TSCA Section 5(a)(3) Determination for Premanufacture Notice (PMN) P-18-0091

Number: P-18-0091
TSCA Section 5(a)(3) Determination: The chemical substance is not likely to present an unreasonable risk (5(a)(3)(C))

Chemical Name:
Generic: Vegetable oil, polymers with diethylene glycol- and polyol- and polyethylene glycol-depolymd poly(ethylene terephthalate) waste plastics and arylcarboxylic acid anhydride

Conditions of Use (intended, known, or reasonably foreseen)[1]:
Intended conditions of use (specific): Manufacture, process and use as a chemical intermediate (polyol) for use in the manufacture of polyurethane polymers, 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 none.
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 increased production volume as reasonably foreseen based on information in the initial PMN submission which was subsequently amended.

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. Although EPA estimated that the new chemical substance could be very persistent, the new chemical substance has low potential for bioaccumulation, such that repeated exposures are not expected to be cumulative. Based on test data on analogous chemical substances and EPA's

[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.

TSCA New Chemicals Program Chemical Category for Esters[2], EPA estimates that the chemical substance has low environmental hazard and potential for the following human health hazards: lung effects (surfactancy effects), irritation to eye, mucous membranes and lung, anesthetization of the eye that may cause considerable damage before anything is noticed, developmental, renal and bladder toxicity, kidney toxicity and renal cancer. EPA concludes that the new chemical substance 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 chemical may present an unreasonable risk. EPA estimated physical/chemical and fate properties of the new chemical substance using data for analogues and of the low molecular weight fraction using data for analogues and EPI (Estimation Program Interface) Suite™, a suite of physical/chemical property and environmental fate estimation programs (http://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program-interface). In wastewater treatment, the new chemical substance is expected to be removed with an efficiency of 90% via sorption and the low molecular weight fraction is expected to be removed with an efficiency of 90% via biodegradation. Removal of the new chemical substance by biodegradation is expected to be negligible, and removal of the low molecular weight fraction by biodegradation is expected to be high. Sorption of the new chemical substance to sludge is estimated to be strong and to soil and sediment is estimated to be very strong. Sorption of the low molecular weight fraction to sludge, soil, and sediment is estimated to be low. Migration of the new chemical substance to groundwater is expected to be negligible due to very strong sorption to soil and sediment, and migration of the low molecular weight fraction to groundwater is expected to be negligible due to rapid biodegradation. Due to low estimated vapor pressure and Henry's law constant, the new chemical substance and low molecular weight fraction are expected to undergo negligible volatilization to air. Overall, these estimates indicate that the new chemical substance and the low molecular weight fraction have low potential to volatilize to air and low potential to migrate to groundwater.

Persistence[3]: 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 for analogues and of the low molecular weight fraction using data for analogues and EPI Suite™. EPA estimated that the aerobic and anaerobic biodegradation half-lives of the new chemical substance are > 6 months and that the aerobic biodegradation half-life is < 2 months and the anaerobic

[2] 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.

[3] 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 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)

biodegradation half-life is 2 - 6 months for the low molecular weight fraction. These estimates indicate that the new chemical substance will be very persistent in aerobic environments (e.g., surface water) and anaerobic environments (e.g., sediment). Further, these estimates indicate that the low molecular weight fraction will have limited persistence in aerobic environments but will be persistent in anaerobic environments.

Bioaccumulation[4]: 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 for analogues and of the new chemical substance to bioaccumulate using data for analogues and EPI Suite™. EPA estimated that the new chemical substance has low bioaccumulation potential based on large predicted molecular volume, which limits bioavailability, and the low molecular weight fraction has low bioaccumulation potential based on BCFBAF model result < 1000 (bioconcentration factor = 3). Although EPA estimated that the new chemical substance could be very persistent and the low molecular weight fraction could be persistent, they have a low potential for bioaccumulation, such that repeated exposures are not expected to cause food-chain effects via accumulation in exposed organisms.

Human Health Hazard[5]: 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 and by comparing it to structurally analogous chemical substances for which there is information on human health hazard. Absorption of the low

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[4] 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 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)

[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.

molecular weight fraction of the new chemical substance is estimated to be moderate to nil via all routes based on physical/chemical properties. EPA identified lung effects, irritation to eye, mucous membranes and lung, and anesthetization of the eye that may cause considerable damage before anything is noticed as hazards based on surfactancy. EPA identified developmental, renal and bladder toxicity, and renal cancer as hazards based on the potential metabolism to form terephthalic acid. EPA identified kidney toxicity as a hazard based on the potential metabolism for form diethylene glycol. EPA quantitatively assessed the new chemical substance using test data on a metabolite, diethylene glycol and identified a NOAEL of 50 mg/kg/day, based on bladder toxicity at the next higher dose. This Point of Departure (POD) also offers protection from the terephthalic acid associated hazard. The diethylene glycol POD was used to derive exposure route- and population-specific points of departure.

Environmental Hazard[6]: Environmental hazard is 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 estimated environmental hazard of this new chemical substance 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 QSAR for esters (low MW 668 oligomer). This substance falls within the TSCA New Chemicals Category esters. Acute toxicity values estimated for fish, aquatic invertebrates, and algae are all > 100 mg/L. Chronic toxicity values estimated for fish, aquatic invertebrates, and algae are all > 10 mg/L. These toxicity values indicate that the new chemical substance is expected to have low 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 20 mg/L (20,000 ppb) and 1 mg/L (1,000 ppb), respectively.

Exposure and Risk Characterization: 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-

[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).

screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014) to estimate general population, consumer, and environmental exposures.

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 exposure to workers via the dermal route. Inhalation exposures to workers were estimated to be negligible. Releases to water and air were estimated. Exposure to the general population was assessed via drinking water. Exposure to the general population via fish ingestion was not assessed because the new chemical substance is not expected to be bioaccumulative. Exposure to the general population via inhalation was not assessed because releases to air were estimated to be negligible (below modeling thresholds). Exposures to consumers 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 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 levels (i.e., LOAEC and NOAEL) described above. Although the presence of a structural alert indicates that exposure to the new chemical substance could result in surfactant effects in the lung, potential risks were not identified for workers via inhalation because inhalation exposures are expected to be negligible. Risks were not identified for developmental, renal and renal cancer effects, or bladder toxicity via dermal exposure as the dermal absorption is nil and the metabolite terephthalic acid and diethyl glycol are expected to form in the liver. Irritation hazards to workers via dermal contact were identified based on surfactant properties. Risks for

these hazards were not quantified due to a lack of dose-response for these hazards. However, exposures can be mitigated by the use of appropriate personal protective equipment (PPE), including impervious gloves, and eye protection. EPA expects that employers will require and workers will use appropriate PPE (i.e., impervious gloves and eye protection) consistent with the Safety Data Sheet prepared by the new chemical submitter, in a manner adequate to protect them.

Risks were not identified for the general population for bladder toxicity via drinking water exposure based on quantitative hazard data for a component of the new chemical (MOE_{Adult} = 2397 and MOE_{Infant} = 571; benchmark MOE =100). Risks were not identified for the general population for irritation via drinking water since these concerns are expected to be mitigated by dilution in the media. Although a cancer slope factor was not available to quantitatively evaluate the risk for renal cancer, renal tumors were observed at doses approximately 8X higher than the POD for noncancer renal effects and MOA evidence suggests renal tumors arise via nongentoxic proliferative mechanisms. Thus, kidney tumors are unlikely to arise without noncancer kidney toxicity. Risks to consumers were not evaluated because consumer uses were not identified as conditions of use.

Risks to the environment were not identified based on low hazard.

Because it is reasonably foreseen that the production volume could increase based on information provided in the initial PMN submission, EPA conducted its assessment at that higher production volume. Because no unreasonable risks to workers, the general population, or environment were identified, and there are no expected consumer exposures, EPA has determined that the new chemical substance is not likely to present unreasonable risk to human health or the environment under the conditions of use.

5/31/2019
Date:

/s/
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