SCREENING-LEVEL HAZARD CHARACTERIZATION

TEST RULE CHEMICAL NAME
Dodecane, 1-chloro-
CASRN 112-52-7

The High Production Volume (HPV) Challenge Program[1] was conceived as a voluntary initiative aimed at developing and making publicly available screening-level health and environmental effects information on chemicals manufactured in or imported into the United States in quantities greater than one million pounds per year. In the Challenge Program, producers and importers of HPV chemicals voluntarily sponsored chemicals; sponsorship entailed the identification and initial assessment of the adequacy of existing toxicity data/information, conducting new testing if adequate data did not exist, and making both new and existing data and information available to the public. Each complete data submission contains data on 18 internationally agreed to "SIDS" (Screening Information Data Set[1,2]) endpoints that are screening-level indicators of potential hazards (toxicity) for humans or the environment.

In the HPV Challenge Program, companies have sponsored more than 2200 HPV chemicals, with approximately 1400 chemicals sponsored directly through the HPV Challenge Program and over 860 chemicals sponsored indirectly through international efforts. Other chemicals, however, remain unsponsored in the voluntary program.[3] Basic hazard data for unsponsored chemicals are being obtained through regulatory efforts such as TSCA Section 4 Test Rules and TSCA Section 8(a)/8(d) Rules. EPA is also initiating actions, such as significant new use rules (SNUR), to manage risks from HPV unsponsored chemicals.

The Environmental Protection Agency's Office of Pollution Prevention and Toxics (OPPT) is evaluating the data available for HPV chemicals by developing hazard characterizations (HCs). These HCs consist of an evaluation of the quality and completeness of the data set available. They are not intended to be definitive statements regarding the possibility of unreasonable risk of injury to health or the environment.

The evaluation is performed according to established EPA guidance[2,4] and is based on hazard data provided by submitters in response to EPA's regulatory actions, as well as other available data; however, in preparing the hazard characterization, EPA considered its own comments and public comments on available data as well as the submitter's responses to comments.

OPPT does not develop HCs for those HPV chemicals which have already been assessed internationally through the HPV program of the Organization for Economic Cooperation and Development (OECD) and for which Screening Initial Data Set (SIDS) Initial Assessment Reports (SIAR) and SIDS Initial Assessment Profiles (SIAP) are available. These documents are

[1] U.S. EPA. High Production Volume (HPV) Challenge Program; http://www.epa.gov/chemrtk/index.htm.
[2] U.S. EPA. HPV Challenge Program – Information Sources; http://www.epa.gov/chemrtk/pubs/general/guidocs.htm.
[3] U.S. EPA. Regulatory Actions for Unsponsored Chemicals: http://www.epa.gov/hpv/pubs/general/regactions.htm.
[4] U.S. EPA. Risk Assessment Guidelines; http://cfpub.epa.gov/ncea/raf/rafguid.cfm.

presented in an international forum that involves review and endorsement by governmental authorities around the world. OPPT is an active participant in these meetings and accepts these documents as reliable screening-level hazard assessments.

These hazard characterizations are technical documents intended to inform subsequent decisions and actions by OPPT. Accordingly, the documents are not written with the goal of informing the general public. However, they do provide a vehicle for public access to a concise assessment of the raw technical data on HPV chemicals and provide information previously not readily available to the public.

Chemical Abstract Service Registry Number (CASRN)	**112-52-7**
Chemical Abstract Index Name	**Dodecane, 1-chloro-**
Structural Formula	See Appendix

Summary

Dodecane, 1-chloro- is a clear, colorless liquid with moderate vapor pressure and low water solubility. It is expected to have low mobility in soil. It was readily biodegradable using a standard OECD test method; therefore, it is not expected to be persistent in the environment. Volatilization is expected to be high given the estimated Henry's Law constant of this substance. Hydrolysis is expected to be negligible. The rate of atmospheric photooxidation is moderate. Dodecane, 1-chloro- is expected to have low persistence (P1) and high bioaccumulation potential (B3).

Human Health Hazard

The acute oral toxicity of CASRN 112-52-7 is low in rats. In a combined repeated-dose/reproductive/developmental toxicity screening test in rats, administration of CASRN 112-52-7 via gavage resulted in liver effects in males at 100 mg/kg-bw/day and adrenal and thymus effects in females at 300 mg/kg-bw/day. The NOAEL for systemic toxicity is not established in males and 100 mg/kg-bw/day in females. In the same study, developmental effects including reductions in pup survival, pup body weight and pup body weight gain were observed at 1000 mg/kg-bw/day. The NOAEL for developmental toxicity is 300 mg/kg-bw/day. No reproductive effects were observed in this study. The NOAEL for reproductive toxicity is 1000 mg/kg-bw/day (highest dose tested). CASRN 112-52-7 was not mutagenic in bacteria *in vitro* but induced chromosomal aberrations in mammalian cells *in vitro*.

Hazard to the Environment

The 96-hour EC_{50} values of CASRN 112-52-7 for aquatic plants were 0.036 mg a.i./L for biomass and > 0.034 mg a.i./L for growth and cell density. The 21-day MATC value of CASRN 112-52-7 for growth of aquatic invertebrates was 0.011 mg a.i./L. The 21-day EC_{50} value of CASRN 112-52-7 for aquatic invertebrates was > 0.017 mg a.i./L for mortality/immobility and reproduction.

No data gaps were identified under the HPV Program.

Introduction

Dodecane, 1-chloro- (CASRN 112-52-7) was identified as a candidate chemical under the EPA Challenge program for high production volume chemicals. As it was not sponsored in the voluntary phase of the HPV Challenge Program, it was deemed as subject to testing requirements under a TSCA Section 4 Test Rule (Testing of Certain High Production Volume Chemicals, Final Rule, 71 FR 13708, March 16, 2006; Document ID EPA-HQ-OPPT-2005-0033-0197; available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0197). The test rule required the following toxicological tests for CASRN 112-52-7: C3 (consisting of chronic toxicity to *Daphnia* and toxicity to algae testing because log $K_{ow} \geq 4.2$), D (acute mammalian toxicity test), E1 (bacterial reverse mutation test), E2 (chromosomal aberration or micronucleus test) and F1 (combined repeated dose toxicity study with the reproduction/developmental toxicity screening test).

In response to the test rule, Lonza Inc. submitted the following studies to satisfy the toxicological testing requirements:

Durando, J. (2008) Acute oral toxicity with 1-chlorododecane: Up and down procedure in rats. Eurofins/Product Safety Laboratories. Study No. 22019. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012.

Gallagher, SP; Kendall, TZ; Krueger, HO. (2008a) 1-Chlorododecane: A 96-hour toxicity test with the freshwater alga (*Pseudokirchneriella subcapitata*). Wildlife International Ltd. Study No. 289A-165. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012.

Gallagher, SP; Kendall, TZ; Krueger, HO. (2008b) A flow-through life-cycle toxicity study of 1-chlorododecane with the cladoceran (*Daphnia magna*). Wildlife International Ltd. Study No. 289A-166. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012.

Gudi, R; Rao, M. (2008) *In vitro* mammalian chromosome aberration test (test article: 1-chlorodecane). BioReliance. Study No. AC01UM.331.BTL. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012.

Sloter, ED. (2008) A combined 28-day repeated dose oral toxicity study with the reproductive/developmental toxicity screening test of 1-chlorododecane in rats. WIL Research Laboratories, LLC. Study No. WIL-636003. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012.

Wagner, OV; VanDyke, MR. (2008) Bacterial reverse mutation assay of 1-chlorododecane. BioReliance. Study No. AC01UM.503.BTL. Available at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012.

The submitted data are summarized in this hazard characterization.

1. Chemical Identity

1.1 Identification and Purity

Toxicological studies submitted by Lonza Inc. tested a substance with 97.42% purity. The structure of the compound is provided in the Appendix.

1.2 Physical-Chemical Properties

The physical-chemical properties of dodecane, 1-chloro- are summarized in Table 1. Dodecane, 1-chloro- is a clear, colorless liquid used as a solvent and as a chemical intermediate to make photographic chemicals, pharmaceuticals, organometallic compounds and surfactants. It has moderate vapor pressure and low water solubility.

Table 1. Physical-Chemical Properties of Dodecane, 1-chloro-[1]	
Property	**Value**
CASRN	112-52-7
Molecular Weight	204.78
Physical State	Clear, colorless liquid[2]
Melting Point	-9.3 °C (measured)[2]
Boiling Point	257 °C (measured)
Vapor Pressure	0.45 mm Hg at 25 °C (measured)
Dissociation Constant (pK_a)	Not applicable
Henry's Law Constant	0.287 atm-m^3/mol (estimated)[3]
Water Solubility	2.75×10^{-3} mg/L at 25°C (measured); 7 mg/L at 20°C (measured)[2]; 0.14 mg/L at 25°C (estimated)[3]
Log K_{ow}	>6.91 (measured)

[1]Lonza Incorporated. (2008) Robust summaries for 1-chlorododecane. EPA-HQ-OPPT-2005-0033-0314. Available online at http://www.regulations.gov/contentStreamer?objectId=0900006480c82aa6&disposition=attachment&contentType=pdf as of August 6, 2012.
[2]Sigma-Aldrich. (2012) Material Safety Data Sheet for 1-chlorododecane. Available online at http://www.sigmaaldrich.com as of August 6, 2012.
[3]U.S. EPA. (2012) Estimation Programs Interface Suite™ for Microsoft® Windows, v4.10. Washington, DC: U.S. Environmental Protection Agency. Available online at http://www.epa.gov/opptintr/exposure/pubs/episuitedl.htm as of July 16, 2012.

2. General Information on Exposure

2.1 Production Volume and Use Pattern

CASRN 112-52-7 was not reported in the 2006 IUR.

2.2 Environmental Exposure and Fate

The environmental fate properties of dodecane, 1-chloro- are summarized in Table 2. Dodecane, 1-chloro- is expected to have low mobility in soil. It was completely eliminated within 24 hours as measured by dissolved organic carbon (DOC) removal using an activated sludge system and ISO Method 9888 (equivalent to the Zahn-Wellens OECD 302B test) and was considered inherently biodegradable. However, the results of this study were consistent with loss by volatilization and no volatilization control was employed in the study making the results questionable. Dodecane, 1-chloro- achieved 95% of its theoretical biochemical oxygen demand (BOD) after 28 days using an activated sludge inoculum and the modified MITI (OECD 301C) test designed for volatile substances. Since it passed a ready biodegradation test it can be concluded that dodecane, 1-chloro- is not persistent in the environment. Volatilization is expected to be high given the estimated Henry's Law constant. Hydrolysis is expected to be negligible. The rate of atmospheric photooxidation is moderate. Dodecane, 1-chloro- is expected to have low persistence (P1) and high bioaccumulation potential (B3).

Table 2. Environmental Fate Characteristics of Dodecane, 1-chloro-[1]	
Property	**Value**
CASRN	112-52-7
Photodegradation Half-life	9.5 hours (estimated)[2]
Hydrolysis Half-life	Stable
Biodegradation	100% after 1 day (inherently biodegradable); 95% after 28 days (readily biodegradable)[3,4]
Bioaccumulation Factor	BAF = 3.1×10^4 (estimated)[2]
Log K_{oc}	4.0 (estimated)[2]
Fugacity (Level III Model)[2]	
Air (%)	8.9
Water (%)	40.7
Soil (%)	42.7
Sediment (%)	7.6
Persistence[5]	P1 (low)
Bioaccumulation[5]	B3 (high)

[1]Lonza Incorporated. (2008) Robust summaries for 1-chlorododecane. EPA-HQ-OPPT-2005-0033-0314. Available online at http://www.regulations.gov/contentStreamer?objectId=0900006480c82aa6&disposition=attachment&contentType=pdf as of August 6, 2012.

[2]U.S. EPA. (2012) Estimation Programs Interface Suite™ for Microsoft® Windows, v4.10. Washington, DC: U.S. Environmental Protection Agency. Available online at http://www.epa.gov/opptintr/exposure/pubs/episuitedl.htm as of July 16, 2012.

[3]National Institute of Technology and Evaluation. (2008) Chemical Risk Information Platform (CHRIP). Searchable by CASRN online at http://www.safe.nite.go.jp/english/db.html as of August 6, 2012.

[4]Sedyk, HA; Klopman, G. (2007) Data analysis and alternative modeling of MITI-I aerobic biodegradation. SAR QSAR Environ Res 18(7-8):693-709.

[5]Federal Register. (1999) Category for persistent, bioaccumulative, and toxic new chemical substances. U.S. Environmental Protection Agency. *Federal Register* 64(213):60194-60204.

Conclusion: Dodecane, 1-chloro- is a clear, colorless liquid with moderate vapor pressure and low water solubility. It is expected to have low mobility in soil. It was readily biodegradable using a standard OECD test method; therefore, it is not expected to be persistent in the environment. Volatilization is expected to be high given the estimated Henry's Law constant of this substance. Hydrolysis is expected to be negligible. The rate of atmospheric photooxidation is moderate. Dodecane, 1-chloro- is expected to have low persistence (P1) and high bioaccumulation potential (B3).

3. Human Health Hazard

A summary of health effects data for SIDS endpoints is provided in Table 3.

Acute Oral Toxicity

Sprague-Dawley rats (8 female/dose) were administered CASRN 112-52-7 (97.42% purity) via gavage at 2000 mg/kg-bw and observed for 14 days following dosing. No deaths occurred. Study available online at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Durando, 2008).
LD_{50} > 2000 mg/kg-bw

Repeated-Dose Toxicity

In a combined repeated-dose/reproductive/developmental toxicity screen, Crl:CD(SD) rats (10/sex/dose) were administered CASRN 112-52-7 (97.42% purity) in corn oil via gavage at 0, 100, 300 or 1000 mg/kg-bw/day for 32 – 52 days. Males were dosed for 14 days prior to mating and throughout the mating period and post-mating for a total of 32 days. Females were dosed for 14 days prior mating, throughout the mating period (up to 14 days), during gestation, and through days 1 – 3 of lactation for a total of 39 – 51 days; females with no evidence of mating or failure to deliver were dosed through post-mating or post-cohabitation day 25 for a total of 39 or 52 days. Endpoints examined in F_0 animals included mortality, clinical signs, body weights, food consumption, organ weights, functional observational batter (FOB), locomotor activity, clinical chemistry, hematology, gross pathology and histopathology. Morbidity was observed in 1 female in the 1000 mg/kg-bw/day group, which was euthanized *in extremis* on gestation day 21; no evidence of parturition noted in this female. In the 1000 mg/kg-bw/day group, lower mean body weight gains and food consumption were noted during the first week of the study in both males and females. No treatment-related effects were seen on hematology, FOB parameters or motor activity. Increased mean liver weights (absolute and/or relative to body and/or brain weight) occurred in males and females at doses of 300 and 1000 mg/kg-bw/day accompanied by minimal to mild centrilobular and panlobular hepatocellular hypertrophy (combined incidence of 0/10, 0/10, 1/10 and 5/10 in females and 0/10, 0/10, 4/10 and 6/10 in males at 0, 100, 300 and 1000 mg/kg-bw/day, respectively). An elevation in serum alanine aminotransferase level was observed in 1000 mg/kg-bw/day males. Microvesicular vacuolation of the periportal area of the liver was observed in 0/10, 5/10, 5/10 and 4/10 males at 0, 100, 300 and 1000 mg/kg-bw/day, respectively. Increased mean adrenal gland weights (absolute and relative to brain weight) were observed in females of the 1000 mg/kg-bw/day group, corresponding with an increased severity of adrenocortical cytoplasmic vacuolation at this dose. A dose-related increase was observed in the incidence of adrenocortical cytoplasmic vacuolation in females (2/10, 4/10, 6/10 and 8/10 at 0, 100, 300 and 1000 mg/kg-bw/day, respectively). Mean thymus gland weights were reduced in females in the 300 and 1000 mg/kg-bw/day group (by 29 and 52%, respectively); although no histological alterations were noted in the thymus, the reduction in thymus weight was considered to be test substance-related due to the magnitude of the effect and dose-responsive nature of the

decrease. Study available online at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Sloter, 2008).
LOAEL (males) = 100 mg/kg-bw/day (based on increased incidence of microvesicular vacuolation of the periportal area of the liver)
NOAEL (males) = Not established
LOAEL (females) = 300 mg/kg-bw/day (based on increased incidence of adrenocortical cytoplasmic vacuolation and reduced mean thymus gland weights)
NOAEL (females) = 100 mg/kg-bw/day

Reproductive/Developmental Toxicity

In the combined repeated-dose/reproductive/developmental toxicity screen in rats described previously, F_0 females were allowed to deliver and rear their pups until lactation day 4. Reproductive and developmental endpoints examined included: mating, fertility, conception and copulation indices; reproductive organ weights and histopathology; numbers of corpora lutea and implantation sites; numbers of live and stillborn pups; pup body weights on postnatal days (PNDs) 1 and 4; pup survival to PND 4; pup sex ratio; and pup clinical signs. All pups were subjected to necropsy on PND 4. One female in the 1000 mg/kg-bw/day group had total litter loss. No signs of toxicity to reproductive organs of either sex were seen at any dose. Postnatal survival was decreased in the 1000 mg/kg-bw/day group; reduced pup body weights on PNDs 1 and 4 and decreased pup body weight gains were also observed at this dose. No other treatment-related effects on reproductive and developmental endpoints were observed. Study available online at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Sloter, 2008).
NOAEL (reproductive toxicity) = 1000 mg/kg-bw/day (highest dose tested)
LOAEL (developmental toxicity) = 1000 mg/kg-bw/day (based on lower postnatal survival, reduced pup body weights on PNDs 1 and 4, and reduced pup body weight gain)
NOAEL (developmental toxicity) = 300 mg/kg-bw/day

Genetic Toxicity – Gene Mutation

In vitro
In a reverse mutation assay, *Salmonella typhimurium* strains TA98, TA100, TA1535 and TA1537 and *Escherichia coli* strain WP2 *uvr*A were exposed to CASRN 112-52-7 (97.4% purity) at 50, 150, 500, 1500 or 5000 µg/plate with and without metabolic activation. Positive and negative controls were tested concurrently and responded appropriately. No increases in the number of revertants were observed at any concentration in any strain with or without metabolic activation. No cytotoxicity was observed. Precipitation was noted at concentrations ≥ 1500 µg/plate for all tester strains in the presence and absence of metabolic activation and at 500 µg/plate for TA98 in the presence of metabolic activation. Study available online at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Wagner and VanDyke, 2008).
CASRN 112-52-7 was not mutagenic in this assay.

Genetic Toxicity – Chromosomal Aberrations

In vitro

Chinese hamster ovary (CHO) cells were exposed to CASRN 112-52-7 (97.42% purity) at concentrations of 6.25, 12.5, 25, 35, 50, 75 or 100 µg/mL with metabolic activation for 4 hours and 1.56, 3.13, 6.25, 12.5, 25, 35 or 50 µg/mL without metabolic activation for 4 or 20 hours. Positive and negative controls were tested concurrently and responded appropriately. The frequency of cells with structural aberrations was increased in the presence of metabolic activation, but there was no increase in aberration frequency in cells without metabolic activation. Cytotoxicity was observed at concentrations ≥ 61.2 µg/mL without activation and ≥ 35 µg/mL with activation. Study available online at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Gudi and Rao, 2008).

CASRN 112-52-7 induced chromosomal aberrations in this assay.

Conclusion: The acute oral toxicity of CASRN 112-52-7 is low in rats. In a combined repeated-dose/reproductive/developmental toxicity screening test in rats, administration of CASRN 112-52-7 via gavage resulted in liver effects in males at 100 mg/kg-bw/day and adrenal and thymus effects in females at 300 mg/kg-bw/day. The NOAEL for systemic toxicity is not established in males and 100 mg/kg-bw/day in females. In the same study, developmental effects including reductions in pup survival, pup body weight and pup body weight gain were observed at 1000 mg/kg-bw/day. The NOAEL for developmental toxicity is 300 mg/kg-bw/day. No reproductive effects were observed in this study. The NOAEL for reproductive toxicity is 1000 mg/kg-bw/day (highest dose tested). CASRN 112-52-7 was not mutagenic in bacteria *in vitro* but induced chromosomal aberrations in mammalian cells *in vitro*.

Table 3. Summary of the Screening Information Data Set - Human Health Data	
Endpoints	**Dodecane, 1-chloro- (CASRN 112-52-7)**
Acute Toxicity Oral LD_{50} (mg/kg-bw)	**> 2000 (rat)**
Repeated-Dose/Reproductive/Developmental Toxicity NOAEL/LOAEL Oral (mg/kg-bw/day)	
Systemic toxicity	**NOAEL (m/f) = Not established/100 LOAEL (m/f) = 100/300**
Reproductive toxicity	**NOAEL = 1000 (hdt)**
Developmental toxicity	**NOAEL = 300 LOAEL = 1000 (rat)**
Genetic Toxicity - Gene Mutation *In vitro*	**Negative**
Genetic Toxicity – Chromosomal Aberrations *In vitro*	**Positive**

Measured data in bold text; hdt = highest dose tested.

4. Hazard to the Environment

A summary of aquatic toxicity data for SIDs endpoints is provided in Table 4.

Acute Toxicity to Fish and Aquatic Invertebrates

Acute toxicity to fish and aquatic invertebrate tests are not required under the HPV program because the log K_{ow} of CASRN 112-52-7 is ≥ 4.2.

Toxicity to Aquatic Plants

Green algae (*Pseudokirchneriella subcapitata*) were exposed to CASRN 112-52-7 (97.42% purity) in dimethyl formamide at nominal concentrations of 0 (dilution water control), 0 (solvent control), 0.016, 0.031, 0.063, 0.13, 0.25 and 0.50 mg a.i./L for 96 hours. Corresponding geometric mean measured concentrations were 0, 0, 0.0055, 0.0076, 0.012, 0.018, 0.024 and 0.034 mg a.i./L, respectively. Exposures occurred at a pH of 7.6 – 8.3 and a temperature of 23.2 – 23.9ºC. At 72 hours, statistically significant ($p < 0.05$) reductions in biomass, growth rate, and

cell density were observed at ≥ 0.012 mg a.i./L. At 96 hours, significant ($p < 0.05$) reductions in biomass and cell density were observed at ≥ 0.012 mg a.i./L and significant ($p < 0.05$) reductions in growth rate were observed at ≥ 0.018 mg a.i./L. Study available online http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Gallagher et al., 2008a).
72-h EC_{50} (biomass) = 0.027 mg a.i./L
72-h EC_{50} (growth) > 0.034 mg a.i./L
72-h EC_{50} (cell density) = 0.029 mg a.i./L
96-h EC_{50} (biomass) = 0.036 mg a.i./L
96-h EC_{50} (growth) > 0.034 mg a.i./L
96-h EC_{50} (cell density) > 0.034 mg a.i./L

Chronic Toxicity to Aquatic Invertebrates

Water fleas (*Daphnia magna*) were exposed to CASRN 112-52-7 (97.42% purity) in dimethyl formamide at nominal concentrations of 0 (dilution water control), 0 (solvent control), 0.0063, 0.013, 0.025, 0.050 and 0.100 mg a.i./L under flow-through conditions for 21 days. Corresponding mean measured concentrations were 0, 0, 0.0015, 0.0027, 0.0057, 0.0072 and 0.017 mg a.i./L, respectively. Exposures occurred at a pH of 8.1 – 8.3, a temperature of 20.0 – 20.3°C, and a dissolved oxygen concentration of ≥ 6.1 mg/L. Mean length and dry weight of daphnids were reduced at 0.017 mg a.i./L by 5% and 9%, respectively. No effects on survival (measured as mobility) or reproduction were observed at any concentration tested. Study available online at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2005-0033-0314 as of December 11, 2012 (Gallagher et al., 2008b).
21-day LOEC (growth) = 0.017 mg a.i./L
21-day NOEC (growth) = 0.0072 mg a.i./L
MATC (growth) = 0.011 mg a.i./L
21-day EC_{50} (mortality/immobility and reproduction) > 0.017 mg a.i./L

Conclusion: The 96-hour EC_{50} values of CASRN 112-52-7 for aquatic plants were 0.036 mg a.i./L for biomass and > 0.034 mg a.i./L for growth and cell density. The 21-day MATC value of CASRN 112-52-7 for growth of aquatic invertebrates was 0.011 mg a.i./L. The 21-day EC_{50} value of CASRN 112-52-7 for aquatic invertebrates was > 0.017 mg a.i./L for mortality/immobility and reproduction.

Table 4. Summary of the Screening Information Data Set – Aquatic Toxicity Data

Endpoints	Dodecane, 1-chloro- (112-52-7)
Aquatic Plants	
96-h EC_{50} (mg/L)	
(cell density)	**> 0.034**
(growth rate)	**> 0.034**
(biomass)	**0.036**

Table 4. Summary of the Screening Information Data Set – Aquatic Toxicity Data	
Endpoints	**Dodecane, 1-chloro- (112-52-7)**
Chronic Toxicity to Aquatic Invertebrates	
21-d MATC (mg/L)	**0.011**
21-d EC_{50} (mg/L)	**> 0.017**

Measured data in bold text; MATC (maximum acceptable toxicant concentration) is the geometric mean of the NOEC and LOEC.

5. References

Durando, J. (2008) Acute oral toxicity with 1-chlorododecane: Up and down procedure in rats. Eurofins/Product Safety Laboratories for Lonza Inc. Study No. 22019 (unpublished report).

Gallagher, SP; Kendall, TZ; Krueger, HO. (2008a) 1-Chlorododecane: A 96-hour toxicity test with the freshwater alga (*Pseudokirchneriella subcapitata*). Wildlife International Ltd. for Lonza Inc. Study No. 289A-165 (unpublished report).

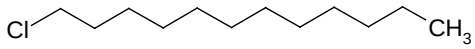
Gallagher, SP; Kendall, TZ; Krueger, HO. (2008b) A flow-through life-cycle toxicity study of 1-chlorododecane with the cladoceran (*Daphnia magna*). Wildlife International Ltd. for Lonza Inc. Study No. 289A-166 (unpublished report).

Gudi, R; Rao, M. (2008) *In vitro* mammalian chromosome aberration test (test article: 1-chlorodecane). BioReliance for Lonza Inc. Study No. AC01UM.331.BTL (unpublished report).

Sloter, ED. (2008) A combined 28-day repeated dose oral toxicity study with the reproductive/developmental toxicity screening test of 1-chlorododecane in rats. WIL Research Laboratories, LLC for Lonza, Inc. Study No. WIL-636003 (unpublished report).

Wagner, OV; VanDyke, MR. (2008) Bacterial reverse mutation assay of 1-chlorododecane. BioReliance for Lonza, Inc. Study No. AC01UM.503.BTL (unpublished report).

APPENDIX

HPV Chemical		
Chemical Name	**CASRN**	**Structure**
Dodecane, 1-chloro-	112-52-7	 SMILES: ClCCCCCCCCCCCC