TSCA Section 5(a)(3) Determination for Significant New Use Notice (SNUN) SN-20-0006

Number: SN-20-0006
TSCA Section 5(a)(3) Determination: The significant new use is not likely to present an unreasonable risk (5(a)(3)(C))

Chemical Name:
Specific: Phenol, 4,4'-[1-[4-[1-(4-hydroxyphenyl)-1-methylethyl]phenyl]ethylidene]bis-;
CASRN: 110726-28-8

Significant New Use: Use as [claimed CBI]. The significant new use rule (SNUR) at 40 CFR 721.5867 for this chemical substance requires notification to EPA for any use other than as an ingredient in a photoresist formulation.

Conditions of Use (intended, known, or reasonably foreseen)[1]:
Intended conditions of use (generic): Import for use and use as a color developer, consistent with the manufacturing, processing, use, distribution, and disposal information described in the SNUN.
Known conditions of use: Applying such factors as described in footnote 1, EPA evaluated whether there are known conditions of use and identified the following known conditions of use, based on previous TSCA submissions: use in photoresist formulations and use in adhesion and film formulations.
Reasonably foreseen conditions of use: Applying such factors as described in footnote 1, EPA evaluated whether there are reasonably foreseen conditions of use and identified the following reasonably foreseen uses based on a previous TSCA submission and patents: use as a solid state image sensor; in the preparation of trisphenol PA type cyanate; as a flame retardant in thermoplastic polymer compositions; as an adhesive for semiconductors; and as a stabilizer for thermal imaging.

Summary: The significant new use is not likely to present an unreasonable risk of injury to

[1] 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.

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 SNUR for this chemical substance. EPA estimated that the chemical substance has the potential to bioaccumulate and be persistent in the environment, such that repeated exposures may cause food-chain effects via accumulation in exposed organisms. Based on its estimated physical/chemical properties, and available data on the chemical substance and structurally analogous substances, EPA estimates that the chemical substance has high environmental hazard and potential for the following human health hazards: specific target organ toxicity. EPA concludes that the significant new use is not likely to present an unreasonable risk under the conditions of use.

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 significant new use of a chemical may present an unreasonable risk. EPA estimated physical/chemical and fate properties of the chemical substance using data for analogues(s) (1,1,1-tris(4-hydroxyphenyl)ethane (CASRN 27955-94-8)) and EPI (Estimation Program Interface) Suite™ (http://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program-interface). In wastewater treatment, the chemical substance is expected to be removed with an efficiency of 90% due to sorption. Removal of the chemical substance by biodegradation is negligible. Sorption of the chemical substance to sludge is expected to be strong and to soil and sediment is expected to be very strong. Migration of the chemical substance to groundwater is expected to be negligible due to very strong sorption to soil and sediment. Due to low estimated vapor pressure and Henry's law constant, the chemical substance is expected to undergo negligible volatilization to air. Overall, these estimates indicate that the chemical substance has low potential to volatilize to air or migrate to groundwater.

Persistence[2]: Persistence is relevant to whether a significant new use of a 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 chemical substance using data for analogues(s) (1,1,1-tris(4-hydroxyphenyl)ethane (CASRN 27955-94-8)) and EPI Suite™. EPA estimated that the chemical substance's aerobic and anaerobic biodegradation half-lives are > 6 months. These estimates indicate that the chemical substance may be very persistent in aerobic environments (e.g., surface water) and anaerobic environments (e.g., sediment).

[2] 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 if there are equivalent or analogous data. (64 FR 60194; November 4, 1999)

Bioaccumulation[3]: Bioaccumulation is relevant to whether a significant new use of a 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 chemical substance to bioaccumulate using data for analogues(s) (1,1,1-tris(4-hydroxyphenyl)ethane (CASRN 27955-94-8)) and EPI Suite™. EPA estimated that the chemical substance has bioaccumulation potential based on BCFBAF model result > 1000 and < 5000 (bioconcentration factor = 9000 [estimated by linear regression from log Kow] and bioaccumulation factor = 4000 [estimated by the Arnot-Gobas method (2003)])[4]. EPA estimated that the chemical substance has the potential to bioaccumulate and be persistent in the environment, such that repeated exposures may cause food-chain effects via accumulation in exposed organisms.

Human Health Hazard[5]: Human health hazard is relevant to whether a significant new use of a 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 chemical substance, and by comparing it to structurally analogous chemical substances for which there is information on human health hazard. Absorption of the chemical substance is expected to be nil to poor through the skin for the neat material and poor when in solution, moderate through the gastrointestinal (GI) tract, and poor through the lungs based on physical/chemical properties. Submitted tests of the chemical substance reported the test substance as not acutely toxic in an acute oral study in rats (LD_{50} > 5000 mg/kg, non-guideline), not acutely toxic in an acute dermal

[3] 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 if 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 if there are equivalent or analogous data. (64 FR 60194; November 4 1999)

[4] 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.

[5] 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)), structure-activity relationships, and/or structural alerts to support characterizing human health hazards.

study in rats (LD_{50} > 2500 mg/kg, non-guideline), non-irritating to skin and eyes in rabbits (non-guideline), not sensitizing to skin in guinea pigs (non-guideline), and not mutagenic in bacteria (non-guideline). EPA identified an oral NOAEL of 5 mg/kg-bw/day based on systemic effects from a substructure of the new chemical substance which is not likely to be formed via metabolism, but for which there is extensive existing data.The selected value was used to derive exposure route- and population-specific points of departure for quantitative risk assessment.

Environmental Hazard[6]: Environmental hazard is relevant to whether a significant new use of a 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 determined environmental hazard for this chemical substance based on acceptable data for an analogous chemical substance and Ecological Structure Activity Relationships (ECOSAR) Predictive Model (https://www.epa.gov/tsca-screening-tools/ecological-structure-activity-relationships-ecosar-predictive-model); specifically the QSAR polyphenols. This substance falls within the TSCA New Chemicals Category of Phenols[7]. Acute toxicity values estimated for fish, aquatic invertebrates, and algae are 0.13 mg/L, 2.1mg/L, and 1.3 mg/L, respectively. Chronic toxicity values estimated for fish, aquatic invertebrates, and algae are 0.013 mg/L, 0.69 mg/L, and 0.25 mg/L, respectively. These toxicity values indicate that the chemical substance is expected to have high environmental hazard. Application of assessment factors of 5 and 10 to acute and chronic toxicity values, respectively, results in acute and chronic concentrations of concern of 0.026 mg/L (26 ppb) and 0.001 mg/L (1 ppb), respectively.

Exposure: The exposure to a chemical substance is potentially relevant to whether a significant new use of a 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 chemical substance under the intended conditions of use described in the SNUN 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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[6] 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).

[7] 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.

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 risk assessment, worker exposures are not expected because the chemical substance is imported, no domestic processing is expected, and the intended use is for consumers only. No releases to air, water, or landfill were expected. Exposure to the general population was not assessed because there are no releases to surface water, landfill, or air. Exposures to consumers were assessed via dermal exposure and ingestion.

Risk Characterization: EPA applies a margin of exposure approach to calculate potential human health risks of significant new uses of 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 significant new use is not likely to present an unreasonable risk. EPA assesses risks to workers considering engineering controls described in the SNUN 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 chemical substance were evaluated using the route-specific effect level *(i.e.,* NOAEL) described above. Based on the hazard determination and available quantitative risk information, EPA did not identify risk for the chemical substance. Risks were not evaluated for workers because worker exposures are not expected. Risks were not evaluated for the general population because general population exposures are not expected.

Risks were not identified for consumers for systemic effects via dermal exposure based on quantitative hazard data for an analogue (MOE = 146; Benchmark MOE = 100). Risks were not identified for consumers for systemic effects via ingestion based on quantitative hazard data for an analogue (MOE = 9,688; Benchmark MOE = 100).

Risks to the environment were not identified due to no releases to water.

It is reasonably foreseen, based on patents on the chemical substance and a previous TSCA submission, that this chemical could be used other than as described in the SNUN and previously submitted PMNs. However, the existing SNUR for this chemical substance defines certain conditions of use as significant new uses. Conditions of use that fall under the restrictions of the SNUR are not likely to present unreasonable risk of injury to health or the environment because 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). EPA previously assessed the known use as an ingredient in a photoresist formulation and did not identify unreasonable risk to human health or the environment.

Because no worker or general population exposures are expected, no releases to the environment are expected, and no unreasonable risks to consumers were identified, EPA has determined that the significant new use is not likely to present unreasonable risk to human health or the environment under the conditions of use.

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/s/
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