Update Dec 2016; changed annual use frequency reporting format

CONCAWE_SCED_13_1_a_v2: Fuels, Liquid, Automotive Refuelling

Products/activities covered by the SCED:
Filling motor vehicle outdoors with a full tank of fuel every week
Applicability of the SCED (depending on substances properties):
Determinant values refer to gasoline as the fuel

Exposure Descriptor or Determinant	Value
SCED characteristics	
Name of the SCEDs	*Fuels, Liquid: Automotive Refuelling*
PC/AC descriptor	PC13
SCED code	CONCAWE_SCED_13_1_a_v2
Code of other related SCED	CONCAWE_SCED_13_2_a_v2 CONCAWE_SCED_13_3_a_v2
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)	52
Rationale	Once/week; consistent with the 90th percentile of 5 times per month (0.17) and average of 3.1 times per month (0.1).
Dermal Specific Parameters	
Exposure via dermal route	Yes
Rationale	
Skin Contact Area	Palm of one hand
Rationale	Only one hand holds the fuel nozzle when refuelling
Dermal transfer factor	0.002
Rationale	Estimated conservative value for gasoline. This value is greater (more conservative) than the 75th percentile of 0.00005 for hand contamination during pouring from a pesticide container
Inhalation Specific Parameters	
Exposure via inhalation route	Yes
Rationale	
Spray application?	No
Amount of Product used per application (g/event)	37500

Exposure Descriptor or Determinant	Value
Rationale	Based on 50 L fuel dispensed and density of 750 g/L. Value is consistent with reported refuelling amounts: 90th percentile of 53 L and average of 30 L
Exposure Time per event (hr)	0.05
Rationale	Consistent with reported refuelling time ranging from 0.3-3.5 min, with an average of 1 min.
Inhalation transfer factor	0.002
Rationale	Measured evaporative losses of 4 – 10.4 g VOC emitted per gallon of gasoline during vehicle refuelling converts to an inhalation transfer factor of 0.001 – 0.004 for automobiles without vapour capture systems. EU laws mandate vapour capture and applying the recovery system default value of 98% efficiency to this data gives an estimated emission of 0.0001-0.0003 weight fraction
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 of the product. Significant indirect contact is unlikely due to volatility of substance.
Volume swallowed (cm3)	N/a
Rationale	
Oral transfer Factor	N/a
Rationale	

CONCAWE_SCED_13_1_a_v2: Supporting Explanation

Self-service customers can be exposed to gasoline through inhalation from vapour evaporation or vapour displacement (from the fuel tank) or dermal contact from spillage when they are refuelling their cars or similar vehicles. Specific changes to the TRA defaults to better represent the scenario in reality while maintaining a conservative exposure prediction included the increase of the product ingredient and use amount from ECETOC TRA defaults and assumptions of weekly fuelling a full tank in a location designed to be conservative for an outdoor scenario. Use of a vapour recovery system at the pump can be expected to further reduce the exposure concentration. The inhalation prediction from TRA v3 based on the parameter values above (728 mg/m^3) is greater than the airborne concentration measurements of 113 mg/m3 as a typical value and 531 mg/m^3 as a reasonable worst case value [4], indicating the conservativeness of the auto-refuelling scenario as a whole.

Exposure Descriptor or Determinant	Value	Rationale
Product Characteristics		
Volatility		Typically 69000 Pa at 34 ^oC (source product and SDSs)
Product Ingredient Fraction (by weight)	1	Increased above ECETOC TRA default (0.5) for fuel – liquids [1]
Frequency of Use (events/day), value <1 indicates infrequent (less than daily) use *	0.14	Once/week; consistent with the 90th percentile of 5 times per month (0.17) and average of 3.1 times per month (0.1) in a recent survey [2]. These data suggest lower values than the TRA default of 1 (daily refuelling) [1]
Dermal Specific Parameters		
Skin Contact Area (cm^2)	210	Palm of one hand as only one hand holds the fuel nozzle. Based on a recent survey, 90% of respondents indicated that on no occasion or only sometimes did they have skin contact during refuelling [2]. These observations suggest a lower value than the TRA default of 857.5 cm^2 [1]. Consumer simulations (visualisation techniques) of the use suggest actual contact area likely to be less than 50 cm^2 [11].
Dermal Transfer Factor**	0.002	Estimated conservative value for gasoline. This value is greater (more conservative) than the 75th percentile of 0.00005 for hand contamination during pouring from a pesticide container [3]. Estimated values supported by consumer simulations of the use [11] where a factor of <0.00001 was calculated for diesel fuel (that might be expected to be associated with higher dermal exposures as a consequence of its lower volatility).
Inhalation Specific Parameters		
Amount of Product used per application (g)	37500	Based on 50 L and density of 750 g/L. Value is consistent with reported refuelling amounts: 90th percentile of 53 L and average of 30 L [2] and 6-60 L [4] and 3.6-85.1 L [5]. This value is increased from the TRA default of 5000 g [1].

Exposure Descriptor or Determinant	Value	Rationale
Exposure Time (hr)	0.05	Set it to be greater than the 97th percentile value for refuelling time [5]. Generally consistent with reported refuelling time ranging from 0.3-3.5 min, with an average of 1 min [4] and self-recall survey estimates based upon 2 min ranges indicating refuelling time 7 min (90th percentiles) and 4 min (average) [2]. These observations indicate a value lower than the TRA default of 4 hr [1].
Is product used outdoors only?	Yes	Service station
Room Volume (m^3)	100	100 m^3 used as a conservative default volume for an outdoors scenario (consistent with Stoffenmanager®) [6]. The TRA default is 20 m^3 [1].
Ventilation specified or likely due to properties (e.g. odour, etc.)- if so what type – (open window, fan)	0.6	TRA default [1] for an indoor room without ventilation.
Inhalation transfer factor (fraction of total amount handled lost to air)	0.002	Evaporative losses during refuelling are expected to be <0.002: measured emissions of 4 – 10.4g VOC emitted per gallon of gasoline during vehicle refuelling converts to an inhalation factor of 0.001 – 0.004 for automobiles without vapour recovery systems [7] and applying the recovery system default value of 98% efficiency [8] to this data gives an estimated emission of 0.0001-0.0003 weight fraction; loss from refuelling without vapour recovery system was <0.002 at 25°C [9]; refuelling loss of about 0.0027 was indicated [10].

* 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:

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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. 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*

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