Supporting Information for Low-Priority Substance Propanol, [(1-Methyl-1,2-Ethanediyl)Bis(Oxy)]Bis- (CASRN 24800-44-0) (Tripropylene Glycol)

Final Designation

February 20, 2020

Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue
Washington, DC 20460

Contents

Tables

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, [(1-methyl-1,2-ethanediyl)bis(oxy)]bis-, referenced as tripropylene 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 tripropylene 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.

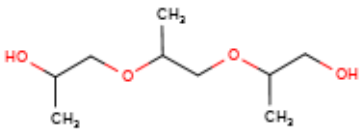
- *Appendix B (Hazard Characterization):* This appendix contains information on each of the studies used to support the hazard evaluation of the chemical substance.

- *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 following initiation[4].

2. Background on Tripropylene Glycol

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

Table 1: Tripropylene Glycol at a Glance	
Chemical Name	Tripropylene Glycol
CASRN	24800-44-0
Synonyms	Propanol, [(1-methyl-1,2-ethanediyl)bis(oxy)]bis-; ((Methylethylene)bis(oxy))dipropanol; 2-(2-(2-Hydroxypropoxy)propoxy)-1-propanol; 2-(2-(2-Hydroxypropoxy)propoxy)propan-1-ol; Tripropylene glycolmixture of isomers; 1-Propanol, 2-(2-(2-hydroxypropoxy)propoxy)-; 1,4,7-trimethyl-3,6-dioxaoctane-1,8-diol
Trade Name(s)	TPG
Molecular Formula	$C_9H_{20}O_4$
Representative Structure	

Tripropylene glycol is a mixture of isomeric chemical compounds formed as a byproduct or coproduct of the manufacture of propylene glycol. Tripropylene glycol is a colorless, nearly odorless, and slightly viscous liquid with a high boiling point. It is hygroscopic, completely soluble in water, and can also dissolve oils. These properties make tripropylene glycol a highly functional solvent used in a variety of applications and product sectors. Section 5 includes conditions of use for this chemical.

[4] https://www.regulations.gov/document?D=EPA-HQ-OPPT-2019-0122-0001

3. Physical-Chemical Properties

Table 2 lists physical-chemical properties for tripropylene 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 Tripropylene Glycol

Source/ Model	Data Type	Endpoint	Endpoint value	Notes
Sigma Aldrich, 2019	Experimental	Physical state at room temp (based on melting point)	Liquid (-19.99°C at 1013 hPa (760 mmHg))	
Reported to the ECHA database, 2008; OECD SIDS, 2001; Kirk-Othmer 2006	Experimental	Molecular weight	192 g/mol	
EPISuitev.4.11[5]	Calculated	Molecular weight	192.26 g/mol	
Lyman, 1990	Experimental	Molar volume	242 cm^3/mol	
Reported to the ECHA database, 2019	Experimental	Water solubility	1000000 mg/L (100% vol) at 20 °C and pH 7.1-8.4	ECHA value measured according to EU Method A.6, flask method.
OECD SIDS, 2001	Experimental	Water solubility	1000000 mg/L (Freely soluble) at 25 °C	
EPISuite v.4.11	Estimated	Water solubility	$5.47x10^5$ mg/L	
Reported to the ECHA database, 2019	Experimental	Water solubility	5.20 mol/L	
OECD SIDS, 2001	Experimental	Water solubility	5.20 mol/L	
Reported to the ECHA database, 2019	Experimental	Log K_{ow}	-0.379 at 21.5°C and pH 5.9	ECHA value measured according to EU Method A.8, shake flask.
OECD SIDS, 2001	Experimental	Log K_{ow}	0.5-0.6 at 25 °C	
EPISuite v.4.11	Estimated	Log K_{ow}	-0.5	

[5] EPI Suite Physical Property Inputs – Boiling Point = 271 deg C, Melting Point = -30 deg C, Vapor Pressure = 0.00195 mm Hg, Water Solubility = 1000000 mg/L, Log P = -0.38, SMILES: CC(O)COC(C)COC(C)CO

Table 2: Physical-Chemical Properties for Tripropylene Glycol				
Source/ Model	**Data Type**	**Endpoint**	**Endpoint value**	**Notes**
EPISuite v.4.11	Estimated	Log K_{oa}	8.14	
EPISuite v.4.11	Estimated	Log K_{oc}	1.0 (MCI); -0.29 (K_{ow})	
Reported to the ECHA database, 2019	Experimental	Vapor pressure	0.00195 mm Hg (0.26 Pa) at 25 °C	ECHA value measured according to EU Method A.4
OECD SIDS, 2001	Experimental	Vapor pressure	1.05 mm Hg (140 Pa) at 25 °C	
Kirk-Othmer, 2006	Experimental	Vapor Pressure	0.0023 mm Hg (0.0003 kPa) at 25 °C	
EPISuite v.4.11	Estimated	Vapor pressure	4.82×10^{-3} mm Hg	
EPISuite v.4.11	Estimated	Henry's Law	<1E-8 atm-m^3/mole	
EPISuite v.4.11	Estimated	Volatilization	69000 days (river) 750000 days (lake)	
EPISuite v.4.11	Estimated	Photolysis (Indirect)	2.28 hours ($T_{1/2}$)	• OH rate constant 5.63 E-11 cm^3/molecule-second (12 hour day; 1.5E6 OH/cm^3) • No ozone prediction
EPISuite v.4.11	Estimated	Hydrolysis	Hydrolysis cannot be estimated	No hydrolyzable functional groups
EPISuite v.4.11	Estimated	Biodegradation potential	Ready prediction: No	
EPISuite v.4.11	Estimated	Wastewater treatment plant removal	93.5% Total Removal (93.2% biodegradation, 0.3% sludge, 0% air)	Input parameters: BIOP = 4, BioA = 1 and BioS = 1 based on 69% degradation after 28d by BOD (59% within 10d window) in 301D test; and 81.9% by BOD and 91.2% by DOC (59% within 10d window) in 301F test
EPISuite v.4.11	Estimated	BAF	0.9	
EPISuite v.4.11	Estimated	BCF	3.16	

Based on its reported physical form and measured melting point, tripropylene 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 expected to be 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 (OECD SIDS, 2001), tripropylene glycol is expected to be volatile when in neat form at ambient temperatures. As a result, exposure to tripropylene glycol is possible through inhalation of vapors and aerosols if they are generated. Based on measured solubility data (OECD SIDS, 2001), tripropylene 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 absorption through the lungs; therefore, if inhalation of vapors or aerosols occurs, absorption through the lungs is likely. Exposure potential changes if tripropylene glycol is present in diluted form. The estimated Henry's Law constant for tripropylene 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 is unlikely, as reflected in the estimated bioconcentration factor (BCF) and bioaccumulation factor (BAF) 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 well 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 tripropylene glycol's biodegradation (discussed in Section 6.3.1) and low-hazard findings from toxicological studies of organisms exposed to a closely-related analog in drinking water (discussed in Section 6.1).

3.1 References

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

European Chemicals Agency (ECHA). (2019). [(methylethylene)bis(oxy)]dipropanol. Retrieved from https://echa.europa.eu/registration-dossier/-/registered-dossier/14788

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

OECD SIDS (2001). Dipropylene glycol (mixed isomers and dominant isomer Cas No: 25265-71-8 and 110-98-5. Retrieved from https://heronet.epa.gov/heronet/index.cfm/reference/download/reference_id/4940388

Sigma Aldrich (2019). Tripropylene glycol. Retrieved from https://www.sigmaaldrich.com/catalog/product/aldrich/187593?lang=en&region=US

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 tripropylene 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[6] is a continuously updated list of chemicals that meet low-concern Safer Choice criteria.[7]

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

The OECD Screening Information Datasets (SIDS) Initial Assessment Meeting (SIAM) discussed the SIDS Initial Assessment Report (SIAR) on tripropylene glycol in July 1994. The SIAM determined this chemical to be "low potential risk and low priority for further work."[8]

The Canadian Government, through an assessment of toxicity and exposure as part of its categorization of the Domestic Substance List, found that tripropylene glycol did not meet its criteria for further attention.[9]

Japan's National Institute of Technology and Evaluation (NITE) categorized tripropylene glycol as Class 5 for Exposure in 2016, and "Out of classification for 2017."[10]

The German Environment Agency (UBA) designated tripropylene glycol as "low hazard to waters" in August 2017 based on an assessment of ecotoxicity and environmental fate.[11]

[6] https://www.epa.gov/saferchoice/safer-ingredients
[7] https://www.epa.gov/sites/production/files/2013-12/documents/dfe_master_criteria_safer_ingredients_v2_1.pdf
[8] https://hpvchemicals.oecd.org/ui/handler.axd?id=0904e02a-7bd2-4898-816f-2f26670b6992
[9] https://canadachemicals.oecd.org/ChemicalDetails.aspx?ChemicalID=1355D4A8-AED4-463A-8818-AE290EE9D32B
[10] http://www.safe.nite.go.jp/jcheck//direct.action?TYPE=DPAGE1&CAS=24800-44-0&MITI=2-430
[11] https://webrigoletto.uba.de/rigoletto/public/searchDetail.do?kennummer=779

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 tripropylene glycol (Appendix A) to inform which uses would be determined conditions of use.[12] 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, tripropylene glycol is manufactured domestically and imported. It is used in processing (incorporation into formulation, mixture or reaction for mining (except oil and gas) and support activities, and incorporation into articles, such as textiles, apparel, leather manufacturing); it is also used as a reactant in plastic material and resin manufacturing and petrochemical manufacturing. Industrial, commercial, and consumers uses include cleaning and furniture care products, lubricants and greases, and water treatment. Based on the known manufacturing, processing, and uses of this chemical substance, EPA assumes distribution in commerce. According to CDR, six facilities reported not recycling (e.g., not recycled, remanufactured, reprocessed, or reused) tripropylene glycol, and one facility reported recycling information as confidential business information (CBI). No information on disposal is found in CDR or through EPA's Toxics Release Inventory (TRI) Program[13] since tripropylene 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[14] and consumer uses. This research improved the Agency's understanding of the conditions of use for tripropylene glycol. In the course of this research, EPA identified uses of tripropylene glycol in laboratory chemicals, cleaning and furnishing care products, lubricants and greases, water treatments, antifreeze and deicing products, agricultural products, adhesives, and drilling fluids. Although EPA identified uses of tripropylene 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

[12] 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).

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

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

of use for tripropylene glycol considered for chemical 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 Tripropylene 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	Intermediates: mining (except oil and gas) and support activities	EPA (2017b)
	Processing—incorporation into article	Finishing agents- textiles, apparel, and leather manufacturing	
	Processing as a reactant	Intermediates- plastic material and resin manufacturing; petrochemical manufacturing	
		Metal manufacturing; transportation equipment manufacturing; wood manufacturing	SPIN (2018)
	Recycling	Recycling	EPA (2017b)[15]
Distribution	Distribution	Distribution	EPA (2017b)
Commercial uses	Fabric, textile, and leather products not covered elsewhere		EPA (2017b); SPIN (2018)
	Lubricants and greases		EPA (2017b)
	Laboratory chemicals		Sigma Aldrich (2018), Reported to the ECHA database, 2018
Industrial/commercial/ consumer uses	Cleaning and furniture care products	Cleaning/washing agents, window/glass cleaner	GoodGuide (2011); Synapse Information Resources (n.d.); Reported to the ECHA database, 2018
	Lubricants and greases		EPA (2017b); Silver Fern Chemical, Inc.(2018); Synapse Information Resources (n.d.); NLM (2018b); Reported to the ECHA database, 2018; SPIN (2018)
	Water treatment		Reported to the ECHA database, 2018

[15] In the 2016 CDR, six facilities reported not recycling (e.g., not recycled, remanufactured, reprocessed, or reused) tripropylene glycol, and one facility reported recycling information as CBI (EPA 2017b).

Table 3: Conditions of Use for Tripropylene Glycol			
Life Cycle Stage	**Category**	**Subcategory of Use**	**Source**
Commercial/consumer	Anti-freeze and de-icing products		Synapse Information Resources (n.d.)
Unknown	Solvent	Agricultural products (non-pesticidal)[16]	NLM (2018b); Reported to the ECHA database, 2018
		Dry cleaning detergents; adhesives and sealant chemicals; automotive trade and repair; cooling media; drilling fluids; emulsion-inhibiting agents; inks; paints and coatings; process regulators	NLM (2018b), Synapse Information Resources (n.d.) SPIN (2018); Ullmann's (2010); Kirk-Othmer (2004); Dow (2018); Reported to the ECHA database, 2018; Dow (2016); Ullman's 2011
	Surfactants		SPIN (2018)
Disposal	Releases to air, wastewater, solid and liquid wastes.		Though not explicitly identified, releases from disposal were assumed to be reasonably foreseen[17]

[16] Information on the use of tripropylene glycol in agricultural products is not sufficient to determine if the use is a TSCA or non-TSCA use.

[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. 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 tripropylene 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 *in vivo* somatic cells		

[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				
		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

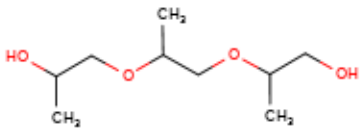
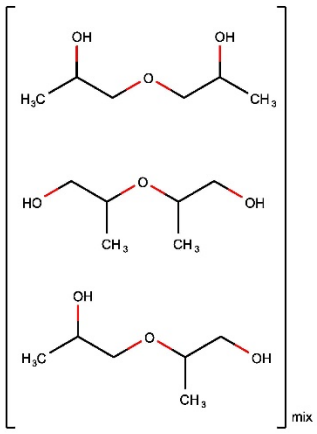
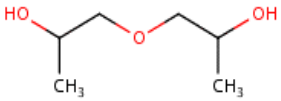
Below is a summary of the reasonably available information that EPA included in the hazard evaluation of tripropylene glycol. In many cases, EPA used analogous chemicals to make findings for a given endpoint. Where this is case, use of the analog is explained. If the chemical studied is not named, the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

Tripropylene glycol is a mixture of branched isomers generated as byproducts or coproducts in the manufacture of propylene glycol when some of the dipropylene glycol formed reacts with unreacted propylene oxide (methyl oxirane) feedstock. The positions of the methyl groups in the product are unspecified. Both analogs used to inform EPA's understanding of this chemical are oligomeric propylene glycols like tripropylene glycol. Dipropylene glycol is a mixture of dipropylene glycol isomers similar to tripropylene glycol but containing two propylene oxide equivalents instead of three. The analog 1,1'-dimethyl diethylene glycol is a specific isomer and a component of dipropylene glycol. As shown in Table 5, EPA used best professional judgement to select analogs for tripropylene glycol based on similarity in structure, physical chemical properties, and functionality, with the assumption that these chemicals 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. Based on these factors, the environmental and toxicological effects of dipropylene glycol and tripropylene glycol are expected to be very similar to each other.

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

6.1.1 Absorption, Distribution, Metabolism, and Excretion

Absorption

To assess absorption potential, EPA used experimental studies on tripropylene glycol and dipropylene glycol. Rats exposed to ^{14}C-tripropylene glycol by oral gavage rapidly absorbed the chemical, as indicated by recovery of 91.4% of the administered dose 24 hours following exposure (OECD, 2001; Reported to the ECHA database, 1995a).

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 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 (Table 2), tripropylene glycol is expected to be absorbed from the lungs if inhaled (Section 3).

Distribution

Tripropylene glycol is considered water soluble based on its physical-chemical properties (Table 2) and is likely to be distributed mainly in aqueous compartments in an organism. This prediction is supported by experimental evidence. Rats exposed to tripropylene glycol by oral gavage contained 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, 24 hours after dosing and provide evidence that tripropylene glycol will be rapidly distributed following oral absorption.

Metabolism

Tripropylene glycol was orally administered in rats and was rapidly metabolized 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 tripropylene glycol will be rapidly metabolized.

Excretion

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 tripropylene 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 from acute exposure by tripropylene glycol using results from oral, dermal, and inhalation exposure studies. One study exposed rats to tripropylene glycol by oral gavage and reported a LD_{50} of 11,500 mg/kg (Reported to the ECHA database, 1974c). Another study exposed rats to tripropylene glycol via drinking water and reported no mortality in any dose group, resulting in a predicted LD_{50} greater than 2000 mg/kg (JETOC, 1997; Reported to the ECHA database, 1993a). 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 tripropylene glycol dermally reported no adverse effects at the single dose tested (16,320 mg/kg), resulting in an LD_{50} greater than 16,320 mg/kg (Reported to the ECHA database, 1974a). This result provides 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 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, 1974b). Based on tripropylene glycol's vapor pressure of 0.00195 torr, the expected air 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 likely at complete air saturation. Considering the chemical's physical-chemical properties (discussed in Section 3) and available experimental data, these results provide sufficient information to indicate tripropylene glycol is of low concern for acute toxicity from inhalation exposures based on no adverse effects reported at the expected air saturation concentration.

6.1.3 Repeated Dose Toxicity

EPA assessed the potential for mammalian toxicity from repeated exposures by tripropylene glycol using a combined repeated dose, reproductive, and developmental study (OECD, 1994; Reported to the ECHA database, 1993c). 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 no observed adverse effect level (NOAEL) was 200 mg/kg-day and the lowest observed adverse effect level (LOAEL) was 1000 mg/kg-day based on changes in organ weight in parents.

For further supporting evidence, EPA also assessed results from mice and rats repeatedly exposed to dipropylene glycol in drinking water. A study on mice exposed to dipropylene glycol in drinking water for 13 weeks demonstrated a NOAEL of 2620 mg/kg-day and a LOAEL of 4790 mg/kg-day based on increased liver weight (Reported to the ECHA database, 2004g; NTP, 2004). A study on rats exposed to dipropylene glycol in drinking water for 14 weeks demonstrated a NOAEL of 425 mg/kg-day and a LOAEL of 890 mg/kg-day based on relative liver weight (Reported to the ECHA database, 2004f; NTP, 2004). 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). A study on 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).

All of these results provide sufficient information to indicate low concern for toxicity resulting from repeated exposures by exceeding the oral 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 mammalian reproductive and developmental toxicity using the combined repeated dose, reproductive, and developmental study discussed in Section 6.1.3 (OECD, 1994; Reported to the ECHA database, 1993c). Rats were exposed to tripropylene glycol via gavage for 49 days, beginning 14 days prior to mating and continuing 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. These results provide sufficient information to indicate low concern for reproductive toxicity by exceeding the 250 mg/kg-day oral benchmark.

EPA further assessed the potential for developmental toxicity using read across from 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 using read across from dipropylene glycol. 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 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 from dipropylene glycol exposure (OECD, 2001; Reported to the ECHA database, 1999). These negative results in an analog provide sufficient information to indicate tripropylene glycol has low concern for genotoxicity.

6.1.6 Carcinogenicity

EPA assessed the potential for tripropylene glycol to cause carcinogenicity in mice and rats using read across from dipropylene glycol. A study on rats exposed to dipropylene glycol in drinking water for two years demonstrated no dose-related effects on cancer incidence or cancer-related effects 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, a study on mice exposed to dipropylene glycol in drinking water for two years also demonstrated 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). Using read-across from this analog, these negative results provide sufficient information to indicate low concern for carcinogenicity for tripropylene glycol.

6.1.7 Neurotoxicity

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

A repeated dose study on rats exposed to tripropylene glycol by oral gavage reported no effects on the limited neurological endpoints that were evaluated (i.e., brain histopathology only). Tripropylene glycol did not produce histopathological lesions in the brain of rats at doses up to 1,000 mg/kg-day (highest dose tested) in a study when males were exposed for 49 days and females were exposed from 14 days prior to mating until day 3 of lactation (OECD, 1994).

[32] https://comptox.epa.gov/dashboard Chemical specific assay list can be found at https://comptox.epa.gov/dashboard/dsstoxdb/results?search=24800-44-0

ToxCast results for tripropylene glycol included 8 *in vitro* high throughput biochemical- and cell-based assays related to neurological functions.[33] Bioactivity was not induced in any assay by tripropylene glycol.

These results provide sufficient information to indicate there is low concern for neurotoxicity associated with tripropylene 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 tripropylene glycol to cause skin sensitization using available experimental studies on dipropylene glycol. A study on guinea pigs (Reported to the ECHA database, 1995d) and three human studies (Reported to the ECHA database, 1995c; Johansen et al., 1995; Leberco Labs, 1994) reported negative results for dipropylene glycol, providing sufficient information to indicate low concern for tripropylene glycol to induce skin sensitization.

6.1.9 Respiratory Sensitization

Experimental data determined to be of adequate quality[34] on tripropylene glycol or closely related analogs were not reasonably available for the assessment of respiratory sensitization potential for tripropylene 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 tripropylene glycol. The results from these NAMs and weight of the scientific evidence provide 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 assays. Experimental data determined to be of adequate quality[36] on tripropylene glycol or closely related analogs were not reasonably available for the assessment of immunotoxicity potential.

---

[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

[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.

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 tripropylene 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 tripropylene glycol.

6.1.11 Skin Irritation

EPA assessed dermal irritation effects using experimental results on rabbits and humans. Humans exposed to tripropylene glycol in a dermal patch study displayed mild erythema at 30 minutes, but the effects were fully reversed by 24 hours, resulting in negative results for skin irritation (Reported to the ECHA database, 1995b). A longer dermal patch study on humans for 14 days also reported negative results for tripropylene glycol to induce skin irritation (Reported to the ECHA database, 1997). Another study demonstrated tripropylene glycol caused mild irritation in rabbits (Reported to the ECHA database, 1974e). These results provide sufficient information to indicate low concern for skin irritation by tripropylene glycol.

6.1.12 Eye Irritation

To assess potential for eye irritation, EPA used the results of *in vivo* and *in vitro* studies. Rabbits exposed to tripropylene 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, 2010a). These results are supported by another rabbit study with similar reversible effects and a non-irritating finding (Reported to the ECHA database, 1974d). An *in vitro* human corneal epithelium model study also reported tripropylene glycol as negative for inducing ocular irritation (Reported to the ECHA database, 2010b). These results provide sufficient information to indicate low concern for eye irritation by tripropylene glycol.

6.1.13 Hazards to Potentially Exposed or Susceptible Subpopulations

The above information supports a low human health hazard finding for tripropylene 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 tripropylene glycol.

6.2 Environmental Hazard

To review environmental hazard endpoints without adequate quality[34] 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 tripropylene 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 tripropylene glycol using experimental data. No adverse effects were observed in aquatic vertebrates, aquatic invertebrates, or algae exposed to tripropylene glycol at the highest doses tested (1000 mg/L), resulting in effects expected at concentrations greater than 1000 mg/L for all three trophic levels (Reported to the ECHA database, 1994a, b; 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 assessed environmental hazard from chronic exposure using available experimental data and estimated values from ECOSAR. A 21-day exposure to *Daphnia magna* indicated no adverse effects at concentrations less than 1000 mg/L (Reported to the ECHA database, 1994; OECD, 1994). For other trophic levels, toxicity from chronic exposure to tripropylene glycol was predicted to occur at 1600 mg/L for aquatic vertebrates and 480 mg/L for algae. These toxicity values provide sufficient information to indicate that tripropylene 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. Due to 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 tripropylene glycol and dipropylene 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 rapidly in the environment and has 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 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 reasonably available information included tests for both ready biodegradation and inherent biodegradation.

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

Tripropylene glycol was tested in three ready tests (OECD 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, 1993b, 1991b). However, in another OECD 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 (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 301F test, meeting the criteria for ready biodegradation but did not meet the 10-day window (Reported to the ECHA database, 2007a, c, 1994c). These data indicate that tripropylene glycol is biodegradable and may be readily biodegradable under the right conditions. Results from additional aerobic studies, including the inherent biodegradability test (OECD 302A) and a seawater biodegradability test (OECD 306) on tripropylene glycol provide further support that tripropylene glycol has the capacity to biodegrade under environmental conditions (Zgoła-Grześkowiak et al., 2008; Reported to the ECHA database, 1994c). Furthermore, the microbial inhibition tests on tripropylene glycol and dipropylene glycol indicate that these substances are non-toxic to microbial populations found in sewage treatment plants (Reported to the ECHA database, 2010c, 1992b).

Based on the weight of the scientific evidence, the data suggest tripropylene glycol is expected to biodegrade under aerobic conditions. Although under some test conditions this chemical may not meet the benchmark for ready biodegradation, both ready and inherent 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 tripropylene 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. Tripropylene 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,[39] EPA has sufficient information to indicate tripropylene glycol has low potential for bioaccumulation in the environment based on the low-concern benchmark of less than 1000.

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

7. Exposure Characterization

EPA considered reasonably available information on exposure for tripropylene 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. Of these sources, EPA determined that the CDR database contained the primary source of information on the conditions of use for this exposure characterization. EPA used these other databases and public sources (described in Table A.2) only where they augmented information from the CDR database and to inform intended, known, or reasonably foreseeable uses.

Tripropylene glycol is a solvent used in processing (incorporation into an article and into a formulation, mixture, or product) and as a reactant in plastic, resin, and petrochemical manufacturing (EPA 2017b). Tripropylene glycol is also used in a variety of industrial, commercial, and consumer 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 and consumers.

7.1 Production Volume Information

Production volume information for tripropylene glycol is based on an analysis of CDR data reported from 1986 to 2015.[40] In reporting years 1986, 1990, 1994, 1998, 2002, 2006 and between 2012 and 2015, aggregate production volume for tripropylene glycol was between 10,000,000 and 50,000,000 lbs. The exact amount is available for one year, 2011, in which 25,531,268 lbs. of tripropylene glycol was produced or imported. 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 tripropylene glycol. Exposure is also possible from other uses, such as distribution and disposal. These activities could result in releases of tripropylene glycol to media including surface water, landfills, and air.

EPA expects high levels of removal of tripropylene 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, tripropylene glycol is expected to biodegrade aerobically in the environment (discussed in Section 6.3.1). Any release of this chemical is expected to break down, reducing exposure to aquatic organisms in the water column and ground water sources of drinking water, including well water. Based on the estimated log K_{oc} (Section 3), tripropylene glycol is expected to have negligible adsorption to sediment, reducing the potential toxicity to benthic organisms.

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

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 tripropylene 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 tripropylene glycol from the potential environmental releases described above. Air exposure is unlikely from incineration. If tripropylene glycol is present in the air from volatilization, it is expected to be reduced because of its short atmospheric half-life of 5 hours (see Table 2 in Section 3). With the exception of time immediately following a release, tripropylene 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 and bioconcentration potential of tripropylene glycol (Table 2 and Section 6.3.2), oral exposure to tripropylene glycol via fish ingestion is unlikely.

7.4 Exposures to Potentially Exposed or Susceptible Subpopulations

EPA identified workers as potentially exposed or susceptible subpopulations based on greater exposure to tripropylene glycol than the general population during manufacturing, processing, distribution, use, and disposal. EPA also identified consumers as a population that may experience greater exposure to tripropylene glycol than the general population through use of cleaning and furniture care products and anti-freeze and de-icing products, for example.

7.4.1 Exposures to Workers

Based on its reported physical form and measured melting point (Table 2), tripropylene glycol is a liquid under ambient conditions. Based on tripropylene 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), tripropylene glycol is expected to be volatile at ambient temperatures, and therefore workers may be exposed through inhalation of vapors. If tripropylene glycol is in a dilute form, the estimated Henry's Law constant for tripropylene glycol suggests volatilization from water and aqueous solutions is expected to be minimal. Workers may be exposed to tripropylene glycol in manufacturing, processing, distribution, use and disposal.

7.4.2 Exposures to Consumers

In addition to the exposure pathways relevant for the general population described in Section 7.3, consumers may be exposed to tripropylene glycol through the use of cleaning and furniture care products, lubricants and greases, and anti-freeze and de-icing products, for example. For all these uses, if dermal contact does occur, tripropylene glycol is expected to have minimal absorption through the skin based on experimental data (Section 6.1.1). If the chemical is in an aerosol product and inhalation exposure occurs, tripropylene 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).

Tripropylene glycol is expected to be metabolized and excreted, further reducing the duration of exposure. Therefore, EPA expects the exposures to tripropylene glycol through use of these products to be low.

8. Summary of Findings

EPA has used reasonably available information on the following statutory and regulatory criteria and considerations to screen tripropylene 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 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 tripropylene glycol. EPA used this information to inform its determination of whether tripropylene glycol meets the statutory criteria and considerations for final designation as a low-priority substance.

- **Hazard potential:**

For tripropylene 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 tripropylene glycol is of low concern for human health and environmental hazard across the range of endpoints in these 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, and the environment as most likely to experience exposures. EPA determined that while the general population, consumers, and workers may be exposed to tripropylene glycol, exposure by the dermal pathway is limited by tripropylene glycol's physical-chemical properties. If ingestion occurs, tripropylene glycol is expected to be quickly metabolized and excreted, reducing the duration of exposure. Inhalation of tripropylene glycol from dilute products is expected to be minimal; however, workers may be exposed to vapors of neat tripropylene glycol. If tripropylene 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 tripropylene 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 tripropylene 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 tripropylene 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 tripropylene glycol is biodegradable under aerobic conditions, with greater than 60 percent biodegradation expected within 28 days. 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 tripropylene 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 tripropylene glycol as a potentially

exposed or susceptible subpopulation (described in more detail in Section 7). Consumers are also a potentially exposed subpopulation because of their use of products such as cleaning and furniture care products, lubricants and greases, and anti-freeze and de-icing 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 and consumers to have a higher exposure to tripropylene glycol than the general population. Because of the chemical's low-concern hazard properties, this exposure does not pose a significant increase in risk for consumers or for workers

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 tripropylene 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 tripropylene 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 tripropylene glycol near significant sources of drinking water. 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. This 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, tripropylene 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, tripropylene 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 tripropylene 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 a closely related analog, 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, tripropylene glycol would degrade in aerobic environments (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 tripropylene 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 tripropylene glycol under 40 CFR 702.9(a)(4) does not support a finding that tripropylene 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 tripropylene glycol and related potential exposures.

Rationale: EPA evaluated the conditions of use of tripropylene 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 tripropylene 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 tripropylene 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 tripropylene 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 tripropylene 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 tripropylene glycol as a low-priority substance could result in increased use and higher production volumes. EPA expects, however, that any changes in tripropylene 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 tripropylene glycol's consistently low-hazard characteristics, which, 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, would still be expected to pose a low concern.

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, tripropylene 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 tripropylene glycol as a low-priority substance.

9. Final Designation

Based on a risk-based screening-level review of the chemical substance and, when applicable, relevant information received from the public and other information as appropriate and consistent with TSCA section 26(h), (i) and (j), EPA concludes that tripropylene 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 tripropylene glycol as a low-priority substance.

Appendix A: Conditions of Use Characterization

EPA gathered information on and related to conditions of use including uses, products, types of users, and status (e.g., ongoing, regulated) for the chemical tripropylene glycol (CAS RN 24800-44-0).

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, five companies manufactured or imported tripropylene glycol at seven sites for reporting year 2015. Individual production volumes were withheld by EPA to protect against disclosure of CBI.

Table presents the historic production volume of tripropylene glycol from the CDR (previously known as the Inventory Update Rule, or IUR) from 1986-2015. In reporting years 1986, 1990, 1994, 1998, 2002, 2006 and between 2012 and 2015, aggregate production volume for tripropylene glycol was between 10,000,000 and 500,000,000 lbs. The exact amount is available for one year, 2011, in which 25,531,268 lbs. of tripropylene glycol was produced or imported. Since 2011, production volume has remained relatively stable without significant increases or decreases.

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

1986	1990	1994	1998	2002	2006	2011	2012	2013	2014	2015
>10M – 50M	>10M – 50M	>10M – 50M	>10M – 50M	>10M – 50M	10 M - < 50 M	25,531,268	10 M – 50 M	10 M – 50 M	10 M – 50 M	10 M – 50 M

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

Note(s):
K = Thousand; M = Million; NDR = No data reported

A.2. Uses

A.2.1 Methods for Uses Table

Section A.1 provides a list of known uses of tripropylene 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 Tripropylene 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)	24800-44-0	No
Canada Chemicals Management Plan information sheets	Government of Canada (2018)	24800-44-0; tripropylene glycol	No
Chemical and Product Categories (CPCat)	CPCat (2019)	24800-44-0	Yes
ChemView [2]	EPA (2018a)	24800-44-0	Yes
Children's Safe Product Act Reported Data	Washington State Dept. of Ecology (2018)	24800-44-0	No
Consumer Product Information Database (CPID)	DeLima Associates (2018)	24800-44-0	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)	Tripropylene glycol	No
DrugBank	DrugBank (2018)	24800-44-0; tripropylene glycol	No
European Chemicals Agency (ECHA) Registration Dossier	ECHA (2018)	24800-44-0	Yes
eChemPortal [2]	OECD (2018)	24800-44-0	No
Envirofacts [2]	EPA (2018b)	24800-44-0	No
Functional Use Database (FUse)	EPA (2017a)	24800-44-0	Yes
Kirk-Othmer Encyclopedia of Chemical Technology	Kirk-Othmer (2006)	24800-44-0; tripropylene glycol	Yes
Non-Confidential 2016 Chemical Data Reporting (CDR)	EPA (2017b)	24800-44-0	Yes
PubChem Compound	Kim et al. (2016)	24800-44-0	Yes
Safer Chemical Ingredients List (SCIL)	EPA (2018e)	24800-44-0	Yes
Synapse Information Resources [2]	Synapse Information Resources (2009)	Tripropylene glycol	Yes

Table A.2: Sources Searched for Uses of Tripropylene glycol			
Title	**Author and Year**	**Search Term(s)**	**Found Use Information?** [1]
Resource Conservation and Recovery Act (RCRA)	EPA (2018d)	Tripropylene glycol; TPG	No
Scorecard: The Pollution Information Site	GoodGuide (2011)	24800-44-0	Yes
Skin Deep Cosmetics Database	EWG (2018)	24800-44-0	Yes
Toxics Release Inventory (TRI)	EPA (2018f)	24800-44-0	No
TOXNET [2]	NLM (2018c)	24800-44-0	Yes
Ullmann's Encyclopedia of Industrial Chemistry	Ullmann's (2000)	24800-44-0; tripropylene glycol	Yes
Additional Sources Identified from Reasonably Available Information			
Sigma Aldrich	Sigma Aldrich (2018)	Incidentally identified while researching details of this chemical's uses and products.	Yes
Silver Fern Chemical Inc.	Silver Fern Chemical Inc. (2018)		
Substances in Preparations in Nordic Countries (SPIN)	SPIN (2018)		
The Dow Chemical Company (Dow)	Dow (2018)		
U.S. EPA's InertFinder	EPA (2018c)		

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 16,175 patents referencing "tripropylene glycol" (USPTO 2018). 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 tripropylene 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 Tripropylene glycol

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
TSCA Conditions of Use: Agriculture and Food Products		
Agricultural chemicals	Unknown	NLM (2018b); Reported to the ECHA database, 2018 NLM's HSDB identifies use of tripropylene glycol as a solvent for agricultural chemicals. ECHA identifies use of tripropylene glycol in agrochemicals in European countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information. ECHA identifies this use under consumer uses and uses by professional workers.
Insecticides	Unknown	Silver Fern Chemical Inc. (2018); CPCat (2019); SPIN (2018) Silver Fern Chemical identifies use of tripropylene glycol in insecticides. The California Department of Pesticide Regulation does not list any pesticides currently used in California that contain tripropylene glycol. CPCat identifies use of tripropylene glycol as an inert ingredient in pesticides, however EPA's InertFinder (2018c) does not report and food, non-food, or fragrance use of pesticides that contain tripropylene glycol as an inert ingredient. SPIN reports use of tripropylene glycol in biocides in Nordic countries. Expected users are unknown, due to the limited availability of information.
TSCA Conditions of Use: Cleaning Products		
Cleaning agents	Consumer, commercial, industrial	GoodGuide (2011); Synapse Information Resources (2009); Reported to the ECHA database, 2018 Pollution Scorecard identifies use of tripropylene glycol in household hard surface cleaners. Synapse Information Resources identifies use of tripropylene glycol in disinfectants, varnish removers, hard surface cleaners, and penetrating oils. ECHA identifies use of tripropylene glycol in cleaning agents in European countries. Expected users are consumer based on identification under Pollution Scorecard's consumer products and ECHA's consumer uses. Expected users are commercial and industrial based on inclusion in ECHA's uses by professional workers and uses at industrial sites.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Soaps	Unknown	NLM (2018b); Synapse Information Resources (2009) NLM's HSDB identifies use of tripropylene glycol in dry-cleaning soaps, and Synapse Information Resources identifies use in soap. Expected users are unknown, due to the limited availability of information.
TSCA Conditions of Use: Manufacturing		
Builders' carpentry and joinery manufacturing	Unknown	SPIN (2018) SPIN reports use of tripropylene glycol in the manufacture of builders' carpentry and joinery in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Chemical manufacturing	Unknown	SPIN (2018) SPIN reports use of tripropylene glycol in the manufacture of chemicals and chemical products in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Machinery and equipment manufacturing	Unknown	SPIN (2018) SPIN reports use of tripropylene glycol in the manufacture of machinery and equipment in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Metal manufacturing	Industrial	SPIN (2018) SPIN reports use of tripropylene glycol in the manufacture of fabricated metal products, as well as the treatment and coating of metals, in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Petrochemical manufacturing	Industrial	EPA (2017b) CDR reports use of tripropylene glycol as an intermediate in petrochemical manufacturing. Expected users are industrial based on reporting under CDR's Industrial Processing and Use Report.
Plastic material and resin manufacturing	Commercial, industrial	EPA (2017b); NLM (2018b); Synapse Information Resources (2009); Reported to the ECHA database, 2018; SPIN (2018); Ullmann's (2018) CDR reports use of tripropylene glycol as an intermediate in plastic material and resin manufacturing. NLM's HSDB identifies use as a plasticizer for 2-hydroxypropyl cellulose resin. Synapse Information Resources identifies use of tripropylene glycol as a comonomer for alkyd resins and unsaturated polyester resins, a chain extender for polyurethane, and an initiator for urethane polyols. Ullmann's states that tripropylene glycol is in an important industrial building block for polyurethane foams and elastomers. ECHA identifies use of tripropylene glycol in polymer processing in European countries. SPIN reports use in the manufacture of rubber and plastic products in Nordic countries. Expected users are industrial based on reporting under CDR's Industrial Processing and Use Report and commercial based on inclusion in ECHA's uses by professional workers.
Transportation equipment manufacturing	Industrial	SPIN (2018) SPIN reports use of tripropylene glycol in the manufacture of other transportation equipment in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Wood manufacturing	Industrial	SPIN (2018) SPIN reports use of tripropylene glycol in the manufacture of wood and cork products, including straw and plaiting materials, in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
TSCA Conditions of Use: Miscellaneous		
Adhesives and binding agents	Unknown	NLM (2018b); SPIN (2018); Ullmann's (2010) NLM's HSDB identifies use of tripropylene glycol as a solvent for gums. Ullmann's identifies use of tripropylene glycol in ultraviolet/electric beam curing adhesives. SPIN reports use in adhesives and binding agents in Nordic countries. Expected users are unknown, due to the limited availability of information
Anti-freeze and de-icing products	Consumer, commercial	Synapse Information Resources (2009); Reported to the ECHA database, 2018 Synapse Information Resources identifies use of tripropylene glycol in lubricant and antifreeze for carburetor fluids. ECHA identifies use in anti-freeze and de-icing products in European countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are consumer and commercial based on inclusion in ECHA's consumer uses and uses by professional workers.
Automotive trade and repair	Unknown	NLM (2018b); Synapse Information Resources (2009); SPIN (2018) NLM's HSDB and Synapse Information Resources identify use of tripropylene glycol in brake and hydraulic fluid components. SPIN reports use in wholesale and retail trade, repair, and maintenance of motor vehicles and motorcycles in Nordic countries. Expected users are unknown, due to the limited availability of information.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Cooling media	Unknown	Synapse Information Resources (2009) Synapse Information Resources identifies use of tripropylene glycol in cooling media. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Drilling fluids	Unknown	Kirk-Othmer (2004) Kirk-Othmer identifies use of tripropylene glycol in water-based drilling fluids for the petroleum industry. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Emulsion-inhibiting agents	Unknown	SPIN (2018) SPIN identifies use of tripropylene glycol in emulsion-inhibiting agents, which are often used in the petroleum industry. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Fabric, textile, and leather	Commercial, industrial	EPA (2017b); SPIN (2018) CDR reports use of liquid tripropylene glycol in fabric, textile, and leather products not covered elsewhere at concentrations of at least one percent but less than 30 percent by weight. CDR also reports use of tripropylene glycol as a finishing agent in textile, apparel, and leather manufacturing. SPIN identifies use of tripropylene glycol in washing agents for textiles and textile impregnation materials in Nordic countries. Expected users are commercial based on CDR's consumer/commercial classification and reporting under CDR's Industrial Processing and Use Report.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Fuels	Consumer	Reported to the ECHA database, 2018 ECHA identifies use of tripropylene glycol in fuels in European countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are consumer based on inclusion in ECHA's consumer uses.
Inks	Unknown	NLM (2018b); Dow (2018); Synapse Information Resources (2009); SPIN (2018) Dow identifies use of tripropylene glycol as a resin solubilizer for common printing ink, and NLM's HSDB reports use of tripropylene glycol in inks. Synapse Information Resources identifies use of tripropylene glycol as a solvent and homogenizer for inks and other coloring materials, including color concentrations. SPIN reports use in coloring agents and in the manufacture of printing inks and mastics in Nordic countries. Expected users are unknown, due to the limited availability of information.
Laboratory chemicals	Commercial, institutional	Sigma Aldrich (2018); Reported to the ECHA database, 2018 Sigma Aldrich identifies use of tripropylene glycol in laboratory chemicals. ECHA identifies use in laboratory reagents in European countries. Expected users are commercial and industrial based on inclusion in ECHA's uses by professional workers and uses at industrial sites.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Lubricants and greases	Consumer, commercial, industrial	EPA (2017b); Silver Fern Chemical Inc. (2018); Synapse Information Resources (2009); NLM (2018b); Reported to the ECHA database, 2018; SPIN (2018) CDR reports use of liquid tripropylene glycol in commercial lubricants and greases. Silver Fern Chemical identifies use in mold lubricants, and Synapse Information Resources identifies use in cutting oils. NLM's HSDB identifies use as a coupling agent in cutting oils and soluble oils. ECHA identifies use of tripropylene glycol in consumer and commercial lubricants, binders, release agents, metal working fluids, and rolling oils in European countries, and SPIN reports use in lubricants and additives in Nordic countries. Expected users are commercial based on CDR's consumer/commercial classification, and consumer and industrial based on inclusion in ECHA's consumer uses and uses at industrial sites.
Mining	Industrial	EPA (2017b) CDR reports use of tripropylene glycol as an intermediate in non-oil and gas mining and support activities. Expected users are industrial based on reporting under CDR's Industrial Processing and Use Report.
Paints and coatings	Unknown	NLM (2018b); Reported to the ECHA database, 2018; SPIN (2018); Dow (2016); Ullmann's (2011) NLM's HSDB identifies use of tripropylene glycol in some paints. Dow identifies growing use of tripropylene glycol in the radiation cure industry, and Ullmann's identifies use as a monomer in radiation-curable acrylate systems. ECHA identifies use in coatings in European countries, and SPIN identifies use in paints (including the manufacture of paints), lacquers, and varnishes in Nordic countries. Expected users are unknown, due to the limited availability of information.

Table A.3: Uses of Tripropylene glycol		
Use	**Expected Users**	**Description of Use and References**
Process regulators	Unknown	SPIN (2018) SPIN reports use of tripropylene glycol in process regulators in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Surfactants	Unknown	SPIN (2018) SPIN reports use of tripropylene glycol in surface active agents in Nordic countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are unknown, due to the limited availability of information.
Water treatment	Consumer, commercial, industrial	Reported to the ECHA database, 2018 ECHA identifies use of tripropylene glycol in water treatment chemicals in European countries. No further information about this use could be found and it is unknown whether this is an ongoing use in the United States. Expected users are based on inclusion in ECHA's consumer uses, uses by professional workers, and uses at industrial sites.
Non-TSCA Uses		
Antiperspirant/ deodorant	Consumer	DeLima Associates (2016); EWG (2018) CPID and EWG generally list consumer products; therefore the expected users are consumer.

Table A.3: Uses of Tripropylene glycol		
Use		**Description of Use and References**
Food[41]	Unknown	Synapse Information Resources (2009); CPCat (2019) (2015) Synapse Information Resources identifies use of tripropylene glycol in food. CPCat reports use of tripropylene glycol as a food additive, however tripropylene glycol is not listed in FDA's Substances Added to Food (2018). Expected users are unknown, due to the limited availability of information.
Makeup remover	Consumer	EWG (2018) EWG generally lists consumer products; therefore the expected users are consumer
Pharmaceuticals	Unknown	Silver Fern Chemical Inc. (2018); NLM (2018b) Silver Fern Chemical, Inc. identifies use of tripropylene glycol as an intermediate in pharmaceuticals. NLM's HSDB identifies use as a solvent for essential oils and pharmaceuticals. DrugBank does not list any current drug-related uses that include tripropylene glycol. Expected users are unknown, due to the limited availability of information.
Shampoo	Consumer	NLM (2018a) NLM's Household Products Database identifies use of tripropylene glycol in shampoos and shampoo/conditioners. None of these products are currently for retail sale, and this use may be historical. The Household Products Database lists household products; therefore, the expected users are consumer.
Children's Products CDR reports did not include any uses in children's products.		
Recycling and Disposal In the 2016 CDR, six facilities reported not recycling (e.g., not recycled, remanufactured, reprocessed, or reused) tripropylene glycol, and one facility reported recycling information as CBI (EPA 2017b).		

[41] EPA notes that Federal Drug Administration (FDA) has a process to assess chemicals that are used as flavoring agents or are allowed for food contact. In

A.3 References

California Dept of Pesticide Regulation. (2013). DPR Databases. Retrieved from https://www.cdpr.ca.gov/dprdatabase.htm

Danish EPA. (2018). Danish surveys on chemicals in consumer products. Retrieved from https://eng.mst.dk/chemicals/chemicals-in-products/consumers-consumer-products/danish-surveys-on-consumer-products/

DeLima Associates. (2016). Speed Stick GEAR DRYCORE Antiperspirant and Deodorant Gel, Fresh Force-04/19/2016. Retrieved from https://www.whatsinproducts.com/types/type_detail/1/17090/standard/p%20class=%22p1%22%3ESpeed%20Stick%20GEAR%20DRYCORE%20Antiperspirant%20and%20Deodorant%20Gel,%20Fresh%20Force-04/19/2016/p%3E/03-008-273

DeLima Associates. (2018). Consumer Product Information Database. Retrieved from https://www.whatsinproducts.com/

Descartes Datamyne. (2018). Descartes Datamyne Import-Export Database.

Dionisio, K. L. (CPCat), Frame, A. M., Goldsmith, M.-R., Wambaugh, J. F., Liddell, A., Cathey, T., . . . Judson, R. S. (2015). Exploring consumer exposure pathways and patterns of use for chemicals in the environment. *Toxicology Reports, 2*, 228-237. doi:http://dx.doi.org/10.1016/j.toxrep.2014.12.009

DrugBank. (2018). DrugBank Database. Retrieved from https://www.drugbank.ca/

European Chemicals Agency (ECHA). (2018). [(methylethylene)bis(oxy)]dipropanol. Retrieved from https://echa.europa.eu/registration-dossier/-/registered-dossier/14788

EWG. (2018). TRIPROPYLENE GLYCOL. Retrieved from https://www.ewg.org/skindeep/ingredient/706712/TRIPROPYLENE_GLYCOL/

GoodGuide. (2011). ((1-METHYL-1,2-ETHANEDIYL)BIS(OXY))BISPROPANOL. Retrieved from http://scorecard.goodguide.com/chemical-profiles/consumer-products.tcl?edf_substance_id=24800-44-0

Government of Canada. (2018). Chemical Substances: Services and Information. Retrieved from https://www.canada.ca/en/health-canada/services/chemical-substances.html

Kim, S., Thiessen, P. A., Bolton, E. E., Chen, J., Fu, G., Gindulyte, A., . . . Bryant, S. H. (2016). PubChem Substance and Compound databases. *Nucleic Acids Research, 44*(Database issue), D1202-D1213. doi:10.1093/nar/gkv951

Kirk-Othmer. (2004). Drilling Fluids. Retrieved from https://onlinelibrary.wiley.com/doi/10.1002/0471238961.0418091203120118.a01.pub2

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

Organisation for Economic Cooperation and Development (OECD). (2018). eChemPortal: Global Portal to Information on Chemical Substances. Retrieved from https://www.echemportal.org/echemportal/index.action

Sigma Aldrich. (2018). Tripropylene Glycol Safety Data Sheet. Retrieved from https://www.sigmaaldrich.com/MSDS/MSDS/DisplayMSDSPage.do?country=US&language=en&productNumber=187593&brand=ALDRICH&PageToGoToURL=https%3A%2F%2Fwww.sigmaaldrich.com%2Fcatalog%2Fproduct%2Faldrich%2F187593%3Flang%3Den

Silver Fern Chemical Inc. (2018). Tripropylene Glycol. Retrieved from http://www.silverfernchemical.com/products/tripropylene-glycol/

Substances in Preparations in Nordic Countries (SPIN). (2018). tripropylenglycol. Retrieved from http://www.spin2000.net/spinmyphp/

Synapse Information Resources. (2009). Specialty Chemicals Source Book. Fourth Edition. Volume 1.

The Dow Chemical Company. (2016). Technical Data Sheet - Dow Tripropylene Glycol, Acrylate Grade. Retrieved from http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_0973/0901b80380973a1a.pdf?filepath=propyleneglycol/pdfs/noreg/117-22801.pdf&fromPage=GetDoc

The Dow Chemical Company. (2018). What specific grades of tripropylene glycol does Dow offer? Retrieved from https://dowservice.custhelp.com/app/answers/detail/a_id/16844

U.S. Environmental Protection Agency (EPA). (2002). 1986-2002 Historical IUR Data. Retrieved from Excel File

U.S. Environmental Protection Agency (EPA). (2006). 2006 IUR Public Database.

U.S. Environmental Protection Agency (EPA). (2017a). *Functional Use Database (FUse)*. Retrieved from: https://catalog.data.gov/dataset/functional-use-database-fuse

U.S. Environmental Protection Agency (EPA). (2017b). Non-Confidential 2016 Chemical Data Reporting (CDR). Retrieved from https://www.epa.gov/chemical-data-reporting

U.S. Environmental Protection Agency (EPA). (2018a). ChemView. Retrieved from https://chemview.epa.gov/chemview

U.S. Environmental Protection Agency (EPA). (2018b). Envirofacts Multisystem Search. Retrieved from https://www3.epa.gov/enviro/facts/multisystem.html

U.S. Environmental Protection Agency (EPA). (2018c). InertFinder. Retrieved from https://iaspub.epa.gov/apex/pesticides/f?p=INERTFINDER:2:::NO:::

U.S. Environmental Protection Agency (EPA). (2018d). Look up table for BR Waste Code (National Biennial RCRA Hazardous Waste Report). Retrieved from https://iaspub.epa.gov/enviro/brs_codes_v2.waste_lookup

U.S. Environmental Protection Agency (EPA). (2018e). Safer Chemical Ingredients List. Retrieved from https://www.epa.gov/saferchoice/safer-ingredients

U.S. Environmental Protection Agency (EPA). (2018f). TRI-Listed Chemicals. Retrieved from https://www.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals

U.S. Food and Drug Administration (FDA). (2018). Substances Added to Food. Retrieved from https://www.accessdata.fda.gov/scripts/fdcc/?set=FoodSubstances&sort=Sortterm&order=ASC&startrow=1&type=basic&search=24800-44-0

U.S. National Library of Medicine (NLM). (2018a). Household Products Database. Retrieved from https://hpd.nlm.nih.gov/cgi-bin/household/brands?tbl=chem&id=3688

U.S. National Library of Medicine (NLM). (2018b). HSDB: Tripropylene Glycol. Retrieved from https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?./temp/~6ZXsEH:2

U.S. National Library of Medicine (NLM). (2018c). TOXNET Hazardous Substances Data Bank. Retrieved from https://toxnet.nlm.nih.gov/cgi-bin/sis/search2

U.S. Patent and Trademark Office (USPTO). (2018). USPTO Patent Full-Text and Image Database. Retrieved from http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=0&f=S&l=50&TERM1=tripropylene+glycol&FIELD1=&co1=AND&TERM2=&FIELD2=&d=PTXT

Ullmann's. (2000). ULLMANN'S Encyclopedia of Industrial Chemistry.

Ullmann's. (2010). Adhesives, 1. General. Retrieved from https://onlinelibrary.wiley.com/doi/10.1002/14356007.a01_221.pub3

Ullmann's. (2011). Paints and Coatings, 3. Paint Systems. Retrieved from https://onlinelibrary.wiley.com/doi/10.1002/14356007.o18_o02.pub2

Ullmann's. (2018). Propanediols. Retrieved from https://onlinelibrary.wiley.com/doi/10.1002/14356007.a22_163.pub2

Washington State Dept. of Ecology. (2018). Children's Safe Product Act Reported Data. Retrieved from https://fortress.wa.gov/ecy/cspareporting/

Appendix B: Hazard Characterization

Table B.1: Human Health Hazard

ADME

Source	Exposure Route	Species & strain (if available)	Duration	Doses and replicate number	Effect	Study Details
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**
2282271, 4940516	Oral (in water)	Sprague-Dawley rats	Single exposure	**Doses**: 500, 1000, and 2000 mg/kg **Replicates:** 5 per sex per dose	**LD_{50}** > 2000 mg/kg	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity > 98% • OECD Guideline 401 • GLP compliant
4940509	Oral (gavage)	Wistar rat	Single exposure, observed for 14 days	**Doses:** 4080, 8160, and 16320 mg/kg **Replicates:** 5 males per group	**LD_{50}**: 11500 mg/kg	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity not reported • Pre-GLP compliance **Mortalities:** • 4,080 mg/kg: 0/5 • 8,160 mg/kg: 0/5 • 16,320 mg/kg: 5/5
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

Table B.1: Human Health Hazard						
4940519	Dermal	Albino rabbits	24 hour exposure, observed for 14 days	**Dose:** 16320 mg/kg **Replicates:** 5 males	**LD_{50}** > 16320 mg/kg	**Methods:** • Test substance reported as 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**
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:** 200 mg/kg-day **LOAEL:** 1000 mg/kg-day based on organ weight changes in parents	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity > 98% • OECD Guideline 422 • GLP compliant
4940384, 4940445	Oral (drinking water)	B6C3F1 mice	2 years	**Doses:** Males: 0, 735, 1220, and 2390 mg/kg-day Females: 0, 575, 1040, 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

Table B.1: Human Health Hazard						
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:** 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 **Endpoints:** • Morality ○ 7,430 mg/kg-day females: (1/10) hypothermia ○ 11,000 mg/kg-day males: (3/10) dehydration ○ 14,700 mg/kg-day females: (1/10) dehydration
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:** 115 mg/kg-day **LOAEL:** 470 mg/kg-day based on increased incidence of nephropathy, focal histiocytic, and focal granulomatous inflammation in male livers	**Methods:** • Test substance: CASRN 25265-71-8 • Purity: 99% • GLP compliance not reported

Table B.1: Human Health Hazard						
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
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

Table B.1: Human Health Hazard						
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 Guideline • GLP compliance
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: 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

Table B.1: Human Health Hazard						
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
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 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

Table B.1: Human Health Hazard						
4940451, 4940388	Chromosomal aberrations (*in vivo)*	Mouse micronuclei	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
Neurotoxicity						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses and replicate number**	**Effect**	**Study Details**
4940389	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 **Results:** • No effects on brain histology
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

Table B.1: Human Health Hazard						
						• 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**
4940512	Dermal	Rabbits	24 hours	**Dose:** 0.01 mL of undiluted solution **Replicates:** 5 animals	Minimally irritating	**Methods** • Test substance reported as CASRN 24800-44-0 • Purity not reported • Pre-GLP compliance **Results:** • Mean irritation score was 2 out of 10 (with 1 = no irritation). Moderate capillary injection was observed on 4 rabbits
4940527	Dermal patch	Humans	24 hours	**Dose:** 0.2 mL of 25% solution **Replicates:** 33 volunteers	Negative	**Methods** • Test substance reported as CASRN 24800-44-0 • Purity not reported • Non-GLP compliant **Results:** • 2 volunteers had mild erythema at 0.5 hours which resolved by 24 hours
4940526	Dermal patch	Humans	Daily for 14 days	**Dose:** 0.2mL of 50% solution **Replicates:** 26 volunteers	Negative	**Methods** • Test substance reported as CASRN 24800-44-0 • Purity not reported • Non-GLP compliant • 1/ 26 subjects did not complete the due to reasons unrelated to exposure

Table B.1: Human Health Hazard						
4940520	Ocular	Rabbits	Single exposure, observed over 24 hours	**Dose:** 0.5 mL of undiluted solution **Replicates:** 5 rabbits	Negative	**Methods** • Test substance reported as CASRN 24800-44-0 • Purity not reported • Predates GLP compliance **Results:** • The overall irritation score was 1 (trace or no injury) and was fully reversible. The test material was considered non-irritating
4940518	Ocular	New Zealand White rabbits	Single exposure, observed over 72 hours	**Dose:** 0.1 mL of undiluted solution **Replicate:** 2 animals	Negative	**Methods** • Test substance reported as CASRN 24800-44-0 • Purity: 99.6% • OECD Guideline 405 • GLP compliant **Results:** • 2/2 animals had mild conjunctival redness, chemosis, and conjunctival discharge at the 1-hour scoring • All effects were reversible by 24 hours.
4940513	Ocular	SkinEthic Human Corneal Epithelium Model (*in vitro*)	10 minutes	**Dose:** 30 µL of undiluted solution **Replicates:** 3 replicates	Negative	**Methods** • Test substance reported as CASRN 24800-44-0 • Purity: 99.6% • GLP compliant

Table B.1: Human Health Hazard						
Other						
Source	**Exposure Route**	**Species & Strain (if available)**	**Duration**	**Doses**	**Effect**	**Study Details**
4088550	Cell viability	Human embryonic stem cells (hESCs) and human adult pulmonary fibroblasts (hPF)	NA	**Doses:** 0.0001-0.1 M	**NOAEL**: 0.00745M for hESCs IC50: 0.04 M for hESCs and hPF	**Methods:** • Test substance reported as CASRN 25265-71-8 • Purity not reported • GLP compliance not reported **Results:** • In hESCs the estimated NOAEL was 0.00745M and the IC50 was 0.045M, only the highest concentration tested was significantly different from (vehicle) controls • The IC50 in hPF cells was identical (0.04M), but a reliable NOAEL could not be determined

Table B.2: Environmental Hazard					
Aquatic Toxicity: Experimental					
Source	**Species & strain (if available)**	**Duration**	**Doses and replicate number**	**Effect**	**Study Details**
4940389, 4940442	*Oryzias latipes*	96 hours	**Doses:** 5 concentrations between 95-1000 mg/L (nominal) **Replicates:** 10 per group	**LC_{50}** > 1000 mg/L	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity: 97% • OECD Guideline 203 • Not GLP compliant
4940389, 4940433	*Daphnia magna*	24 hours	**Doses**: 5 concentrations between 10-1000 mg/L	**EC_{50}** > 1000 mg/L	**Methods:**

Table B.2: Environmental Hazard					
			Replicates: 4 replicates per concentration, 5 organisms per replicates		• Test substance reported as CASRN 24800-44-0 • Purity: 97% • OECD Guideline 202 • Not GLP compliant
4940434, 4940389	*Daphnia magna*	21 days	**Doses**: 5 concentrations between 10-1000 mg/L **Replicates:** 4 replicates per concentration, 10 organisms per replicates	**NOEC**: 1000 mg/L	**Methods:** • Test substance reported as CASRN 24800-44-0 • Purity: 97% • OECD Guideline 202 • Not GLP compliant **Results:** • LC_{50} > 1000 mg/L for mortality • EC_{50} > 1000 mg/L for reproduction rate
4940389	*Selenastrum capricornutum*	72 hours	**Doses:** 5 nominal concentrations 95-1000 mg/L	**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	**Chemical Class**	**Species**	**Predicted Effect Level**	**Notes**	
ECOSAR v2.0 (Class: Neutral Organics)	ChV	Aquatic vertebrates	1600 mg/L	Physical properties used for estimation Log K_{ow} -0.38; water solubility 1000 mg/L; melting point -30°C SMILES: CC(O)COC(C)COC(C)CO	
ECOSAR v2.0 (Class: Neutral Organics)	ChV	Green algae	480 mg/L	Physical properties used for estimation Log K_{ow} -0.38; water solubility 1000 mg/L; melting point -30°C SMILES: CC(O)COC(C)COC(C)CO	

Table B.3: Fate					
Environmental Fate: Experimental					
Source	**Endpoint**	**Duration**	**Doses and number of replicates**	**Results**	**Study Details**
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:** • 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
4940432	O_2 consumption, CO_2 consumption, DOC removal	28 days	**Dose:** 100 mg/L	Readily biodegradable	**Method:** • Test substance reported as 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

Table B.3: Fate					
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)
4940428	Aerobic seawater	64 days	**Dose:** 51.2 mg/L	• 46.1% DOC removal after 64 days • 33.5% CO_2 evolution after 62 days	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity 99.4% • OECD Guideline 306 • GLP compliant
4946320	Sediment/water	20 days	**Doses:** 5 and 10 mg/L	Inherently Biodegradable	**Method:** • Test substance reported as CASRN 24800-44-0 • Purity not reported • OECD Guideline 301E • GLP compliant **Endpoint:** • < 10% after 20 days with 10 mg/L dose • 100% biodegradation by day 16 with 5 mg/L • Authors suggest that oxidation products may be toxic to inoculum and TPG is inherently biodegradable
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					
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:** • EC_{50} >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		
EPISuite v.4.11 (BIOWIN 7)	Estimated	Anaerobic biodegradation	Not predicted to biodegrade quickly under anaerobic conditions	Probability of -0.0712. Fragment representation is valid. Fast degradation is defined as predicted probability >0.5.	
EPI Suite Reference			The measured melting point and boiling point entered into EPI Suite were taken from PhysProp. The measured vapor pressure and Log K_{ow} were taken from ECHA.	EPI Suite (Physical Property Inputs - BP = 271 deg C, MP = -30 deg C, VP = 0.00195 mm Hg, WS = 1000000 mg/L, Log P = -0.38 SMILES: CC(O)COC(C)COC(C)CO	

B.1 References

Bates, HK; Price, CJ; Marr, MC; Myers, CB; Heindel, JJ; Schwetz, BA. (1992a). Final report on the developmental toxicity of dipropylene glycol (CAS #25265-71-8) in New Zealand white rabbits. (NTP Study No. TER-90-14). Research Triangle Park, NC: National Toxicology Program.

Bates, HK; Price, CJ; Marr, MC; Myers, CB; Heindel, JJ; Schwetz, BA. (1992b). Final report on the developmental toxicity of dipropylene glycol (CAS No. 25265-71-8) in Sprague-Dawley (CD (trade name)) rats. Research Triangle Park, NC: National Toxicology Program.

BUA (GDCh Advisory Committee on Existing Chemicals). (1996). Dipropylene glycol. In GD BUA (Ed.). Stuttgart, Germany: S. Hirzel.

ECHA (European Chemicals Agency). (1974a). [(methylethylene)bis(oxy)]dipropanol: acute toxicity: dermal. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/3/4

ECHA (European Chemicals Agency). (1974b). [(methylethylene)bis(oxy)]dipropanol: acute toxicity: inhalation: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/3/3/?documentUUID=b3324441-49d4-432b-b4fc-72047a3b05d2

ECHA (European Chemicals Agency). (1974c). [(methylethylene)bis(oxy)]dipropanol: acute toxicity: oral: 002 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/3/2/?documentUUID=ca7e2977-01ec-4b31-97da-eb08a118b3af

ECHA (European Chemicals Agency). (1974d). [(methylethylene)bis(oxy)]dipropanol: eye irritation: 003 supporting | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/4/3/?documentUUID=93b85621-2813-4cb3-be0f-c81034a5c6ee

ECHA (European Chemicals Agency). (1974e). [(methylethylene)bis(oxy)]dipropanol: skin irritation/corrosion. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/4/2

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (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

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

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (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

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

ECHA (European Chemicals Agency). (1993a). [(methylethylene)bis(oxy)]dipropanol: acute toxicity: oral: 001 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/3/2

ECHA (European Chemicals Agency). (1993b). [(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

ECHA (European Chemicals Agency). (1993c). [(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

ECHA (European Chemicals Agency). (1994a). [(methylethylene)bis(oxy)]dipropanol: long-term toxicity to aquatic invertebrates: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/6/2/5/?documentUUID=a8c2f1e5-a2b2-44bd-92e3-e036789c5d4d

ECHA (European Chemicals Agency). (1994b). [(methylethylene)bis(oxy)]dipropanol: short-term toxicity to aquatic invertebrates: 001 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/6/2/4/?documentUUID=e7896c57-46b4-445a-ac8b-2c4107d544fa

ECHA (European Chemicals Agency). (1994c). [(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

ECHA (European Chemicals Agency). (1994d). 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

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

ECHA (European Chemicals Agency). (1995b). [(methylethylene)bis(oxy)]dipropanol: exposure related observations in humans: other data: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/11/6

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

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

ECHA (European Chemicals Agency). (1997). [(methylethylene)bis(oxy)]dipropanol: exposure related observations in humans: other data: 002 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/11/6/?documentUUID=ca6dcade-09d9-479c-b79c-dccdc9d44937

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

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

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

ECHA (European Chemicals Agency). (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

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

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (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

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

ECHA (European Chemicals Agency). (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

ECHA (European Chemicals Agency). (2010a). [(methylethylene)bis(oxy)]dipropanol: eye irritation: 001 key | experimental result. Helsinki, Finland. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/4/3

ECHA (European Chemicals Agency). (2010b). [(methylethylene)bis(oxy)]dipropanol: eye irritation: 002 key | experimental result. https://echa.europa.eu/registration-dossier/-/registered-dossier/14788/7/4/3/?documentUUID=6112967b-d401-4691-92fc-c1090a4e63c5

ECHA (European Chemicals Agency). (2010c). [(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

Fasano, WJ. (2007). Dipropylene glycol: in vitro dermal absorption rate testing [TSCA Submission]. Fasano, WJ. https://chemview.epa.gov/chemview/proxy?filename=2008-1-8EHQ-08-16930B_8ehq_0108_16930b.pdf

Fasano, WJ; ten Berge, W; Banton, MI; Heneweer, M; Moore, NP. (2011). Dermal penetration of propylene glycols: Measured absorption across human abdominal skin in vitro and comparison with a QSAR model. Toxicol In Vitro 25: 1664-1670. http://dx.doi.org/10.1016/j.tiv.2011.07.003

JETOC (Japan Chemical Industry Ecology-Toxicology & Information Center). (1997). Toxicity testing results of environmental chemicals. JETOC Info Sheet No. 26 (Special Issue No. 2): 1-83.

Johansen, JD; Jemec, GBE; Rastogi, SC. (1995). Contact sensitization to dipropylene glycol in an eczema population [Abstract]. Contact Derm 33: 211-212. http://dx.doi.org/10.1111/j.1600-0536.1995.tb00560.x

Leberco Labs (Leberco Laboratories). (1994). Letter from [] to usepa submitting irritation toxicity studies of 2-propanol, 1,1'-oxybis- in the rabbit dated 03/24/94 (sanitized). (86940000234S).

NTP (National Toxicology Program). (2004). NTP technical report on the toxicology and carcinogenesis studies of dipropylene glycol (CAS NO. 25265-71-8) in F344/N rats and B6C3F1 mice (pp. 6-260). Research Triangle Park, NC: U.S Department of Health and Human Services. Public Health Service. National Institutes of Health. https://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr511.pdf

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

Zgoła-Grześkowiak, A; Grześkowiak, T; Zembrzuska, J; Frańska, M; Frański, R; Lukaszewski, Z. (2008). Bio-oxidation of tripropylene glycol under aerobic conditions. Biodegradation 19: 365-373. http://dx.doi.org/10.1007/s10532-007-9142-6

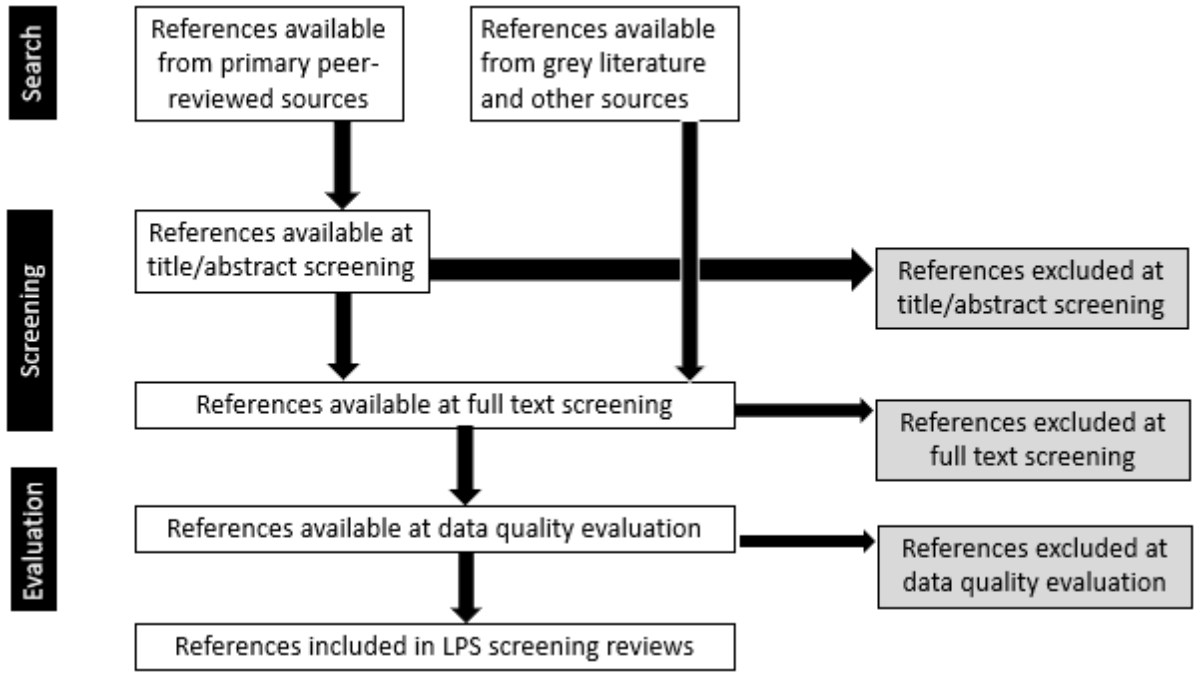
Appendix C: Literature Search Outcomes

C.1 Literature Search and Review

This section briefly describes the literature search and review process, search terms, and search outcomes for the hazard and fate screening of tripropylene glycol. Search outcomes and reference details are provided on the candidate's HERO[42] project page.

EPA created a fit-for-purpose process to transparently document the literature search and review[43] of available hazard and fate information for low-priority substance (LPS) candidates. References from peer-reviewed primary sources, grey sources,[44] 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



C.1.1 Search for Analog Data

To supplement the information on the candidate chemical, tripropylene glycol, the following LPS candidates were used as analogs for read-across: 1,1'-dimethyldiethylene glycol and dipropylene glycol.

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

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

[44] 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.

For more details and justification on analogs, see section 6.1.1. Analogs were used to fill data gaps on endpoints for which tripropylene glycol lacked quality data, such as developmental 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 tripropylene glycol described above.[43] Tripropylene glycol and the two analogs mentioned above fall under the glycol cluster.

C.1.2 Search Terms and Results

EPA began the literature review process for the hazard screening of tripropylene 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 lists the search terms used in the database search of peer -reviewed literature for the glycol cluster including tripropylene glycol. For grey literature and other secondary sources, Table C.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]
	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; no other restrictions
	Toxline	Same as human health strategy synonyms only; no other restrictions

Table C.1: Search Terms Used in Peer Reviewed Databases		
	TSCATS 1	Same as human health strategy CASRN only; no other restrictions
	Proquest Agricola	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; no other restrictions

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.[43] Of these, 71 references were included for data evaluation and used to support the designation of tripropylene 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 tripropylene 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[43] 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 tripropylene 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[45] 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
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

[45] 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									
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

Table C.3: Off-topic references excluded at Title/Abstract Screening for human health hazard									
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
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

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)**
		4947114 4951209 61412 824457 1744616 1744618 3039593 4441664 4442235 4862648 4940287 4940288 4940320 4940383 4940385 4940387 4940395 4940392 4946053 4948456 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.

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 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[46]	4951261
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

[46] 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)**
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

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 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., <28 days for repeat dose).	4940388 4940389 4941420 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** For mixtures, the components and ratios were not characterized or did not include information that could result in a reasonable approximation of components.	3039551
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**	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)**
	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).	
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.
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 tripropylene 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[47] relevant to environmental hazard									
44187	4440871	4949112	4948988	4946374	2892020	4738993	1744618	4949052	4948891
404898	4441664	4949113	4948989	4946375	2978028	4742957	1763125	4949053	4948892

[47] 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									
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
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

Table C.7: Off-Topic References Excluded at Title/Abstract Screening for Environmental Hazard									
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

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)**
		4951178 1744616 4940286 4951206 4951228 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
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**	4940388 **3041958**

Table C.9: Data Quality Metrics and Unacceptable References Excluded at Data Quality Evaluation for Environmental Hazard		
Question	**Unacceptable if:**	**References excluded (HERO ID)**
	Major inconsistencies were present in reporting of results.	

C.2.3 Fate

For the screening review of LPS candidate tripropylene 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[48] 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
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

[48] 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									
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

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 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
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.

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 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.[49]

For tripropylene 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 Tripropylene Glycol based on Public Comment

Source	HERO ID	Notes
The Dow Chemical Company. (2016) Product Safety Assessment: Tripropylene Glycol	NA	EPA captured this information from other sources in Section 3: Physical-Chemical Properties.
Fiume, Monice M. et al. (2012). Safety Assessment of Propylene Glycol, Tripropylene Glycol, and PPGs as Used in Cosmetics. International Journal of Toxicology, 31 (Supplement 2),	3036587	This review article was part of EPA's literature review process but was excluded due to a lack of sufficient details needed to evaluate the studies cited.
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.
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.
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.
EPA's Safer Chemical Ingredients List	NA	EPA reviewed and included information in Section 4: Relevant Assessment History.

[49] 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-2019-0122 addresses tripropylene glycol.