

## TSCA Section 5(a)(3) Determination for Premanufacture Notice (PMN) P-20-0038

**Number: P-20-0038**

**TSCA Section 5(a)(3) Determination:** The chemical substance is not likely to present an unreasonable risk (5(a)(3)(C))

**Chemical Name:**

Specific: 1,3,5-Triazine-2,4,6(1H,3H,5H)-trione, 1,3,5-tris[3-(2-oxiranyl)propyl]-; CASRN: 91403-64-4

**Conditions of Use (intended, known, or reasonably foreseen)<sup>1</sup>:**

Intended conditions of use (specific): Import for processing and use as a resist compound for semiconductor manufacture, consistent with the manufacturing, processing, use, distribution, and disposal information described in the PMN.

Known conditions of use: Applying such factors as described in footnote 1, EPA evaluated whether there are known conditions of use and found use as a monomer/crosslinker based on a previous TSCA submission.

Reasonably foreseen conditions of use: Applying such factors as described in footnote 1, EPA evaluated whether there are reasonably foreseen conditions of use and found use as a curing agent, a photosensitive compound for liquid crystal displays, liquid crystal alignment agent and liquid crystal display element, and thermosetting compound for electrically conductive materials based on a patent search.

**Summary:** The chemical substance is not likely to present an unreasonable risk of injury to health or the environment, without consideration of costs or other nonrisk factors, including an unreasonable risk to a potentially exposed or susceptible subpopulation identified as relevant by the Administrator under the conditions of use, based on the risk assessment presented below and the terms of the proposed Significant New Use Rule (SNUR) signed by EPA.<sup>2</sup> EPA estimated

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<sup>1</sup> Under TSCA § 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.” In general, EPA considers the intended conditions of use of a new chemical substance to be those identified in the section 5(a) notification. Known conditions of use include activities within the United States that result from manufacture that is exempt from PMN submission requirements. Reasonably foreseen conditions of use are future circumstances, distinct from known or intended conditions of use, under which the Administrator expects the chemical substance to be manufactured, processed, distributed, used, or disposed of. The identification of “reasonably foreseen” conditions of use will necessarily be a case-by-case determination and will be highly fact-specific. Reasonably foreseen conditions of use will not be based on hypotheticals or conjecture. EPA’s identification of conditions of use includes the expectation of compliance with federal and state laws, such as worker protection standards or disposal restrictions, unless case-specific facts indicate otherwise. Accordingly, EPA will apply its professional judgment, experience, and discretion when considering such factors as evidence of current use of the new chemical substance outside the United States, evidence that the PMN substance is sufficiently likely to be used for the same purposes as existing chemical substances that are structurally analogous to the new chemical substance, and conditions of use identified in an initial PMN submission that the submitter omits in a revised PMN. The sources EPA uses to identify reasonably foreseen conditions of use include searches of internal confidential EPA PMN databases (containing use information on analogue chemicals), other U.S. government public sources, the National Library of Medicine’s Hazardous Substances Data Bank (HSDB), the Chemical Abstract Service STN Platform, REACH Dossiers, technical encyclopedias (e.g., Kirk-Othmer and Ullmann), and Internet searches.

<sup>2</sup> Reasonably foreseen conditions of use subject to a proposed SNUR are not likely to present an unreasonable risk of injury to health or the environment. Based on EPA’s experience, it is the Agency’s judgment that a new use

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that the new chemical substance could have limited persistence and low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms. Although EPA estimated that the hydrolysis product could be very persistent, the substance has low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms. Based on EPA's TSCA New Chemicals Program Chemical Category for Epoxides,<sup>3</sup> test data on analogous chemical substances, and physical/chemical properties, EPA estimates that the chemical substance has moderate environmental hazard and potential for the following human health hazards: acute toxicity, skin and eye irritation, skin sensitization, respiratory sensitization, germ cell mutagenicity, reproductive toxicity, and specific target organ toxicity. The PMN describes conditions of use that mitigate the human health and environmental risks.

As set forth below, the information available to EPA is sufficient to permit the Agency to conduct a reasoned evaluation of the health and environmental effects of the chemical substance under the conditions of use that are not subject to the proposed SNUR, in order to determine that the chemical substance is not likely to present an unreasonable risk under those conditions of use. As such, EPA does not need to impose testing requirements to conduct this evaluation. Whether testing is needed to evaluate the effects of the intended, known, or reasonably foreseen conditions of use of a chemical substance subject to a PMN is determined on a case-by-case basis. To the extent that testing may be necessary to conduct a reasoned evaluation of the health or environmental effects of the reasonably foreseen conditions of use that are subject to the proposed SNUR, EPA will make the appropriate determination if a Significant New Use Notice (SNUN) is submitted following finalization of the SNUR.

EPA assessed the intended conditions of use, previously assessed the new chemical substance under the known conditions of use, and addressed reasonably foreseen conditions of use by proposing a SNUR. Therefore, EPA determines the new chemical substance is not likely to present unreasonable risk to human health or the environment.

**Fate:** Environmental fate is the determination of which environmental compartment(s) a chemical moves to, the expected residence time in the environmental compartment(s) and removal and degradation processes. Environmental fate is an important factor in determining exposure and thus in determining whether a chemical may present an unreasonable risk. EPA

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would not commence during the pendency of a proposed SNUR because web posting of a proposed SNUR serves as the cut-off date for a significant new use. Therefore, manufacturers and processors would not commence a prohibited new use that would be legally required to cease upon the finalization of the SNUR. Once a SNUR is final and effective, no manufacturer or processor – including the PMN submitter – may undertake the conditions of use identified as a significant new use of the PMN substance in the SNUR. EPA must first evaluate the new use in accordance with the requirements of TSCA Section 5 and (a) either conclude that the new use is not likely to present an unreasonable risk under the conditions of use; or (b) take appropriate action under section 5(e) or 5(f). If EPA were not to finalize the proposed SNUR, then that decision would be based on information and data provided to the Agency during the comment period demonstrating that the reasonably foreseen conditions of use subject to the proposed SNUR are not likely to present an unreasonable risk. Under either scenario, the reasonably foreseen condition of use is not likely to present an unreasonable risk.

<sup>3</sup> TSCA New Chemicals Program (NCP) Chemical Categories. <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/chemical-categories-used-review-new>.

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estimated physical/chemical and fate properties of the new chemical substance using data submitted for the new chemical substance and EPI (Estimation Program Interface) Suite™ (<http://www.epa.gov/tsc-screening-tools/epi-suite-estimation-program-interface>) and of the hydrolysis product using data submitted for the new chemical substance and EPI Suite™. In wastewater treatment, the new chemical substance is expected to be removed with an efficiency of 0% to 25% due to hydrolysis and the hydrolysis product is expected to be removed with an efficiency of 0% due to low biodegradability, low sorption, and low stripping. Removal of the new chemical substance by biodegradation is negligible and removal of the hydrolysis product by biodegradation is negligible. Sorption of the new chemical substance and the hydrolysis product to sludge, soil, and sediment is expected to be low. Migration of the new chemical substance and the hydrolysis product to groundwater is expected to be rapid due to low sorption to soil and sediment. Due to low estimated vapor pressure and Henry's law constant, the new chemical substance and the hydrolysis product are expected to undergo negligible volatilization to air. Overall, these estimates indicate that the new chemical substance and the hydrolysis product have low potential to volatilize to air and high potential to migrate to groundwater.

**Persistence<sup>4</sup>:** Persistence is relevant to whether a new chemical substance is likely to present an unreasonable risk because chemicals that are not degraded in the environment at rates that prevent substantial buildup in the environment, and thus increase potential for exposure, may present a risk if the substance presents a hazard to human health or the environment. EPA estimated degradation half-lives of the new chemical substance using data submitted for the new chemical substance and of the hydrolysis product using data submitted for the new chemical substance and EPI Suite™. EPA estimated that the new chemical substance's aerobic biodegradation half-life is 2 to 6 months, anaerobic biodegradation half-life is > 6 months, and hydrolysis half-life is days; and that the hydrolysis product's aerobic and anaerobic biodegradation half-lives are > 6 months. However, the new chemical substance may have limited persistence in aerobic environments (e.g., surface water) and anaerobic environments (e.g., sediments) due to hydrolysis. Further, these estimates indicate that the hydrolysis product may be very persistent in aerobic environments (e.g., surface water) and anaerobic environments (e.g., sediment).

**Bioaccumulation<sup>5</sup>:** Bioaccumulation is relevant to whether a new chemical substance is likely to present an unreasonable risk because substances that bioaccumulate in aquatic and/or terrestrial species pose the potential for elevated exposures to humans and other organisms via food chains. EPA estimated the potential for the new chemical substance to bioaccumulate using data

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<sup>4</sup> Persistence: A chemical substance is considered to have limited persistence if it has a half-life in water, soil or sediment of less than 2 months or if there are equivalent or analogous data. A chemical substance is considered to be persistent if it has a half-life in water, soil or sediments of greater than 2 months but less than or equal to 6 months or if there are equivalent or analogous data. A chemical substance is considered to be very persistent if it has a half-life in water, soil or sediments of greater than 6 months or there are equivalent or analogous data. (64 FR 60194; November 4, 1999)

<sup>5</sup> Bioaccumulation: A chemical substance is considered to have a low potential for bioaccumulation if there are bioconcentration factors (BCF) or bioaccumulation factors (BAF) of less than 1,000 or if there are equivalent or analogous data. A chemical substance is considered to be bioaccumulative if there are BCFs or BAFs of 1,000 or greater and less than or equal to 5,000 or there are equivalent or analogous data. A chemical substance is considered to be very bioaccumulative if there are BCFs or BAFs of 5,000 or greater or there are equivalent or analogous data. (64 FR 60194; November 4 1999)

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submitted for the new chemical substance and of the hydrolysis product to bioaccumulate using EPI Suite™. EPA estimated that the new chemical substance has low bioaccumulation potential based on hydrolysis and the hydrolysis product has low bioaccumulation potential based on BCFBAF model result < 1000 (parent compound bioconcentration factor = 5 [estimated by linear regression from log Kow] and bioaccumulation factor = 2 [estimated by the Arnot-Gobas method (2003)]<sup>6</sup>; hydrolysis product bioconcentration factor = 3 [estimated by linear regression from log Kow] and bioaccumulation factor = 1 [estimated by the Arnot-Gobas method (2003)]). EPA estimated that the new chemical substance could have limited persistence and low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms. Although EPA estimated that the hydrolysis product could be very persistent, the substance has low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms.

**Human Health Hazard<sup>7</sup>:** Human health hazard is relevant to whether a new chemical substance is likely to present an unreasonable risk because the significance of the risk is dependent upon both the hazard (or toxicity) of the chemical substance and the extent of exposure to the substance. EPA estimated the human health hazard of this chemical substance based on its estimated physical/chemical properties, available data on the new chemical substance, by comparing it to structurally analogous chemical substances for which there is information on human health hazard, and other structural information. Absorption is expected to be moderate to good through the skin, moderate through the gastrointestinal (GI) tract, and good through the lungs based on physical/chemical properties. For the new chemical substance, EPA identified hazards for acute toxicity, irritation to skin, eyes, and respiratory tract, neurotoxicity, genotoxicity, and systemic, reproductive, and developmental effects based on data on the new chemical substance and analogue data. EPA identified hazards for skin and respiratory sensitization based on structural alerts. Submitted tests of the new chemical substance reported an LD<sub>50</sub> > 300 mg/kg-bw and < 2000 mg/kg-bw (OECD 423), positive *in vivo* dermal sensitization data (OECD 406), and positive *in vitro* mutagenicity data with and without metabolic activation (OECD 471); the new chemical substance was negative in an *in vivo*

<sup>6</sup> Arnot JA, Gobas FAPC. 2003. A generic QSAR for assessing the bioaccumulation potential of organic chemicals in aquatic food webs. *QSAR and Combinatorial Science* 22: 337-345.

<sup>7</sup> A chemical substance is considered to have low human health hazard if effects are observed in animal studies with a No Observed Adverse Effect Level (NOAEL) equal to or greater than 1,000 mg/kg/day or if there are equivalent data on analogous chemical substances; a chemical substance is considered to have moderate human health hazard if effects are observed in animal studies with a NOAEL less than 1,000 mg/kg/day or if there are equivalent data on analogous chemical substances; a chemical substance is considered to have high human health hazard if there is evidence of adverse effects in humans or conclusive evidence of severe effects in animal studies with a NOAEL of less than or equal to 10 mg/kg/day or if there are equivalent data on analogous chemical substances. EPA may also use Benchmark Dose Levels (BMDL) derived from benchmark dose (BMD) modeling as points of departure for toxic effects. See <https://www.epa.gov/bmds/what-benchmark-dose-software-bmds>. Using this approach, a BMDL is associated with a benchmark response, for example a 5 or 10 % incidence of effect. The aforementioned characterizations of hazard (low, medium, high) would also apply to BMDLs. In the absence of animal data on a chemical or analogous chemical substance, EPA may use other data or information such as from *in vitro* assays, chemical categories (e.g., Organization for Economic Co-operation and Development, 2014 Guidance on Grouping of Chemicals, Second Edition. ENV/JM/MONO(2014)4. Series on Testing & Assessment No. 194. Environment Directorate, Organization for Economic Co-operation and Development, Paris, France. ([http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono\(2014\)4&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2014)4&doclanguage=en))), structure-activity relationships, and/or structural alerts to support characterizing human health hazards.

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micronucleus test (OECD 474). EPA identified a LOAEL of 0.72 mg/kg-bw/day based on reproductive effects, which was protective for neurotoxicity and systemic effects, and a NOAEC of 1.79 mg/m<sup>3</sup> based on reproductive effects. These values were used to derive exposure route- and population-specific points of departure. EPA qualitatively evaluated irritation, sensitization, and genotoxicity effects.

**Environmental Hazard<sup>8</sup>:** Environmental hazard is relevant to whether a new chemical substance is likely to present unreasonable risk because the significance of the risk is dependent upon both the hazard (or toxicity) of the chemical substance and the extent of exposure to the substance. EPA estimated environmental hazard of this new chemical substance based on acute toxicity data submitted for the new chemical substance and using the Ecological Structure Activity Relationships (ECOSAR) Predictive Model (<https://www.epa.gov/tsca-screening-tools/ecological-structure-activity-relationships-ecosar-predictive-model>); specifically the QSARs for polyepoxides and aromatic triazines. This substance falls within the TSCA New Chemicals Category of Epoxides. Acute toxicity values estimated for fish, aquatic invertebrates, and algae are > 94.1 mg/L (submitted test data), > 90.9 mg/L (submitted test data), and 0.86 mg/L (ECOSAR), respectively. Chronic toxicity values estimated for fish, aquatic invertebrates, and algae are 0.29 mg/L (ECOSAR), 3.4 mg/L (ECOSAR), and 0.22 mg/L (ECOSAR), respectively. These toxicity values indicate that the new chemical substance is expected to have moderate environmental hazard. Application of assessment factors of 4 and 10 to acute and chronic toxicity values, respectively, results in acute and chronic concentrations of concern of 0.215 mg/L (215 ppb) and 0.022 mg/L (22 ppb), respectively.

**Exposure:** The exposure to a new chemical substance is potentially relevant to whether a new chemical substance is likely to present unreasonable risks because the significance of the risk is dependent upon both the hazard (or toxicity) of the chemical substance and the extent of exposure to the substance.

EPA estimates occupational exposure and environmental release of the new chemical substance under the intended conditions of use described in the PMN using ChemSTEER (Chemical Screening Tool for Exposures and Environmental Releases; <https://www.epa.gov/tsca-screening-tools/chemsteer-chemical-screening-tool-exposures-and-environmental-releases>). EPA uses EFAST (the Exposure and Fate Assessment Screening Tool; <https://www.epa.gov/tsca-screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014>) to estimate general population, consumer, and environmental exposures.

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<sup>8</sup> A chemical substance is considered to have low ecotoxicity hazard if the Fish, Daphnid and Algae LC50 values are greater than 100 mg/L, or if the Fish and Daphnid chronic values (ChVs) are greater than 10.0 mg/L, or there are not effects at saturation (occurs when water solubility of a chemical substance is lower than an effect concentration), or the log Kow value exceeds QSAR cut-offs. A chemical substance is considered to have moderate ecotoxicity hazard if the lowest of the Fish, Daphnid or Algae LC50s is greater than 1 mg/L and less than 100 mg/L, or where the Fish or Daphnid ChVs are greater than 0.1 mg/L and less than 10.0 mg/L. A chemical substance is considered to have high ecotoxicity hazard, or if either the Fish, Daphnid or Algae LC50s are less than 1 mg/L, or any Fish or Daphnid ChVs is less than 0.1 mg/L (Sustainable Futures <https://www.epa.gov/sustainable-futures/sustainable-futures-p2-framework-manual>).

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EPA considers workers to be a potentially exposed or susceptible subpopulation (PESS) on the basis of greater exposure potential compared to the general population. EPA also considers PESS in conducting general population drinking water exposures by evaluating risks associated with water intake rates for multiple age groups, ranging from infants to adults. EPA considers consumers of specific products to be a potentially exposed or susceptible subpopulation on the basis of greater exposure potential compared to the general population who do not use specific products.

For this new chemical assessment, EPA assessed worker exposure via dermal exposure; inhalation exposure to workers is not expected. No releases to water are expected. Releases to air and landfill are expected to be negligible (below modeling thresholds). Exposures to the general population were not assessed because no releases to water are expected, and releases to air and landfill are expected to be negligible. Consumer exposures were not assessed because consumer uses were not identified as conditions of use.

**Risk Characterization:** EPA applies a margin of exposure approach to calculate potential human health risks of new chemicals. A benchmark (acceptable) margin of exposure (MOE) is derived by applying uncertainty factors for the following types of extrapolations: intra-species extrapolation ( $UF_H = 10$  to account for variation in sensitivity among the human population), inter-species extrapolation ( $UF_A = 10$  to account for extrapolating from experimental animals to humans) and LOAEL-to-NOAEL extrapolation ( $UF_L = 10$  to account for using a LOAEL when a NOAEL is not available). Hence, in the New Chemicals Program, a benchmark MOE is typically 100 and 1,000 when NOAELs and LOAELs, respectively, are used to identify hazard. When allometric scaling or pharmacokinetic modeling is used to derive an effect level, the  $UF_H$  may be reduced to 3, for a benchmark MOE of 30. The benchmark MOE is used to compare to the MOE calculated by comparing the toxicity NOAEL or LOAEL to the estimated exposure concentrations. When the calculated MOE is equal to or exceeds the benchmark MOE, the new chemical substance is not likely to present an unreasonable risk. EPA assesses risks to workers considering engineering controls described in the PMN but in the absence of personal protective equipment (PPE) such as gloves and respirators. If risks are preliminarily identified, EPA then considers whether the risks would be mitigated by the use of PPE (e.g., impervious gloves, respirator).

Risks to human health for the new chemical substance were evaluated using the route-specific effect level (i.e., LOAEL) described above. Risks were identified for workers for reproductive effects via dermal exposure based on quantitative hazard data for an analogue (MOE = 0.04; benchmark MOE = 1,000). Risks were not evaluated for workers via inhalation because inhalation exposures are not expected. Irritation, sensitization, and genotoxicity hazards to workers via dermal contact were identified. Risks will be mitigated if exposures are controlled by the use of appropriate PPE, including impervious gloves, eye protection and protective clothing. EPA expects that employers will require and workers will use appropriate PPE (i.e., impervious gloves, eye protection glasses, protective clothing), consistent with the Safety Data Sheet prepared by the PMN submitter, in a manner adequate to protect them.

Risks to the general population were not evaluated because general population exposures are not expected. Risks to consumers were not evaluated because consumer uses were not identified as conditions of use.

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Risks to the environment were evaluated by comparing estimated surface water concentrations with the acute and chronic concentrations of concern. Risks to the environment were not identified due to no releases to water.

It is reasonably foreseen, based on a patent search, that the new chemical substance could be used in number of other uses that may have different releases and exposures than the intended or known uses. The SNUR that has been proposed for this chemical substance defines certain conditions of use as significant new uses. The proposed significant new uses include: (1) manufacturing, processing, or use resulting in inhalation exposures; and, (2) water releases resulting in exceedance of a surface water concentration of 5 ppb. Conditions of use that fall under the restrictions of the proposed SNUR are not likely to present unreasonable risk of injury to health or the environment because (1) those conditions of use are not likely to be commenced during the pendency of the proposed SNUR, and (2) upon finalization of the SNUR, those conditions of use would be prohibited unless and until EPA makes an affirmative determination that the significant new use is not likely to present an unreasonable risk or takes appropriate action under section 5(e) or 5(f).

06/30/2020  
Date: \_\_\_\_\_

/s/ \_\_\_\_\_  
Madison H. Le, Director  
Chemical Control Division  
Office of Pollution Prevention and Toxics  
U.S. Environmental Protection Agency