Development of the CONCAWE SCEDs

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Outline

- What are petroleum substances ?
- Which petroleum substances are sold for consumer uses ?
  - And what do these uses extend to ?
- Which CONCAWE SCEDs have been developed?
- What is their basis and format?
- Issues arising during the development
  - Related information needs

Petroleum Substance Composition

- Derived from crude oil
- Not defined in terms of individual constituents
- Contain numerous structures
  - related isomers of different hydrocarbon classes with undefined & variable composition, i.e. *they are UVCBs*
- Produced according to technical performance specifications
- Typically defined by refining process, distillation range, carbon number range, viscosity and hydrocarbon classes, etc.
- Petroleum substances are grouped together into major product categories
  - e.g. kerosines, gas oils, base oils, aromatic extracts, etc.

CONCAWE Petroleum Substance Categories*

- Low Boiling Point Naphthas (Gasolines)
- Kerosines & MK1 diesel fuel
- Cracked Gas Oils
- Straight Run Gas Oils
- Other Gas Oils
- Vacuum Gas Oils / Hydrocracked Gas Oils / Distillate Fuels
- Highly Refined Base Oils
- Other Lubricant Base Oils
- Foots oils
- Unrefined / Acid treated Oils
- Distillate Aromatic Extracts
- Treated Distillate Aromatic Extracts
- Residual Aromatic Extracts
- Heavy Fuel Oil Components
- Petrolatums
- Paraffin and Hydrocarbon waxes
- Slack waxes
- Bitumen & Oxidised asphalt
- Sulphur

* Categories with consumer uses shown in **blue**

Consumer Uses of Petroleum Substances (PSs)

- Many different PSs have common uses
  - Particularly as fuels and lubricants
- But the general use terms cover a range of specific uses
  - E.g. fuelling a car vs garden machinery vs indoor heater
- And different PSs can also be used very differently for a common use
  - LPG vs diesel vs gasoline in motor vehicles
- Historically, some PSs have also been used as ‘general solvents’

- How many SCEDs are required to cover the range of uses?
- Are ‘repeat SCEDs’ required for the similar uses of different products?
- Are the iterable exposure determinants contained in the TRAv3/ChR15 sufficient/appropriate to address PSs?
  - Are consumers really exposed to 70 litres of fuel when re-fuelling?
  - Are both hands coated with lubricants when oiling a bike chain?

Scope of Current CONCAWE SCEDs

Product Category	Use Type	Product Type
Fuels	• Consumer re-fuelling of cars and similar vehicles	• Gasoline • LPG • Diesel
	• Garden equipment use	• Gasoline
	• Home space heating	• Kerosene • LPG
	• Recreational vehicles	• Gasoline
	• Lamp oils	• Gas oils • Foots oils
Lubricants	• Filling passenger vehicle engine	• Base oils • Kerosene • Gas oils • RAEs

Format of CONCAWE SCEDs

Auto-refuelling with gasoline

Exposure Descriptor or Determinant	Value	Justification
Use description	**Consumer re-fuelling of cars and similar vehicles** Filling motor vehicle outdoors with a full tank of fuel every week	
Product/Article Use Category	PC13	
PC/AC Subcategory	None	Automobile refuelling with gasoline
Product Characteristics	Volatility	69000 Pa at 34 °C (EM MSDS)
Product Ingredient Fraction (by weight)	1	Increased above ECETOC TRA default (0.5) for fuel – liquids [1]
Frequency of Use (events/day , and for an infrequently used product also provide days/year)	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) [2]. These data suggest lower values than the TRA default of 1 (daily refuelling) [1]
Relevant Route(s) of Exposure	dermal / inhalation	Oral exposure is not considered relevant for this use
Dermal Specific Parameters		
Skin Contact Area (cm^2)	210	Palm of one hand as only one hand holds the fuel nozzle. Survey data indicated that 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]
Skin 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]
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 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 mins, with an average of 1 min [4] and self-recall survey estimates based upon 2 mins ranges indicating refuelling time 7 mins (90th percentiles) and 4 mins (average) [2]. These observations indicate a value lower than the TRA default of 4 hr [1].
Is product used outdoors only?	Outdoor use	
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 20m^3[1].
Ventilation specified or likely due to properties (i.e., odor, etc.)- if so what type – (open window, fan)	0.6	TRA default [1]
Inhalation factor (fraction of total amount handles lost to air)	0.002	Evaporative losses during refuelling are expected to be <0.002: measured emissions of 4 – 10.4 g VOC emitted per gallon of gasoline during vehicle refueling converts to an inhalation factor of 0.001 – 0.004 for automobiles without vapor recovery systems [7] and applying the recovery system default value of 98% efficiency [8] to Quigley's 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].
Oral Specific Parameters		
Volume Ingested (cm3)	n/a	
Oral Transfer Factor	n/a	
Sector/organisation with responsibility for the sheet	CONCAWE	Arlean Rohde (Arlean.rohde@concawe.be)

Scenario justification:

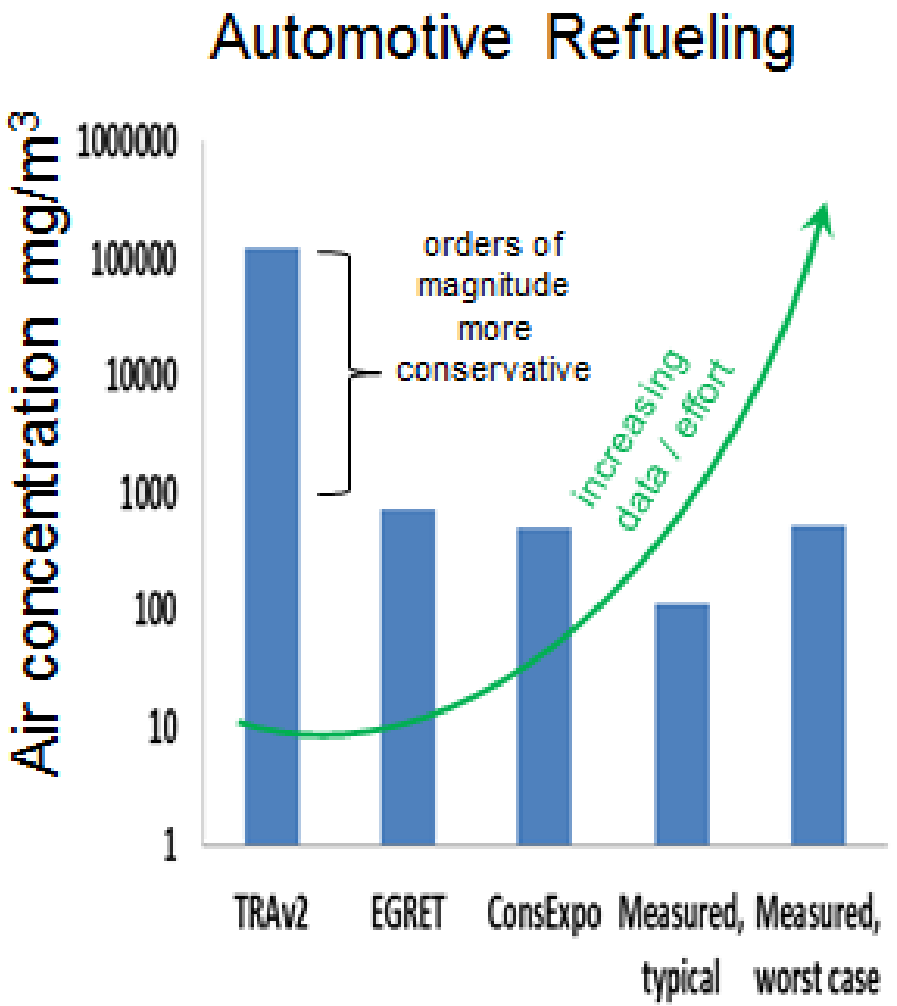
Self-service customers can be exposed to gasoline through inhalation from vapour evaporation/displacement or dermal contact from spillage when they are refuelling their cars or similar vehicles. Specific changes to the TRA defaults to better represent the scenario in reality while maintaining a conservative exposure prediction included the increase of the product ingredient and use amount from ECETOC TRA defaults and assumptions of weekly fueling a full tank in a location designed to be conservative for an outdoor scenario. Considering use of a vapour recovery system can further reduce the exposure concentration.

Issues Identified

- Need SCEDs to describe major differences in substance characteristics for different PS types used in the same application
  - Values for key determinants can differ markedly
  - Is the TRAv3 ‘sufficiently’ for certain product types ?
- Need for additional justification beyond that available in the SCED template ?
  - E.g. is it sufficient to just quote a reference or is something more substantive advisable ? How to address non-peer review sources ?
- Supporting process required for obtaining stakeholder support for SCED content
  - Not all PSs are used as fuels/lubricants (and vice versa)
  - Both industry and non-industry stakeholders

Impact of SCED Application

The information within the SCED is critical for enabling more realistic estimates of exposure to be obtained



Summary

- 13 SCEDs have been developed by CONCAWE
- TRAv3 Appendix F used as their basis
  - But include additional information to explain why the scenario and SCED values are considered appropriate
- Developing the SCEDs is a resource intensive exercise
  - Which highlights the relative strengths of understandings on the nature of consumer exposures
  - And where the collection of further data may be appropriate
- CONCAWE has now initiated research to reduce uncertainties for key exposure determinants
- CONCAWE will develop further SCEDs if and when the need arises

Questions ?