The PAR kik ACITV 20% was amended following a MAC request in May 2018 by the applicant Martec Handels AG to include a newly submitted Efficacy Study and Stability test. Sections of the original PAR which are affected by those studies are highlighted in grey shading.

Swiss Competent Authority Product Assessment Report (PAR)

kik ACTIV 20% DEET

Amendment, September 2018

Internal registration/file no:	SZID 338993
Authorisation/Registration no:	CH-2015-ZL-0002
Granting date/entry into force of authorisation/ registration:	May 5, 2015
Expiry date of authorisation/ registration:	July 31, 2022
Active ingredient:	DEET
Product type:	PT 19

Biocidal Product Assessment Report (PAR) related to product authorisation under Regulation (EU) No 528/2012 (BPR)

Federal Office of Public Health FOPH
Chemical Products Division
Biocides Section
Schwarzenburgstrasse 165, CH-3003 Bern

Common Notification Authority for Chemicals of FOPH - FOEN - SECO
Schwarzenburgstrasse 165, CH-3003 Bern

cheminfo@bag.admin.ch
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Federal Office for the Environment FOEN
Air Pollution Control and Chemicals Division
Biocides and Plant Protection Products Section
Worblentalstrasse 68, CH-3063 Ittigen

Contents

1 General information about the product application

1.1 Applicant

Company Name:	Martec Handels AG
Address:	Bubenbergstrasse 11
City:	Zürich
Postal Code:	8045
Country:	Switzerland
Telephone:	+41 44 783 95 30
Fax:	+41 44 783 95 49
E-mail address:	sales@martecag.com

1.1.1 Person authorised for communication on behalf of the applicant

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

1.2 Current authorisation holder

Company Name:	Martec Handels AG
Address:	Bubenbergstrasse 11
City:	Zürich
Postal Code:	8045
Country:	Switzerland
Telephone:	+41 44 783 95 30
Fax:	+41 44 783 95 49
E-mail address:	sales@martecag.com
Letter of appointment for the applicant to represent the authorisation holder provided (yes/no):	no

1.3 Proposed authorisation holder

Company Name:	Martec Handels AG
Address:	Bubenbergstrasse 11
City:	Zürich
Postal Code:	8045
Country:	Switzerland
Telephone:	+41 44 783 95 30
Fax:	+41 44 783 95 49
E-mail address:	sales@martecag.com
Letter of appointment for the applicant to represent the authorisation holder provided (yes/no):	no

1.4 Information about the product application

Application received:	November 30th, 2012
Application reported complete:	July 31st, 2013
Type of application:	Product authorisation
Further information:	-

1.5 Information about the biocidal product

1.5.1 General information

Trade name:	kik ACTIV 20% DEET
Manufacturer's development code number(s), if appropriate:	200101.002
Product type:	PT19
Composition of the product (identity and content of active substance(s) and substances of concern; full composition see confidential annex):	Active substance: 20.0 % (w/w) DEET Substance of concern: 32.0 % (w/w) Propan-2-ol
Formulation type:	Propan-2-ol-water based solution
Ready to use product (yes/no):	yes
Is the product the very same (identity and content) to another product already authorised under the regime of directive 98/8/EC (yes/no); If yes: authorisation/registration no. and product name: or	no

Has the product the same identity and composition like the product evaluated in connection with the approval for listing of active substance(s) on to Annex I to directive 98/8/EC (yes/no):	no

1.5.2 Information on the intended use(s)

Overall use pattern (manner and area of use):	The product is a pump spray to be applied onto the intact skin as a repellent against mosquitoes, including tiger mosquitoes. The use is seasonal, during outdoor activities. To be applied on the uncovered parts of the skin. Protection time for mosquitoes is on average 5 hours.
Target organisms:	Mosquitoes (including tiger mosquitoes)
Category of users:	Non-professional, general public (consumer use).
Directions for use including minimum and maximum application rates, application rates per time unit (e.g. number of treatments per day), typical size of application area:	The product is sprayed onto the uncovered parts of the skin only. Adults and children over 12 years: no more use than twice a day. Children under 12 years: use only once a day. Not for use on children under 2 years
Potential for release into the environment (yes/no):	yes
Potential for contamination of food/feedingstuff (yes/no)	no
Proposed Label:	kik ACTIV 20 % DEET protects against mosquitoes (including tiger mosquitoes) on average 5 hours. Application on adults and children **over** 12 years: apply to skin areas not covered by clothes, maximum twice a day. **Warning: children under 12 years, maximum once a day, to be applied by adults; do not apply on children's hands. Not for use on children under 2 years**. Apply sparingly, do not spray the whole body but only exposed skin areas. For facial applications, spray your hands and rub them over the face. Avoid areas around eyes. Reapply if necessary, especially in case of strong perspiration or after bathing.
Use Restrictions:	Do not use more than twice a day. Children under 12 years: maximum once a day. Not for use on children under 2 years

1.5.3 Information on active substance(s)

Active substance chemical name:	DEET (N,N-Diethyl-m-toluamide)
CAS No:	134-62-3
EC No:	205-149-7
Purity (minimum, g/kg or g/l):	> 970 g/kg
Inclusion directive:	2010/51/EU
Date of inclusion:	01.08.2012
Is the active substance equivalent to the active substance listed in Annex I to 98/8/EC (yes/no):	yes
Manufacturer of active substance(s) used in the biocidal product:	
Company Name:	Vertellus Performance Materials Inc.
Address:	2110 High Point Road
City:	Greensboro
Postal Code:	NC 27403
Country:	USA
Telephone:	1-336-292-1781
Fax:	1-336-834-4974
E-mail address:	msds@vertellus.com

1.5.4 Information on the substance(s) of concern

Substance chemical name	Propan-2-ol
CAS No:	67-63-0
EC No :	200-661-7
Purity (minimum, g/kg or g/l):	n.a.
Typical concentration (minimum and maximum, g/kg, or g/l):	> 250 g/kg (s. Confidential Annex 8)
Relevant toxicological/ecotoxicological information:	Eye irrit.2, H319 - STOT SE3, H336 Xi, R36-67
Original ingredient (trade name):	n.a.

1.6 Documentation

1.6.1 Data submitted in relation to product application

No new data on the active substance have been submitted in relation to the product application.

Data for the relevant formulation have been submitted on efficacy (see Annex 2 of this document). All these data have been accepted and evaluated. The evaluation of the efficacy study summaries can be found in Annex 7 of this document.

1.6.2 Access to documentation

A letter of access has been granted to Martec Handels AG (”Martec”) by Vertellus Performance Materials Inc. ("Vertellus"). Vertellus owns or has access to the data used and submitted for the inclusion of DEET into Annex I of Directive 98/8/EC. Vertellus has authorised the Swiss Competent Authority to use these data to assess Martec's product application as discussed in this document.

2 Summary of the product assessment

2.1 Identity related issues

2.1.1 Identity of the active substance

The identity of DEET is determined by HPLC under usage of a reference material.

2.1.2 Composition of the product

Trade name	**kik ACTIV 20% DEET**	
Manufacturer´s development code number(s)	200101.002	
Ingredient of preparation	Function	Content %(w/w)
DEET	Active substance	20.000
Isopropanol	Solvent	32.000

2.2 Classification, labelling and packaging

2.2.1 Classification of the biocidal product

The following EU classification and labelling for the biocidal product kik ACTIV 20% DEET is proposed. The classification is based on the official classification of the active substance in Regulation (EC) No 1272/2008 (CLP Regulation) and on the classification of other non-active substances, taking into account available study results on the biocidal product and taking into account existing data on one similar product (see Annex 9).

Risk	**Signal word and pictogram**	**Hazard Statement**
	WARNING	
Flam. Liq. 3	 (GHS02)	**H226**: Flammable liquid and vapour
Eye Irrit. 2	 (GHS07)	**H319**: Causes serious eye irritation
STOT SE 3	 (GHS07)	**H336**: May cause drowsiness or dizziness
Supplemental label elements		

		Contains : DEET, Propan-2-ol
		EUH208 — Contains Lilial. May produce an allergic reaction.
Precautionary Statement General		
P101		If medical advice is needed, have product container or label at hand.
P102		Keep out of reach of children.
P103		Read label before use.
Precautionary Statement Prevention		
P210		Keep away from heat/sparks/open flames/hot surfaces. — No smoking.
P261		Avoid breathing spray
P270		Do not eat, drink or smoke when using this product.
Precautionary Statement Response		
P304, P340		IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305, P351, P338		IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Precautionary Statement Disposal		
P501		Dispose of contents/container in accordance with local, national, international regulation.

Justification:

Flammability:

Based on the results obtained in a study on the flammability of the mixture, the flash point of kik ACTIV 20% DEET has been determined to be greater than 21°C but less than 60°C. The biocidal product has to be classified with Flam. Liq. 3, H226 (“Flammable liquid and vapour”).

Acute oral toxicity:

Using the ATE method for the acute toxicity classification as provided for in the CLP Regulation and taking into consideration the oral LD50 data and the concentration of DEET in the biocidal product, kik ACTIV 20% DEET does not have to be classified in GHS with respect to acute oral toxicity.

Detailed calculation for acute oral toxicity

ATEmix = 100 : (20.0 % : 1892 mg/kg bw) = 9460 mg/kg bw; Acute Tox. 4, H302 not required.

Eye and skin irritation:

DEET is officially classified with Skin Irrit. 2, H315 “Causes skin irritation” and Eye Irrit. 2, H319 “Causes serious eye irritation” according to the CLP. The concentration of Propan-2-ol which is classified as an eye irritant exceeds the cut off limit of 1% for serious damage to eyes/eye irritation according to the CLP and needs, therefore, to be considered in the classification for ocular irritation. Considering the provisions of the CLP for the classification of mixtures with respect to eye irritation, kik ACTIV 20% DEET has to be classified with Eye Irrit. 2, H319 “causes serious eye irritation” as the total concentration of eye irritating substances exceeds the trigger of ≥ 10% for a classification with respect to eye and skin irritation.

Although the concentration of the active substance DEET in the biocidal product does exceed the trigger of ≥ 10% for a classification with respect to skin irritation, a classification of kik ACTIV 20% DEET as a skin irritant is not required based on the application of a read across/bridging approach with a similar product (see Annex 9).

Detailed calculation for eye irritation:

DEET + Propan-2-ol = (sum ≥ 10% acc. to the CLP); Eye Irrit. 2, H319 required.

Drowsiness or dizziness:

The biocidal product contains Propan-2-ol which is classified with STOT SE 3, H336 (“May cause drowsiness or dizziness”) at a concentration above the trigger of 20%. Based on the provisions of the CLP, kik ACTIV 20% DEET has to be classified with STOT SE 3, H336 (“May cause drowsiness or dizziness”).

Detailed calculation for eye irritation :

≥ 20% Propan-2-ol (≥ 20% acc. to the CLP); STOT SE 3, H336 required.

Sensitisation

The biocidal product contains one substance classified as sensitizing H317 that is present in a concentration ≥ 0,1 %. According to the provisions of the CLP, kik ACTIV 20% DEET shall bear the statement: EUH208 — ‘Contains Lilial. May produce an allergic reaction’

Environmental effects:

DEET is officially classified with Aquatic Chronic 3, H412 “harmful to aquatic life with long lasting effects”. The concentration of other components in the biocidal product which are classified with respect to chronic aquatic toxicity is below the cut off limits of 0.1% (Aquatic Chronic 1) and 1% (Aquatic Chronic 2, H411, and Aquatic Chronic 3, H412) according to the CLP for the classification with respect to hazards to the aquatic environment. Therefore, only DEET has to be taken into account in the classification for environmental hazards. Considering the provisions of the CLP for the classification of mixtures with respect to environmental hazards, kik ACTIV 20% DEET has **not** to be classified with Aquatic Chronic 3, H412 “harmful to aquatic life with long lasting effects” as the total concentration of components classified with Aquatic Chronic 3, H412, does not exceed the trigger of 25% for a classification with respect to environmental hazards.

Detailed calculation for environmental hazards, Aquatic Chronic 3, H412:

20% DEET (sum ≥ 25% acc. to Table 4.1.2 of the CLP); Aquatic Chronic 3, H412, **not** required.

2.2.2 Packaging of the biocidal product

The biocidal product is supplied to the market in plastic bottles of 100 ml, equipped with pump spray devices.

2.3 Physico-chemical properties and analytical methods

A letter of access has been submitted for the active substance. The physico-chemical properties of the active substance can be found in the CAR[4].

As indicated in the CAR (Doc I; 2.1.1.2):
DEET as manufactured is a clear almost colourless liquid with a mild characteristic DEET odour. Existing data indicates that DEET has a melting point below -20°C and purified DEET has a boiling point of 284.2°C and its relative density is 0.998. The solubility of DEET in water is 11.2 g/L (no pH control). The pH dependency of the solubility was not assessed, but DEET is not considered to be able to dissociate at environmentally relevant pH. The vapour pressure was extrapolated to be 0.23 Pa at 25°C, from measurements at 32-52°C and the Henry's Law Constant of 3.93 x 10-3 Pa.m3.mol-1 which indicates that volatilisation is not expected to significantly contribute to the dissipation of DEET in the environment. The Log Pow is 2.4 at pH 6, which indicates no potential for DEET to bioaccumulate. DEET is very soluble in polar as well as in non-polar organic solvents. DEET has a flash-point of 144°C and is not considered to be explosive or oxidizing, based on theoretical considerations. DEET should be regarded as slightly surface active as the surface tension is 58 mN/m at 20°C.

2.3.1 Physico-chemical properties

A summary of the physico-chemical properties for kik ACTIV 20% DEET is given in Table 1 below. The references are listed in Annex 2 of this document and correspond to the Document IIIB.

Table 1: Physico-chemical properties of the biocidal product:

	Method	Purity/Specification	Results	Reference
Physical state and nature	Visual inspection.	Specification as given in section B2.2	Clear, homogeneous solution	[redacted] (2013), BioGenius GmbH, study no. Mo4492, B3.1/02
Colour	Visual inspection.	Specification as given in section B2.2	Colourless	[redacted] (2013), BioGenius GmbH, study no. Mo4492, B3.1/02
Odour	Comparison to other characteristic odours at room temperature	Specification as given in section B2.2	Fruity, citric odour	[redacted] (2013), BioGenius GmbH, study no. Mo4492, B3.1/02
Explosive properties	-	Specification as given in section B2.2	Not explosive. None of the ingredients in the formulation are classified as explosive.	-

	Method	Purity/Specification	Results	Reference
Oxidizing properties	-	Specification as given in section B2.2	Not oxidizing. None of the ingredients in the formulation are classified as oxidizing.	-
Flash point	EC method A.9 & ASTM D 93, procedure B (Pensky-Martens closed cup tester).	Specification as given in section B2.2	29.5 °C (corrected to 101.3 kPa).	[redacted](2012), BioGenius GmbH, study no. Mo4489, B3.4/01
Auto flammability	-	Specification as given in section B2.2	> 100°C None of the components has an auto-ignition point < 100°C.	-
Other indications of flammability	-	-	-	-
Acidity / Alkalinity	CIPAC MT 75.3	Specification as given in section B2.2	pH = 5.9 at 20°C (neat formulation)	[redacted](2013), BioGenius GmbH, study no. Mo4492, B3.1/02
Relative density / bulk density	EC method A.3 (oscillating density meter)	Specification as given in section B2.2	D420 = 0.944	[redacted](2013), BioGenius GmbH, study no. Mo4492, B3.1/02
Storage stability – stability and shelf life Effect of temperature	CIPAC MT 39	Specification as given in section B 2.2	Storage at 0 ± 2°C for 1 week: no separation or precipitate	[redacted](2013), BioGenius GmbH, study no. Mo4492, B3.1/02
	CIPAC MT 46.3	Specification as given in section B 2.2	Storage at 40 ± 2°C during 8 weeks. *DEET content w/w*: Pre storage: 20.0 % After storage: 19.6 % *Appearance*: No appreciable changes (physical state, odour) *Weight loss:* Less than 0.2 % *pH-Value:* Before storage: 5.9 After storage: 5.3 *Relative density*: Pre storage: 0.944 After storage: 0.942	[redacted](2013), BioGenius GmbH, study no. Mo4492, B3.1/02

	Method	Purity/Specification	Results	Reference
			Storage at 20 ± 2°C during 12 months. *DEET content w/w*: Before storage: 20.0 % After storage: 20.8 % *Appearance*: No appreciable changes (physical state, odour) *Weight loss:* Less than 0.2 % *pH-Value*: Before storage: 5.9 After storage: 5.7 *Relative density*: Before storage: 0.944 After storage: 0.944	[redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/02
			Storage at 20 ± 2°C during 24 months. *DEET content w/w*: Before storage: 20.0% After storage: 19% *Appearance:* No appreciable changes (physical state, odour) *Weight loss:* 0.115 % *pH-Value*: Before storage: 5.9 After storage: 5.45 *Relative density*: Pre storage: 0.944 After storage: 0.943	[redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/03
			Storage at 20 ± 2°C during 36 months. *DEET content w/w:* Pre storage: 20.0 % After storage: 20.0 % w/w	[redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/04

	Method	Purity/Specification	Results	Reference
			Appearance: No appreciable changes (physical state/colour, odour) *Weight loss:* 0.19 % *pH-Value:* Before storage 5.9 After storage 5.2 *Relative density:* Pre storage 0.944 After storage 0.944 <u>Storage at 20 ± 2°C during 48 months.</u> *DEET content w/w:* Pre storage: 20.0 % After storage: 20.4 % w/w *Appearance:* No appreciable changes (physical state/colour, odour) *Weight loss:* 0.265 % *pH-Value:* Before storage 5.9 After storage 5.1 *Relative density:* Pre storage 0.944 After storage 0.943 <u>Storage at 20 ± 2°C during 60 months.</u> *DEET content w/w:* Pre storage: 20.0 % After storage: 19.4 % w/w *Appearance:* No appreciable changes (physical state, odour), the color changed to slightly yellow *Weight loss:* 0.335 %	[redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/05 [redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/05

	Method	Purity/Specification	Results	Reference
			pH-Value: Before storage 5.9 After storage 5.15 *Relative density:* Pre storage 0.944 After storage 0.943 **Conclusion:** The product is stable under the conditions of the test.	
Effects of light	-	-	Not relevant. The product is placed on the market in lightproof pump spray dispensers so that effect of light can be excluded.	-
Reactivity towards container material	Determination of weight loss and visual description of the packaging during storage.	Specification as given in section B 2.2	Storage at 40 ± 2°C during 8 weeks. *Packaging material*: Pump spray made up of a 100 mL HDPE bottle and a spray with a LDPE dip tube. *Packaging stability*: Samples in sound condition, sealed and without leakages, dimensional stable Storage at 20 ± 2°C during 12 months. *Packaging stability*: Samples in sound condition, sealed and without leakages, dimensional stable Storage at 20 ± 2°C during 24 months. *Packaging stability:*	[redacted] (2017), BioGenius GmbH, study no. Mo4492, B3.1/02 [redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/02 [redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/03

	Method	Purity/Specification	Results	Reference
			Samples in sound condition, sealed and without leakages, dimensional stable Storage at 20 ± 2°C during 36 months. *Packaging stability:* Samples in sound condition, sealed and without leakages, dimensional stable Storage at 20 ± 2°C during 48 months. *Packaging stability:* Samples in sound condition, sealed and without leakages, dimensional stable Storage at 20 ± 2°C during 60 months. Samples in sound condition, sealed and without leakages, dimensional stable.	[redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/04 [redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/05 [redacted] (2017), BioGenius GmbH, study no. 4492, B3.7/05
Technical characteristics in dependence of the formulation type				
Particle size of spray droplets	CIPAC MT 187	Specification as given in section B 2.2.	Dv (10): 33 µm Dv (50): 67 µm Dv (90): 122 µm	[redacted] (2013), BioGenius GmbH, study no. Mo4492, B3.1/02
Wettability / Suspensibility	-	-	Not applicable. Alcohol-water-based clear solution.	-
Wet sieve analysis	-	-	Not applicable. Alcohol-water-based clear solution.	-
Emulsifiability	-	-	Not applicable. Alcohol-water-based clear solution.	-
Disintegration time	-	-	Not applicable. Alcohol-water-based clear solution.	-

	Method	Purity/Specification	Results	Reference
Attrition/friability of granules; integrity of tablets	-	-	Not applicable. Alcohol-water-based clear solution.	-
Persistence of foaming	-	-	Alcohol-water-based clear solution which is ready-for-use and not diluted in water before use.	-
Flowability/Pourability	-	-	Not applicable. Alcohol-water-based clear solution.	-
Dustability	-	-	Not applicable. Alcohol-water-based clear solution.	-
Compatibility with other products	-	-	Not relevant The product is not intended for use together with other products.	-
Surface tension	-	-	Study not required (< 10% of hydrocarbons)	-
Viscosity	-	-	Study not required (< 10% of hydrocarbons)	-
Particle size distribution	-	-	Not applicable. Alcohol-water-based clear solution.	-

2.3.2 Analytical methods

	Principle of method
Technical active substance as manufactured:	HPLC
Impurities in technical active substance:	HPLC
Active substance in the formulation:	HPLC

2.4 Risk assessment for physico-chemical properties

The formulation of kik ACTIV 20% DEET is a clear alcohol/water based solution, ready-to-use, packed into lightproof HDPE spray bottles.

Based on the properties of the formulation components, the product is neither oxidising nor explosive.

As the product exhibits a flash point of 29.5°C, the GHS-Code H226 is assigned according to Regulation EC 1272/2008 with regard to flammable risk.

The product is proved to be stable for at least 60 months at 20 °C, based on results after 60 months of the stability study.

The technical properties of the formulation indicate that no particular problems are expected when it is handled and stored as recommended.

As the formulation contains less than 10% hydrocarbons no potential aspiration hazards should be expected according to Regulation EC 1272/2008.

2.5 Effectiveness against target organisms

2.5.1 Function

The product is an insect repellent (PT19).

2.5.2 Organism(s) to be controlled and products, organisms or objects to be protected

The repellent is intended to protect humans against disease- (vector-carrying species) and nuisance-causing organisms. Organisms to be controlled are biting and sucking insects and arachnids. Data were submitted to support a label claim only against mosquitoes. The submitted product label contains broad efficacy claims: "the active substance is also efficacious against other insects (flies, horse flies, fleas) and ticks". However, the general claim "insects" is not sufficiently supported by data on mosquitoes only and no test has been submitted on ticks. The applicant justifies these claims by stating that the efficacy of DEET against a great variety of blood-sucking arthropods is known by experience.

However, the CA of Switzerland considers this general statement not to be sufficient to demonstrate the effectiveness of the product against these types of insects. According to the TNsG on Product Evaluation, waiving of efficacy studies can be accepted if published data exist in which the methods and results are described in sufficient detail to allow a full assessment and if the equivalence of the products is documented. No such data have been submitted.

2.5.3 Effects on target organisms

Kik ACTIV 20% DEET is applied directly onto the human skin. The repelling biocidal active substance DEET evaporates from the skin surface into the air surrounding the skin. The target organisms sense the repellent and refrain from landing onto the skin and biting.

2.5.4 Mode of action

The mechanism of action of insect repellent biocidal active substances is not revealed yet; the repellent effect could be olfactory-based. The repellent action starts directly after application without delay.

2.5.5 Occurrence of resistance

Development of resistance is not a point of concern for a repellent. Since a repellent only repels organisms and does not kill them, no selection pressure for the development of resistance is built up. In agreement with the CAR on DEET, it is considered unnecessary to take actions to prevent development of resistance by target organisms.

2.5.6 Evaluation of the label claims

Mosquitoes

The following studies are available for the evaluation of label claims against mosquitoes:

- Laboratory efficacy evaluation of the mosquito repellent *kik ACTIV 20% DEET* (Test IIIB5.10/01)
- Determination of the repelling efficacy of a product with 20 % DEET applied on human arms against Asian tiger mosquito, Aedes albopictus (Test IIIB5.10/02)

These data support the efficacy of this product against mosquitoes. A summary of these studies submitted by the applicant can be found in Annex 7 of this document.

According to the Guidance on the Biocidal Products Regulation; Volume II Efficacy – Assessment and Evaluation (Parts B&C), Version 1.0, February 2017, testing of repellents against mosquitoes should be performed with a Culex species and with an Aedes species. [redacted]

A mean protection time (arithmetic mean) of 5.1 hours was calculated. It was decided to round off the mean protection time to 5 hours. Following this calculation, the label states "*Protects against mosquitoes on average **5 hours***". However, variations in the protection time are expected between consumers due to their different attractiveness for mosquitoes, as demonstrated in the efficacy studies.

The Guidance on the Biocidal Products Regulation; Volume II Efficacy – Assessment and Evaluation (Parts B&C), Version 1.0, February 2017 state that products intended to be used as repellents on skin require a field study showing repellence in the field. Although field trials are considered to provide the ultimate efficacy evaluation of repellents, they have severe drawbacks because of ethical concerns, practical reasons and the influence of changing weather conditions. Taking this into account, no field trials have been conducted with Kik ACTIV 20% DEET since the active substance DEET has been used in repellents for decades and is well known to be effective also in the field.

2.6 Exposure assessment

2.6.1 Description of the intended use(s)

The product kik ACTIV 20% DEET is used in Product Type 19 “Repellents and Attractants” as an insect repellent and is applied directly on human skin. Mosquitoes are the target organisms. Kik ACTIV 20% DEET is a pump spray containing DEET at a concentration of 20.0 %.

2.6.2 Assessment of exposure to humans and the environment

The direct exposure of humans to the active ingredient DEET from biocidal uses of kik ACTIV 20% DEET has been estimated using valid exposure models and approaches as described in Document IIB, Chapter 8.2 of the CAR on DEET. The indirect exposure and secondary exposure are not relevant.

The evaluation of professional exposure is not relevant since the product kik ACTIV 20% DEET is intended for consumer use only.

The direct and indirect exposure of the environment to the active ingredient DEET from biocidal uses of kik ACTIV 20% DEET has been estimated using valid exposure models and approaches as described in Document IIB, Chapter 8.3 of the CAR on DEET.

Since the potential human and environmental exposure towards the biocidal product has been sufficiently characterized in the CAR on DEET, no additional studies related to the exposure to humans and the environment are required. For details on the human health risk assessment please see chapter 2.7 below. For details on the environmental risk assessment please see chapter 2.8 of this document.

2.7 Risk assessment for human health

2.7.1 Hazard potential

2.7.1.1 Toxicology of the active substance

The toxicology of the active substance DEET was examined extensively according to standard requirements. The results of this toxicological assessment can be found in the CAR. The assessment report, including the List of End-Points for the substance, can be found on CIRCA_BC (EUkom/ECHA).

The threshold limits and labelling regarding human health risks, as well as a summary of the hazard identification and effects assessment from the DEET Assessment Report, are listed in Annex 4 „Toxicology and metabolism – active substance" of this document.

The human health effects of the biocidal product kik ACTIV 20% DEET related to endpoints other than acute toxicity, primary irritation and skin sensitisation can be assessed on the basis of the data available for the active substance DEET.

DEET was comprehensively assessed in the CAR and was shown not to be carcinogenic, genotoxic or toxic to reproduction. Several studies are available to investigate the potential neurotoxicity of DEET. DEET was shown to be neurotoxic in dogs when given in capsules, however, no neurotoxicity was observed when DEET was given with the diet or applied dermally.

2.7.1.2 Toxicology of the substance(s) of concern

The biocidal product contains the following substances of concern (SoC): Propan-2-ol.

Propan-2-ol is identified as a SoC based on its classification with Eye Irrit 2., H319; STOT SE 3, H336 (CLP). Since the concentration of the solvent in the biocidal product exceeds the respective trigger values according to the provisions of the CLP, a classification of kik ACTIV 20% DEET as an eye irritant (H319) and with H336 ("May cause drowsiness or dizziness") is required.

Since the prevention of the risk of eye irritation is addressed in the labelling of the product (see SPC) and taking into account that exposure by inhalation is considered negligible, the potential risks towards the SoC during application of kik ACTIV 20% DEET are sufficiently controlled by classification and labelling of the product. For this reason a quantitative risk characterization is not required for the SoC.

2.7.1.3 Toxicology of the biocidal product

The toxicology of the biocidal product kik ACTIV 20% was examined appropriately according to standard requirements.

Dermal penetration

No dermal penetration study is available for kik ACTIV 20%. However, in the CAR on DEET (Document IIA, chapter 3.1), a dermal absorption of 20 % was derived from the results obtained in a dermal penetration study using a 15 % (w/w) ethanol solution of DEET and undiluted technical grade DEET. The results demonstrated that the dermal absorption of DEET is independent from the applied concentration (valid for concentrations between 15 % and 100%). In the absence of a dermal penetration study for kik ACTIV 20% DEET, read across to a human skin absorption study performed with a DEET formulation cited in the assessment report for DEET has been made to derive the dermal penetration of DEET from kik ACTIV 20% DEET. The use of the dermal penetration data from the skin absorption study evaluated in the assessment report of DEET is justified for the following reasons:

A skin absorption of 20% through human skin has been determined for the undiluted material (i.e. pure DEET) as well as for a 15% (w/w) ethanolic solution of DEET. The results of this skin absorption study demonstrate that the penetration of DEET through human skin is not dependent on the concentration of the active substance. As kik ACTIV 20% DEET contains about 20% of the active substance as well as an alcoholic solvent and taking into consideration that the absorption of DEET through human skin does not depend on the concentration, the concentration of DEET in the biocidal product is covered by the concentration range tested in the available dermal penetration study. Since ethanol as solvent contributes to an enhancement of the dermal penetration of a substance and as the impact of ethanol compared to the alcoholic solvent on dermal penetration is considered to be similar, it is concluded that the results of the available skin penetration study with human skin are applicable for the assessment of the dermal penetration of DEET from kik ACTIV 20% DEET.

Acute toxicity

Acute oral toxicity

The acute oral toxicity of kik ACTIV 20% DEET can be derived from the product component data.

Therefore, a study on the acute oral toxicity of the biocidal product is considered scientifically unjustified and has been waived for animal welfare reasons. The active substance DEET is officially classified as “harmful if swallowed” (CLP: Acute Tox. 4, H302) in Annex VI of CLP Regulation. Taking into consideration the Acute Toxicity Estimate (ATE) of the mixture as provided for in the CLP for the assessment of the acute toxicity of mixtures, the product kik ACTIV 20% DEET is not classified with respect to acute oral toxicity.

Acute dermal toxicity

Neither the active substance DEET nor any other component in the biocidal product is classified with respect to acute dermal toxicity. For this reason, a classification of kik ACTIV 20% DEET for acute dermal toxicity is not required.

Acute inhalation toxicity

The active substance DEET is not classified for acute inhalation toxicity. One other component, the bittering agent Bitrex in kik ACTIV 20% DEET, which is classified with respect to acute inhalation toxicity, has not to be taken into account in the classification due to the low concentration in the biocidal product. For this reason, a classification of kik ACTIV 20% DEET for acute inhalation toxicity is not required.

Irritation and corrosivity

In order to further assess the potential skin irritancy of kik ACTIV 20% DEET, the results of a skin irritation study performed with another DEET-based product in rabbits were used. The application of a

read-across/bridging approach is justified as the composition of kik ACTIV 20% DEET is very similar and the related product contains a higher concentration of DEET which is legally classified as a skin irritant (s. Confidential Annex 9).

The potential eye irritancy of the biocidal product was assessed on the basis of the provisions of the CLP for the classification of mixtures taking into consideration the concentration of eye irritating components in the mixture.

Skin irritancy

For kik ACTIV 20% DEET, the potential skin irritancy has been assessed by applying the bridging principles and using the results of a human patch test with the similar formulation kik ACTIV 25% DEET. Kik ACTIV 25% DEET is almost identical in composition to kik ACTIV 20% DEET except the active substance content which is higher in kik ACTIV 25% DEET and which represents, thus, a worst case for kik ACTIV 20% DEET. In order to further assess the potential skin irritancy of kik ACTIV 20% DEET, the results of a skin irritation study performed with another DEET-based product (s. Confidential Annex 9) in rabbits were used. Due to the similarity of kik ACTIV 20% DEET and kik ACTIV 25% DEET it can be concluded that kik ACTIV 20% DEET does not possess a skin irritation potential in humans and a classification and labelling with respect to skin irritancy is not required.

Eye irritancy

A study to investigate the potential eye irritancy of kik ACTIV 20% DEET has not been performed. The potential eye irritancy of the biocidal product has been assessed on the basis of the individual components. The active substance DEET is officially classified as an eye irritant. Besides DEET, only Propan-2-ol which is classified with respect to eye irritancy has to be taken into consideration in the classification. Its concentration exceeds the cut off limit of 1% as provided for in the CLP. Based on the the criteria for the classification of mixtures according to the CLP, kik ACTIV 20% DEET has to be classified as a potential eye irritant because the concentration of the components in the product exerting local effects on the eyes exceeds the concentration limit of 10% (CLP).

Sensitization

Skin sensitization

A study to investigate the potential skin sensitisation of kik ACTIV 20% DEET has not been performed. For this reason, the potential skin sensitising properties of the biocidal product have been assessed on the basis of the individual components. With the exception of one component in the biocidal product which itself is a mixture, neither the active ingredient DEET nor any other (co-) formulant contained in kik ACTIV 20% DEET are classified with respect to skin sensitisation. Since the net concentration of substances in the skin sensitising component does not exceed the trigger of 1%, a classification of kik ACTIV 20% DEET as a potential skin sensitizer is not required according to the criteria in the CLP regulation for the classification of mixtures with respect to skin sensitization..

The biocidal product contains one substance classified as Skin Sens. I; H317 and present in a concentration ≥ 0,1 %. Based on the provisions of the CLP, kik ACTIV 20% DEET shall bear the statement: EUH208 — ‘Contains Lilial. May produce an allergic reaction’.

2.7.2 Exposure

The product kik ACTIV 20% DEET is used as a pump spray by the general public (consumer use). The route of exposure is dermal. Oral exposure by hand-to-mouth transfer is not considered to be a significant route of exposure because of the repellent smell and taste of DEET. In addition, kik ACTIV

20% DEET contains the bitter agent Bitrex at an effective concentration. The concentration of Bitrex (see confidential part in Annex 8 of this document) corresponds to the recommended amount (between 10 to 100 ppm) for consumer products[1]. Thus, sufficient prevention of ingestion can be assumed, comparable to the representative product in the CAR on DEET.

Exposure by inhalation is considered to be negligible: [redacted] Additionally, with respect to insect repellents, in section 5.2 of the "Technical Notes for Guidance – Human Exposure to Biocidal Products – Guidance on Exposure Estimation" (European Commission, 2002, part 2) the following is stated:

"*The inhalation route is excluded due to the use outdoors, and because use indoors takes place in the summer in situations where there is a high ventilation rate. On these grounds, the inhalation exposure to aerosol sprays is also considered to be negligible".*

In the CAR on DEET, this argumentation was adopted and consequently, exposure by inhalation was not assessed. However, it was argued that inhalation exposure could not be fully ruled out on the basis of the consideration as provided in the TNsG (see above) and that, therefore, a recommendation on ventilation needs to be included on the product label. This requirement will be complied with in the case of kik ACTIV 20% DEET: The product label will include a respective statement.

An overview on the relevance of the different exposure routes as discussed above is summarised in Table 2.7.2-1 (corresponding to Table 12.3.2.2-1 in the CAR on DEET, Document II-C, p. 87).

Table 2.7.2- 1 Summary of main paths of human exposure

Exposure path	Industrial use	Professional use	General public	Via the environment
Inhalation	Not applicable	Not applicable	Negligible	No
Dermal	Not applicable	Not applicable	Yes	No
Oral	Not applicable	Not applicable	Negligible [a)]	No

a) Oral ingestion should not be a major contribution to the exposure with use of kik ACTIV 20% DEET containing Bitrex.

2.7.2.1 Exposure of professional users

The evaluation of professional exposure is not relevant since the product kik ACTIV 20% DEET is intended for consumer use only.

2.7.2.2 Exposure of non-professional users and the general public

Tier-1-Assessment: 2 Applications/day

In the CAR on DEET, the exposure calculations were based on results by [redacted] (1990)[2] who conducted a survey in humans for the application of a product containing DEET at a

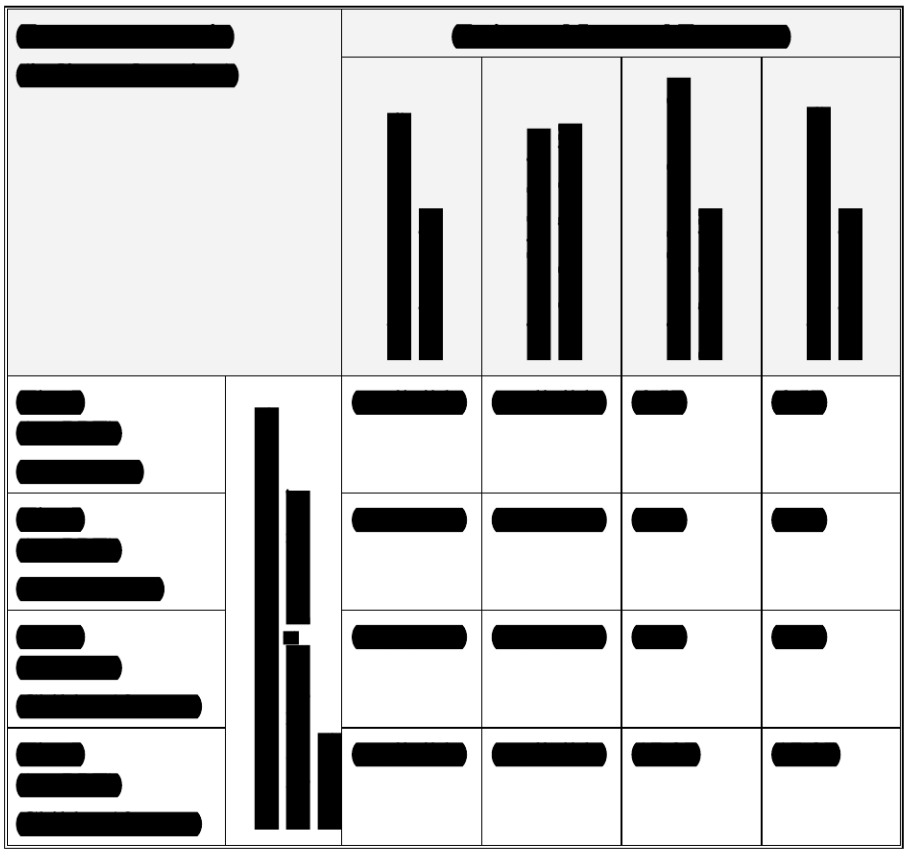
[1] Technical Information Datasheet No5 (bitrex.com)
[2] [redacted] (1990) Human use and exposure to insect repellents containing DEET. DPR Reg. Doc. 50191:162

concentration of 26.1%. In the CAR, the results on the exposure toward DEET obtained from this study were linearly extrapolated to a 15 % DEET formulation (representative product in the CAR) and expressed as mg active substance/person for the treatment of 64% of the body surface. This restricted body surface represents body parts not covered by clothing such as head, arms, hands, legs and feet, respectively. Additionally, in the CAR the risk characterisation was performed assuming two applications per day. At the Technical Meeting (TM) I and II in 2009 the decision was taken that the exposure assessment for DEET should be based on the 75th percentile values of the usage data as determined in the study by [redacted] For one application of the DEET containing product, these values were 1.5 g active substance for males, 1.0 g active substance for females, 1.66 g for children over 12 years and 1.42 g for children under 12 years. Body weights of 70 kg and 60 kg were used for male and female adults, as well as 62.8 kg and 25.5 kg for children over 12 years and under 12 years, respectively.

Kik ACTIV 20% DEET has a DEET concentration of 20.0 %, which is approximately 1.33 times the concentration of the representative product assessed in the CAR. The estimated internal exposures are calculated in the tier-1 assessment assuming that the product will be applied at the same application rate as the 15% reference product in the CAR and the 26.1 % average DEET product of the usage data[2]. For calculation details, please refer to Figure 1 in Annex 6.

In Table 2.7.2.2-1, the results of the primary exposure estimates towards kik ACTIV 20% DEET following two applications in adults and children are summarized.

[redacted]



[redacted]

2.7.2.3 Exposure to residues in food

Exposure to residues in food is not relevant, as no contamination of food is expected.

2.7.3 Risk Characterisation

Substance of concern (SoC):

Kik ACTIV 20% DEET is a pump-spray containing the active substance and one substance of toxicological concern, propan-2-ol. Propan-2-ol is identified as a SoC due to its classification as Eye Irrit. 2; H319 and STOT SE 3; H336 and its concentration of > 25 %. The classification H319 ("Causes serious eye irritation") of propan-2-ol contributes to the same classification of DEET, resulting also in the classification H319 of the product. Prevention of the risk of eye irritation is addressed in the labelling of the product (see SPC).

The additional hazard classification H336 ("May cause drowsiness or dizziness") of the SoC is valid also for the product and can be assessed in a qualitative way, taking into account, that exposure by inhalation is considered negligible. The pump spray, producing only a very low proportion of aerosol in a respirable range, is used outdoors and there will be no risk for causing dizziness and drowsiness during application.

Since the potential risks towards the SoC during application of kik ACTIV 20% DEET are sufficiently controlled by classification and labelling of the product, a quantitative risk characterization is not required for the SoC. Therefore, only the active substance DEET is considered in the risk characterization in this chapter. This concept is in accordance with the outcome of the workshop on SoC, organised in a parallel session to the Technical Meeting TMII 2013.

2.7.3.1 Risk for Professional Users

Not relevant, as the product is intended for consumer use.

2.7.3.2 Risk for non-professional users and the general public

Intended uses

Kik ACTIV 20% DEET is used as a repellent against mosquitoes. The pattern of use is the same as outlined in the representative product in the CAR on DEET: seasonal, during outdoor activities, applied on the uncovered parts of the skin in similar frequencies. Although not indicated on the label, users sometimes apply repellents also to their clothes to prevent mosquitoes from biting through the clothes. Exposure from application on clothing is considered negligible compared to the direct application on the skin. The exposure scenario developed in the CAR on DEET is considered applicable in a first tier for the uses of kik ACTIV 20% DEET. This first tier results in a safe use in adults and children over 12 years but not in children under 12 years. Therefore, a second tier is necessary in order to define the conditions under which the product can be safely applied also to children under 12 years.

Critical endpoints:

Acute toxicity and eye irritation:

The active substance DEET is classified for the acute oral toxicity and irritation with Acute Tox. 4 H302 Skin Irrit. 2 H315 and Eye Irrit. 2; H319 according to Annex VI of Regulation (EC) 1272/2008. Considering the concentration of 20 % DEET, the product has a low order of acute toxicity. Kik ACTIV 20% DEET is irritating to eyes based on the classification of DEET and the solvent propan-2-ol.

Repeated exposure:

Clinical signs of neurotoxicity have been observed in animal studies with DEET. In medical literature, reports on very rare cases have associated poisoning symptoms of seizures, headaches, ataxia and/or agitation/restlessness with DEET exposure. The AEL is derived from the dermal NOAEL from rat studies (> 1000 mg/kg bw/day; 820 mg/kg bw/day taking into account 82 % dermal absorption). Applying a safety factor of 100, the AEL repeated is set at 8.2 mg/kg bw/day.

Dermal penetration:

No dermal absorption study is available for kik ACTIV 20 % DEET. However, the data for the active substance are considered to be sufficient to address this endpoint for the product. 15 % DEET in ethanol and undiluted DEET resulted in < 10 % absorption in humans, or up to 20 % when corrected for radioactive recovery. For the alcohol-water-based product kik ACTIV 20 % DEET, the dermal absorption of 20 % derived in the CAR is considered adequate for the exposure assessment.

Exposure paths:

Kik ACTIV 20 % DEET is used as a pump spray by the general public. The route of exposure is mainly dermal. Oral exposure by hand-to-mouth transfer is not considered to be a significant route of exposure because of the taste of DEET and the content of the bitter agent Bitrex at an effective concentration. In addition, hands of children under 12 years should not be treated in order to avoid oral uptake.

Exposure by inhalation is considered to be negligible due to the large size of the droplets formed when the product is applied as a pump spray and due to the use outdoors. Consequently, the exposure by inhalation does not need to be assessed in a quantitative way.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Tier-2 assessment

[redacted]

Derivation of label instructions

From the risk assessment described above, it is concluded that the product can be used twice a day without restriction on adults and children over 12 years, but only once a day on children under 12 years on a reduced skin surface. The product should not be used on children under 2 years.

The following label instructions are required:

Application: adults and children over 12 years: apply to skin areas not covered by clothes, maximum twice a day.

Warning: do not use more than once a day on children between 2 and 12 years; the product should be applied by adults; do not apply on children's hands.

Not for use on children under 2 years. Apply sparingly, do not spray on the whole body but only to exposed skin areas. For facial applications, spray your hands and rub them over the face. Avoid areas around the eyes. Reapply if necessary, especially in case of strong perspiration or after bathing.

2.7.3.3 Risk for consumers via residues

Not relevant, as no contamination of food is expected.

2.8 Risk assessment for the environment

Kik ACTIV 20% contains DEET as the only active substance at a concentration of 20 % (w/w). The environmental exposure and risk assessment is based on the assessment of DEET as described in the CAR.

2.8.1 Environmental effects assessment

2.8.1.1 Effects assessment of the active substance

The environmental effects assessment for DEET is described in the Competent Authority Report (CAR) by the Rapporteur Member State Sweden. No further studies related to the environmental effects of DEET have been submitted.

2.8.1.2 Effects assessment of the biocidal product

Despite the higher amount of active substance in the product kik ACTIV 20% DEET it can be regarded as similar to the representative product assessed in the course of the Annex I inclusion procedure. There is no evidence that any ingredient may significantly influence the ecotoxicology of the active substance

in the product. The product kik ACTIV 20% DEET contains environmentally classified co-formulants in amounts that do not significantly contribute to the classification of kik ACTIV 20% DEET. No substances of concern regarding the environment have been identified in the biocidal product kik ACTIV 20% DEET. As a consequence, ecotoxicological studies with the product kik ACTIV 20% DEET were not deemed necessary. For the active substance DEET, information on fate and effects is derived from the CAR. The following PNEC values from the CAR are used in the environmental risk assessment of kik ACTIV 20% DEET:

$PNEC_{surface\ water}$ = 0.043 mg a.s./L

$PNEC_{sediment}$ = 0.0741 mg a.s./kg wwt sediment

$PNEC_{soil}$ = 0.0379 mg a.s./kg wwt soil

$PNEC_{STP}$ = > 10 mg a.s./L

All further parameters of DEET (fate and effect) have been taken from the List of Endpoints of the CAR on DEET.

2.8.2 Environmental exposure assessment

The product kik ACTIV 20% DEET can be regarded as comparable to the representative product assessed in the CAR in terms of the relevant routes of entry into the environment. In the CAR it is stated:

The products containing DEET can be expected to be used both indoors and outdoors. However, the direct outdoor emissions to water, air and soil are diffuse and probably minor during use, because of the direct application to human skin. The main route into the environment is instead assumed to be indirect, derived from when the public bath or shower after DEET application. The water compartment (both inland and marine) is therefore expected to be exposed to DEET mainly from STP effluents.

In the CAR of the active substance DEET two different approaches for the assessment of exposure via STP (Sewage Treatment Plant) effluents are provided: a tonnage based approach and a consumption based approach; the former being identified as the main approach by the Rapporteur Member State Sweden. The tonnage based approach as presented in the CAR covers the amount of DEET in Europe and therefore covers also the amount formulated in kik ACTIV 20% DEET.

In addition to the tonnage based approach, a consumption based exposure assessment is presented in the CAR as a supplementary approach. This consumption based assessment makes use of the emission scenario for PT1 due to the lack of an emission scenario for PT19. In view of the fact that kik ACTIV 20% DEET contains twice the concentration of active substance as the representative product OFF™ and for reasons of transparency, a consumption based approach specific to kik ACTIV 20% DEET is presented in the PAR. We calculated two tiers: Tier 1A, Tier 1B:

Tier 1A: It follows the assumptions made in the CAR where the amount of DEET consumed per application is understood to be independent of the concentration of the active substance- in the product (a.s. triggered consumption). In the CAR of DEET (Doc III-B6) average values for the amount of product applied to skin and clothing are given. The Swedish CA concluded that it would be more appropriate for the environmental risk assessment to use the average consumption rather than any higher percentile of individual usage since the calculated environmental exposure reflects the use of all inhabitants using the product. This average consumption rate of DEET on skin and clothing is described in Doc III-B6 of the CAR and is also the basis for emission calculations for kik ACTIV 20% DEET in Tier 1A:

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

According to the Emission Scenario Document (ESD) for PT 1, the environmental emissions are calculated as follows:

$Elocal_{water}$=Nlocal*Nappl*Finh*Fwater*$Qform_{appl}$*$Cform_{weight}$*Fpenetr*10E-6

$Elocal_{air}$ = Nlocal*Nappl*Finh*F_{air}*$Qform_{appl}$* $Cform_{weight}$ *Fpenetr*10E-6

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

2.8.2.1 PEC calculation for the aquatic compartment

Based on the calculated emission presented in Table 2.8-2 and the properties of the substance DEET, the environmental distribution of DEET has been derived by means of the methods described in the Technical Guidance Document on Risk Assessment, Part II (TGD):

$PEC_{microorganisms}$, the concentration in the untreated wastewater, is derived from $Clocal_{inf}$ according to TGD II 2.3.7.1. eq. 32:

$Clocal_{inf}$= ($Elocal_{water}$ * 10E6)/$EFFLUENT_{STP}$

where

$EFFLUENT_{STP}$ is the effluent discharge rate of STP (l/d)

which in turn can be calculated from TGD II 2.3.7.1. eq. 34:

$EFFLUENT_{STP}$ = CAPACITYstp * WASTEWinhab

where

$CAPACITY_{STP}$: capacity of the STP; default 10 000 eq (TGD II 2.3.6.6 table 9)

$WASTEW_{inhab}$: sewage flow per inhabitant; default 200 l/(d*eq)

The concentration in the treated STP effluent is (TGD II 2.3.7.1. eq. 33):

$Clocal_{eff}$ = $Clocal_{inf}$*$Fstp_{water}$

where:

$Fstp_{water}$: Fraction of emission directed to water by STP (Based on Simple Treat model: 0.13).

Thus,

PEC_{STP} = $PEClocal_{effluent}$ = $Clocal_{eff}$

[redacted]

[redacted]

According to TGD II 2.3.8.3, the local concentration in surface water during the emission episode, PEClocal$_{water}$, is:

PEClocal$_{water}$ = Clocal$_{water}$= Clocal$_{eff}$/[(1+Kpsusp*SUSPwater*10E-6)*DILUTION]

where:

Kp$_{susp}$: solids-water partition coefficient of suspended matter; Kp$_{susp}$=Foc$_{susp}$*Koc (Foc$_{susp}$: 0.1 (default));

and Koc: 43.3 (measured)); 0.1*43.3= 4.33 l/kg

SUSP$_{water}$: conc of susp matter in the river; default: 15 mg/l

DILUTION: dilution factor; default: 10

[redacted]

According to TGD II 2.3.8.4, the concentration of DEET in sediment relates to the concentration in freshly deposited sediment; therefore, the default properties of suspended matter were used in conjunction with the surface water concentrations of DEET as determined by the following equations:

PEClocal$_{sediment}$= (K$_{susp-water}$ / RHO$_{susp}$) x 1000 x PEC local$_{water}$
Where:
K$_{susp-water}$: the suspended matter-water partitioning coefficient parameter = 1.98 m^3/m^3.

RHO$_{susp}$: Bulk density of suspended matter = 1150 kg/m^3

The calculated PEClocal $_{sediment}$ values are the following:

Tier 1A: PEClocal $_{sediment}$ = 0.044 mg/kg wwt

Tier 1B: PEClocal $_{sediment}$ = 0.04 mg/kg wwt

2.8.2.2 PEC calculation (terrestrial compartment) according to TGD

The PEC in soil is calculated as the local concentration in agricultural soil averaged over 30 days after sludge application. The concentration just after the first year of sludge application is given by:

$$Csludge_{soil}(0) = \frac{C_{sludge} \times APPL_{sludge}}{DEPTH_{soil} \times RHO_{soil}}$$

Where:
C$_{sludgesoil}$ (0) = concentration in soil due to sludge in first year at t=0 (mg/kg)
C$_{sludge}$ = concentration in dry sewage sludge (mg/kg)
APPL$_{sludge}$ = dry sludge application rate (TGD II) = 0.5 kg/m2 ·yr
DEPTH$_{soil}$ = mixing depth of soil (TGD II) = 0.2 m
RHO$_{soil}$ = bulk density of soil (TGD II) = 1700 kg/m^3

The concentration in dry sewage sludge is given by:

$$Csludge = \frac{Fstp_{sludge} \times Elocal_{water}}{SLUDGERATE}$$

Where:
$Fstp_{sludge}$ = fraction of emission directed to sludge by STP (appendix II of TGD II) = 0.004
$Elocal_{water}$ = local emission rate to water during episode (mg/d)
SLUDGERATE = rate of sewage sludge production (TGD II) (kg/d)

At the end of each year, a fraction of the initial concentration remains in the top-soil layer (Facc). After 10 applications of sludge the concentration in soil $Csludge_{soil\ 10}(0)$ is given by:

$$Csludge_{soil\ 10}(0) = Csludge_{soil\ 1}(0) \times \left[1 + \sum_{n=1}^{9} Facc^{n}\right]$$

Where:
$Facc = e^{-365\,k}$,
and k is the first order rate constant for removal from top soil; it is 0.023 d^{-1} for the active substance DEET.

Emissions to air are considered negligible. The PEC in agricultural soil averaged over 30 days is then given by:

$$PECsoil_{30d} = Csludge_{soil\ 10}(0) \times \frac{\left(1 - e^{-k \cdot t}\right)}{k \cdot t}$$

[redacted]

[redacted]

2.8.2.3 PEC calculation (groundwater)

The overall assumption of the CAR is that the only exposure route to groundwater is via the application of sludge from STPs. Accordingly, the PEC in groundwater is calculated as the PEC in pore water from the local concentration in agricultural soil averaged over 180 days after sludge application:

$$PEClocal_{soil,\ porew} = \frac{PEClocal_{soil} \times RHO_{soil}}{K_{soil\text{-}water} \times 1000}$$

$PEC_{groundwater} = PEClocal_{soil,\ porew}$

Where:

$PEC_{groundwater}$= Predicted environmental concentration in groundwater (mg/L)
$PEClocal_{soil,\ porew}$= Predicted environmental concentration in soil porewater (mg/L)
$PEClocal_{soil}$= Predicted environmental concentration in local soil (mg/kg_{wwt})
RHO_{soil} = bulk density of wet soil (default value=1700 kg/m^3)

$K_{soil-water}$= soil-water partitioning coefficient (calculated using eq. 24,TGD) It has been estimated as 1.499 m^3/m^3

[redacted]

Table 2.8-3: Summary of data used and assumptions made to calculate PECgw for DEET in FOCUS PEARL scenarios.

Parameters	Values
Model used	FOCUS PEARL ver. 4.4.4
Years of simulation	26 (including 6 yrs "warming-up" period)
[redacted]	[redacted]
Date of application	1 October annually for 20 years [b]
Molar mass	191.3 g/mol
Vapour pressure	0.23 Pa (25°C)
Water solubility	11200 mg/L (25°C)
Kom	25.1 L/kg [c]
Freundlich exponent 1/n	0.9 (FOCUS default)
DT50 soil	30 days (12°C) [d]
Coefficient for uptake in plants	0 (worst-case assumption)

[redacted]

b Autumn application assumed to represent a worst-case situation.
c Calculated from Koc as 43.3/1.724.
d In accordance with TGD, Part II 2.3.6.5, for ready biodegradable substances

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

It has to be emphasized that the application of sewage sludge from STPs to agricultural land is not allowed in Switzerland (ORRChem; RS 814.81, annex 2.6, chapter 5.2).

2.8.2.4 Exposure monitoring in Switzerland – data published in the open literature

Measured concentrations (MECs; Table 2.8-5) from surveys conducted in Swiss rivers as well as in STP effluents are compared to the PECs in surface water and in the STP. MECs are all much lower than the PECs based on consumption. The highest surface freshwater concentration found in recent surveys was 1.04 µg/l, which is within the same range as the estimated realistic worst case PEC value calculated in EUSES (3.3 µg/l) for the tonnage based approach in the CAR. The average concentration found in STP effluent was 0.593 µg/l, which is below the estimated realistic worst case PEC value calculated in EUSES (32.2 µg/l) for the tonnage based approach in the CAR.

Table 2.8-5: Environmental monitoring data for DEET in Switzerland

Area information	Concentrations found	Reference
Surface freshwater Switzerland, canton Zürich – catchment basins of the rivers Furtbach, Jonen and Reppisch	**Highest value: 1.04 µg/l**	[redacted] 2010.
Surface freshwater Switzerland, canton Luzern – rivers in Aargau and Luzern	**Highest value: 0.187 µg/l** **Average value: 0.0127 µg/l**	[redacted] 2010.
Surface freshwater and STP-effluents in Switzerland Micropol database, status April 2010	**Surface water - average value: 135 ng/l** **Lake Konstanz: 87 ng/l in 1m depth** **STP effluent – average value: 593 ng/l**	[redacted] 2010.
Groundwater **NAQUA monitoring results**	**No detection**	**FOEN report 03/09**

It is important to consider that there is a significant uncertainty associated with measured values due to temporal and spatial variation. Such temporal fluctuations are of particular relevance for the consumption of DEET due to the seasonality in its application: the highest values expected during peak insect season. MECs may also show geographical variations.

References

[redacted](2010). Zustand der Fliessgewässer in den Einzugsgebieten von Furtbach, Jonen und Reppisch; AWEL – Amt für Abfall, Wasser Energie und Luft, Messkampagne 2008/2009; Baudirektion Kanton Zürich

[redacted](2010). Pestizide in Aargauer und Luzerner Fliessgewässern; Untersuchungen 2002 - 2007; Kanton Aargau, Kanton Luzern

[redacted](2010). Mikroverunreinigungen - Beurteilungskonzept für organische Spurenstoffe aus kommunalem Abwasser; Studie im Auftrag des BAFU, Eawag, Dübendorf

FOEN report 03/09. Ergebnisse der Grundwasserbeobachtung Schweiz (NAQUA) Zustand 2004-2006

2.8.3 Environmental risk characterisation

The environmental risk characterization for biocidal active substances in the context of Article 5 and Annex VI of Directive 98/8/EC involves the comparison of PEC and PNEC values for each relevant environmental compartment as well as for non-target organisms. For this purpose Risk Characterization Ratios (PEC/PNEC) are calculated for the aquatic and terrestrial compartments as shown in Table 2.8-8. All calculated PEC/PNEC ratios are below 1 meaning that the risk to the environment for these compartments is acceptable.

According to the CAR no risk for secondary poisoning has been identified for DEET based on the low BCF (biococentration factor) values (see 4.1.4 in doc II-A). No additional assessment of secondary poisoning has been performed.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

In Switzerland the application of sewage sludge from STPs to agricultural land is not allowed (Chemical Risk Reduction Ordinance (ORRChem, RS 814.81, Annex 2.6, point 5). Consequently, a risk for the contamination of groundwater through the application of sewage sludge does not have to be considered in Switzerland.

2.9 Measures to protect man, animals and the environment

Methods and precautions concerning handling and use

The instructions for use must contain the following indications:

Apply sparingly, do not spray the whole body but only exposed skin areas. For facial applications, spray your hands and rub them over the face. Avoid areas around the eyes. Reapply if necessary, especially in case of strong perspiration or after bathing.

Adults and children over 12 years: do not use more than twice a day**.** Children 2 to 12 years: do not use more than once a day; the product should be applied by adults; do not apply on children's hands.

Not for use on children under 2 years.

Not water-resistant. Do avoid any contact with plastic material and fibres, varnished surfaces, and similar materials.

Labelling according to CLP: Flammable liquid and vapour - If medical advice is needed, have product container or label at hand - Causes serious eye irritation - Avoid contact with eyes - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing - Keep out of reach of children - Avoid breathing spray - Keep away from heat/sparks/open flames/hot surfaces - No smoking - Harmful to aquatic life with long lasting effects - Avoid release to the environment - Dispose of contents/container to in accordance with local/regional/national/ international regulations.

Use only in well-ventilated areas. Avoid spilling or spraying in enclosed areas. Keep away from all sources of ignition – Refrain from smoking.

Methods and precautions concerning storage

Provide solvent-resistant and impermeable floor. Keep only in original container. Do not store together with oxidizing agents. Do not store together with acids. Do not store together with food and animal food/diet. Keep/store out of reach of children. Keep container in a well-ventilated place. Keep container tightly closed. Protect from heat/overheating and from sun.

Methods and precautions concerning transport
Classification according to ADR/IMDG/IATA:
UN 1993
ADR: LQ 1 l, Transport category (tunnel restriction code) 3 (D/E)
EMS: F-E, S-E

Methods and precautions concerning fire
Suitable extinguishing media: Water spray jet, alcohol-resistant foam, dry powder
Extinguishing media that must not be used: Full water jet

Advice for fire fighters
Do not inhale explosion and/or combustion gases. Use self-contained breathing apparatus.
Cool containers at risk with water spray jet. Fire residues and contaminated fire fighting water must be disposed of in accordance within the local regulations.

Specific treatment in case of an accident, e.g. first-aid measures, antidotes, medical treatment if available; emergency measures to protect the environment

Personal precautions, protective equipment and emergency procedures
Keep away from all sources of ignition. Ensure adequate ventilation. High risk of slipping due to leakage/spillage of product.
Eye protection: Safety glasses.
Hand protection: In full contact butyl rubber, > 120 min (EN 374)
Skin protection: Solvent-resistant protective clothing.
Respiratory protection: Do not inhale gases/vapours/aerosols. If ventilation insufficient, wear respiratory protection. Short term: filter apparatus, filter A.

First aid measures
General: Change soaked clothing.
Eye contact: In case of contact with eyes rinse thoroughly with plenty of water.
Skin contact: When in contact with the skin unintentionally and in large amounts, clean with soap and water.
Inhalation: Ensure supply of fresh air. In the event of symptoms seek for medical treatment.
Ingestion: Rinse out mouth and give plenty of water to drink. Do not induce vomiting. Supply with medical care.
Most important symptoms and effects, both acute and delayed: Irritant effects. In very rare cases clinical symptoms of seizures, headaches, ataxia and/or agitation/restlessness have been associated with DEET exposure.
Indication of any immediate medical attention and special treatment needed:
Treat symptomatically. Forward the container, label and / or MSDS to the doctor.

Environmental precautions

Prevent spread over a wide area (e.g. by containment or oil barriers). Do not discharge into the drains/surface waters/groundwater.

Methods and material for containment and cleaning up

Pick up with absorbent material (e.g. sand, universal absorbent, diatomaceous earth). Dispose of absorbed material in accordance within the regulations.

Procedures for waste management of the biocidal product and its packaging

Dispose of contents/container in accordance with local/regional/national/ international regulations. According to European Waste Catalogue and Swiss waste legislation: Dispose of the biocidal product as ”pesticides” (waste no. 200119[3]).

Dispose of the empty packaging as “plastic packaging” (waste no. 150102).

Emergency measures to protect the environment

In case of accidental release, contain and clean up spill with absorbent material (e.g. sand, universal absorbent, diatomaceous earth). Dispose of absorbed material in accordance with the local regulations.

Procedures for waste management of the biocidal product and its packaging

Dispose of as hazardous waste or in accordance with local, national, international regulations. Uncontaminated packaging may be taken for recycling. Contaminated packaging should be disposed of as hazardous waste. The empty bottle can be disposed of without cleaning.

Possibility of destruction or decontamination following release in or on the following:

Release into the air is not relevant for the product. Do not discharge into the drains/surface waters/groundwater. In case of large spill, responsible authorities must be informed. Avoid any release in/on soil. In case of a large spill without immediate containment, it may be required to collect and dispose of the top soil layer as waste. Inform responsible authorities of spill.

Observations on undesirable or unintended side-effects, e.g. on beneficial and other non-target organisms

None of the co-formulants of the product is present in concentrations that are of ecotoxicological concern, therefore only DEET is considered to be relevant for this point. In the Competent Authority Report (CAR) for DEET it is stated that the degree of indirect exposure as a result of use of the active substance in this biocidal product is negligible, as the primary route of exposure is direct application to the skin. Additionally, the environmental risk assessment shows that there is minimal direct transfer of the active substance to the environment during use. Undesirable side-effects on non-target organisms are therefore not expected.

[3] dangerous waste in EU

3 Proposal for decision

Based on the evaluation in this report, in accordance with Directive 98/8/EC[4], it is concluded that kik ACTIV 20 % DEET is sufficiently effective as repellent and has no unacceptable effects on human health and the environment, provided the product is used properly according to the provisions of the authorisation. Therefore, the Swiss CA proposes the authorisation of the biocidal product kik ACTIV 20 % DEET as a repellent against mosquitoes.

Particular conditions:

- The biocidal product kik ACTIV 20 % DEET contains 20.0 % (w/w) DEET.
- Minimum purity of the active substance DEET as manufactured: 970 g/kg.
- Product Type: PT 19.
- Kik ACTIV 20 % DEET contains the substance of toxicological concern propan-2-ol (> 25 %), which has been taken into consideration in the classification and labelling of the product.
- Efficacy: The authorisation is granted as a repellent for uses against mosquitoes. Only claims against mosquitoes are allowed. The protection times to be declared on the label: protects against mosquitoes on average 5 hours.
- Use restrictions:
- The intended use of kik ACTIV 20 % DEET as a repellent against mosquitoes is similar to the representative product in the CAR on DEET. The exposure assessment was therefore performed in a first tier in the same exposure scenarios, based on two applications per day. In these exposure scenarios, the resulting dermal DEET exposure is increased proportionally to the higher DEET concentration compared to the representative product and exceeds the acceptable exposure level when used on children under 12 years. Use restrictions for these children are therefore necessary according to a second tier assessment and have to be on the label of kik ACTIV 20 % DEET. The following label instructions are required:
- Application: Adults and children over 12 years: apply to skin areas not covered by clothes, maximum twice a day.
- Warning: Do not use more than once a day on children from 2 to 12 years; the product should be applied by adults; do not apply on children's hands. Not for use on children under 2 years. Apply sparingly, do not spray on the whole body but only to exposed skin areas. For facial application, spray your hands and rub them over the face. Avoid areas around eyes. Reapply if necessary, especially in case of strong perspiration or after bathing.
- All conditions outlined in the summary of product characteristics (SPC, Annex 1 of this document) are applicable.

[4] See the annotation to the legal framework in the preface of this document.

Annex:

1. **Summary of product characteristics**
2. **List of studies reviewed**
3. **Analytical methods residues – active substance**
4. **Toxicology and metabolism –active substance**
5. **Toxicology – biocidal product**
6. **Exposure assessment of non-professional operators and the general public**
7. **Efficacy data**

Annex 1: Summary of product characteristics

(a) Product trade name: kik ACTIV 20% DEET

(b) (i) Qualitative and quantitative information on the composition of the biocidal product

NB: This information is confidential and should not be disclosed to third parties

Active substance(s)				Contents				
Common name	IUPAC name	CAS number	EC number	Concentration	Unit	w/w (%)	Minimum purity (% w/w)	Same source as for Annex I inclusion
DEET	N,N-Diethyl-3-methylbenzamid	134-62-3	205-149-7	200	g/kg	20	97.0	☒ yes ☐ no

Co-formulants					Contents				
Common name	IUPAC name	Function	CAS number	EC number	Concentration	Unit	w/w (%)	Classification	Substance of concern
Confidential – see R4BP									

(b) (ii) Is the product identical to the representative product, assessed for the purpose of the Annex I inclusion?

☐ **yes** ☒ **no** ☐ **unknown**

If not, briefly describe the difference.

The product assessed for the purpose of the Annex I inclusion is a 15% DEET self-pressurized aerosol spray while the product assessed in this product assessment report is a 20% DEET pump spray.

(b) (iii) Does the biocidal product contain or consist of Genetically Modified Organisms (GMOs) within the meaning of Directive 2001/18/EC?

☐ **yes** ☒ **no**

If yes, does the product comply with Directive 2001/18/EC?

☐ **yes** ☐ **no**

A copy of any written consent(s) of the competent authorities to the deliberate release into the environment of the GMOs for research and development purposes where provided for by Part B of the above-mentioned Directive was provided.

(c) Manufacturer of the active substance (name and address including location of plant)

Name of the active substance: DEET

Manufacturer

Company Name:	Vertellus Performance Materials Inc.			
Address:	2110 High Point Road			
City:	Greensboro	Postal Code: NC 27403	Country:	USA
Telephone:	+1-336-292-1781	Fax: +1-336-834-4974	E-Mail:	msds@vertellus.com

(d) Formulator of the biocidal product (name and address including location of plant(s))

Formulator

Company Name:	Medena AG			
Address:	Industriestrasse 16			
City:	Affoltern am Albis	Postal Code: 8910	Country:	Switzerland
Telephone:	+41 44 762 57 57	Fax:+41 44 762 57 58	E-Mail:	info@medena.ch

Physical state and nature of the biocidal product:

(e) Type of formulation: Propan-2-ol-water based solution

(f) Ready-to-use product: ☐ no ☒ yes

Classification and labelling statements of the biocidal product:

(g) Product classification according to GHS: Flam. Liq. 3H226. Eye Irrit. 2 H319. STOT SE 3 H336

(h) Hazard statement according to GHS: H226; H319; H336. P101, P102, P103; P210, P261, P270; P304, P340, P305, P351, P338; P501.

(i) Signal word and pictograms according to GHS: WARNING; GHS02, GHS07.

(j) Supplemental label elements according to GHS: Contains: DEET, Propan-2-ol. EUH208: Contains Lilial. May produce an allergic reaction.

Intended uses and efficacy:

(k) PT: 19, insect repellent.

(l) Target harmful organisms: Mosquitoes (Culicidae, Code I.3.12.1)

(m) Development stage of target organisms: adult mosquitoes.

(n) Function/mode of action: preventively; repellent effect could be olfactory-based.

(o) Field of use: Insect repellent to be applied directly onto human skin.

(p) Application aim: Insect repellent to prevent from biting and sucking mosquitoes.

(q) User category: Non-professional, general public (consumer use).

(r) Application method: Spraying from a manual pump spray.

Directions for use:

(s) Manner and area of use: The biocidal product is supplied to the consumer in plastic bottles of 100 ml, equipped with pump spray devices. It is sprayed onto the skin as a repellent against mosquitoes. The use is seasonal, during outdoor activities, to be applied on the uncovered parts of the skin. Protection time is about 5 hours.

(t) Conditions of use: The biocidal product must be sprayed only on the exposed skin area and not more than twice a day, and not more than once a day for children under 12 years. Not for use on children under 2 years.

(u) Instructions for safe use of the product: Use not more than twice a day, and not more than once a day for children under 12 years. Not for use on children under 2 years. Avoid contact with the eyes. Keep out of reach of the children.

(v) Particulars of likely direct or indirect adverse effects and first aid instructions Particulars of likely direct or indirect adverse effects and first aid instructions: Irritating to eyes. Very rare case reports have associated poisoning symptoms of seizures, headaches, ataxia and/or agitation/restlessness with DEET exposure.
In case of contact with eyes rinse thoroughly with plenty of water. In case of ingestion rinse out mouth and give plenty of water to drink. Do not induce vomiting. Seek medical advice and have product container or label at hand.

(w) Instructions for safe disposal of the product and its packaging: Dispose of contents/container in accordance with local, national, international regulations. Do not discharge into the drains/surface waters/groundwater.

(x) Conditions of storage and shelf-life of the product under normal conditions of storage: Provide solvent-resistant and impermeable floor. Keep only in original container. Do not store together with oxidizing agents. Do not store together with acids. Do not store together with food and animal food/diet. Keep/store out of reach of children. Keep container in a well-ventilated place. Keep container tightly closed. Protect from heat/overheating and from sun.

(y) Additional information: -

Annex 2: List of studies reviewed

List of new data[5] submitted in support of the evaluation of the active substance
n.a.

List of new data submitted in support of the evaluation of the biocidal product

Section No	Reference No	Author	Year	Title	Owner of data	Letter of Access		Data protection claimed	
						yes	no	yes	no
3.01	B3.1/02	[redacted]	2013	Determination of physico-chemical properties and storage stability test for kik ACTIV 20% DEET - **8 weeks interim report**; BioGenius GmbH, Bergisch Gladbach, Germany; Study No.: Mo4492 , 19.01.2013, GLP, unpublished	Martec Handels AG		x	x	
3.04	B3.4/01	[redacted]	2012	Final Report Determination of the Flash Point A.9 for kik ACTIV 20% DEET and GLP Study Plan; BioGenius GmbH; study no. Mo4489; 12.11.2012; GLP; unpublished	Martec Handels AG		x	x	
3.07	B3.7./03	[redacted]	2014	Deterrnination of physico-chemical properties and storage stability test for kik ACTIV 20%	Martec Handels AG		x	x	

5 Data which have not been already submitted for the purpose of the Annex I inclusion.

Section No	Reference No	Author	Year	Title	Owner of data	Letter of Access		Data protection claimed	
						yes	no	yes	no
				DEET - **table of interim results after 24 months**; BioGenius GmbH, Bergisch Gladbach, Germany, Study No.: Mo4492, 29.10.2014, GLP, unpublished;					
3.07	3.7./04	[redacted]	2015	Deterrnination of physico-chemical properties and storage stability test for kik ACTIV 20% DEET - **table of interim results after 36 months**; BioGenius GmbH, Bergisch Gladbach, Germany; Study No.: Mo4492, 28.10.2015, GLP, unpublished	Martec Handels AG		x	x	
3.07	B3.7/05	[redacted]	2016	Determination of physico-chemical properties and storage stability test for kik ACTIV 20% DEET - **table of interim results after 48 months**; BioGenius GmbH, Bergisch Gladbach, Germany; Study No.: Mo4492 , 02.11.2016, GLP, unpublished	Martec Handels AG		x	x	
3.07	B3.7/06	[redacted]	2017	**Final Report** Determination of physico-chemical properties and storage stability test for kik ACTIV 20% DEET; BioGenius GmbH, Bergisch Gladbach, Germany; Study No.: Mo4492, 04.01.2018, GLP, unpublished	Martec Handels AG		x	x	
3.08	B3.8/01	[redacted]	2012	Table of results and GLP Study Plan Determination of physico-chemical properties (including	Martec Handels AG		x	x	

Section No	Reference No	Author	Year	Title	Owner of data	Letter of Access		Data protection claimed	
						yes	no	yes	no
				particle size of spray droplets) and storage stability test for kik ACTIV 20% DEET; BioGenius GmbH; study no. Mo4492; 31.10.2012; GLP; unpublished					
4.01	B3.4/01	[redacted]	2012	Final Report Validation of Method MV062: Determination of N,N-Diethyltoulamide in kik ACTIV and Non-GLP Study Plan; BioGenius GmbH; study no. Mo4491; 30.10.2012; Non-GLP; unpublished	Martec Handels AG		x	x	
5.10	B5.10/01	[redacted]	2012	Study report Laboratory efficacy evaluation of the mosquito repellent kik ACTIV 20% DEET, Swiss TPH, CH-4002 Basel, ; Report/Study Number: not stated; 20.11.2012, Non-GLP; unpublished	Martec Handels AG		x	x	
5.10	B5.10/02	[redacted]	2017	Biological Test Report: Determination of the repelling efficacy of a product with 20 % DEET applied on human arms against Asian tiger mosquito, *Aedes albopictus*; BioGenius GmbH, D-51429 Bergisch Gladbach; Report/Study Number: BIO146b-17/Mo5943; 23.11.2017, Non-GLP; unpublished	Martec Handels AG		x	x	

Section No	Reference No	Author	Year	Title	Owner of data	Letter of Access		Data protection claimed	
						yes	no	yes	no
6.02.01	B6.2.1/01	[redacted]	2012	Dermatological report on human Patch Test - Test for primary skin irritation and hypersensitivity of human subjects after single application, kik ACTIV 25% DEET; dermatest®, Münster, Germany; Report/Study Number: not stated; 19.11.2012; Non-GLP; unpublished	Martec Handels AG		x	x	

Annex 3: Analytical methods residues – active substance

DEET

The analytical methods of the CAR are also suitable for this product.

Annex 4: Toxicology and metabolism –active substance

DEET

Threshold Limits and other Values for Human Health Risk Assessment

Summary			
	Value	Study	SF
AEL repeated	8.2 mg/kg bw/day*	90 day dermal study in rats	100
AEL medium-term	-	-	-
AEL acute	0.75 mg/kg bw/day	8-week oral capsule study in dogs	100

* corrected for a dermal absorption of approximately 82% in the rat

Inhalative absorption	Default 100 %
Oral absorption	85-91%
Dermal absorption	Less than 20% (when corrected for total recovery) of a dermally applied dose of DEET, either as a 15% (w/w) solution in ethanol or as the undiluted technical grade material, is absorbed through the skin during an 8-hour exposure period in humans.

Classification	
with regard to toxicological data (according to the CLP):	Acute Tox. 4 ; H302 Skin Irrit. 2; H315 Eye Irrit. 2; H319

A summary of the hazard identification and effects assessment from the DEET Assessment Report (European Commission, 11 March 2010, page 11 to 14) is presented here:

The absorption, distribution, metabolism, and excretion studies (ADME) show that, more than 80% of DEET given orally to rats is absorbed and excreted in the urine. DEET showed no evidence for accumulation. When applied dermally to rats 74-78% is absorbed and excreted in the urine. The dermal absorption of DEET occurred at a slower rate than oral absorption (peak plasma concentration ≥4 hr vs. <1 hr, respectively). Seventy-four to ninety-one percent of the administered radioactivity was excreted via urine and about 3-7% was excreted via the faeces. DEET was metabolised completely in all oral and dermal treatment groups with little or no parent compound excreted in the urine. DEET is extensively metabolized to 2 major metabolites, m-[(N,N-diethylamino)carbonyl] benzoic acid and m-[(ethylamino)carbonyl]benzoic acid. DEET is absorbed slowly (peak plasma concentration ≥8 hr), metabolised completely, and excreted rapidly when applied to human skin. Less than 20% (when corrected for total recovery) of a dermally applied dose of DEET, either as a 15% (w/w) solution in ethanol or as the undiluted technical grade material, is absorbed through the skin during an 8-hour

exposure period. Plasma level studies were performed in rats (oral and dermal exposure) and in dogs (oral exposure) to compare plasma levels and area under the curve (AUC) at NOAEL levels with human plasma levels and AUC (dermal exposure).

The acute toxicity studies show that the oral LD50 for DEET warrants a classification as Xn, R22, Harmful if swallowed. The rabbit acute dermal LD50 of DEET is greater than 2000 mg/kg and the rodent acute dermal LD50 is > 5000 mg/kg. The acute inhalation LD50 of DEET is greater than 2.02 mg/L, the highest concentration tested which is lower than the upper EU classification limit, acute toxicity category 4 according to GHS and recommended highest dose according to the OECD guideline. However, in light of animal welfare consideration, testing of animals at higher doses is not considered warranted since inhalation exposure to the product is considered negligible. Even if no mortality was observed at the limit dose tested (2.02 mg/l/4h), it can't be fully ensured that the LC50 would be > 5mg/l/4h. The classification R20 can therefore not be fully ruled out based on this test.

DEET is slightly irritating to the skin. However, repeated dose studies (dermal) in pigs and rats showed that repeated dermal dosing resulted in dermal irritation at all doses tested and remained at study end. A classification as R36, Irritating to eyes is not warranted based on the results in the eye irritation test. However, the mean score for corneal opacity is 1 for three animals at 24, 48 h and 72 h, and warrants a classification as Eye Irrit 2 – H319 according to the GHS.

DEET did not result in a skin sensitisation response in the Buehler test.

Several repeated dose toxicity studies for the oral and dermal route was submitted for DEET. Male rats were the most sensitive gender to DEET for repeated dose effects. Male rats developed alpha2u-globulin nephropathy that is considered gender and species specific. This effect was not considered relevant for risk assessment. Clinical signs of neurotoxicity also occurred in dogs shortly after oral dosing. In both rats and dogs decreased body weights was observed after oral dosing with DEET. Dermal application of DEET to rats and minipigs resulted mainly in skin irritations but no systemic toxicity or pathological findings. DEET showed no genotoxic potential in a battery of in vitro tests in bacteria and mammalian cells. DEET did not result in an increase in tumours in rats and mice and was not considered oncogenic in the carcinogenicity studies.

The teratogenicity of DEET was investigated in two species, rat and rabbit. The studies were performed according to the OECD 414 guideline and both studies were preceded by dose finding studies. However the studies were performed prior to the latest revision of the OECD guideline in 2001 and has therefore some discrepancies compared to the current guideline. The mothers were treated only during the organogenesis and not to scheduled sacrifice. The studies therefore have some limitations in assessing potential effects during later stages of embryonal development. However considered that the 2-generation study in rats gave no further indications of an embryotoxic or teratogenic effects at comparable doses, these studies are considered acceptable for risk assessment purposes. There were no teratogenic effects observed in the studies up to maternally toxic doses, embryotoxicity was only expressed as decreased foetal body weights (rats).

There were no effects on reproduction in a 2-generation study in rats. Parental males were the most sensitive gender based on kidney effects that were considered species specific and irrelevant for risk assessment to man. There were no effects on reproduction. The effects observed in mothers and offspring were reduced body weights, in offspring during later parts of the lactation period. The study was performed in 1989 and shows therefore some discrepancies compared to the current OECD 416

guideline. The 2-generation study was considered suitable for risk assessment despite deviations from the current OECD 416 guideline.

No studies were submitted by the applicant that specifically investigated neurotoxicity after dermal application. However, neurotoxicity of DEET was investigated in an acute oral delayed neurotoxicity study and in a delayed neurotoxicity study following multigenerational exposure in rats. In the acute neurotoxicity study an increased response time to heat stimulus and decreased rearing activity at one hour post-dose was observed in the high dose group. The multigenerational exposure resulted in a transient increase in locomotor activity in the high dose group. The multigenerational neurotoxicity study has some limitations in assessing the risk on exposure to the developing brain in children since there was no information on exposure to pups during lactation and no functional tests were performed on young animals.

Other studies were submitted to support the conclusion that the kidney effects observed in rats were species specific.

Medical data were collected from various resources, direct observations from clinical cases and published literature. No studies on manufacturing plant personnel were submitted in the dossier. A report was submitted where detailed information was collected in a registry from individuals who used DEET-containing insect repellents and reported local, neurologic or systemic effects. Information on concentrations of DEET products used was available but information was not obtained for application rate. In a 7 year span 12 reports of cases of major (temporary) severity were possibly related to DEET (seizure, other neurological, dermal, and other) and one case of major severity was probably related to DEET (non-neurological). Fifty-nine cases with seizures were reported with 90% of the seizure cases of major or moderate severity. People with underlying seizure disorder were not disproportionately represented (6.8%) in these 59 cases. It was concluded in the report that most of the seizures were probably idiopathic since these are not uncommon, especially in children. Furthermore it was also concluded in the report that because over 5 billion applications of DEET occurred in the population during the 7 year span the overall risk of clinically significant adverse events is extremely low.

Setting of an ADI is not considered necessary, since exposure to DEET is via direct application to skin.

The ARfD of a chemical can be defined as "an estimate of a substance in food and/or drinking water, normally expressed on a body weight basis, that can be ingested in a period of 24 hours or less, without appreciable health risk to the consumer on the basis of all the known facts at the time of evaluation" (EU guidance, 7199/VI/99/rev 6). By this definition, the setting of ARfD for DEET which is used as an insect repellent directly applied to the skin (PT19) is considered not to be relevant by RMS, since there will be no exposure of DEET via food or drinking water. However since the use of DEET containing repellents include application to the skin on hands and on clothing, there is a risk of ingestion by hand to mouth behaviour, especially in children and an AELacute is proposed to be set. According to the data base on toxicological effects there is a possibility of acute toxicity manifested as neurotoxicity. The lowest relevant NOAEL for neurotoxicity is based on clinical signs of neurotoxicity. An 8-week oral capsule study in dogs, terminated at day 5 due to severe toxicity, yielded a NOAEL of 75 mg/kg/day based on clinical signs of neurotoxicity (abnormal head movements and ptyalism, emesis, ptosis, ataxia, convulsions). Division by a standard assessment factor of 100, gives an AELacute of 0.75 mg/kg bw/day.

DEET is used as an insect repellent directly applied to the skin. Furthermore, there is according to the applicant currently no production of DEET within the European Union. The setting of an AOEL for

professional use, bystanders and re-entry workers is therefore not considered relevant. For risk assessment in consumers an AELrepeated of 8.2 mg/kg bw/day is set based on the 90 day dermal study in rats with a NOAEL of 1000 mg/kg bw/day, the highest achievable dose and using a standard assessment factor of 100 and correction of a dermal absorption of approximately 82% in the rat. It was decided at TM II 2009, to use the dermal study in rats, even though rat was clearly not the most sensitive species with respect to neurotoxic effects. It was discussed to use an additional factor for correcting for the difference in species sensitivity. At the same time it was also discussed that the assessment factor could be reduced due to the availability of human plasma data and plasma data in both rats and dogs, as well as metabolism data in humans and rats. The use of a standard assessment factor of 100 was therefore considered appropriate.

Annex 5: Toxicology – biocidal product

kik ACTIV 20% DEET

General information
The product kik ACTIV 20% DEET is a colourless clear alcohol-water-based liquid solution, supplied as a pump spray, containing DEET at a concentration of 20.0 %.

Acute toxicity, irritancy and skin sensitisation of the preparation (Annex IIIB, point 6.1, 6.2, 6.3)	
Rat LD50 oral (OECD 420)	No study has been performed with kik ACTIV 20% DEET. Using the ATE method in CLP, an ATEmix of 9460 mg/kg bw is calculated for the product.
Rat LD50 dermal (OECD 402)	No study has been performed with kik ACTIV 20% DEET. The acute dermal toxicity of DEET was tested in rats and rabbits and resulted in acute dermal LD_{50} values of > 5000 mg/kg bw and > 2000 mg/kg bw. The product is not classified applying the criteria of CLP.
Rat LC50 inhalation (OECD 403)	No study has been performed with kik ACTIV 20% DEET. The acute inhalation toxicity of DEET was tested in male and female rats and resulted in an acute inhalation LC_{50} value > 2.02 mg/L, the highest concentration studied. The product is not classified applying the criteria of CLP.
Skin irritation (OECD 404)	No study has been performed with kik ACTIV 20% DEET. kik ACTIV 20% DEET is not classified based on bridging data of a similar product (see Annex 9).
Eye irritation (OECD 405)	No study has been performed with kik ACTIV 20% DEET. Based on the irritating potential of the active ingredient DEET and of Propan-2-ol, kik ACTIV 20% DEET has to be classified regarding eye irritation.
Skin sensitisation (OECD 429; LLNA)	No study has been performed with kik ACTIV 20% DEET. With the exception of one component in the biocidal product

Acute toxicity, irritancy and skin sensitisation of the preparation (Annex IIIB, point 6.1, 6.2, 6.3)		
	which itself is a mixture, neither the active ingredient DEET nor any other (co-) formulant contained in kik ACTIV 20% DEET are classified with respect to skin sensitisation. Since the net concentration of substances in the skin sensitising component does not exceed the trigger of 1%, a classification of kik ACTIV 20% DEET as a potential skin sensitiser is not required according to the CLP regulation for the classification of mixtures with respect to skin sensitization.	

Additional toxicological information (e.g. Annex IIIB, point 6.5, 6.7)
Short-term toxicity studies Toxicological data on active substance(s) (not tested with the preparation) Toxicological data on non-active substance(s) (not tested with the preparation) Further toxicological information

Classification and labelling proposed for the preparation with regard to toxicological properties (Annex IIIB, point 9)	
Directive 1999/45/EC	Xi; R36, R67. S2, S23, S26, S46, S51
Regulation 1272/2008/EC	GHS07; Eye Irrit. 2 – H319, STOT SE 3 – H336. P101, P102, P261, P305, P351, P338.

Annex 6: Exposure assessment of non-professional operators and the general public

Figure 1 Human health exposure and risk assessment applying approach in the DEET CAR (based on the 75th percentile values [redacted] 1990, reflecting application to 64% of body surface)

	Application rate/person (64% body surface) according to [redacted] [mg product]*	Body weights as considered in the DEET CAR [kg]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Male adult	5747.00	70.00					
female adult	3831.00	60.00					
child >12 years	6360.00	62.80					
Child <12 years	5440.00	25.50					
Dermal penetration for DEET according to CAR [%]	20						
AEL_{dermal} in mg/kg bw per day according to CAR	8.20						
DEET - content of kik ACTIV 20% DEET (15% is the concentration in the product assessed in the CAR)	20.0						

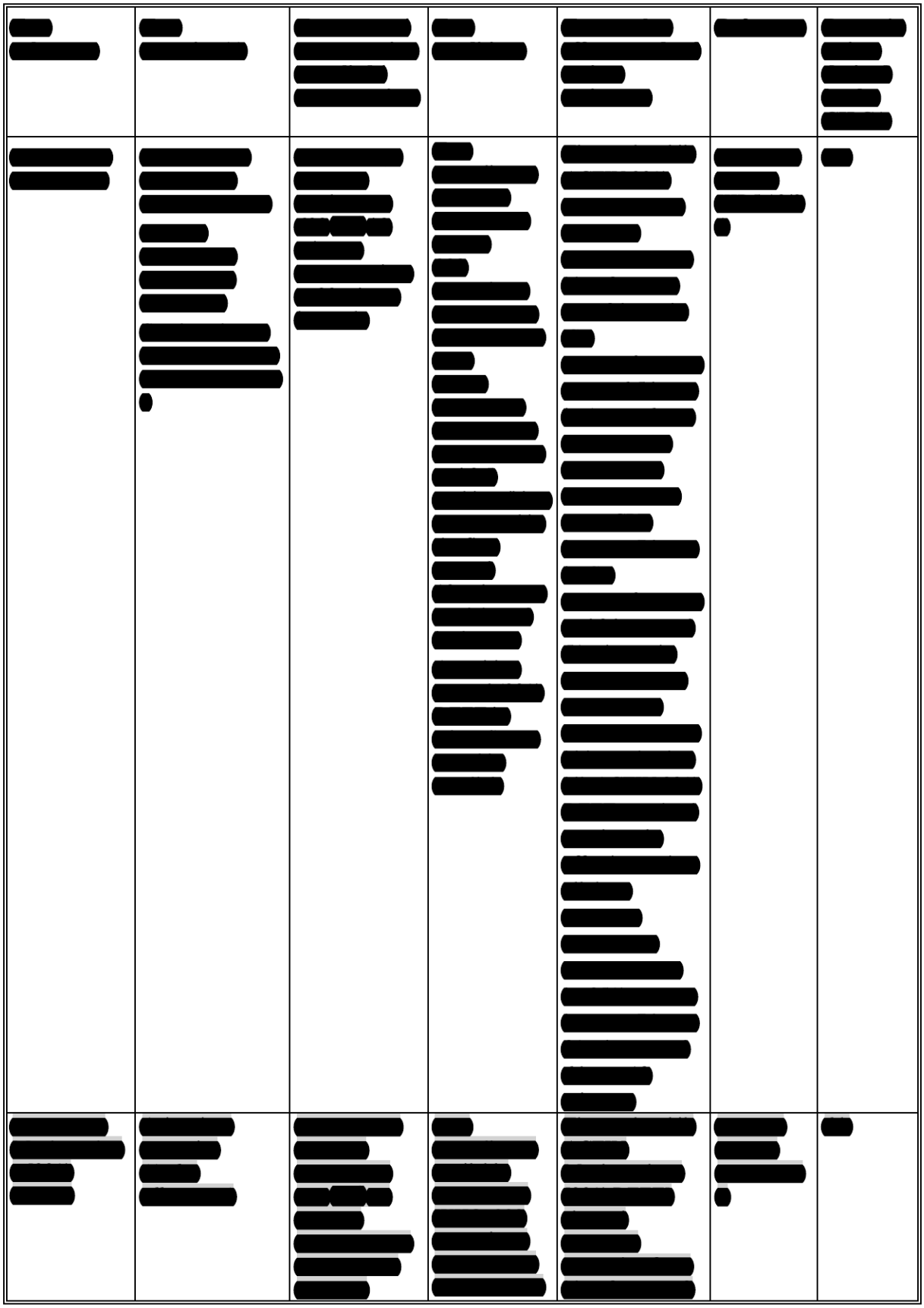
*The application rates per person for the product have been calculated based on the use rates for the active substance DEET as reported in the DEET-CAR, taking into consideration that the product in the CAR contained 15% DEET, while the average DEET concentration of the products covered in [redacted] usage study was 26.1%. It is assumed that the use rate in terms of amount of product applied per person is independent of the active substance concentration. Thus, kik ACTIV 20% DEET will be applied at the same use rates as the 15% reference product in the CAR and the 26.1 % average DEET product of the usage study.

It needs to be highlighted that the following values always refer to treatment of 64% of the body surface (head, entire arms, entire legs, hand and feet).

- 1.5 g a.s. per adult male determined for product containing 26.1% DEET --> 5747 mg product/person/application
- 1.0 g a.s. per adult female determined for product containing 26.1% DEET --> 3831 mg product/person/application
- 1.66 g a.s. per child > 12 yrs. determined for product containing 26.1% DEET --> 6360 mg product/person/application
- 1.42 g a.s. per child < 12 yrs. determined for product containing 26.1% DEET --> 5440 mg product/person/application

n.a. = not applicable

Annex 7: Efficacy data



Test substance	Test organism(s)	Test system / concentrations applied / exposure time	Test conditions	Test results: effects, mode of action, resistance	Reference	Protection time derived by the CH CA
			[redacted]	[redacted]		