2273142	4949092	4949007	4948898	4862648

[50] The information needs for fate includes a list of study characteristics pertaining to the associated media and exposure pathways, associated processes, and use of controls. A complete list of the information needs is provided in Table A3 of the "Approach Document for Screening Hazard Information for Low-Priority Substances Under TSCA". These information needs helped guide the development of questions for title/abstract and full-text screening.

Table C.10: Off-Topic References Excluded at Initial Screening for Fate									
744085	4949037	4948962	4947107	4168926	2292715	4949094	4949009	4948899	4909646
789593	4949039	4948963	4947108	4173202	2302957	4949095	4949010	4948900	4940595
789651	4949040	4948964	4947109	4275583	2563138	4949096	4949011	4948902	4940694
824457	4949042	4948965	4947110	4276472	2692340	4949098	4949012	4948904	4940855
926985	4949044	4948966	4947111	4339757	2824290	4949099	4949013	4948905	4941418
992939	4949045	4948967	4947113	4376725	2875983	4949100	4949015	4948906	4941419
1058389	4949046	4948968	4947114	4388064	2883990	4949102	4949016	4948909	4941420
1058433	4949047	4948969	4947115	4391261	2887419	4949103	4949017	4948911	4945941
1112905	4949049	4948970	4947130	4395587	2892020	4949104	4949018	4948912	4946061
1124442	4949051	4948971	4947131	4398518	2978028	4949105	4949020	4948913	4946132
1124901	4949052	4948972	4947132	4399866	3009070	4949106	4949021	4948914	4946133
1142139	4949053	4948974	4947135	4400649	3036268	4949108	4949022	4948915	4946147
1153582	4949054	4948975	4947136	4404349	3036587	4949109	4949023	4948916	4946178
1156301	4949055	4948977	4947137	4408404	3036785	4949110	4949024	4948918	4946179
1167387	4949056	4948978	4947138	4420372	3036899	4949111	4949026	4948919	4946180
1201159	4949058	4948979	4947140	4420932	3037885	4949112	4949027	4948920	4946188
1201176	4949060	4948980	4947141	4420947	3038211	4949113	4949028	4948921	4946189
1201178	4949061	4948981	4947155	4421954	3038973	4949116	4949029	4948922	4946190
1204953	4949063	4948982	4947156	4423539	3039406	4949117	4949030	4948923	4946191
1249186	4949064	4948983	4947159	4425601	3039551	4949118	4949031	4948925	4946193
1321888	4949065	4948984	4947160	4426820	3039791	4949119	4949032	4948926	4946194
1458307	4949066	4948985	4947161	4428638	3041935	4949120	4946380	4948927	4946210
1496934	4949067	4948986	4947175	4428838	3114932	4949121	4946387	4948928	4946247
1549118	4949068	4948988	4947177	4433785	3115961	4949122	4946408	4948930	4946257
1611582	4949070	4948989	4947182	4436364	3225794	4949123	4946410	4948931	4946258
1612753	4949071	4948990	4947185	4436864	3374286	4949126	4946419	4948932	4946259
1615034	4949072	4948991	4947189	4438060	3402924	4949128	4946506	4948933	4946263
1689217	4949074	4948992	4947201	4438415	3445046	4949129	4946513	4948934	4946322
1781960	4949075	4948993	4947202	4576534	3476490	4949130	4946538	4948935	4946324
1808388	4949076	4948994	4947203	4579583	3477473	4949132	4946547	4948936	4946329
1865871	4949078	4948995	4947204	4583202	3491334	4949134	4946614	4948938	4946359
1875316	4949080	4948996	4947224	4660346	3539276	4949135	4946615	4948940	4946360
1955931	4949081	4948997	4948885	4704876	3559324	4949138	4946617	4948942	4946361
1967450	4949082	4948998	4948886	4705492	3562800	4949140	4946619	4948943	4946374
1970619	4949083	4948999	4948887	4706833	3577212	4949141	4946620	4948944	4946375
2231679	4949084	4949000	4948890	4738360	3577235	4949142	4948952	4948946	4946376
2232056	4949085	4949001	4948891	4738993	3590105	4949149	4948953	4948947	4946377
2232422	4949086	4949002	4948892	4742957	3619406	4949150	4948954	4948948	4949157
2232425	4949087	4949003	4948893	4828940	3625221	4949152	4948955	4948949	4949158
2232427	4949088	4949004	4948894	4828943	3753956	4949153	4948956	4948950	4949159
3830898	4949156	3847436	3874693	4088550	3830342	4949154	4948958	4948951	4951181
3846566									
Reference excluded (HERO ID) because the reference did NOT present quantitative environmental fate data									
N/A.									

Table C.11: Screening Questions and Off-Topic References Excluded at Full Text Screening for Fate		
Question	**Off-topic if answer is:**	**References excluded (HERO ID)**
Does the reference contain information pertaining to a low- priority substance candidate?	No	4940397 4940399 4949131 1763087 4940401
What type of source is this reference?	Review article or book chapter that contains only citations to primary literature sources	N/A.
Is quantitative fate data presented?	No	N/A.
Is this primarily a modeling/simulation study? [Note: Select "Yes" only if there is no experimental verification]	Yes	N/A.

Table C.12: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Fate		
Data quality metric	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 1: Test Substance Identity	The test substance identity or description cannot be determined from the information provided (e.g., nomenclature was unclear and CASRN or structure were not reported). **OR** For mixtures, the components and ratios were not characterized or did not include information that could result in a reasonable approximation of components.	N/A.
Metric 2: Study Controls	The study did not include or report crucial control groups that consequently made the study unusable (e.g., no positive control for a biodegradation study reporting 0% removal). **OR** The vehicle used in the study was likely to unduly influence the study results.	4940366 4940402 4940404
Metric 3: Test Substance Stability	There were problems with test substance stability, homogeneity, or preparation that had an impact on concentration or dose estimates and interfered with interpretation of study results.	4940404 4940430
Metric 4: Test Method Suitability	The test method was not reported or not suitable for the test substance. **OR** The test concentrations were not reported. **OR** The reported test concentrations were not measured, and the nominal concentrations reported greatly exceeded the substances water solubility, which would greatly inhibit meaningful interpretation of the outcomes.	4940402 4940404
Metric 5: Testing Conditions	Testing conditions were not reported, and the omission would likely have a substantial impact on study results. **OR** Testing conditions were not appropriate for the method (e.g., a biodegradation study at temperatures that inhibit the microorganisms).	4940366 4940402 4940404

Table C.12: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Fate		
Data quality metric	**Unacceptable if:**	**References excluded (HERO ID)**
Metric 6: System Type and Design- Partitioning	Equilibrium was not established or reported, preventing meaningful interpretation of study results. **OR** The system type and design (e.g. static, semi-static, and flow-through; sealed, open) were not capable of appropriately maintaining substance concentrations, preventing meaningful interpretation of study results.	N/A.
Metric 7: Test Organism- Degradation	The test organism, species, or inoculum source were not reported, preventing meaningful interpretation of the study results.	4940402 4940430
Metric 8: Test Organism- Partitioning	The test organism information was not reported. **OR** The test organism is not routinely used and would likely prevent meaningful interpretation of the study results.	N/A.
Metric 9: Outcome Assessment Methodology	The assessment methodology did not address or report the outcome(s) of interest.	1763085 4940402 4940404 4940388 4940389
Metric 10: Data Reporting	Insufficient data were reported to evaluate the outcome of interest or to reasonably infer an outcome of interest. **OR** The analytical method used was not suitable for detection or quantification of the test substance. **OR** Data indicate that disappearance or transformation of the parent compound was likely due to some other process.	N/A.
Metric 11: Confounding Variables	There were sources of variability and uncertainty in the measurements and statistical techniques or between study groups.	4940402 4940404 4940430
Metric 12: Verification or Plausibility of Results	Reported value was completely inconsistent with reference substance data, related physical chemical properties, or otherwise implausible, suggesting that a serious study deficiency exists (identified or not).	1763085 4940366 4940402 4940404

Appendix D: Summary of Public Comments

On March 21, 2019, EPA initiated the prioritization process for 20 chemical substances as candidates for designation as Low-Priority Substances. EPA published a document in the Federal Register providing the identity of the chemical substances being initiated for prioritization and a general explanation of why the Agency chose these chemical substances. EPA provided a 90-day comment period during which interested persons could submit relevant information on these chemical substances.[51]

For dipropylene glycol, EPA received public comment recommending that the Agency consider specific publicly available data sources. EPA reviewed all of these sources as part of its screening review of the chemical. Table 1 below lists these recommended sources, the HERO ID (if applicable), and notes about each source. EPA used the Health & Environmental Research Online (HERO) database to search, retrieve, and/or store data sources supporting scientific assessments. For references with HERO IDs, more information on the references can be found by searching the HERO ID at https://hero.epa.gov/hero/index.cfm/search/index.

Table D.1: Recommended Sources for Dipropylene Glycol based on Public Comment

Source	HERO ID	Notes
The Dow Chemical Company. (2013). Product Safety Assessment: Dipropylene Glycol.	NA	EPA captured this information from other sources in Section 3: Physical-Chemical Properties.
CIR (2006). Annual Review of Cosmetic Ingredient Safety Assessments- 2004/2005. International Journal of Toxicology, 25(Suppl 2), 1-89.	5021883	This article was part of EPA's literature review process. It includes concentrations of dipropylene glycol and other chemicals in cosmetics and other products, which are not in TSCA's regulatory scope.
CIR (1985). Final Report on the Safety Assessment of Butylene Glycol, Hexylene Glycol, Ethoxydiglycol, and Dipropylene Glycol. Journal of the American College of Toxicology, 4(5), 223- 248	4941420	This article was part of EPA's literature review process but was excluded due to limited data reported in the summaries.
Fowles, J. R., Banton, M. I., & Pottenger, L. H. (2013). A toxicological review of propylene glycols. Critical reviews in toxicology, 43(4), 363-390.	3038211	This is a review article that contains citations to other literature sources, which EPA consulted but excluded because it only contains citations to primary literature sources.
West, R., Banton, M., Hu, J., & Klapacz, J. (2014). The Distribution, Fate, and Effects of Propylene Glycol Substances in the Environment. Reviews of Environmental Contamination and Toxicology Volume 232. Springer, Cham, 2014. 107-138.	2537482	This is a review article that contains citations to other literature sources, which EPA consulted.
Haque T, Rahman KM, Thurston DE, Hadgraft J, Lane ME. (2017). Topical delivery of anthramycin I. Influence of neat solvents. European journal of pharmaceutical sciences. 104:188-195.	4947114	This article was part of EPA's literature review process but was excluded because the reference did not contain information pertaining to the low-priority substance candidate

[51] Docket number EPA-HQ-OPPT-2019-0131 includes the list of 20 chemical substances that are candidates for designation as Low-Priority Substances for risk evaluation (https://www.federalregister.gov/documents/2019/03/21/2019-05404/initiation-of-prioritization-under-the-toxic-substances-control-act-tsca). Individual dockets were established for each of the 20 low-priority candidates. Docket number EPA-HQ-OPPT-2019-0124 addresses dipropylene glycol.

Table D.1: Recommended Sources for Dipropylene Glycol based on Public Comment		
Source	**HERO ID**	**Notes**
US EPA Exposure Predictions (mg/kg bw/day) for Dipropylene glycol (CAS No. 25265-71-8) / DTXSID0027856 from EPA CompTox Chemicals Dashboard.	NA	This source was not used because it contains predicted exposure data.
High Throughput Heuristics for Prioritizing Human Exposure to Environmental Chemicals" Environ. Sci. Technol. 2014, 48(21):12760-12767.	3841221	This article was part of EPA's literature review process. It was excluded because it includes predicted exposure data.
EU REACH and ECHA datasets	NA	EPA reviewed and included information in Section 4: Relevant Assessment History.
Environment Canada	NA	EPA reviewed and included information in Section 4: Relevant Assessment History.
OECD SIDS Initial Assessment	NA	EPA reviewed and included information in Section 4: Relevant Assessment History.
Safer Choice Chemical List (SCIL)	NA	EPA reviewed and included information in Section 4: Relevant Assessment History.