Update Dec 2016; changed annual use frequency reporting format

CONCAWE_SCED_13_4_a_v2: Fuels, liquids, garden equipment refuelling

Products/activities covered by the SCED:
Filling lawn mower outdoors with a full tank of fuel once per week during spring and summer (6 months)
Applicability of the SCED (depending on substance's properties):
SCED data refers to gasoline

Exposure Descriptor or Determinant	Value
SCED characteristics	
Name of the SCEDs	Lubricants, liquids, garden equipment refuelling
PC/AC descriptor	PC13
SCED code	CONCAWE_SCED_13_4_a_v2
Code of other related SCED	
Author	CONCAWE
Source of SCED	http://www.concawe.org
Physical form of the product	Liquids
User characteristics	
Adult/child assumed	Covers adult use
Common parameters	
Concentration of substance in mixture (g/g)	1
Explanations	>99% of formulated product is the substance
Frequency of use over a day (event/day)	1
Rationale	Unchanged from ECETOC TRA default value
Frequency of use over a year (times/year)	26
Rationale	Once/two weeks: refuelling of garden machinery activity occurs mostly during spring and summer; reported frequency for (vehicle) refuelling activity throughout the year was once/week, that corresponds to once/two weeks per year for garden equipment.
Dermal Specific Parameters	
Exposure via dermal route	Yes
Rationale	
Skin Contact Area	Inside of one hand/palm
Rationale	Only one hand holds the fuel nozzle when re-fuelling. Total area exposed less than for one hand.
Dermal transfer factor	0.001
Rationale	Estimated value for gasoline. This value is greater (more conservative) than the <0.001% of material handled that has been measured as being transferred onto the skin when refuelling cars.
Inhalation Specific Parameters	
Exposure via inhalation route	Yes
Rationale	
Spray application?	No
Amount of Product used per application (g/event)	750

Exposure Descriptor or Determinant	Value
Rationale	Based on tank size of 1 L and substance density of 750 g/L
Exposure Time per event (hr)	0.033
Rationale	Estimated 2 min: time taken to refuel a smaller size tank should be significantly less than for the auto-refuelling exposure time of 3 min.
Inhalation transfer factor	0.03
Rationale	Estimated loss of <0.03 product used via spillage or evaporation.
Place of use	Outdoor
Oral Specific Parameters	
Exposure via oral route	Oral exposure assumed to be negligible
Rationale	Direct oral contact will only arise from intentional ingestion. Indirect exposure may occur from incidental contact with contaminated surfaces but is not considered a significant exposure source due to volatility of substance.
Volume swallowed (cm3)	N/a
Rationale	
Oral transfer Factor	N/a
Rationale	

CONCAWE_SCED_13_4_a_v2: Supporting Explanation

Customers can be exposed to gasoline through inhalation from vapour evaporation/ displacement or dermal contact from spillage when they are refuelling their garden equipment (e.g. lawnmower). Specific changes to the TRA defaults to better represent the scenario in reality while maintaining a conservative exposure prediction include the increase of the product ingredient from ECETOC TRA defaults and assumptions of bi-weekly refuelling a full tank in a location designed to be conservative for an indoor scenario. Changes to the assumptions concerning dermal exposure reflect data from comparable vehicle scenarios.

Exposure Descriptor or Determinant	Value	Rationale
Product Characteristics		
Volatility	69 KPa	At ambient (source product SDS)
Product Ingredient Fraction (by weight)	1	Increased above ECETOC TRA default (0.5) for lubricants, greases, and release products – liquids [1]
Frequency of Use (events/day), value <1 indicates infrequent (less than daily) use *	0.07	Once/two weeks, based on a recent survey data [2]. In the survey, refuelling activity of garden machinery occurred mostly during spring and summer and the reported frequency for (vehicle) refuelling activity throughout the year was once/ week, that corresponds to once/ two weeks per year for garden equipment. The survey results suggest a lower value than the TRA default of 1 [1].
Dermal Specific Parameters		
Skin Contact Area (cm^2)	210	Estimated quarter of each hand based on UV visualisation data [8], a decrease from the TRA default: 857.5 cm^2 [1].
Dermal Transfer Factor**	0.001	Estimated value for gasoline. This value is greater (more conservative) than the <0.001% of material handled that has been measured as being transferred onto the skin when refuelling cars with diesel [8] and the 75th percentile of 0.00005 for hand contamination during pouring from a pesticide container [3].The skin transfer factor should not be confused with the nature of any subsequent dermal absorption of the substance [9], which can be expected to be very low [10].
Inhalation Specific Parameters		
Amount of Product used per application (g)	750	Based on 1 L and density of 750 g/L (tank size of lawnmower is about 0.9 L [4]). Due to the smaller size of lawn and garden equipment fuel tanks, the amount is lower than the generic fuel TRA default of 5000 g [1].
Exposure Time (hr)	0.05	Estimated 2 min as it should take less time to refuel a smaller size tank than auto-refuelling. In the auto-refuelling, the exposure time (3 min) was set to be greater than the 97th percentile value for refuelling time [5], which is generally consistent with reported refuelling time ranging from 0.3-3.5 min, with an average of 1 min [6] and self-recall survey estimates

		based upon 2 min ranges indicating refuelling time 7 min (90th percentiles) and 4 min (average) [2]. Typical refuelling practices suggest values lower than the TRA default of 4 hr [1].
Is product used outdoors only?	No	Garage
Room Volume (m^3)	34	Garage volume [7]. This activity is likely to take place outdoors or, if indoors, in a garage. Sufficient space for equipment and fuel container handling are also needed. The volume is increased as compared to the TRA default of 20 m^3 [1].
Ventilation specified or likely due to properties (e.g. odour, etc.)- if so what type – (open window, fan)	1.5	A default ventilation rate for a garage based on RIVM general factsheet [7].
Inhalation transfer factor (fraction of total amount handled lost to air)	0.03	Assumed to be less controlled than scooter refuelling (which is estimated as 0.02 for refuelling spillage and 0.002 for vapour displacement emission [6])

* A frequency of <1 is used for chronic exposure assessments. Exposure for the day of use would still be based upon a value of 1 or greater (if the default suggests multiple uses occur in a single day).

****** Dermal transfer factor (DTF) represents the % of total amount handled that is transferred to the skin. If this factor is being applied in a tool with an algorithm that uses skin surface area and the thickness of the layer to calculate dermal loading, such as ECETOC TRA v3, the DTF would need to be adjusted so that the final dermal loading remains the same as when the DTF is applied to the total amount.

References:

1. ECETOC (2014) ECETOC Targeted Risk Assessment (TRA) Tool, version3.1. Brussels: European Centre for Ecotoxicology and Toxicology of Chemicals (available at: http://www.ecetoc.org/tra)

2. CONCAWE (2014) Use of motor fuels and lubricants: habits and practices of consumers in Europe. Report No. 4/14. Brussels: CONCAWE

3. HSE (2008) Pesticide containers: guidance on operator exposure considerations. London: Health and Safety Executive (http://www.pesticides.gov.uk/Resources/CRD/Migrated-Resources/Documents/P/packaging-guidance.pdf)

4. Lawnmower tank size (UK): http://www.amazon.co.uk/McCulloch-M46-500CD-4-Wheel-Self-Propelled-Lawnmower/dp/B0052X7CQA/ref=sr_1_fkmr1_2?ie=UTF8&qid=1346209129&sr=8-2-fkmr1

5. Vainiotalo, S. et al (1999) Customer exposure to MTBE, TAME, C6 Alkyl methyl ethers, and benzene during gasoline refueling. *Environ Health Perspect 107, 2, 133-140*

6. Hakkola, M.A. and Saarinen, L.H. (2000) Customer exposure to gasoline vapors during refueling at service stations. *Applied Occupational and Environmental Hygiene 15, 677-680*

7. Bremmer, H. et al (2006) Limiting conditions and reliability, ventilation, room size, body surface area. General fact sheet. Updated version for ConsExpo 4. RIVM report 320104002. Bilthoven: National Institute for Public Health and the Environment

8. Galea K. et al (2013) Determination of the potential for dermal exposure from transfer of lubricants and fuels by consumers. IOM report TM/13/03. Edinburgh: Institute of Occupational Medicine. (available at http://www.iom-world.org/media/106928/iom_tm1303.pdf)

9. Frasch, H.F. et al (2014) Analysis of finite dose dermal absorption data: Implications for dermal exposure assessment. *Journal of Exposure Science and Environmental Epidemiology 24, 65–73*

10. ten Berge, W. (2009) A simple dermal absorption model: Derivation and application. *Chemosphere 75, 11, 1440–1445*