

## TSCA Section 5(a)(3) Determination for Premanufacture Notice (PMN) P-17-0115

**Number: P-17-0115**

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

**Chemical Name:**

Generic: Aminoalkyl alkoxysilane

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

Intended conditions of use (specific): Manufacture and process for use and use as an adhesion promoter for coating formulations supplied to roof coating contractors, 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 found none.

**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. 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, the silanol, 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. EPA also estimated that the hydrolysis product, [claimed CBI], could have limited

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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.

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persistence and 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 Alkoxysilanes<sup>2</sup>, test data on analogous chemical substances, and test data on the chemical substance's hydrolysis products, EPA estimates that the chemical substance has low environmental hazard and potential for the following human health hazards: Eye Irritation, Reproductive Toxicity, Specific Target Organ Toxicity. 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 (compounds with [claimed CBI] moieties); of the hydrolysis product, the silanol, using EPI (Estimation Program Interface) Suite™ (<http://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program-interface>); and of the hydrolysis product, [claimed CBI], using data for analogue(s) ([claimed CBI]) and EPI (Estimation Program Interface) Suite™ (<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 99% due to rapid hydrolysis; the hydrolysis product, the silanol, is expected to be removed with an efficiency of 0% due to low biodegradability, low sorption, and low stripping; and the hydrolysis product, [claimed CBI], is expected to be removed with an efficiency of 90% due to biodegradation. Removal of the hydrolysis product, the silanol, by biodegradation is negligible and removal of the hydrolysis product, [claimed CBI], by biodegradation is high and destruction (mineralization) of the hydrolysis product, [claimed CBI], by biodegradation is complete. Sorption of the hydrolysis products, the silanol and [claimed CBI], to sludge, soil, and sediment is expected to be low. Migration of the new chemical substance to groundwater is expected to be negligible due to rapid hydrolysis; migration of the hydrolysis product, the silanol, to groundwater is expected to be rapid due to low sorption to soil and sediment; and migration of the hydrolysis product, [claimed CBI], to groundwater is expected to be negligible due to low sorption to soil and sediment, mitigated by biodegradation. Due to low estimated vapor pressure and Henry's law constant, the new chemical substance and the hydrolysis products, the silanol and [claimed CBI], are expected to undergo negligible volatilization to air. Overall, these estimates indicate that the new chemical substance has low potential to volatilize to air or migrate to groundwater; that the hydrolysis products, the silanol, has low potential to volatilize to air and has high potential to migrate to groundwater; and that the hydrolysis product, [claimed CBI], has low potential to volatilize to air or migrate to groundwater.

**Persistence<sup>3</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

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<sup>2</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>.

<sup>3</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

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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 (compounds with [claimed CBI] moieties); of the hydrolysis product, the silanol, using EPI Suite™; and of the hydrolysis product, [claimed CBI], using data for analogue(s) ([claimed CBI]) and EPI Suite™. EPA estimated that the new chemical substance's hydrolysis half-life is minutes; that the hydrolysis product's, the silanol, aerobic biodegradation half-life is 2 to 6 months and anaerobic biodegradation half-life is 2 months to > 6 months; and that the hydrolysis product's, [claimed CBI], aerobic and anaerobic biodegradation half-lives are < 2 months. These estimates indicate that 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, the silanol, may be persistent in aerobic environments (e.g., surface water) and may be persistent or very persistent anaerobic environments (e.g., sediment). These estimates indicate that the hydrolysis product, [claimed CBI], may have limited persistence in aerobic environments (e.g., surface water) and anaerobic environments (e.g., sediment).

**Bioaccumulation<sup>4</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 for analogues (compounds with [claimed CBI] moieties); of the hydrolysis product, the silanol, to bioaccumulate using EPI Suite™; and of the hydrolysis product, [claimed CBI], to bioaccumulate using EPI Suite™. EPA estimated that the new chemical substance has low bioaccumulation potential based on rapid hydrolysis; that the hydrolysis product, the silanol, has low bioaccumulation potential based on BCFBAF model result < 1000 (hydrolysis product, the silanol, bioconcentration factor = 3 (estimated by linear regression from log Kow) and bioaccumulation factor = 1 (estimated by the Arnot-Gobas method (2003)<sup>5</sup>)); and that the hydrolysis product, [claimed CBI], has low bioaccumulation potential based on BCFBAF model result < 1000 (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, the

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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)

<sup>4</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 if there are equivalent or analogous data. (64 FR 60194; November 4 1999)

<sup>5</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.

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silanol, 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. EPA also estimated that the hydrolysis product, [claimed CBI], 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.

**Human Health Hazard<sup>6</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 and by comparing it to structurally analogous chemical substances for which there is information on human health hazard. The new chemical substance is composed of a [claimed CBI] mixture [claimed CBI]. Absorption of the HMW component of the new chemical substance (MW = [claimed CBI] g/mol) is expected to be moderate through the skin, good through the gastrointestinal (GI) tract, and poor through the lungs, based on physical/chemical properties. Absorption of the LMW component of the new chemical substance (MW = [claimed CBI] g/mol) is expected to be moderate to good through the skin, moderate through the GI tract, and good through the lungs, based on physical/chemical properties. For the new chemical substance, EPA identified hazards for eye irritation and developmental toxicity based on the analogue data. EPA also identified hazards for irritation to the eyes based on information provided in the safety data sheet (SDS), prepared by the submitter, and irritation to the eyes and respiratory tract and lung toxicity based on the reactivity of the alkoxysilane and amine moieties. Submitted test data on the new chemical substance reported low hazard in an acute oral toxicity study in rats ( $LD_{50} > 2,000$  mg/kg-bw; OECD 420), no skin irritation potential in vitro (OECD 439), and no dermal sensitization in vivo (OECD 429). EPA identified a NOAEL of 75 mg/kg-bw/day for lung effects and a NOAEL of 100 mg/kg-bw/day for maternal and developmental toxicity. These values were used to derive exposure route- and population-specific points of departure for quantitative risk assessment. EPA qualitatively evaluated irritation effects.

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<sup>6</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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**Environmental Hazard**<sup>7</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 using hazard data on an analogous chemical. This substance falls within the TSCA New Chemicals Category of Alkoxysilanes. Acute toxicity values measured for fish, aquatic invertebrates, and algae are >100 mg/L, >100 mg/L, and >100 mg/L, respectively. Chronic toxicity values measured for fish, aquatic invertebrates, and algae are >10 mg/L, >10 mg/L, and >10 mg/L, respectively. 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**: 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.

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 exposures via the inhalation and dermal routes. Releases to water, air, incineration, and landfill were estimated. Exposures to the general

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<sup>7</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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population were assessed via drinking water, fish ingestion, groundwater impacted by landfill leaching, and via stack air inhalation. Exposures to the general population via fugitive air inhalation were not assessed because releases to air were expected to be negligible (below modeling thresholds). 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 levels (i.e., NOAELs) described above. Risks were identified for workers for maternal and developmental toxicity via dermal exposure based on quantitative hazard data an analogue ( $MOE_{\text{dermal}} = 11$ ; Benchmark MOE = 100). Risks were not identified for workers for lung toxicity via inhalation exposure based on quantitative hazard data for an analogue ( $MOE = 25,641$ ; Benchmark MOE = 100). Irritation hazards to workers via inhalation were identified based on analogue data and reactivity of alkoxy silane and amine moieties of the new chemical substance. Risks for these endpoints were not quantified due to a lack of dose-response for these hazards. Risks will be mitigated if exposures are controlled by the use of appropriate PPE, including eye protection and respiratory protection. EPA expects that employers will require and workers will use appropriate PPE, consistent with the Safety Data Sheet prepared by the PMN submitter, in a manner adequate to protect them.

Risks were not identified for the general population for maternal and developmental toxicity via ingestion of drinking water, fish, or groundwater impacted by landfill leaching based on quantitative hazard data for an analogue ( $MOE_{\text{AdultDW}} = 3,249$ ;  $MOE_{\text{InfantDW}} = 774$ ;  $MOE_{\text{Fish Ingestion}} = 35,051$ ;  $MOE_{\text{Landfill}} = 188,324$ ; Benchmark MOE = 100). Risks were not evaluated for the general population via inhalation stack air releases because exposures are expected to be negligible (releases were below modeling thresholds) or via fugitive air because no releases are expected. Irritation hazards to the general population are not expected via drinking water or groundwater impacted by landfill leaching due to dilution of the chemical substance in the media. 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 not identified based on low hazard.

Because worker exposures can be controlled by PPE, no unreasonable risks to 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.

8/26/2020  
Date:

/s/  
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Chemical Control Division  
Office of Pollution Prevention and Toxics  
U.S. Environmental Protection Agency