Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products

PRODUCT ASSESSMENT REPORT OF BIOCIDAL PRODUCT FOR MAJOR CHANGE OF NATIONAL AUTHORISATION APPLICATIONS

(submitted by the evaluating Competent Authority)

IR 35/10

Product type 19

Ethyl butylacetylaminopropionate (IR3535)

Case Number (NA-BBP) in R4BP: BC-AE020176-67
Case Number (NA-MAC) in R4BP: BC-HJ066500-47

Evaluating Competent Authority: France

Date: April 2019
Updated: December 2023

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Note to the reader

This consolidated PAR is based on the PAR of the first authorisation of the reference product Insect Repellent Pump Spray IR3535 20% (Asset nr.: BE-0012319-0000) and has been updated with the NA-MAC data on the product IR 35/10.

In this consolidated PAR, the assessments related to the new data of the product IR 35/10 are at the end of the concerned section and are highlighted in grey.

The SPC (in the section 2.1 of the PAR) corresponds to the currently authorised uses in France of the product IR 35/10.

HISTORY OF THE DOSSIER

Application type	refMS /eCA	Case number in the refMS	Decision date	Assessment carried out (i.e. first authorisation / amendment / renewal)
NA-APP	*BE*	BC-BL013906-42	16/05/2017	Initial National Authorisation of Insect Repellent Pump Spray IR3535 20%
NA-MRP	*FR*	BC-UW020009-14	17/04/2019	Mutual recognition for Authorisation of Insect Repellent Pump Spray IR3535 20%
NA-BBP	*FR*	BC-AE020176-67	07/05/2019	National authorisation of same biocidal product IR 35/10
NA-AAT	*FR*	BC-HB065832-51	09/04/2021	Amendment of national authorization of biocidal product IR 35/10
NA-MAC	*FR*	BC-HJ066500-47	04/01/2024	Major change application: - Extension of use of the repellent product to horses and ponies.

1 CONCLUSION

Insect Repellent Pump Spray IR3535® 20% can be authorized following Art.19(1) of Regulation (EU) No 528/2012 as a ready-to-use repellent (PT19) to be used against mosquitoes and ticks in temperate areas and should only be applied once per day on uncovered parts of the face, hands, arms, legs and feet.

Within two years of the publication by the European Chemicals Agency of Union guidance on how to generate efficacy data for insect repellents at the recommended application rates, the authorization holder shall submit data to confirm the minimum effective application rate. Those data shall be submitted in the form of an application for a change of the authorization in accordance with Commission Implementing Regulation (EU) No 354/2013.

Remark:

- This product is not authorized for use on children below 1 year old.
- This product is not authorized for use in tropical conditions, due to lack of efficacy studies.
- This product is not authorized for use on clothes, due to lack of efficacy studies
- This product is not authorized to be used against biting flies (stable flies, black flies, sand flies), deer flies, biting midges, house flies, wasps and bees, due to lack of efficacy studies

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Physico-chemical properties and analytical methods:
The new packagings are considered acceptable.

Human health:
The risk for humans and animals is acceptable when the RMMs proposed in the SPC are applied.

Dietary exposure:
Application of the biocidal product on horses intended for human consumption is not claimed by the applicant and a risk mitigation measure has been proposed: do not use near or on livestock. Moreover, the product is applied by direct spraying on the most exposed parts of the horses. The product is not supposed to be applied by hand and no transfer of residues from hand to food is expected. Therefore, based on intended uses, no direct or indirect exposure via food is expected.

Efficacy against target organisms:
The product IR 35/10 has been shown to be efficacious against the housefly (*Musca domestica*), the stable fly (*Stomoxys calcitrans*), horse flies (*Tabanus sudeticus, Haematopota pluvialis*), biting midges (*Culicoïdes* spp), black flies (*Simulium venustum, Simulium nyssa, Prosimulium mixtum*), sandflies (*Phlebotomus* spp.), the common house mosquito (*Culex* spp.), the castor bean tick (*Ixodes ricinus*) and the African tick (*Hyalomma marginatum*), when applied on horses/ponies.
No efficacy data was provided for *Haematopinidae*. Furthermore, a claim against *Trypanosoma* parasites is not in the scope of the BPR. Biocides against arthropods can only claim to kill or repel the arthropods, not to prevent the diseases.
More information is available in section 3.5 of the PAR.

Environment:
The use of the product on horses leads to unacceptable risks for the soil compartment when application of the product (Application step) and hosing of horses (Service life) takes place on bare soil.
A risk mitigation measure is proposed for the application step:

- *The animals must be treated on sealed/paved ground in order to prevent direct releases to soil.*

The following risk mitigation measure can be applied to reduce emissions to the environment during the hosing of horses (Service-life):

- *Treated horses must be hosed/rinsed only on sealed/paved ground in order to prevent direct releases to soil*.

General conclusion (Major change application 2021):
Compliance with Article 19.1 criteria, as defined in the Regulation (EU) n°528/2012, for the major change application of the biocidal product IR 35/10 is reported in the table below.

Target organisms	Application rates	Use description	Conclusion
House fly (*Musca domestica)* Stable fly (*Stomoxys calcitrans*) Horse flies (*Tabanus sudeticus, Haematopota pluvialis*) Biting midges (*Culicoides* spp.) Black flies (*Simulium venustum, Simulium nyssa, Prosimulium mixtum*) Sandflies (*Phlebotomus* spp.) Common house mosquito (*Culex pipiens*) Castor bean tick (*Ixodes ricinus*) African tick (*Hyalomma marginatum)* Developmental stage : adults	5g or 10g or 16,7g product/m² body surface area	Application by direct spraying on horses and ponies Outdoor Professional and non-professional users	Acceptable
Haematopinidae *Trypanosoma evansi* *Trypanosoma brucei*	5g or 10g or 16,7g product/m² body surface area	Application by direct spraying on horses and ponies Outdoor Professional and non-professional users	Not acceptable

2 ASSESSMENT REPORT

2.1 SUMMARY OF THE PRODUCT ASSESSMENT

2.1.1 Administrative information

2.1.1.1 Identifier of the product

Identifier	**Country (if relevant)**
IR 35/10	France
ANTI MOSQUITO	
MOSQUITO SHIELD	
INSECT STOP	
MÜCKENSCHUTZ	
INSEKTENBREMSE	

2.1.1.2 Authorisation holder

Name and address of the authorisation holder	**Name**	ARTHUR SCHOPF HYGIENE GMBH & CO. KG
	Address	PFAFFENSTEINSTRAßE 1 83115 NEUBEUERN ALLEMAGNE
Authorisation number	FR-2019-0044	
Date of the authorisation	11/04/2019	
Expiry date of the authorisation	16/05/2027	

2.1.1.3 Manufacturer(s) of the products

Name of manufacturer	ARTHUR SCHOPF HYGIENE GMBH & CO. KG
Address of manufacturer	PFAFFENSTEINSTRAßE 1 83115 NEUBEUERN ALLEMAGNE
Location of manufacturing sites	PFAFFENSTEINSTRAßE 1 83115 NEUBEUERN ALLEMAGNE
	ELEKTRONSTRAßE 8 06749 BITTERFELD ALLEMAGNE

2.1.1.4 Manufacturer(s) of the active substance

Active substance	Ethyl butylacetylaminopropionate
Name of manufacturer	MERCK S.L.U.
Address of manufacturer	CALLE MARIA DE MOLINA 40 28006 MADRID SPAIN
Location of manufacturing sites	POLIGONO MERCK 08100 MOLLET DE VALLES BARCELONA SPAIN
Name of manufacturer	Merck KGaA
Address of manufacturer	FRANKFURTER STRAßE 250 64293 DARMSTADT GERMANY

Location of manufacturing sites	POLIGONO MERCK 08100 MOLLET DE VALLES BARCELONA SPAIN

2.1.2 Product composition and formulation

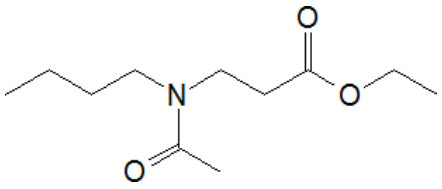
NB: the full composition of the product according to Annex III Title 1 should be provided in the confidential annex.

Does the product have the same identity and composition as the product evaluated in connection with the approval for listing of the active substance(s) on the Union list of approved active substances under Regulation No. 528/2012?

Yes ☐

No ☒

2.1.2.1 Identity of the active substance

Main constituent(s)	
ISO name	IR3535
IUPAC or EC name	ethyl 3-[N-acetyl-N-butyl] aminopropionate
EC number	257-835-0
CAS number	52304-36-6
Index number in Annex VI of CLP	
Minimum purity / content	≥ 99 % w/w
Structural formula	

2.1.2.2 Candidate(s) for substitution

The active substance IR3535® is not a candidate for substitution.

2.1.2.3 Qualitative and quantitative information on the composition of the biocidal product

Common name	IUPAC name	Function	CAS number	EC number	Content (%)
IR3535®	ethyl 3-[N-acetyl-N-butyl] aminopropionate	Active substance	52304-36-6	257-835-0	20 purity: ≥99%

Full composition is available in the confidential annex.

2.1.2.4 Information on technical equivalence

Not needed, since the manufacturer is the same as included in the Union list of approved active substances.

2.1.2.5 Information on the substance(s) of concern

The biocidal product contains the following substances of concern (SoC):

Common name	IUPAC name	Function	CAS number	EC number	Content (%)
Ethanol 96%	Ethanol	solvent	64-17-5	200-578-6	35

During the referral discussions concerning this product, it was decided that ethanol should be considered as a substance of concern (SoC).

According to the definition in the BPR (Article (3)(f)), a SoC is a substance which has an inherent capacity to cause an adverse effect. In this product, ethanol is the cause for the classification as a flammable liquid and during the referral discussions it was agreed that flammability can be considered as a cause to provoke an adverse effect and, therefore, ethanol should be considered as a SoC.

Due to the lack of guidance in relation to physical-chemical endpoints, the methodology described in the guidance for human health assessment of SoC, can be applied by analogy. Accordingly, the label of the product should include the corresponding H/P statements but a qualitative/quantitative risk assessment is not necessary. Ethanol will be indicated in the SPC Section 2.1.

Related to the submission of the analytical method for determining the concentration of the SoC, Article 21 of the BPR is applicable and waiving of the data requirements is allowed and accepted.

2.1.2.6 Type of formulation

AL – Any other liquid

2.1.3 Hazard and precautionary statements

Classification and labelling of the products of the family according to the Regulation (EC) 1272/2008

Classification	
Hazard category	Flammable liquid, category 3 Eye irritation, category 2
Hazard statement	H226: Flammable liquid and vapour H319: Causes serious eye irritation
Labelling	
Signal words	Warning
Hazard statements	H226: Flammable liquid and vapour H319: Causes serious eye irritation
Precautionary statements	P101 If medical advice is needed, have product container or label at hand. P102 Keep out of reach of children. P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 : If eye irritation persists:Get medical advice.
Note	-

2.1.4 Authorised use(s)

2.1.4.1 Use description

Table 1. Use # 1 – Spray to repel mosquitoes and ticks from human skin (general public)				
Product Type	PT19 – Repellents and attractants (Pest control)			
Where relevant, an exact description of the authorised use	Repellent			
Target organism (including development stage)	**Scientific name**	**Common name**		
	Culicidae	Mosquitoes		
	Ixodidae	Ticks		
	only in temperate areas			
Field of use	Indoors and outdoors			
Application method(s)	Spray directly onto the exposed skin and distribute the liquid on the skin by hand.			
Application rate(s) and frequency	Mosquitoes : 0.00067 g/cm² skin Protection time : 8 hours Ticks : 0.00067 g/cm² skin Protection time : 12 hours			
Category(ies) of users	Non-professional			
Pack sizes and packaging material	**Type**	**Material**	**Size**	
	Bottle	Plastic: HDPE	≥25.0 - ≤ 750.0 mL	

2.1.4.2 Use-specific instructions for use

Apply on the different parts of the body the described number of spray:

- Toddlers from 1 to 2 years old : 2 to 3 for the head and the neck, 2 by arm, 2 by leg. Do not apply more than once a day.
- Child from 2 to <6 years old : 3 for the head and the neck, 2 by arm, 3 by leg. Do not apply more than once a day.
- Child from 6 to <12 years old : 3 for the head and the neck, 3 by arm, 4 by leg. Do not apply more than twice a day.
- Adult and child from 12 years old : 7 for the head and the neck, 5 by arm, 2 to 3 by hand, 8 by leg, 3 by foot. Do not apply more than twice a day.

- In case of application of a sunscreen, wait minimum 20 minutes after its application to apply the repellent product.
- Consider the use of personal vector protection in combination with a biocidal repellent.

2.1.4.3 Use-specific risk mitigation measures

- Apply only to uncovered areas of the skin.
- Do not spray directly on the face but spray on hands and then apply on the face.
- For adults and children over 6 years old, the product needs to be applied twice a day maximum.
- For children from 1 to 5 years old: the product needs to be applied maximum once a day.
- Do not apply on hands of children.
- For children, the product needs to be applied by an adult.

2.1.4.4 Where specific to the use, the particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

2.1.4.5 Where specific to the use, the instructions for safe disposal of the product and its packaging

2.1.4.6 Where specific to the use, the conditions of storage and shelf-life of the product under normal conditions of storage

2.1.4.7 Use description

Table 1. Use # 2 – Application on horses/ponies	
Product Type	PT19 – Repellents and attractants (Pest control)
Where relevant, an exact description of the authorised use	Repellent to be applied on horses/ponies
Target organism (including development stage)	*Musca domestica* - House fly *Stomoxys calcitrans* - Stable fly *Tabanus sudeticus, Haematopota pluvialis* – Horse flies *Simulium venustum, S. nyssa, Prosimulium mixtum* – Black flies *Culicoïdes* spp. – Biting midges *Phlebotomus* spp. - Sandflies *Culex* spp. – Common house mosquito *Hyalomma marginatum* – African tick *Ixodes ricinus* – Castor bean tick Developmental stage : adults
Field of use	Outdoors

<table>
<tr><td>Application method(s)</td><td>Direct spraying on the horses/ponies
Ready-to-use product</td></tr>
<tr><td>Application rate(s) and frequency</td><td>
<table>
<tr><th rowspan="2">Target organisms</th><th colspan="3">Protection time</th></tr>
<tr><th>5 g/m²</th><th>10 g/m²</th><th>16,7g/m²</th></tr>
<tr><td>House fly</td><td>up to 4h</td><td>up to 5h</td><td>up to 5h</td></tr>
<tr><td>Stable fly</td><td>up to 3h</td><td>up to 4h</td><td>up to 5h</td></tr>
<tr><td>Horse flies</td><td>up to 2h</td><td>up to 3h</td><td>up to 5h</td></tr>
<tr><td>Biting midges</td><td>up to 4h</td><td>up to 5h</td><td>up to 6h</td></tr>
<tr><td>Black flies</td><td>up to 5h</td><td>up to 7h</td><td>up to 9h</td></tr>
<tr><td>Sandflies</td><td>up to 3h</td><td>up to 4h</td><td>up to 5h</td></tr>
<tr><td>Common house mosquito</td><td>up to 4h</td><td>up to 5h</td><td>up to 6h</td></tr>
<tr><td>Castor bean tick</td><td>up to 6h</td><td>up to 8h</td><td>up to 8.5h</td></tr>
<tr><td>African tick</td><td>up to 3h</td><td>up to 4h</td><td>up to 5h</td></tr>
</table>
1 application per day
</td></tr>
<tr><td>Category(ies) of users</td><td>Professional
Non-professional</td></tr>
<tr><td>Pack sizes and packaging material</td><td>
<table>
<tr><th>Type</th><th>Material</th><th>Size</th></tr>
<tr><td>Canister</td><td>HDPE</td><td>3L and 5L</td></tr>
<tr><td>Spray bottle (Versaplast EU 28/410)</td><td>PET</td><td>≥250 mL - ≤ 2L</td></tr>
<tr><td>Spray bottle (Versaplast EU 28/410)</td><td>HDPE</td><td>≥100 mL - ≤ 2L</td></tr>
<tr><td>Canister</td><td>PET</td><td>3L and 5L</td></tr>
</table>
</td></tr>
</table>

2.1.4.8 Use-specific instructions for use

- The product is only intended to be sprayed on the horse or pony body, no spreading is needed.
- For use all over the horse's or pony's body, apply the dosage of 5 g of product per m², avoiding contact with eyes and nostrils.
- When used at a dose rate of 10 g of product per m²: treat the animal on the most exposed parts of its body (not all of it) by avoiding contact with eyes and nostrils. As example, for a ride in the forest, in order to avoid tick bites, it is recommended to treat the lower parts of the animal: chest, shoulders, forearms, front legs, hips, thighs and hind legs.
- When used at a dose rate of 16.7 g of product per m²: treat the animal on the most exposed parts of its body (not all of it) by avoiding contact with eyes and nostrils. For example, to repel flies during a day's riding, treat the most exposed parts of the horse, such as the head, chest, shoulders, forearms, lower parts of the hind legs and front legs. In order to avoid possible insect bites on other parts of the horse, a quarter blanket must be used as a physical and mechanical protection (the areas usually covered by the blanket are the back, ribs, rump, hips, thighs and part of the top of the hind legs).

2.1.4.9 Use-specific risk mitigation measures

- Do not use near or on animals intended for consumption.
- Spray the product outdoor or in a well ventilated area.
- Spray the product downwards below the eye level.
- Wash hands after application of the product.
- Avoid the animal's eyes and eye area.
- Children should not treat the horse themselves. An adult must do it for them.
- The animals must be treated on sealed/paved ground in order to prevent direct releases to soil.
- Treated horses must be hosed down/rinsed only on sealed/paved ground in order to prevent direct releases to soil.

2.1.4.10 Where specific to the use, the particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

2.1.4.11 Where specific to the use, the instructions for safe disposal of the product and its packaging

2.1.4.12 Where specific to the use, the conditions of storage and shelf-life of the product under normal conditions of storage

2.1.5 General directions for use

2.1.5.1 Instructions for use

- Comply with instructions of use.
- Efficacy in tropical conditions is not demonstrated.
- Respect dosages of the product.
- Always read the label and follow all instructions given therein.
- If exceptionally, the treatment seems to show too low efficacy, inform the marketing authorisation holder.
- Do not mix with other repellents.
- The protection time is given as indication. Environmental factors (temperature, wind, etc.) can modify the duration of protection.
- Reapply after exposure to water, but do not exceed the recommended maximum number of applications.

2.1.5.2 Risk mitigation measures

- Keep out of the reach of children.
- Avoid breathing of vapor or spray mists.
- Treat outdoors in a well ventilated place only.
- Wash hands before any food manipulation.
- Do not use the product close to foodstuffs and surfaces which can be in contact with food or drink intended for human consumption.

2.1.5.3 Particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

In case of contact with the user's eyes: rinse the eyes with plenty of warm water, keeping the eyelids open, then continue rinsing under a stream of warm water for 10 minutes. If wearing lenses: rinse immediately with warm water, then remove the lenses if there is no contraindication and continue rinsing under a thin stream of warm water for 10 minutes. If signs of irritation persist or visual disturbances happen, consult a doctor.

If skin lesions, redness or pain appear after application of the product, consult a doctor.

In the event of inhalation of high concentrations: rest in a half-sitting position; if symptoms appear contact the poison center or call 15/112.

In case of contact with the mouth: rinse thoroughly with water and contact the poison center or call 15/112.

In the event of disturbance of consciousness, place the subject in a lateral safety position (lying on his side); call 15/112. Do not drink or vomit.

2.1.5.4 Instructions for safe disposal of the product and its packaging

- Dispose of unused product, its packaging (….) and all other waste, in accordance with local regulations
- Do not discharge unused product on the ground, into water courses, into pipes (sink, toilets…) nor down the drains

2.1.5.5 Conditions of storage and shelf-life of the product under normal conditions of storage

- Keep the container tightly closed.
- Store at less than 40 ° C.
- Storage period: 18 months.

2.1.6 Other information

- If exceptionally, the treatment seems to show low efficacy, inform the marketing authorisation holder.
- The product for animals and the product for humans have to be put on the market in different packaging.
- In order to guarantee the effectiveness of the product when applied, the number of sprays of the product and the doses at which it is to be used must appear on the label.

2.1.7 Packaging of the biocidal product

Type of packaging	Size/volume of the packaging	Material of the packaging	Type and material of closure(s)	Intended user (e.g. professional, non-professional)	Compatibility of the product with the proposed packaging materials (Yes/No)
Bottle	≥25 - ≤750 mL	plastic: HDPE	pump head covered by a cap	non-professional	Yes

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Type of packaging	Size/volume of the packaging	Material of the packaging	Type and material of closure(s)	Intended user (e.g. professional, non-professional)	Compatibility of the product with the proposed packaging materials (Yes/No)
Can	3L; 5L	plastic: HDPE			Yes
Bottle	≥100 mL - ≤2L	plastic: HDPE trigger spray Versapl ast EU 28/410			Yes
Bottle	≥250 mL - ≤2L	plastic: PET trigger spray Versapl ast EU 28/410			Yes
Can	3L; 5L	plastic: PET			Yes

2.1.8 Documentation

2.1.8.1 Data submitted in relation to product application

Please see §3.1 list of studies for the biocidal product.

2.1.8.2 Access to documentation

The applicant of this product is the same as the review program participant for the active substance and is thus the owner of all data on the active substance.

2.2 ASSESSMENT OF THE BIOCIDAL PRODUCT

2.2.1 Intended use(s) as applied for by the applicant

<table>
<tr><th colspan="2">Table 2. Use # 1 – Application to skin</th></tr>
<tr><td>Product Type</td><td>PT19 – Repellents and attractants (Pest control)</td></tr>
<tr><td>Where relevant, an exact description of the authorised use</td><td>Insect repellent pump spray IR3535® 20% is a ready to use product. The repellent is sprayed onto the skin. 3g product is sufficient for the application to approximately 50% of the body surface (face, hands, arms and legs as assessed in the CAR for IR3535®). For treatment of the face, spray the repellent solution onto the palm of the hand and distribute the solution over the skin of the face thereby taking care to protect the eyes.
Relevant codes: VI.1.1 and VI.9 (manual distribution over skin)</td></tr>
<tr><td>Target organism (including development stage)</td><td>
<table>
<tr><th>Scientific name</th><th>Common name</th><th>Development stage</th></tr>
<tr><td>Culicidae</td><td>Mosquitoes</td><td>Adults</td></tr>
<tr><td>Ixodidae</td><td>Ticks</td><td>Nymphs</td></tr>
<tr><td>Ixodidae</td><td>Ticks</td><td>Adults</td></tr>
</table>
</td></tr>
<tr><td>Field of use</td><td>Other
use in well ventilated areas</td></tr>
<tr><td>Application method(s)</td><td>Spraying: The ready to use product is a pump spray which is sprayed directly onto the exposed skin</td></tr>
<tr><td>Application rate(s) and frequency</td><td>Dose: 3.0 g
Insect Repellent Pump Spray IR3535® 20% is intended to be used in summer when insects are frequent. It is usually applied once a day depending on outdoor activities, weather and presence of insects. The application can be repeated when necessary (noticeable reduction in repellence). The pump spray can be applied up to 3 times per day for adults, up to 2 times for children between the age of 3 and 10 years and maximally 1 time per day for children below 3 years.</td></tr>
<tr><td>Category(ies) of users</td><td>General public</td></tr>
<tr><td>Pack sizes and packaging material</td><td>
<table>
<tr><th>Type</th><th>Material</th><th>Size</th></tr>
<tr><td>Bottle</td><td>Plastic: HDPE</td><td>>25.0 - < 750.0 mL</td></tr>
</table>
Due to a technical issue with SPC-editor and IUCLID, the applicant wasn’t able to include the ≥ and ≤ symbols. The applied packaging should have been ‘larger or equal to 25 mL to smaller or equal to 750 mL’.
</td></tr>
</table>

- **MAJOR CHANGE APPLICATION (2021)**

Table 3. Use # 2 – Horse spray application	
Product Type	PT19 – Repellents and attractants (Pest control)
Where relevant, an exact description of the authorised use	The biocidal product is a ready to use spray for external use and topical application (to be applied outside or in well ventilated areas) on horses or ponies as a repellent against horseflies, flies, mosquitoes and ticks to protect against bites and nuisances.
Target organism (including development stage)	House fly (*Musca domestica*) Stable flies (*Stomoxys calcitrans*) Horse Fly (*Tabanidae*) Biting midges (*Ceratopogonidae*) Blackflies (*Simuliidae*) Castor bean tick (*Ixodes ricinus*) Ticks (*Ixodidae*) Sandflies (*Psychodidae*) Horse fly (*Haematopinidae*) Trypanosoma Evansi (*Haematopinidae*) Trypanosoma Brucei (*Haematopinidae*) Turkey Gnats (*Simuliidae*) Psychodidae (*Psychodidae*) Culex pipens (*Culicidae*) Sheep Tick (*Ixodidae*) European Wood Tick (*Ixodidae*) African Tick (*Ixodidae*) Mediterranean Tick (*Ixodidae*) Hyalomma (*Ixodidae*) Development stage: Adults
Field of use	Outdoor To be used outside and in well ventilated areas (only on paved ground).
Application method(s)	Spraying: Apply by direct spraying on the most exposed parts of the horse or pony depending on the pressure of biting insects and parasites and also depending on the encountered situation. Apply this repellent sparingly.

Application rate(s) and frequency	Application Rate: 5 g/m² Dilution (%): Number and timing of application: Once a day. Application Rate: 10 g/m² Dilution (%): Number and timing of application: Once a day. Application Rate: 16.7 g/m² Dilution (%): Number and timing of application: Once a day.
Category(ies) of users	Professional General public (non-professional)
Pack sizes and packaging material	Can 3L; 5L HDPE Bottle 250 mL - ≤2L plastic: PET trigger spray Versaplast EU 28/410 Can 3L; 5L PET

2.2.2 Clarification on product composition and compositions tested

In the studies submitted several test materials were used. Below, the differences to the product Insect Repellent Pump Spray IR3535® 20% are described, whereas the full composition of the test materials is provided in the confidential part of the PAR.

- **Insect Repellent Pump Spray IR3535® 20%**
- **Insect Repellent Pump Spray IR3535® 20% without Bitrex**
- **US Pump Spray Formulation:** In the US EPA formulation, ethanol denatured with Bitrex and tertbutanol (final concentrations 0.0002% and 0.042 %, respectively) is used, whereas in the EU formulation (Insect Repellent Pump Spray IR3535® 20%) a final concentration of 0.0011% Bitrex is present. Other components are identical in both formulations and only the water content was adjusted to compensate for the slight differences in composition.
- **Insect Repellent Pump Spray Lice IR3535® 20% without Bitrex:** Slightly higher concentration emollient, no film forming substance present, and no Bitrex present.
- **TMT-003** (efficacy test against *Aedes albopictus*): Similar to the Insect Repellent Pump Spray IR3535® 20% once dried on the skin. The 2-propanol and water will have evaporated and the remaining substances are present in the same concentration as the pump spray. The main difference is that TMT-003 also contains butylene glycol.

2.2.3 Physical, chemical and technical properties

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Physical state at 25 °C and 101.3 kPa	OPPTS 830.6317 Storage Stability	US Pump Spray Formulation	Liquid	Study no 245-003, Meinerling M., 2009
Colour at 25 °C and 101.3 kPa	OPPTS 830.6317 Storage Stability / Organoleptic	US Pump Spray Formulation	Slightly yellowish to colourless	Study no 245-003, Meinerling M., 2009
Odour at 25 °C and 101.3 kPa	OPPTS 830.6317 Storage Stability / Organoleptic	US Pump Spray Formulation	Mild, slightly alcoholic	Study no 245-003, Meinerling M., 2009
Acidity / alkalinity	CIPAC MT75 At 20°C	US Pump Spray Formulation	Undiluted: between 4.4 and 5 At 1% : between 3.8 and 4.6	Study no 245-003, Meinerling M., 2009
Relative density / bulk density	OECD Guideline 109	US Pump Spray Formulation	Relative density D420 = 0.955	Study no 213-002, Fieseler A., 2011
Storage stability test – accelerated storage	CIPAC MT 46.3, under GLP regulation – HPLC method and Organoleptic	READ ACROSS Insect Repellent Pump Spray Lice	8 weeks at 40±2°C. Humidity 30-65%. Packaging: HDPE pump spray bottle – 150 mL	31232204, Meinerling, M., 2009. Institut für Biologische Analytik und Consulting IBACON GmbH

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
		IR3535® 20% without Bitrex	- No change in colour, odour, or clarity. - No change in packaging appearance. -19.3% to 18.8%: this corresponds to a variation of 2.59% of active substance content - Free acid content: <0.5 % w/w before and after storage	
	CIPAC MT 46.3, Internal analytical method: KV-GC-0054	IR 35/10 250mL PET bottle (hand-help trigger sprayer Versaplast EU 28/410) Batch IR20SCHO-02	Test: Initial characterization / After 8 weeks at 40°C Packaging: PET bottle (hand-held trigger sorayer) / PET bottle (hand-held trigger sorayer) Weight variation (%): A : 0.27% B : 0.31% / A : 0.35% B: 0.36% AS content of IR3535: 20.6 +/- 1% w/w / 20.9 +/- 1% w/w Appearance (colour, odour and physical state): Clear solution / Clear solution Compatibility (resistance) of the packaging material: The container does not present any deformation in both bottom and lateral layers, or loss of sample and evident corrosion phenomena / The container does not present any deformation in both bottom and lateral layers, or loss of sample and evident corrosion phenomena pH value (neat test item): 4.81 / 5.0 pH value (1%	SCHO-2021/12-001 Schopf 2021

			aqueous dilution) The analytical method is not validated, data for the validation of the analytical method is not provided, results cannot be taken into account. But the weight and the resistance of the packaging are stable during accelerated storage.	
Storage stability test – long term storage at ambient temperature	OPPTS 830.6317 Storage Stability	US Pump Spray Formulation	Packaging: commercial packaging: white HDPE flask with white pump stopper and clear cap - No change in colour or clarity of the tested item. - No change in packaging appearance: no indication of corrosion or decomposition, no alteration of label -pH values (20°C): Undiluted formulation: 5.0 at the beginning of the test; 4.4 at the end of the test 1% dilution; 4.6 at the beginning of the test; 3.8 at the end of the test -Active substance content:	Study no 245-003, Meinerling M., 2009

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			24 months at 25° : 20.1% to 17.9%: this corresponds to a variation of 10.9% of active substance content At 18 month : 20.1% to 19.1%: this corresponds to a variation of 5% of active substance content → results not acceptable for storage of 2 years but acceptable for 18 months. -Free acid content: At the beginning 0.1 % w/w; after 18 months of storage: 1.3% w/w; after 24 months of storage: 2.1%w/w	
Storage stability test – low temperature stability test for liquids	CIPAC MT 39.3	Insect Repellent Pump Spray IR3535® 20% without Bitrex	0°C during 1 week: colourless clear homogenous liquid with a slight alcoholic odour before and after.	Study no 245-010, Meinerling M., 2011
Effects on content of the active substance and technical characteristics of the biocidal product - light	-	US Pump Spray Formulation	The product is stored in lightproof plastic flasks → waived	Study no 245-003, Meinerling M., 2009
Effects on content of the active substance and technical characteristics of the biocidal product – temperature and humidity	organoleptic	US Pump Spray Formulation	Since the product is tightly closed there are no effects due to humidity. Effects of temperature have been studied (see above). The product should not be stored for prolonged times (more than 8 weeks) at temperatures >40°C.	Study no 245-003, Meinerling M., 2009

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Effects on content of the active substance and technical characteristics of the biocidal product - reactivity towards container material	organoleptic	US Pump Spray Formulation	No indication of corrosion or decomposition was observed.	Study no 245-003, Meinerling M., 2009
Wettability	Waived	-	the product is liquid	-
Suspensibility, spontaneity and dispersion stability	Waived	-	the product is not intended to be diluted	-
Wet sieve analysis and dry sieve test	Waived	-	the product is not intended to be diluted and the product is liquid	-
Emulsifiability, re-emulsifiability and emulsion stability	Waived	-	the product is not intended to be diluted and is not an emulsion	-
Disintegration time	Waived	-	the product is not a tablet to be desintegrated	-
Particle size distribution, content of dust/fines, attrition, friability	Waived	-	the product is not a powder nor a granule	-
Persistent foaming	Waived	-	the product is not intended to be diluted	-
Flowability/Pourability/Dustability	Waived	-	the product is not a powder, a granule nor an emulsion	-
Burning rate — smoke generators	Waived	-	the product is not a smoke generator	-
Burning completeness — smoke generators	Waived	-	the product is not a smoke generator	-
Composition of smoke — smoke generators	Waived	-	the product is not a smoke generator	-
Spraying pattern	CIPAC MT 187 FEA Guidelines 643; 644	IR 35/10 Batch IR20SCHO-02 PET 250 mL trigger spray Versaplast EU 28/410	Discharge rate: 1.19 g/spray hub. No solid deposits on the spray heads and on the trigger mechanism were observed. Spray diameter (3 sprays at 30 cm): internal 24 cm External 36 cm circular Particle size analysis: Dv (10) µm: 37 Dv (50) µm: 114 Dv (90) µm: 304 % V< 10µm: 1.3 % V < 50 µm: 17	Study Mo7273, Berengardt 2021

			The MMAD: 114 µm	
	Particle size distribution [Laser light diffraction, technical compliance to the requirements of	Insect Repellent Pump Spray IR3535® 20%	Fraction of particles <5µm: <0.6 %. Range (n=50): 0.28 - 0.68 microns, with a mean of 0.45 % < 5.23 microns. Fraction of particles <50µm: 51.79<x<60.27 %	Study no 2016_04_26, B. Batz, 2016

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			Range (n=50): 47.78 – 54.86 microns, with respective means of 59.95 % and 51.46 %. [Malvern SprayTec Spectrometer, Distance nozzle to beam center: 3cm, Focal length: 200mm, Test time 200ms, Data recording rate: 1000Hz, Optical parameters: 1.34/0/1, Laser wave length: 670nm] Fraction of particles <10µm: ~1.5 %. Range (n=12): 0.98 – 1.95%, with an average of 1.495 % <10 microns. [Malvern SprayTec Spectrometer, Focal length: 300mm, Test time 400ms, Data recording rate: 2.5kHz, Laser wave length: 632.8nm]	
Physical compatibility	Waived	-	the product is not intended to be used in combination with other products	-
Chemical compatibility	Waived	-	the product is not intended to be used in combination with other products	-
Degree of dissolution and dilution stability	Waived	-	the product is not a tablet and is not intended to be diluted	-
Surface tension	OECD 115	Insect Repellent Pump Spray IR3535® 20%	Surface tension of undiluted product = 29.581 mN/m (at 20°C)	Study no 009093, J. zur Lage, 2016

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Viscosity	OECD 114 (rotational viscosimeter)	Insect Repellent Pump Spray IR3535® 20%	Viscosity (20°C) = 6.8 mPa.s Viscosity(40°C) = 3.46 mPa.s	Study no 009093, J. zur Lage, 2016 Lab investigation 009093 – PM-PFC-RT, zur Lage (04.07.2016) : IR3535_Ref Formulations Surface tension Viscosity_reg.Aff

Conclusion on the physical, chemical and technical properties of the product

The Insect Repellent Pump Spray IR3535® 20% is a colourless clear liquid with characteristic mild slight alcoholic odour. The pH of the undiluted ready-to-use product is between 4.4 and 5. The relative density is $D_{4\ 20}$ = 0.955. At ambient temperature the product has a long term stability for 18 months and is stable under cold and accelerated storage conditions. Light influence is avoided by using a lightproof packaging. There are no humidity effects expected in that closed package. The product should not be stored for prolonged times at temperatures >40°C. At 20°C the surface tension is 29.581 mN/m and the viscosity 6.8 mPa.s. At 40°C the viscosity is 3.46 mPa.s. Physical and chemical compatibility with other products are not relevant.

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New packagings were claimed. Concerning the new claimed packaging in PET and HDPE, an accelerated storage stability study was provided and show that the packagings are stable. Moreover, the properties of the sprayer were provided at initial time and are acceptable. The properties of the sprayer after accelerated storage have not been provided. However, as the accelerated storage study has been performed with the trigger spray and as no modification has been observed, we can consider that the properties of the sprayer have not been changed. Therefore, no further data are required.

2.2.4 Physical hazards and respective characteristics

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Explosives	Waived	-	none of ingredients are classified as explosive substances	-
Flammable gases	Waived	-	the product is liquid	-
Flammable aerosols	Waived	-	the product is liquid	-
Oxidising gases	Waived	-	the product is liquid	-
Gases under pressure	Waived	-	the product is liquid	-

Flammable liquids	Closed cup flashpoint tester	Insect Repellent Pump Spray IR3535® 20% without Bitrex	Flash point : 28.7°C +-2°→ Classification in Flam Liq 3	Study no 242-005, Fieseler A., 2011
Flammable solids	Waived	-	the product is liquid	-
Self-reactive substances and mixtures	Waived	-	none of ingredients are classified as self-reactive substances	-
Pyrophoric liquids	Waived	-	none of ingredients are classified as pyrophoric substances	-
Pyrophoric solids	Waived	-	the product is liquid	-
Self-heating substances and mixtures	Waived	-	none of ingredients are classified as self-heating substances	-
Substances and mixtures which in contact with water emit flammable gases	Waived	-	none of ingredients are classified as able to emit flammable gases in contact with water	-
Oxidising liquids	Waived	-	none of ingredients are classified as oxidising substances	-
Oxidising solids	Waived	-	the product is liquid	-
Organic peroxides	Waived	-	none of ingredients are classified as organic peroxides	-
Corrosive to metals	Waived	-	none of ingredients are classified as corrosive to metals	-
Auto-ignition temperatures of products (liquids and gases)	EC A15 auto-ignition temperature (l & g)	Insect Repellent Pump Spray IR3535® 20% without Bitrex	Auto-ignition temperature = 440°C	Study no 242-002, Dornhagen J., 2011
Relative self-ignition temperature for solids	Waived	-	the product is liquid	-
Dust explosion hazard	Waived	-	the product is liquid	-

Conclusion on the physical hazards and respective characteristics of the product

The auto-ignition temperature of the solution is 440°C and the flashpoint of the solution is 28.7°C. The product has no self-reacting properties and does not react with air and is not self-heating since it is a liquid at room temperature. It is not able to react with metals and is not corrosive. The product is not oxidizing nor explosive but must be classified as flammable liquid, category 3 (H226).

2.2.5 Methods for detection and identification

Analytical methods for the analysis of the product as such including the active substance, impurities and residues									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
IR3535	HPLC method & UV-visible spectroscopy. The identity of IR3535 was established by comparison of the retention time and by comparison of the UV spectra obtained from sample solution and reference material.	1%/5 (1% IR3535 – 5% hydrolysis product) 5%/5 (5% IR3535 – 5% hydrolysis product) 10%/10 (10% IR3535 – 1% hydrolysis product) 30%/ 10 (30% IR3535 – 1% hydrolysis product) Validated concentration range 1 – 30% IR3535	Correlation of the peak area of different standard solutions with their corresponding concentrations resulted in a linear regression with regression coefficient of at least 0.999. Concentration range = from 25 to 1750 mg/L, Number of calibration points = 9	The retention time of the analyte IR3535 in the samples solution did not differ by more than 1% from the standard solution. In addition, the identity of the analyte was confirmed by comparison of the UV spectrum of the test item with the UV-spectrum of the fortified sample solution.	1% 94 – 110 5% 97-101 10% 97 – 101 30% 97 – 101	110 100 100 98	2.3 2.1 5.1 2.1	LOD = 7 mg/L LOQ = 250 mg/L (corresponding to 5% w/w)	Study no 421-001, Meinerling M., 2007 1st Final Report Amendement from 14th of June 2016

Hydrolysis product of IR3535: 3-(N-n-butyl-n-acetyl)aminopropionic acid	HPLC method & UV-visible spectroscopy. The identity of hydrolysis product was established by comparison of the retention time and by comparison of the UV spectra obtained from	1%/10 (10% IR3535 – 1% hydrolysis product) 1%/10 (30% IR3535 – 1% hydrolysis product) 5%/5	Correlation of the peak area of different standard solutions with their corresponding concentrations resulted in a linear regression with regression coefficient of at least 0.999.	The retention time of the analyte hydrolysis product in the samples solution did not differ by more than 1% from the standard solution. In addition, the identity of the	1% 99 – 104 5% 99-104	103 99	<2.2% <2.7%	LOD = 3 mg/L LOQ = 50 mg/L (corresponding to 1% w/w)	Study no 421-001, Meinerling M., 2007 Statement Ibacon, 2016 Study no 98322204, Fieseler,2015
	sample solution and reference material.	(1% IR3535 – 5% hydrolysis product) 5%/5 (5% IR3535 – 5% hydrolysis product) Validated concentration range 0.1 – 5% hydrolysis product.The lowest concentration comes from report 98322204 with 10% IR3535 solution (READ ACROSS from IR3535 Lotion).	Concentration range = from 25 to 300 mg/L, number of Calibration points = 9	analyte was confirmed by comparison of the UV spectrum of the test item with the UV-spectrum of the fortified sample solution.					

IR3535	GC-FID using an internal standard.	No data	**No data**	The retention time of the analyte IR3535 in the samples solution did not differ by more than 1% from the standard solution.	No data	No data	No data	No data	Study SCHO-2021/12-001 Scopf 2021 Analytical method KV-GC-0054

Conclusion on the methods for detection and identification of the product

IR3535® and its metabolite IR3535® free acid (hydrolysis product) can both be determined in the product Insect Repellent Pump Spray IR3535® 20% with an HPLC-Diode Array Detector/UV-VIS detector (at 220nm) and a RP18 (250*4 mm) column.

The identity of the analyte is confirmed by comparison of the retention times. The standard regression is linear. The method is repeatable. The mean recovery rates at each spiking level are in the range of 92 – 104%. Repeated injection of the samples resulted in a coefficient of variation which was less than 2.7 %. The limit of quantification (LOQ) is 5% for IR3535® corresponding to 250 mg/L and the limit of detection (LOD) is 7 mg/L for IR3535®. The limit of quantification (LOQ) is 0.1% for IR3535® free acid corresponding to 5 mg/L and the limit of detection (LOD) is 3 mg/L for IR3535® free acid. The overall mean recovery rate for IR3535® and IR3535® free acid was ≥ 94%.

For other analytical methods refer to the CAR of active substance.

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The analytical method (SCHO-2021/12-001) used in the storage stability study (SCHO-2021/12-001) is not validated.
Several validation data are missing for the analytical method KV-GC-0054, therefore it cannot be considered as validated. However as the method is not used in the assessment of the accelerated storage of the product study in PET packaging, no further data are required

2.2.6 Efficacy against target organisms

2.2.6.1 Function and field of use

Main Group 03 : Pest Control

Product Type 19 : Repellents and attractants

According to the concept label submitted by Merck (please note that Merck does not market these products):

The product ***Insect Repellent Pump Spray IR3535® 20%*** is presented as a ready-to-use pump spray to be applied on uncovered human skin (to face, arms, hands, legs and feet only) and on clothes.

The product is intended to be used by general public (children from 1 year old and adults) in temperate and tropical areas. An adult should apply this product to children under 10 years of age.

For an adult 3 gram product suffice.

2.2.6.2 Organisms to be controlled and products, organisms or objects to be protected

According to the use claimed by the applicant :

- The product ***Insect Repellent Pump Spray IR3535® 20%*** is intended to be used to repel arthropods on skin and clothes.

- The target organisms to be controlled are mainly mosquitoes and ticks. This product is also intended to repel biting flies (stable flies, black flies, sand flies), deer flies, biting midges, house flies, wasps and bees from treated skin and clothing preventing respective consequences.

- The organisms to be protected are humans.

2.2.6.3 Effects on target organisms, including unacceptable suffering

The applicant submitted 4 studies. Please see the summary (and comments) of all the studies submitted in the table section 2.2.6.5.

2.2.6.4 Mode of action, including time delay

The mode of action of IR3535® is not a passive masking of an attracting odour of a victim, but an active repellent effect as insects avoid entering regions with IR3535® vapours. The exact biochemical mode of action of IR3535® on insects is not well known yet, but it is most self-evident to assume that IR3535® has an olfactory-based effect.

2.2.6.5 Efficacy data

Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
PT19 Repellent	- RTU pump spray - Applied on uncovered human skin - For consumers - In temperate and tropical areas	**US Pump Spray Formulation** Hydroalcoholic solution	**TICKS** *Ixodes scapularis* (US deer ticks) nymphs Given the information provided by DE eCA (Büchel et al. - 2015 - "Repellent efficacy of DEET, Icaridin, and EBAAP against Ixodes ricinus and Ixodes scapularis nymphs (Acari, Ixodidae).") during the commenting phase, no significant differences in repellent efficacy were found between the two species tested (when compared the repellent efficacy of 10% EBAAP =IR3535)."	Lab test	- with 10 volunteers - 0.00067 g BP/cm^2 on the lower arm - Exposure started 15 minutes after application - 3 min exposure time, every 15 min until 14 hours - "normal" climatic conditions for temperate areas (+19-26°C ; 31-52% rH)	12 hours complete protection In temperate areas only	**Doc N° 336-1918/2006** **Reliability 1** **Key study**
1PT19 Repellent	- RTU spray - Applied on uncovered human skin - For consumers - In temperate and tropical areas	**US Pump Spray Formulation** Hydroalcoholic solution	**MOSQUITOES** *Aedes melanimon* (predominant species*), Culex erythrothorax, Culex tarsalis, Culiseta incidens, Anopheles freeborni and Aedes vexans* With very high mosquito pressure	Field test on 2 different sites (Forest and Marsh/Pasture)	- with 20 volunteers - 0.00067 g/cm^2 for legs (and 0.00051 g/cm^2 for arms). - Exposure started 2h (Forest) or 3h (Marsh/Pasture) after application - 1 min exposure time, every 15 min until 14 hours - "normal" climatic conditions for temperate areas (+19-25°C ; 24-39% rH)	8 hours complete protection In temperate areas only	**Doc N° 336-1919/2006** **Reliability 1** **Key study**
PT19 Repellent	- RTU spray - Applied on uncovered human skin - For consumers	**Insect Repellent Pump spray (15% IR3535)**	**TICKS** *Ixodes ricinus* (EU sheep ticks) nymphs	Lab test	- with 11 volunteers - 1 g BP/600 cm^2 on the forearm - Exposure started immediately after application - 5 min exposure time, every 15 min	8 hours complete protection In temperat	**Doc N° 336-1921/2006** **Supportive study**

	- In temperate and tropical areas				- "normal" climatic conditions for temperate areas (+23.2-25.4°C ; 24.2±3.7% rH)	e areas only	
PT19 Repellent	- RTU spray - Applied on uncovered human skin - For consumers - In temperate and tropical areas	**The composition of the product tested is not reported TMT-003**	**MOSQUITOES** *Aedes albopictus*	"Arm-in-cage" simulated-use test	ND	ND	**Doc N° 336-1922/2006** **Reliability 4**

Conclusion on the efficacy of the product
The product ***Insect Repellent Pump Spray IR3535® 20%*** (hydroalcoholic solution, 20% IR3535) when used at a dose of 0.00067 g/cm^2 provides up to 12 hours complete protection time against ticks found in temperate areas. The product ***Insect Repellent Pump Spray IR3535® 20%*** (hydroalcoholic solution, 20% IR3535) when used at a dose of 0.00067 g/cm^2 for legs (and 0.00051 g/cm^2 for arms) provides up to 8 hours complete protection time against mosquitoes found in temperate areas.

2.2.6.6 Occurrence of resistance and resistance management

There are no reported cases of resistance developing in the literature so far.

2.2.6.7 Known limitations

- As stated by the applicant, the product is intended to be used in tropical areas. But, due to the absence of efficacy tests on tropical species (at more than +30°C), the use of this product in tropical areas hasn't been authorized.

- As stated by the applicant, the product is intended to be used on skin against black flies, horse-flies, wasps and bees. But, due to the absence of relevant efficacy tests, these uses of the product haven't been authorized.

- As stated by the applicant, the product is intended to be used on clothes. But, due to the absence of efficacy tests and good results on clothes, this use of the product hasn't been authorized.

2.2.6.8 Evaluation of the label claims

According to the label, the product ***Insect Repellent Pump Spray IR3535®*** (hydroalcoholic solution, 20% IR3535) does provide a good protection against ticks and mosquitoes during 8 hours in temperate and tropical areas.

Based on the efficacy tests submitted and validated, this claim is partially supported i.e. only for a use in temperate areas.

For products claiming protection against mosquitoes & ticks such as the product ***Insect Repellent Pump Spray IR3535®*** (hydroalcoholic solution, 20% IR3535), the protection time against mosquitoes & ticks found in temperate areas would be of 8h when used at 0.00067 g/cm^2, based on the efficacy tests submitted and validated.

For products claiming protection against mosquitoes only, the protection time against mosquitoes found in temperate areas would be of 8h when used at 0.00067 g/cm^2 for legs (and 0.00051 g/cm^2 for arms), based on the efficacy tests submitted and validated.

For products claiming protection against ticks only, the protection time against ticks found in temperate areas would be of 12h when used at 0.00067 g/cm^2, based on the efficacy tests submitted and validated.

Remark : Mentioning on the label application rate (such as 0.00167 g product/cm^2) is not easy to observe and useless for the consumer. Therefore, the efficacy expert is of the opinion to put on the label more friendly consumer use instructions such as "Apply sparingly to uniformly cover uncovered parts of the body (face, hands, arms, legs and feet only)".

- References related to intended uses under tropical conditions must be removed from the label

- References related to intended uses on clothes must be removed from the label

- All references related to target organisms other than ticks and mosquitoes must be removed from the label.
- All the warnings such as "Applying sun care products or cosmetic formulations after repellent use will decrease the efficacy of the repellent considerably", "Do not apply

over cuts, wounds, freshly shaven or irritated skin" and "Mechanical protection (clothing, mosquito nets) is to be preferred" must be mentioned on the label.

2.2.6.9 Relevant information if the product is intended to be authorised for use with other biocidal product(s)

N.D.

- **MAJOR CHANGE APPLICATION (2021)**

The product IR 35/10 (same as INSECT REPELLENT PUMP SPRAY IR3535® 20%), was initially authorized as a ready-to-use insect repellent used to protect humans against mosquitoes and ticks, for adults and children over 1 year old.

The applicant requests a major change consisting of the addition of uses by application outdoor and topical application on horses and ponies as repellent against house fly, stable fly, horse fly, biting midge, sandfly, common house mosquito and ticks to protect them against bites and nuisances, for professional and non-professional users, at the application rate of 5g/m^2; 10g/m^2 or 16,7g/m^2, depending on the target organisms.

According to the uses claimed by the applicant, in the frame of the major change application, the target organisms to be control are:

- *Musca domestica* - House fly
- *Stomoxys calcitrans* - Stable fly
- *Tabanidae* - Horse Fly
- *Ceratopogonidae* - Biting midges
- *Simuliidae* – Blackflies (also called turkey gnat)
- *Psychodidae* – Sandflies
- *Haematopinidae*
- *Trypanosoma evansi*
- *Trypanosoma brucei*
- *Culex pipiens*
- *Ixodidae* – Ticks
- *Ixodes ricinus* - Castor bean tick
- *Hyalomma marginatum* - African Tick

To support the efficacy of the product IR 35/10 the applicant has submitted the following efficacy study:

<table>
<tr><th colspan="7">Experimental data on the efficacy of the biocidal product against target organism(s)</th></tr>
<tr><th>PT and use number</th><th>Test product</th><th>Function / Test organism(s)</th><th>Test method / Test system / concentrations applied / exposure time</th><th>Test results: effects</th><th>Reference</th><th>Number in IUCLID section 6.7/Test report title</th></tr>
<tr>
<td>PT19 Repellent Indoors Outdoors</td>
<td>IR3535 Spray 20% Ethyl butylacetylaminopropionate

Fresh</td>
<td>Repellent:

M. domestica
S. calcitrans
Tabanus sudeticus & Haematopota pluvialis (mixed)

Culicoïdes imicola

Simulium venustum + S. nyssa + Prosimulium mixtum (mixed)

Phlebotomus papatasi

C. pipiens

I. ricinus
H. marginatum

Developmental stage: adults</td>
<td>Simulated-use test

The following test schemes were applied:
1) Animal-to cage method for nuisance flies, biting flies and mosquitoes
Test on 2 different horses (treated and untreated).
An adjustable box was used to have a smooth and comfortable fixation of each test horse.
The test item was topically applied to one of the horses sides of the belly (horse going into the left box received a treatment on its right side, the right horse on its left side).
The release chamber (central part between two horses) connects to two identical flexible fine nylon mesh funnel systems which can be opened and closed and which are attached at their end to the sides of the horses.
On the distal part of the frames flat plastic meshed cassettes are inserted. These plastic mesh screens are sitting directly on the skin of the animals allowing landing flies to get in contact with the treated hair, however not being able to reach the skin itself and therefore not being able to bite the horses (no biting). Landings (attempts to bite) counted if longer than 2 seconds.

Depending on the target species, the releases and tests are conducted during daytime or after sunset at night, or more rarely during twilight.
The flies are released via the front</td>
<td><u>Results for 1) Animal-to cage method for nuisance flies, biting flies and mosquitoes and 2) Crossing zone horse leg test for ticks</u>

For house flies a protection time is guaranteed when the percentage of repellency is above 90%. For all other species protection time is 100% (complete protection time).

Maximum protection time in dose related simulated-use test scenarios (average of the 3 sites):
<table>
<tr><th rowspan="2">Test organisms</th><th colspan="3">Protection time</th></tr>
<tr><th>5 g/m²</th><th>10 g/m²</th><th>16,7g/m²</th></tr>
<tr><td>M. domestica</td><td>Up to 4h</td><td>Up to 5h</td><td>Up to 5h</td></tr>
<tr><td>S. calcitrans</td><td>Up to 3h</td><td>Up to 4h</td><td>Up to 5h</td></tr>
<tr><td>T. sudeticus
H. pluvialis</td><td>Up to 2h</td><td>Up to 3h</td><td>Up to 5h</td></tr>
<tr><td>C. imicola</td><td>Up to 4h</td><td>Up to 5h</td><td>Up to 6h</td></tr>
<tr><td>S. venustum
S. nyssa
P. mixtum</td><td>Up to 5h</td><td>Up to 7h</td><td>Up to 9h</td></tr>
<tr><td>P. papatasi</td><td>Up to 3h</td><td>Up to 4h</td><td>Up to 5h</td></tr>
<tr><td>C. pipiens</td><td>Up to 4h</td><td>Up to 5h</td><td>Up to 6h</td></tr>
<tr><td>I. ricinus</td><td>Up to 6h</td><td>Up to 8h</td><td>Up to 8.5h</td></tr>
<tr><td>H. marginatum</td><td>Up to 3h</td><td>Up to 4h</td><td>Up to 5h</td></tr>
</table>

<u>Results for 3) Cage-to-animal mortality check test and tick mortality test</u>
<table>
<tr><th rowspan="2">Test organisms</th><th colspan="3">Relative mortality (%)</th></tr>
<tr><th>5 g/m²</th><th>10 g/m²</th><th>16,7g/m²</th></tr>
<tr><td>M. domestica</td><td>1,15</td><td>2,30</td><td>0</td></tr>
<tr><td>S. calcitrans</td><td>1,15</td><td>1,19</td><td>1,15</td></tr>
<tr><td>T. sudeticus
H. pluvialis</td><td>5,67</td><td>1,15</td><td>3,49</td></tr>
<tr><td>C. imicola</td><td>2,34</td><td>1,19</td><td>2,30</td></tr>
<tr><td>S. venustum
S. nyssa</td><td>4,52</td><td>2,30</td><td>1,15</td></tr>
</table>
</td>
<td>Dr. Günter C. Müller 2021

RI=2
Only 4 horses used in each sites.
No direct contact between insects and animal treated (except for ticks).</td>
<td>STUDY REPORT: Repellent efficacy of "IR3535 AL Spray 20%" for use on horses against the most eminent biting flies, mosquito and ticks, tested under simulated-use conditions KC_FT_012_01</td>
</tr>
</table>

Experimental data on the efficacy of the biocidal product against target organism(s)						
PT and use number	**Test product**	**Function / Test organism(s)**	**Test method / Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**	**Number in IUCLID section 6.7/Test report title**
			opening/closure in pre-defined numbers (not more than 100 specimens) into the central chamber and are allowed to settle down for 4 minutes. After this the access to the two funnel systems is made possible and the flies are allowed to select between and go for the treated or untreated horse for 6 minutes. 3 separate site with each 4 horses are used. 2) Crossing zone horse leg test for ticks 12 horses are used per treatment group (4 horses per site; 3 sites). 3 cm wide crossing zone was marked on the control leg as well as on the leg of a pair of treated horses (forelegs) by drawing a line 5 cm above the horses carpal joints. The release point of the ticks was also marked by a line at a distance of 3 cm below the crossing zone. Ticks were placed on the release point by use of a brush. The first exposure in our tick tests were 30 minutes post treatment and continued each 30 minutes. Each tick was watched for a maximum of 3 minutes. 10 ticks were tested every 30 min. 3) Cage-to-animal mortality check test and tick mortality test <u>Flies, biting flies, mosquitoes:</u> 30 test specimens released into a cage attached to the horses side of the belly. Test repeated 3 times. The cages were attached to the horses	*P. mixtum* *P. papatasi* 4,60 1,15 1,19 *C. pipiens* 1,11 2,22 1,11 *I. ricinus* 0 0 0 *H. marginatum* 0 1,11 0 Mortalities were very low for ticks (around 1%) and for the biting flies, mortalities did not exceed 5,67% (allowed limit ≤10%) when comparing treated and untreated control treatments. It can thus be concluded that there was no repellent related effect on the natural mortality of the tested target organisms. **<u>Conclusion:</u>** Simulated-use test results achieved at the required protection levels (100% for biting flies, mosquitoes and ticks and ≥90 % for house flies) for the 3 dosages (5 g/m^2, 10 g/m^2 and 16.7 g/m^2). Protection time varies according to target organisms and application rate.		

Experimental data on the efficacy of the biocidal product against target organism(s)						
PT and use number	**Test product**	**Function / Test organism(s)**	**Test method / Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**	**Number in IUCLID section 6.7/Test report title**
			side of the belly and we could use of the interface with the already described cassette, so the horses could not be bitten by the biting flies and mosquitoes or bothered by the house flies. 1 hour exposure. Mortality was determined by applying the ABBOTT formula which compares mortalities in the treatment versus the untreated control group. <u>Ticks:</u> the same test set-up as described above can be used with a defined number of ticks (30 ticks/treatment in 3 replications). Ticks are placed in the treated area on the line that marks the end of the crossing zone for a maximum of 3 minutes. Afterwards the ticks should be kept in the laboratory and mortality should be recorded 24 hours after exposure. The test should be conducted within 30 minutes directly after the product application and before the first exposure for repellency testing. Concentration applied : 1 stroke (pump) = 1.1 g output. 3 dosages addressed: 5g/m^2, 10g/m^2, 16.7g/m^2			

In conclusion, based on the efficacy data provided, we consider that the elements presented, in the frame of the assessment of the major change application, are sufficient to demonstrate the efficacy of the product IR 35/10 when applied on skin horses and ponies, against the following test organisms:

Test organisms	Protection time 5 g/m²	10 g/m²	16,7g/m²
M. domestica	Up to 4 hours	Up to 5 hours	Up to 5 hours
S. calcitrans	Up to 3 hours	Up to 4 hours	Up to 5 hours
T. sudeticus *H. pluvialis*	Up to 2 hours	Up to 3 hours	Up to 5 hours
C. imicola *S. venustum*	Up to 4 hours	Up to 5 hours	Up to 6 hours
S. nyssa *P. mixtum*	Up to 5 hours	Up to 7 hours	Up to 9 hours
P. papatasi	Up to 3 hours	Up to 4 hours	Up to 5 hours
C. pipiens	Up to 4 hours	Up to 5 hours	Up to 6 hours
I. ricinus	Up to 6 hours	Up to 8 hours	Up to 8.5 hours
H. marginatum	Up to 3 hours	Up to 4 hours	Up to 5 hours

However, at the submission of the dossier the ECHA guidance Vol II part B+C 2021 was not applicable. Therefore, at the renewal of the dossier, new efficacy trial must be submitted, in line with the requirements of this guidance.

The efficacy was not demonstrated for the following claims:

- *Haematopinidae*
- *Trypanosoma evansi*
- *Trypanosoma brucei*

No efficacy data was provided for *Haematopinidae*. Furthermore, a claim against *Trypanosoma* parasites is not in the scope of the BPR. Biocides against arthropods can only claim to kill or repel the arthropods, not to prevent the diseases.

In conclusion, based on the efficacy data provided, we consider that the product IR 35/10 is efficient as a repellent against house flies (*Musca domestica*), stables flies (*Stomoxys calcitrans*), horse flies (*Tabanus sudeticus, Haematopota pluvialis*), biting midges (*Culicoïdes* spp.), black flies (*Simulium venustum, Simulium nyssa, Prosimulium mixtum*), sandflies (*Phlebotomus* spp.), the common house mosquito (*Culex* spp.), the castor bean tick (*Ixodes ricinus*) and the African tick (*Hyalomma marginatum*) at the application rates of 5 g/m^2, 10 g/m^2 or 16.7 g/m^2, on horses or ponies.

Occurrence of resistance and resistance management

A literature research was conducted by L. Brunin reviewing open peer-reviewed literature on occurrence of resistance and resistance management to IR3535® based products. The present review presents an overview of published data on Ethyl butylacetylaminopropionate (CAS no. 52304-36-6) resistance and sustainable resistance management strategies.

A peer-reviewed paper demonstrates occurrence of resistance against *Ae. aegypti*. but no other record could be found allowing the assumption that IR3535® based products are not known to lead to resistance of any of the targeted species.
A proposal is done that an occurrence watch related to resistance of target species to the active substance Ethyl butylacetylaminopropionate (IR3535®) is conducted for 5 years and will be submitted to ANSES as a post-authorisation requirement.

2.2.7 Risk assessment for human health

2.2.7.1 Assessment of effects on Human Health

Acute dermal toxicity, skin and eye irritation and sensitising properties were assessed using formula EUS26-15 Insect Repellent Spray (US Pump Spray Formulation). The test substance can be regarded as representative for the product under evaluation. The main difference between the 2 formulas is the presence (EUS26-15) / absence (product under evaluation) of a small amount of denaturant. The harmonized classification of the substance in question indicates that it will not affect the results of the properties tested. For details, see section 2.2.2 and confidential part of the PAR.

(I) Skin corrosion and irritation

New data for this section are due to differences in product composition.

Summary table of animal studies on skin corrosion /irritation					
Method, Guideline, GLP status, Reliability	**Species, Strain, Sex, No/group**	**Test substance, Vehicle, Dose levels, Duration of exposure**	**Results** *Average score (24, 48, 72h)/ observations and time point of onset, reversibility; other adverse local / systemic effects, histopathological findings*	**Remarks *(e.g. major deviations)***	**Reference**
OPPTS 870.2500 OECD 404 EU 92/69 Annex V, B4 GLP=yes Rel=1	Albino rabbit New Zealand White 2♂, 1♀ 1 test group, 3 animals	EUS26-15 Insect Repellent Spray No vehicle 0.5 ml / 2.5 cm x 2.5 cm 4h	Erythema: 24h: 1.0 48h: 0.6 72h: 1.0 Edema: 24h: 1.0 48h: 0.6 72h: 0.3 Very slight erythema and edema. Max score erythema 1, earliest onset 0.5-1h; max score edema 1, earliest onset 0.5-1h. Very slight erythema persisted for 2 animals through study termination. No deaths, no remarkable bw changes	US Pump Spray Formulation	[redacted] 2006 (a)

Individual and mean dermal scores for erythema and edema [redacted] 2006 (a))

Animal	Erythema									Edema						
	Sex	Site	0.5 – 1 h	24 h	48 h	72 h	4 d	7 d	14 d	0.5 – 1 h	24 h	48 h	72 h	4 d	7 d	14 d
45169	M	B	1	1	1	1	1	1	1	1	1	1	0	0	0	0
45171	M	D	1	1	0	1	1	1	0	0	1	0	0	0	0	0
45186	F	B	1	1	1	1	1	1	1	0	1	1	1	1	1	0
Means 24-72 hours (individual animals)																
45169	1									0.67						
45171	0.67									0.33						
45186	1									1						
Mean 24-72 hours (all animals)																
	0.89									0.67						

There were no deaths or remarkable body weight changes noted during the study. Dermal findings for the 4-hour exposure sites consisted of very slight erythema and edema (grade 1). Very slight erythema persisted for two animals through study termination. Based on the evaluation according to EU criteria, the mean scores at 24-72 hours for erythema and edema were calculated to be 0.89 and 0.67, respectively.

The mean scores determined for erythema (0.89) and edema (0.67) do not require a classification according to the EU and GHS classification and labelling system.

Although erythema grade 1 (very slight erythema, barely perceptible, area of edges not well defined) persisted in two out of three animals until the end of the 14-day post-observation period, a classification as a potential skin irritant is not required. According to EU Directive 2001/59/EC or Regulation (EC) No. 1272/2008 (CLP), a classification as a skin irritant should be considered when hyperplasia, hyperkeratosis, scaling, discoloration, fissures, scabs or alopecia persist in two or more animals at the end of the observation period which has not been observed in the skin irritation study with Insect Repellent Pump Spray IR3535® 20 %.

No *in vitro* or human data are available for skin corrosion/irritation.

Conclusion used in Risk Assessment – Skin corrosion and irritation	
Value/conclusion	Biocidal product not classified for skin corrosion/irritation according to (EU) nr. 1272/2008
Justification for the value/conclusion	Mean scores for erythema and edema do not trigger a classification. Severity of skin reactions that persisted to the end of the observation period was limited (erythema grade 1).
Classification of the product according to CLP and DSD	none

(II) Eye Irritation

New data for this section are due to differences in product composition.

Summary table of animal studies on serious eye damage and eye irritation					
Method, Guideline, GLP status, Reliability	**Species, Strain, Sex, No/group**	**Test substance,Dose levels, Duration of exposure**	**Results** ***Average score (24, 48, 72h)/ observations and time point of onset, reversibility***	**Remarks** ***(e.g. major deviations)***	**Reference**
OPPTS 870.2400 OECD 405 EU 92/69 Annex V, B5 GLP=yes Rel=1	Albino rabbit New Zealand White 2♂, 1♀ 1 test group, 3 animals	EUS26-15 Insect Repellent Spray No vehicle 0.1ml 1 single unwashed exposure	Cornea: 24h: 2.0 48h: 1.3 72h: 1.0 Iris: 24h: 0.0 48h: 0.0 72h: 0.0 Conjunctiva; redness: 24h: 3.0 48h: 3.0 72h: 2.3 Conjunctiva; chemosis: 24h: 2.3 48h: 2.3 72h: 2.0 Reversibility: Yes Earliest onset for all symptoms: 1h Max scores: cornea 2, conjunctiva, redness 3, conjunctiva, chemosis 4 Reversible at d14 2 out of 3 animals: average corneal opacity ≥1, average conjunctival redness ≥2	US Pump Spray Formulation	[redacted] (2006) (b)

Individual Total Scores and for Ocular Irritation ([redacted] 2006 (b))

Rabbit No/sex	No. 45158/male				No. 45170/male				No. 45182/female			
Time after treatment [hours]	1	24	48	72	1	24	48	72	1	24	48	72
Cornea												
Opacity	1	2	1	0	2	2	2	2	1	2	1	1
Area involved	1	2	2	0	1	4	4	3	1	2	1	1
Iris	0	0	0	0	0	0	0	0	0	0	0	0
Conjunctivae												
Redness	3	3	3	2	3	3	3	3	3	3	3	2
Chemosis	4	2	3	3	3	2	2	1	4	3	2	2
Discharge	3	2	2	0	3	3	2	1	3	2	2	1
Mean of 24-72-hour Readings: individual animals	Opacity: 1 Iris: 0 Redness: 2.7 Chemosis: 2.7				Opacity: 2 Iris: 0 Redness: 3 Chemosis: 1.7				Opacity: 1.33 Iris: 0 Redness: 2.7 Chemosis: 2.3			
Mean of 24-72-hour Readings: all animals	Opacity: 1.44 Iris: 0 Redness: 2.8 Chemosis: 2.2											
Classification	Irritant (EU: Xi, R36; GHS: Eye Irrit. 2, H319)											

There were no deaths or remarkable body weight changes noted during the study. Positive corneal and conjunctival irritations were noted for all animals. Corneal irritation subsided by study day 10 and conjunctival irritation subsided by study day 14. The left (control) eyes were free of evidence of ocular irritation and other findings for the duration of the study. According to EU and CLP criteria, the mean scores for corneal reactions, iritis, conjunctival redness and chemosis were 1.44, 0, 2.8 and 2.2, respectively, resulting in a classification as a potential eye irritant (EU criteria: Xi, R36; GHS criteria: Eye Irrit. 2, H319).

Based on the results obtained in the eye irritation study with EUS26-15 Insect Repellent Spray in rabbits, the biocidal product is a potential eye irritant and needs to be classified with respect to eye irritancy (EU criteria: Xi, R36; GHS criteria: Eye Irrit. 2, H319).

No *in vitro* or human data are available for eye corrosion/irritation.

Conclusion used in Risk Assessment – Eye irritation	
Value/conclusion	the biocidal product has to be classified as a potential eye irritant according to (EU) nr. 1272/2008 (Eye Irrit. 2, H319)
Justification for the value/conclusion	average score was ≥ 1 for corneal opacity and ≥ 2 for conjunctival redness and chemosis in 2 out of 3 animals
Classification of the product according to CLP and DSD	Eye damage/irritation cat 2, H319

(III) Respiratory tract irritation

Conclusion used in the Risk Assessment – Respiratory tract irritation	
Justification for the conclusion	Neither the active ingredient nor one of the other relevant ingredients of the biocidal product are classified with respect to respiratory tract irritation. Insect Repellent Pump Spray IR3535® 20 % does not pose a respiratory tract irritation hazard.
Classification of the product according to CLP and DSD	There is no indication that a classification with respect to respiratory tract irritation is necessary for Insect Repellent Pump Spray IR3535® 20 %.

(IV) Skin sensitization

Summary table of animal studies on skin sensitisation					
Method, Guideline, GLP status, . Reliability	**Species, Strain, Sex, No/group**	**Test substance, Vehicle, Dose levels, duration of exposure Route of exposure** *(topical/intradermal, if relevant)*	**Results** *(EC3-value or amount of sensitised animals at induction dose); evidence for local or systemic toxicity (time course of onset)*	**Remarks** ***(e.g. major deviations)***	**Reference**
OECD 406 OPPTS 870.2600 EU 92/69 Annex V, B6 GLP=yes Rel=1	Guinea pig Hartley [Crl: HA] 10 ♂ and 10 ♀/ test group 5 ♂ and 5 ♀/ naïve control group	EUS26-15 Insect Repellent Spray No vehicle Undiluted 0.3 ml/site 6h exposure Epicutaneous, occlusive	No positive dermal reactions in the test or the naive control groups No deaths, no test article related clinical findings, no remarkable bw changes	US Pump Spray Formulation	[redacted] (2006) (c)

Dermal Observations and Severity Indices [redacted] 2006 (c))

Dermal Scores													
Group	**Material**	**24 hour**					**48 hour**					**Severity Index**		**Incidence Index**
		0	+/-	1	2	3	0	+/-	1	2	3	24 h	48 h	
Test		17	3	0	0	0	16	4	0	0	0	0.1	0.1	0 %
Naive Control-I		10	0	0	0	0	9	1	0	0	0	0.0	0.1	NA

TA = Test Article
NA = Not Applicable

The skin sensitisation potential of EUS26-15 Insect Repellent Spray was evaluated using the modified Buehler test method.

Animal welfare benefits and scientific advantages make the LLNA the preferred test for sensitization. However, existing data of good quality derived from a Buehler test should be acceptable as they preclude the need for further in vivo testing. As none of the cosmetic ingredients in

the formulation have a sensitizing potential and as the active substance is not considered as sensitizing (Buehler test and Photoallergenicity maximisation test), the Buehler test was regarded as acceptable.

There were no deaths, nor were there any test article-related clinical findings or remarkable body weight changes during the study period. Following challenge dosing with EUS26-15 Insect Repellent Spray, there were no positive dermal reactions (score ≥ 1) in the test or the naive control groups. The Incidence Index for the test group with a score ≥ 1 was 0 % (0/20) following challenge dosing.

In the positive control experiments which were performed as a separate study, the positive control substance HCA was a sensitizer when administered as both a 10 % concentration in 70/30 (v/v) in acetone/PEG 400 and a 20 % concentration in 70/30 (v/v) in acetone/PEG 400 under the conditions of the study. The mean incidence indices for the positive controls were 20 % and 60 % at a concentration of 10 % and 20 %, respectively. This confirms the reliability of the test system as indicated by the dose-response relationship.

EUS26-15 Insect Repellent induced no skin sensitisation reactions in albino guinea pigs when using the modified Buehler test method. A classification with respect to skin sensitisation is not required.

No *in vitro* or human data are available for skin sensitisation.

Conclusion used in Risk Assessment – Skin sensitisation	
Value/conclusion	Biocidal product not classified for skin sensitisation according to (EU) nr. 1272/2008
Justification for the value/conclusion	Following challenge dosing with EUS26-15 Insect Repellent Spray, there were no positive dermal reactions (score ≥ 1) in the test or the naive control groups. The Incidence Index for the test group with a score ≥ 1 was 0 % (0/20) following challenge dosing.
Classification of the product according to CLP and DSD	none

(V) Respiratory sensitization (ADS)

Conclusion used in Risk Assessment – Respiratory sensitisation	
Value/conclusion	
Justification for the value/conclusion	None of the ingredients of the product is known to be sensitizing to the respiratory tract. Moreover, from tests in guinea pigs the product was proven not to exert any skin sensitizing properties. In addition, the active ingredient IR3535® did not show a sensitizing or photosensitizing potential from tests in guinea pigs.
	Finally, IR3535® products are on the market for more than 40 years and there are no indications for any sensitizing potential neither to the skin nor to the respiratory tract. Based on all this data it is thus concluded that the product is not sensitizing to the respiratory tract.
Classification of the product according to CLP and DSD	none

(VI) Acute toxicity

a. Acute toxicity by oral route

Value used in the Risk Assessment – Acute oral toxicity	
Value	Biocidal product not classified for acute oral toxicity according to (EU) nr. 1272/2008
Justification for the selected value	Neither the active ingredient nor one of the other relevant ingredients of the biocidal product are classified with respect to acute oral toxicity. Thus, Insect Repellent Pump Spray IR3535® 20 % has no potential for an acute oral toxicity hazard and no classification with respect to acute oral toxicity is required. No human data are available for acute oral toxicity.
Classification of the product according to CLP and DSD	none

Data waiving	
Information requirement	Acute oral toxicity: Study scientifically unjustified
Justification	Since the acute oral toxicity of Insect Repellent Pump Spray IR3535® 20 % can be assessed on the basis of the properties of the ingredients, the performance of an acute oral toxicity study with the biocidal product is scientifically not justified. See IUCLID data point 8.5.1 Endpoint study record: Acute toxicity: oral.001. There are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Regulation (EC) No 1272/2008 (CLP), and synergistic effects between any of the components are not expected.

b. Acute toxicity by inhalation

No human data are available for acute inhalation toxicity.

Value used in the Risk Assessment – Acute inhalation toxicity	
Value	Biocidal product not classified for acute toxicity (inhalation) according to (EU) nr. 1272/2008
Justification for the selected value	None of the components of the biocide are classified for acute inhalation toxicity according to (EU) nr. 1272/2008.
Classification of the product according to CLP and DSD	none

Data waiving	
Information requirement	Acute inhalation toxicity: Study scientifically unjustified
Justification	Since the acute inhalation toxicity of Insect Repellent Pump Spray IR3535® 20 % can be assessed on the basis of the properties of the ingredients, the performance of an acute inhalation toxicity study with the biocidal product is scientifically not justified. See IUCLID data point 8.5.2 Endpoint study record: Acute toxicity: inhalation.001. There are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Regulation (EC) No 1272/2008 (CLP), and synergistic effects between any of the components are not expected.

c. Acute toxicity by dermal route

Summary table of animal studies on acute dermal toxicity						
Method, Guideline, GLP status, Reliability	**Species, strain, Sex, No/group**	**Test substance, Vehicle, Dose levels, Surface area**	**Signs of toxicity** *(nature, onset, duration, severity, reversibility)*	**LD50**	**Remarks** *(e.g. major deviations)*	**Reference**
OECD 402 EU 92/69 Annex V, B.3 EPA OPPTS 870.1200 GLP=yes Rel=1	Rat Crl:CD(SD) 5♀, 5♂/dose	EUS26-15 Undiluted 5000 mg/kg bw 10% of body area Semiocclusive	See below	>5000 mg/kg bw	US Pump Spray Formulation	[redacted] (2006) (d)

There were no deaths, remarkable body weight changes or macroscopic findings at the scheduled necropsy. Clinical findings noted persisted until day 1 post-dosing and included abnormal excretion, and various discoloured areas due to discharges/excretions which were observed. Dermal findings noted during the study consisted of very slight erythema (grade 1) and pinpoint scabbing at the dose sites. Very slight erythema (grade 1) persisted until study termination on day 14.

Based on the results of this study, the LD_{50} of EUS26-15 Insect Repellent Spray was greater than 5000 mg/kg bw when administered once for 24 hours to the clipped, unabraded skin of male and female albino rats. A classification of the biocidal product with respect to acute dermal toxicity is not required.

No human data are available for acute dermal toxicity.

Value used in the Risk Assessment – Acute dermal toxicity	
Value	Biocidal product not classified for acute dermal toxicity according to (EU) nr. 1272/2008
Justification for the selected value	In an acute dermal toxicity study, the LD_{50} of EUS26-15 Insect Repellent Spray was greater than 5000 mg/kg bw.
Classification of the product according to CLP and DSD	none

(VII)Information on dermal absorption

In a dermal toxicokinetics/metabolism study with 5 male and 5 female human volunteers, the dermal absorption of the active substance IR3535® from a pump spray containing 20% IR3535® has been determined in parallel (Dekant, 2010). In this study, approx. 3 grams of the formulation were applied once to hands, arms, legs, feet, face and neck of each volunteer (ca. 64% of total body area). The total amount of IR3535® and its metabolite IR3535®-free acid excreted with the urine over a period of 48 hours presented 13.3% of the dermal dose of IR3535® applied. Since IR3535® is rapidly and extensively metabolized and as IR3535®-free acid has a low molecular weight and high water solubility, it is expected that urinary excretion of IR3535®-free acid and IR3535® represents the total extent of absorption of IR3535® in humans and a distribution to organs and tissues is considered to be negligible. The results of this study have been summarized in in the active substance dossier and were assessed for the approval of IR3535®.

The assessment of this study resulted in an overall dermal penetration of 14% IR3535®.

Since the composition of Insect Repellent Pump Spray IR3535® 20 % and the concentration of IR3535® is identical to the product tested in the dermal toxicokinetics/metabolism study, a separate skin absorption study with the biocidal product can be waived. Instead, the skin absorption of 14% for IR3535® can be applied to Insect Repellent Pump Spray IR3535® 20%. A dermal penetration of 14% will be used in the human exposure assessments for the intended use of the biocidal product.

See IUCLID datapoint 8.6 Dermal absorption Endpoint study record: Dermal absorption.001.

Value(s) used in the Risk Assessment – Dermal absorption			
Substance	Insect Repellent Pump Spray IR3535® 20%		
Value(s)*	14% dermal absorption for 20% IR3535 lotion/ cream formulations		
Justification for the selected value(s)	human volunteer study on a water/ethanol-based 20 % IR3535® formulation (Dekant, 2010)		

Data waiving	
Information requirement	Skin absorption study
Justification	Human volunteer study on a water/ethanol-based 20 % IR3535® formulation

(VIII) Available toxicological data relating to non active substance(s) (i.e. substance(s) of concern)

There are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Directive 1999/45/EC and Regulation (EC) No 1272/2008 (CLP), and synergistic effects between any of the components are not expected.

(IX) Available toxicological data relating to a mixture

Available toxicological data relating to a mixture that a substance(s) of concern is a component of

There are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Directive 1999/45/EC and Regulation (EC) No 1272/2008 (CLP), and synergistic effects between any of the components are not expected.

(X) Other

Not applicable.

- **MAJOR CHANGE APPLICATION (2021)**

The major change has no impact on the hazard.

2.2.7.2 Exposure assessment

The active substance contained in the product Insect Repellent Pump Spray IR3535® 20 % is the same as evaluated in the CAR for IR3535® and therefore no new data/information on the active substance is required.

The composition of the representative product from the CAR is not identical to that of Insect Repellent Pump Spray IR3535® 20 %. However, the intended use is identical as well as the amount of active substance in both products. It does not contain substances of toxicological concern apart IR3535®.

Following the referral conclusions for this product, it has been decided that Ethanol should be considered as a substance of concern, since it is responsible for the classification of the biocidal product as a flammable liquid.

However, from a toxicological point of view, ethanol is not considered relevant. Based on its harmonized classification, ethanol is not classified for any human health hazard. Considering the fact that there is currently no guidance of how to treat physico-chemical hazard, it was agreed that the application of P-sentences and H-sentences will cover the risk, based on an analogy with the Human Health document CA-Nov14-Doc 5.11 when substances are classified in band A.

Consequently, no risk assessment was performed for ethanol. Identification of main paths of human exposure towards active substance(s) and substances of concern from its use in biocidal product

Summary table: relevant paths of human exposure							
Exposure path	**Primary (direct) exposure**			**Secondary (indirect) exposure**			
	Industrial use	**Professional use**	**Non-professional use**	**Industrial use**	**Professional use**	**General public**	**Via food**
Inhalation	n.a.	n.a.	Yes	n.a.	n.a.	Yes	n.a.
Dermal	yes	n.a.	Yes	n.a.	n.a.	Yes	n.a.
Oral	n.a.	n.a.	n.a.	n.a.	n.a.	Yes	n.a.

For primary exposure, the most relevant route of exposure is the dermal route. During the application phase, inhalation exposure is possible resulting from respiring aerosols after spraying. It was considered that the respirable particles will be absorbed via the lower airways and that the non-respirable particles will precipitate in the upper airways and be taken in orally. Direct oral exposure is not considered to be relevant because of the repellent taste (bad palatability) of the active substance and because the biocidal product is not intended to be applied by children younger than 11 years.

For secondary exposure, dermal exposure is possible for adults treating or handling children. However this scenario is fully covered by primary adult dermal exposure. Hand to mouth transfer is also possible for adults and children; nonetheless, the biocidal product is not intended to be applied on children's hands which reduces potential oral uptake of the dermally applied active substance. For inhalative exposure, the inhalation of volatilized residues after application is also relevant.

(I) General information

General default values for exposure assessment

Default value considering age groups[1]			
Age groups	**Body weight [kg]**	**Respiration rate [m³/air/hour]**	**Total body surface area [cm²]**
ADULT irrespective of gender (based on female 30 to <40 years old)	60	1.25	16600
CHILD 6 to < 12 years old irrespective of gender (based on female 6 to <11 years old)	23.9	1.32	9200
CHILD 2 to < 6 years old irrespective of gender (based on data from female 2 to <6 years old)	15.6	1.26	6800
TODDLER 1 to <2 years old irrespective of gender (based on female 1 to <2 years old)	10	1.26	4800
INFANT < 1 year old irrespective of gender (based on female 6 to <12 months old)	8	0.84	4100

[1] Recommendation no. 14 of the BPC Ad hoc Working Group on Human Exposure Default human factor values for use in exposure assessments for biocidal products (revision of HEEG opinion 17 agreed at the Human Health Working Group III on 12 June 2017)

Treated surface, applied amount of biocidal product and number of application per day:

Treated surface:

The treated surface is assumed to be the uncovered parts of the body. According Recommendation no. 11 of the BPC Ad hoc Working Group on Human Exposure : Proposal for harmonising the assessment of human exposure to repellents (PT19) (Version 2.1 agreed at Human Health Working Group V on 22 November 2017), the uncovered body surface area corresponds to 55% of the total body surface.

Amount of biocidal product:

Following the efficacy assessment for this product, the efficacious application rate is : 0.00067 g product/cm² skin against ticks and 0.00067 g/cm² for legs (and 0.00051 g/cm² for arms) against mosquitoes.

Therefore, the application rate is considered to be **0.67 mg/cm².**

Number of application per day:

The applicant proposes that : "*Insect Repellent Pump Spray IR3535® 20% is intended to be used in summer when insects are frequent. It is usually applied once a day depending on outdoor activities, weather and presence of insects. The application can be repeated when necessary (noticeable reduction in repellence). The pump spray can be applied up to 3 times per day for adults, up to 2 times for children between the age of 3 and 10 years and maximally 1 time per day for children below 3 years.*"

Summary : Amount of product used per application for the different age groups, treated surface and number of application per day			
Age groups	**Amount of product used per application [g]**	**Treated surface [cm²]**	**number of applications per day**
ADULT irrespective of gender (based on female 30 to <40 years old)	6.1171	9130	3 applications/day
CHILD 6 to < 12 years old irrespective of gender (based on female 6 to <11 years old)	3.3902	5060	2 applications/day
CHILD 2 to < 6 years old irrespective of gender (based on data from female 2 to <6 years old)	2.5058	3740	2 applications/day
TODDLER 1 to <2 years old irrespective of gender (based on female 1 to <2 years old)	1.7688	2640	1 application/day
INFANT < 1 year old irrespective of gender (based on female 6 to <12 months old)	1.51085	2255	1 application/day

Dermal, inhalatory and oral absorption:

- Inhalatory absorption : 100 %
- Dermal absorption : 14 %
- Oral absorption : 100 %

(II) List of scenarios

Insect Repellent Pump Spray IR3535® 20 % is used by the general public. The primary route of exposure is dermal.

Oral exposure by hand-to-mouth transfer is not considered to be a significant route of primary exposure, because of the repellent taste (bad palatability) of the active substance, thus, preventing repeated mouthing of IR3535® by children and infants. Furthermore, the biocidal product is not intended to be applied by children younger than 11 years which makes an oral uptake of the dermally applied active substance inconsiderable.

A potential inhalation exposure is only possible during the application phase via spraying. After application, no inhalation exposure risk is anticipated due to the low vapour pressure of IR3535®. Moreover, it has to be taken into account that the exposure time to the spray is extremely short and that it is not recommended to spray the biocidal product directly onto the face.

Dermal secondary exposure is possible for adults treating or handling children. However, this scenario is fully covered by primary adult dermal exposure. A parent applying (spraying) the product on children and herself/himself has been taken into account for inhalative secondary exposure.

Hand to mouth transfer has been developed consistently with the DEET dossier. It was proposed to use a reverse scenario to estimate this exposure.

Inhalation of volatilized residues after application is relevant based on the HEEG opinion on Assessment of Inhalation Exposure of Volatilized Biocide Active Substance. The exposure to volatilised residues indoors was calculated using ConsExpo model..

Summary table: scenarios			
Scenario number	**Scenario** (e.g. mixing/ loading)	**Primary or secondary exposure Description of scenario**	**Exposed group** (e.g. professionals, non-professionals, bystanders)
1.	Application phase	Primary exposure: Dermal exposure assessment for adults, children, toddlers and infants.	Non-professionals
2.	Application phase	Primary exposure: Inhalation exposure assessment for adults, children, toddlers and infants.	Non-professionals
3.	Post-application phase	Secondary exposure (indirect exposure as a result of use): Hand-mouth transfer reverse reference scenario (oral exposure)	Non-professionals
4.	Post-application phase	Parent treating two children and himself/herself (spraying) (combined inhalative and oral exposure)	Non-professionals
5.	Post-application phase	Inhalation of volatilised residues after application (inhalative exposure)	Non-professionals
6.	Exposure during production	Mixing and Loading model – worst case for the production, formulation and disposal of the biocidal product	Professionals

(III) Industrial exposure

There is no concern about industrial exposure because of the intend of use apart for the production/formulation and disposal of the biocidal product. This exposure is addressed under a point below (scenario 6).

(IV) Professional exposure

Not relevant since the product Insect Repellent Pump Spray IR3535® 20 % is intended to be used by general public.

(V) Non-professional exposure

Scenario 1: Primary exposure: Dermal exposure assessment for adults, children, toddlers and infants.

Description of Scenario 1		
This scenario is based on the one available in the CAR of IR3535®. It has been updated with the document : Biocide Human Health Exposure Methodology (Oct 2015).		
Dermal exposure: Number of application/day x amount b.p./application x percent of a.s. in b.p. **Systemic exposure:** Dermal exposure x percent of dermal absorption **Dermal systemic exposure:** Systemic exposure / body weight		
	Parameters	**Value**
For All categories	Dermal absorption[1]	14%
	% of active substance in biocidal product[1]	20%
Tier 1- Adult	Number of application / day[1]	3
	Body weight[1]	60 kg
	Amount of biocidal product/ application[1]	6.12 g
Tier 1- Child 6 to < 12 years old	Number of application / day[1]	2
	Body weight[1]	23.9 kg
	Amount of biocidal product/ application[1]	3.39 g
Tier 1- Child 2 to < 6 years old	Number of application / day[1]	2
	Body weight[1]	15.6 kg
	Amount of biocidal product/ application[1]	2.51 g
Tier 1- Toddler	Number of application / day[1]	1
	Body weight[1]	10 kg
	Amount of biocidal product/ application[1]	1.77 g
Tier 1- Infant	Number of application / day[1]	1
	Body weight[1]	8 kg
	Amount of biocidal product/ application[1]	1.51 g
Tier 2- Adult	Number of application / day[2]	2
Tier 2- Child 6 to < 12 years old	Number of application / day[2]	1
Tier 2- Child 2 to < 6 years old	Number of application / day[2]	1
Tier 3- Adult	Number of application / day[2]	1

[1] General information, see justification above
[2] Limitation of the exposure

Calculations for scenario 1

Summary table: estimated exposure for Dermal Primary exposure		
Exposure scenario	**Tier/PPE**	**Estimated dermal uptake**
Scenario 1 – ADULT 3 applications/day	Tier 1 / no PPE	8.56 mg/kg bw/day
Scenario 1 – CHILD (6-12) 2 applications/day	Tier 1 / no PPE	7.94 mg/kg bw/day
Scenario 1 – CHILD (2-6) 2 applications/day	Tier 1 / no PPE	8.99 mg/kg bw/day
Scenario 1 – TODDLER 1 application/day	Tier 1 / no PPE	4.95 mg/kg bw/day
Scenario 1 – INFANT 1 application/day	Tier 1 / no PPE	5.29 mg/kg bw/day
Scenario 1 – ADULT 2 applications/day	Tier 2 / no PPE	5.71 mg/kg bw/day
Scenario 1 – CHILD (6-12) 1 application/day	Tier 2 / no PPE	3.97 mg/kg bw/day
Scenario 1 – CHILD (2-6) 1 application/day	Tier 2 / no PPE	4.50 mg/kg bw/day
Scenario 1 – ADULT 1 application/day	Tier 3 / no PPE	2.85 mg/kg bw/day

Scenario 2: Primary exposure: Inhalation exposure assessment for adults, children, toddlers and infants.

Description of Scenario 2
This scenario is based on the one available in the CAR of IR3535®. It has been adapted with the documents : Biocide Human Health Exposure Methodology (Oct 2015) and Guidance on the biocidal products Regulation (volume III Human Health – Part B Risk Assessment, Oct 2015).
Model used: "Consumer spraying and dusting model 2 - Hand-held trigger spray" from Biocide Human Health Exposure Methodology, p. 220 **Inhaled product** = Inhalation rate x number of application/day x spray duration (min.) / 60 min. x indicative value for inhalation **Inhaled active substance** = inhaled product x percent of a.s. in the b.p. Particle size distribution will determine the respirable fraction of the product released. Regarding the cut-off value for respirable droplet size, different sources are available. The BPR guidance III part B states that particles below 15 µm may reach the alveolar region of the respiratory tract. According to the Biocides Human Health Exposure Methodology, particles larger than 20 µm are all non-respirable and particles smaller than 5 µm are respirable for about 35 %. The draft Proposal for harmonising the assessment of human exposure to repellents (PT19) states that in general, the cut-off for the respirable fraction is 10 µm, and refers to ConsExpo 4.1 for the assessment of inhalation exposure. In ConsExpo 4.1, the default cut-off for the respirable fraction has been set at 15 µm. For the present assessment, a cut-off value of 15 µm for the respirable fraction has been chosen. The applicant provided a study for the distribution of particles and their size. 11.21 %(V) of the released biocidal product has a diameter below 15.81 µm(V). The rest is regarded as non-respirable and is assumed to be taken in orally. **Inhalation systemic exposure:** 11.21 % x inhaled a.s. x inhalation absorption / body weight **Oral systemic exposure:** 88.79 % x inhaled a.s. x oral absorption / body weight

	Parameters	Value
For All categories	Inhalation absorption[1]	100%
	Oral absorption[1]	100%
	% of active substance in biocidal product[1]	20%
	Indicative value for inhalation[2]	10.5 mg/m^3
	Spray duration[3]	4 minutes
Tier 1- Adult	Number of application / day[1]	3
	Body weight[1]	60 kg
	Respiration rate [m^3/air/hour] [1]	1.25 m³/h
Tier 1- Child 6 to < 12 years old	Number of application / day[1]	2
	Body weight[1]	23.9 kg
	Respiration rate [m^3/air/hour] [1]	1.32 m³/h
Tier 1- Child 2 to < 6 years old	Number of application / day[1]	2
	Body weight[1]	15.6 kg
	Respiration rate [m^3/air/hour] [1]	1.26 m³/h

Tier 1- Toddler	Number of application / day[1]	1
	Body weight[1]	10 kg
	Respiration rate [m^3/air/hour] [1]	1.26 m^3/h
Tier 1- Infant	Number of application / day[1]	1
	Body weight[1]	8 kg
	Respiration rate [m^3/air/hour] [1]	0.84 m^3/h
Tier 2- Adult	Number of application / day[4]	2
Tier 2- Child 6 to < 12 years old	Number of application / day[4]	1
Tier 2- Child 2 to < 6 years old	Number of application / day[4]	1
Tier 3- Adult	Number of application / day[4]	1

[1] General information, see justification above
[2] Model used: "Consumer spraying and dusting model 2 - Hand-held trigger spray" Biocide Human Health Exposure Methodology, p. 220
[3] CAR of IR3535® (expert judgement)
[4] Limitation of the exposure

Calculations for scenario 2

Summary table: estimated exposure for Inhalation Primary exposure			
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated oral uptake**
Scenario 2 – ADULT 3 applications/day	Tier 1 / no PPE	0.000981 mg/kg bw	0.00777 mg/kg bw
Scenario 2 – CHILD (6-12) 2 applications/day	Tier 1 / no PPE	0.00173 mg/kg bw	0.0137 mg/kg bw
Scenario 2 – CHILD (2-6) 2 applications/day	Tier 1 / no PPE	0.00253 mg/kg bw	0.0201 mg/kg bw
Scenario 2 – TODDLER 1 application/day	Tier 1 / no PPE	0.00198 mg/kg bw	0.0157 mg/kg bw
Scenario 2 – INFANT 1 application/day	Tier 1 / no PPE	0.00165 mg/kg bw	0.0131 mg/kg bw
Scenario 2 – ADULT 2 applications/day	Tier 2 / no PPE	0.000654 mg/kg bw	0.0052 mg/kg bw
Scenario 2 – CHILD (6-12) 1 application/day	Tier 2 / no PPE	0.000867 mg/kg bw	0.0069 mg/kg bw
Scenario 2 – CHILD (2-6) 1 application/day	Tier 2 / no PPE	0.000127 mg/kg bw	0.0100 mg/kg bw
Scenario 2 – ADULT 1 application/day	Tier 3 / no PPE	0.000327 mg/kg bw	0.0026 mg/kg bw

Scenario 3: Secondary exposure (indirect exposure as a result of use): Hand-mouth transfer reverse reference scenario (oral exposure)

Description of Scenario 3
This scenario is based on the one available in the CAR of IR3535®. It has been updated with the document : Biocide Human Health Exposure Methodology (Oct 2015).
Hand to mouth transfer might be possible for small children. However this scenario is not considered to be a significant route of exposure because of bad palatability (bitterness) preventing repeated mouthing by small children and you may not apply to children's hand. At TM IV 2010, it was agreed to develop the scenario "hand-mouth transfer" consistently with the DEET dossier evaluated by SE and to be discussed with HEEG and TM agreed not to sum up the two routes (oral and dermal) in small children. Reverse reference scenario is included to show how much IR3535® anyone can be exposed to, after oral exposure without exceeding reference dose (AEL for IR3535® is 5 mg/kg bw/d). **External dermal amount of a.s. per application**: Amount of b.p./application x percent of a.s. in b.p. / body weight **Oral systemic exposure via hand-mouth transfer is:** External dermal amount of a.s. per application x Factor for oral intake by hand-mouth transfer x oral absorption **Number of time of application b.p. before exceeding the AEL via hand-mouth transfer :** AEL / Oral systemic exposure via hand-mouth transfer

	Parameters	Value
For All categories	Oral absorption[1]	100 %
	% of active substance in biocidal product[1]	20 %
Tier 1- Adult	Factor for oral intake by hand-mouth transfer[2]	4 %
	Body weight[1]	60 kg
	Amount of biocidal product/ application[1]	6.12 g
Tier 1- Child 6 to < 12 years old	Factor for oral intake by hand-mouth transfer[2]	8 %
	Body weight[1]	23.9 kg
	Amount of biocidal product/ application[1]	3.39 g
Tier 1- Child 2 to < 6 years old	Factor for oral intake by hand-mouth transfer[2]	8 %
	Body weight[1]	15.6 kg
	Amount of biocidal product/ application[1]	2.51 g
Tier 1- Toddler	Factor for oral intake by hand-mouth transfer[2]	8 %
	Body weight[1]	10 kg
	Amount of biocidal product/ application[1]	1.77 g
Tier 1- Infant	Factor for oral intake by hand-mouth transfer[2]	8 %
	Body weight[1]	8 kg
	Amount of biocidal product/ application[1]	1.51 g

[1] General information, see justification above

[2] 4% is the factor of the total treated body surface (Head, hands, arms, legs and feet) reported to the surface area of the fingers. 8% is the factor of the total treated body surface (Head, hands, arms, legs and feet) reported to

the surface area of the hands. They are default values currently discuss for a harmonisation of human exposure scenarios for PT19.

Calculations for scenario 3

Summary table: estimated exposure for Hand-mouth transfer reverse reference scenario (oral exposure)		
Exposure scenario	**Tier/PPE**	**Calculated exposure to IR3535®**
Scenario 3 – ADULT	Tier 1 / no PPE	Adult up to 6.13 applications
Scenario 3 – CHILD (6-12)	Tier 1 / no PPE	Child (6-12) up to 2.20 applications
Scenario 3 – CHILD (2-6)	Tier 1 / no PPE	Child (2-6) up to 1.94 applications
Scenario 3 – TODDLER	Tier 1 / no PPE	Toddler up to 1.77 applications
Scenario 3 – INFANT	Tier 1 / no PPE	Infant up to 1.65 applications

Scenario 4: Parent treating two children and himself/herself (spraying) (combined inhalative and oral exposure)

Description of Scenario 4		
Worst case: a parent applying (spraying) the product on two children and herself/himself **Model used:** it's the same model than the one used to do the scenario 2. Remark: the secondary dermal exposure were not assessed. It is covered by the primary dermal use exposure of the adult. The product would probably be rubbing on the child skin and the layer will not exceed the amount the adult will put on himself. So, BE has decided to follow the CAR which supposes that the dermal secondary exposure will be covered by the primary dermal exposure. Only inhalation exposure is relevant in this case.		
	Parameters	**Value**
For All categories	Inhalation absorption[1]	100 %
	Oral absorption[1]	100 %
	% of active substance in biocidal product[1]	20 %
	Indicative value for inhalation[2]	10.5 mg/m³
	Body weight[1]	60 kg
	Respiration rate [m³/air/hour][1]	1.25 m³/h
	Spray duration[3]	4 minutes
Tier 1- Adult	Number of application / day[1]	7 (3 appl/d for adult and 2 appl/d for each of the 2 children)

[1] General information, see justification above
[2] Model used: "Consumer spraying and dusting model 2 - Hand-held trigger spray" Biocide Human Health Exposure Methodology, p. 220
[3] CAR of IR3535® (expert judgement)

Calculations for scenario 4

Summary table: estimated exposure for treating two children and himself/herself				
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated oral uptake**	**Estimated total uptake**
Scenario 4 – ADULT (2 appl/child and 3 appl/himself)	Tier 1 / no PPE	0.00229 mg/kg bw	0.0181 mg/kg bw	0.0204 mg/kg bw

Scenario 5: Inhalation of volatilised residues after application (inhalative exposure)

Description of Scenario 5
This scenario is not based on the one available in the CAR of IR3535® because it's has been demonstrated that the SVC could exceed 1% in a number of cases. Considering HEEG opinion 13 (Assessment of Inhalation Exposure of Volatilized Biocide Active Substance), the inhalation of volatilised residues after application has to be taken into account for this product. The scenario is based on ConsExpo : inhalation of vapour, instantaneous release as a worst case and based on the document: Biocide Human Health Exposure Methodology (Oct 2015).
Inhalation of volatilized residues after application is relevant considering the HEEG opinion on Assessment of Inhalation Exposure of Volatilized Biocide Active Substance: $$\frac{0.328 \times 215.29 \times 0.15}{5} = 2.12$$ The result of this equation is superior to 1 which means that the inhalation exposure couldn't be considered as negligible. So this exposure was assessed using ConsExpo – exposure to vapour – instantaneous release. **General inputs to the model :** Exposure duration: 24 hours (all day) Product amount: calculated dependent of the amount applied per day and per age categories Weight fraction compound: 20% (biocidal product information) Room volume: 20m^3 (default value of ConsExpo) Ventilation rate: 0.6 /h (default value of ConsExpo) Vapour pressure: 0.15 Pa (at 20 °C) (active substance information) Molecular weight: 215.29 g/mol (active substance information) Temperature : 25°c (ambient temperature)

	Parameters	**Value**
Tier 1- Adult	Product amount[1]	6.12 g
	Body weight[2]	60 kg
	Respiration rate [m^3/air/hour][2]	1.25 m³/h
Tier 1- Child 6 to < 12 years old	Product amount[1]	3.39 g
	Body weight[2]	23.9 kg
	Respiration rate [m^3/air/hour][2]	1.32 m³/h
Tier 1- Child 2 to < 6 years old	Product amount[1]	2.51 g
	Body weight[2]	15.6 kg
	Respiration rate [m^3/air/hour][2]	1.26 m³/h
Tier 1- Toddler	Product amount[1]	1.77 g
	Body weight[2]	10 kg
	Respiration rate [m^3/air/hour][2]	1.26 m³/h
Tier 1- Infant	Product amount[1]	1.51 g
	Body weight[2]	8 kg
	Respiration rate [m^3/air/hour][2]	0.84 m³/h

[1] According the primary exposure, only one application per day can be authorized. Therefore, the product amount corresponds to 1 application/day.
[2] General information, see justification above

Calculations for scenario 5

Summary table: estimated exposure for inhalation of volatilised residues after application (inhalative exposure)		
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake of volatilised residues after application**
Scenario 5 – ADULT	Tier 1 / no PPE	2.12 mg/kg bw/day
Scenario 5 – CHILD (6-12)	Tier 1 / no PPE	3.12 mg/kg bw/day
Scenario 5 – CHILD (2-6)	Tier 1 / no PPE	3.37 mg/kg bw/day
Scenario 5 – TODDLER	Tier 1 / no PPE	3.71 mg/kg bw/day
Scenario 5 – INFANT	Tier 1 / no PPE	2.64 mg/kg bw/day

Combined scenarios : Total primary exposure, combination of scenario 1 and 2

Summary table: estimated exposure for combined scenarios 1+2					
Exposure scenario	**Tier / PPE**	**Estimated dermal uptake [mg/kg bw/day]**	**Estimated inhalation uptake [mg/kg bw]**	**Estimated oral uptake [mg/kg bw]**	**Estimated total acute uptake for primary use [mg/kg bw]**
Scenario 1+2 – ADULT 3 applications/day	Tier 1 / no PPE	8.56	0.000981	0.00777	8.57
Scenario 1+2 – CHILD (6-12) 2 applications/day	Tier 1 / no PPE	7.94	0.00173	0.0137	7.96
Scenario 1+2 – CHILD (2-6) 2 applications/day	Tier 1 / no PPE	8.99	0.00253	0.0201	9.02
Scenario 1+2 – TODDLER 1 application/day	Tier 1 / no PPE	4.95	0.00198	0.0157	4.97
Scenario 1+2 – INFANT 1 application/day	Tier 1 / no PPE	5.29	0.00165	0.0131	5.30
Scenario 1+2 – ADULT 2 applications/day	Tier 2 / no PPE	5.71	0.000654	0.0052	5.71
Scenario 1+2 – CHILD (6-12) 1 application/day	Tier 2 / no PPE	3.97	0.000867	0.0069	3.98
Scenario 1+2 – CHILD (2-6) 1 application/day	Tier 2 / no PPE	4.50	0.000127	0.0100	4.51
Scenario 1+2 – ADULT 1 application/day	Tier 3 / no PPE	2.85	0.000327	0.0026	2.86

The exposure of inhalation of volatilized residues after application and the combined inhalative and oral exposure of a parent treating two children are negligible compared to primary (dermal) exposure.

(VI) Exposure of the general public

Exposure of the general public is covered by the secondary exposure of non-professional.

(VII)Monitoring data

Not applicable.

- **MAJOR CHANGE APPLICATION (2021)**

Please see the risk characterization part.

(VIII) Dietary exposure

Considering the scenario 3 (hand to mouth transfer), considering that the amount in scenario 3 will be superior to the amount on the fingers of the hands (possible contact surface for transfer of residue to food) and finally considering that the biocidal product is not used for and/or during food production, or in rooms where food is produced processed or stored, the dietary risk would be covered by the scenario 3.

However, Belgium is of advice that the restriction measures (Wash hands thoroughly after handling., do not use on children's hands) must stay to avoid any misuse of the product.

- **MAJOR CHANGE APPLICATION (2021)**

Application of the biocidal product on horses intended for human consumption is not claimed by the applicant and a risk mitigation measure has been proposed: do not use near or on livestock. Moreover, the product is applied by direct spraying on the most exposed parts of the horses. The product is not supposed to be applied by hand and no transfer of residues from hand to food is expected. Therefore, based on intended uses, no direct or indirect exposure via food is expected.

(IX) Exposure associated with production, formulation and disposal of the biocidal product

In modern formulation plants typically automated equipment is used to add the formulation ingredients and to fill the formulated product into the respective vessels (closed systems). The workers (trained professionals) usually wear personal protective equipment (e.g. gloves). Thus the exposure can occur during the mixing and loading and have been calculated as a worst case.

Scenario 6 : Mixing and Loading model – worst case for the production, formulation and disposal of the biocidal product

Description of Scenario 6
For a worst case situation, it was estimated that the more sustainable model for industrial exposure production, formulation and disposal is : RISKOFDERM Dermal model (loading liquid, automated or semi-automated) from HEEG opinion 1 (2008). **Dermal exposure via clothing:** default potential exposure rates on clothing x Purity of the active substance x Duration of task x Number of events per day (x (1-Factor of protection for clothing)) **Dermal exposure via hands:** default potential exposure rates on hands x Purity of the active substance x Duration of task x Number of events per day (x (1-Factor of protection for gloves)) **Dermal systemic exposure:** (Dermal exposure via clothing + Dermal exposure via hands) x percent of dermal absorption / body weight **Inhalation exposure:** Inhalation is no relevant for this model and is not taken into account **Systemic exposure:** Dermal systemic exposure + 0 (inhalation exposure n.r.)

	Parameters[1]	**Value**
Tier 1	Purity of the active substance[1]	99 %
	Dermal absorption[1]	50 %
	default potential exposure rates on clothing[2]	101 mg/min
	default potential exposure rates on hand[2]	2.02 mg/min
	default potential exposure rates for inhalation[2]	n.r. mg/m³ (and the substance has a low vapour pressure)
	Bodyweight[3]	60 kg
	Number of events per day	1/day
	Duration of task	10 min
Tier 2	Factor of protection for Uncoated cotton coverall[3]	75 %
Tier 3	Factor of protection for gloves[3]	90 %

[1] CAR (doc IIA)
General information, see justification above
[2] RISKOFDERM Dermal model: loading liquid, automated or semi-automated (HEEG opinion 1, 2008)
[3] Biocide Human Health Exposure Methodology (Oct 2015)

Calculations for Scenario 6

Summary table: systemic exposure associated with production, formulation, and disposal					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake**	**Estimated dermal uptake [mg/kg bw/d]**	**Estimated oral uptake**	**Estimated total uptake [mg/kg bw/d]**
Scenario 6	Tier 1/ no PPE	n.r.	8.5	n.r.	8.5
Scenario 6	Tier 2/ Uncoated cotton coverall	n.r.	2.25	n.r.	2.25
Scenario 6	Tier 3/ Uncoated cotton coverall and gloves	n.r.	2.1	n.r.	2.1

(X) Aggregated exposure

Not applicable.

(XI) Summary of exposure assessment

Scenarios and values to be used in risk assessment			
Scenario number	**Exposed group (e.g. professionals, non-professionals, bystanders)**	**Tier/PPE**	**Estimated total uptake**
1.	Non-professionals, adult	Tier 1, no PPE, dermal, 3 applications/day	8.56 mg/kg bw/day
	Non-professionals, child (6-12)	Tier 1, no PPE, dermal, 2 applications/day	7.94 mg/kg bw/day
	Non-professionals, child (2-6)	Tier 1, no PPE, dermal, 2 applications/day	8.99 mg/kg bw/day
	Non-professionals, toddler	Tier 1, no PPE, dermal, 1 application/day	4.95 mg/kg bw/day
	Non-professionals, infant	Tier 1, no PPE, dermal, 1 application/day	5.29 mg/kg bw/day
	Non-professionals, adult	Tier 2, no PPE, dermal, 2 applications/day	5.71 mg/kg bw/day
	Non-professionals, child (6-12)	Tier 2, no PPE, dermal, 1 application/day	3.97 mg/kg bw/day
	Non-professionals, child (2-6)	Tier 2, no PPE, dermal, 1 application/day	4.50 mg/kg bw/day
	Non-professionals, adult	Tier 3, no PPE, dermal, 1 application/day	2.85 mg/kg bw/day
2.	Non-professionals, adult	Tier 1, no PPE, inhalation, 3 applications/day	0.00875 mg/kg bw
	Non-professionals, child (6-12)	Tier 1, no PPE, inhalation, 2 applications/day	0.015646 mg/kg bw
	Non-professionals, child (2-6)	Tier 1, no PPE, inhalation, 2 applications/day	0.022615 mg/kg bw
	Non-professionals, toddler	Tier 1, no PPE, inhalation, 1 application/day	0.01764 mg/kg bw
	Non-professionals, infant	Tier 1, no PPE, inhalation, 1 application/day	0.0147 mg/kg bw
	Non-professionals, adult	Tier 2, no PPE, inhalation, 2 applications/day	0.005833 mg/kg bw
	Non-professionals, child (6-12)	Tier 2, no PPE, inhalation, 1 application/day	0.007732 mg/kg bw
	Non-professionals, child (2-6)	Tier 2, no PPE, inhalation, 1 application/day	0.011308 mg/kg bw
	Non-professionals, adult	Tier 3, no PPE, inhalation, 1 application/day	0.002917 mg/kg bw
3.	Non-professionals, adult	Tier 1, no PPE, Hand-mouth transfer reverse reference scenario, oral	Up to 6.13 applications
	Non-professionals, child (6-12)	Tier 1, no PPE, Hand-mouth transfer reverse reference scenario, oral	Up to 2.20 applications
	Non-professionals, child (2-6)	Tier 1, no PPE, Hand-mouth transfer reverse reference scenario, oral	Up to 1.94 applications

	Non-professionals, toddler	Tier 1, no PPE, Hand-mouth transfer reverse reference scenario, oral	Up to 1.77 applications
	Non-professionals, infant	Tier 1, no PPE, Hand-mouth transfer reverse reference scenario, oral	Up to 1.65 applications
4.	Non-professionals, adult	Tier 1, no PPE, inhal+oral, 7 appl/d	0.0204 mg/kg bw
5.	Non-professionals, adult	Tier 1 / no PPE	2.12 mg/kg bw/day
	Non-professionals, child (6-12)	Tier 1 / no PPE	3.12 mg/kg bw/day
	Non-professionals, child (2-6)	Tier 1 / no PPE	3.37 mg/kg bw/day
	Non-professionals, toddler	Tier 1 / no PPE	3.71 mg/kg bw/day
	Non-professionals, infant	Tier 1 / no PPE	2.64 mg/kg bw/day
6.	Professionals	Tier 1 / no PPE	8.5 mg/kg bw/d
	Professionals	Tier 2/ Uncoated cotton coverall	2.25 mg/kg bw/d
	Professionals	Tier 3/ Uncoated cotton coverall and gloves	2.1 mg/kg bw/d

2.2.7.3 Risk characterisation for human health

Reference values to be used in Risk Characterisation

Reference	Study	NOAEL (LOAEL)	AF[1]	Correction for oral absorption	Value
AELshort-term	Rabbit, oral, 28-days toxicity study Rabbit, oral, developmental study	500 (1500) mg/kg bw/d 300 (600) mg/kg bw/d	100	100%	5 mg/kg bw/d
AELmedium-term	Rabbit, oral, 28-days toxicity study Rabbit, oral, developmental study	500 (1500) mg/kg bw/d 300 (600) mg/kg bw/d	100	100%	5 mg/kg bw/d
AELlong-term	Rabbit, oral, 28-days toxicity study Rabbit, oral, developmental study	500 (1500) mg/kg bw/d 300 (600) mg/kg bw/d	100	100%	5 mg/kg bw/d (not applicable here, maximum number of applications is 28 days per year)
ARfD	n.a.	n.a.			not applicable, no residues in food or feed occur
ADI	n.a.	n.a.			not applicable, no residues in food or feed occur

[1] reason for assessment factor: factor 10 for both intra-species and interspecies differences. No extrapolation factor for duration is needed, as the overall NOAEL is derived from a repeated 28d-oral toxicity study and a teratogenicity study.

(I) Risk for industrial users

Systemic effects

Task/ Scenario	Tier	Systemic NOAEL mg/kg bw/d	AEL mg/kg bw/d	Estimated uptake mg/kg bw/d	Estimated uptake/ AEL (%)	Acceptable (yes/no)
Scenario 6, mixing & loading, professional	1	500 mg/kg bw/d	5 mg/kg bw/d	8.5 mg/kg bw/d	170%	no
Scenario 6, mixing & loading, professional	2	500 mg/kg bw/d	5 mg/kg bw/d	2.25 mg/kg bw/d	45%	yes
Scenario 6, mixing & loading, professional	3	500 mg/kg bw/d	5 mg/kg bw/d	2.1 mg/kg bw/d	42%	yes

Combined scenarios

Scenarios combined	Tier	Systemic NOAEL mg/kg bw/d	AEL mg/kg bw/d	Estimated uptake mg/kg bw/d	Estimated uptake/ AEL (%)	Acceptable (yes/no)
n.a.						

Local effects

The biocidal product is classified as eye damage/irritation cat 2, H319. However, appropriate risk mitigation measures are assumed to be taken by professionals during production, formulation and disposal. Consequently, there is no need to consider local effects separately.

Conclusion

There is no concern for professionals working with Insect Repellent Pump Spray IR3535® 20% during production, formulation and disposal when using appropriate PPE (minimum PPE required: uncoated cotton coverall).

(II) Risk for professional users

Systemic effects

Task/ Scenario	Tier	Systemic NOAEL mg/kg bw/d	AEL mg/kg bw/d	Estimated uptake mg/kg bw/d	Estimated uptake/ AEL (%)	Acceptable (yes/no)
n.a.						

Combined scenarios

Scenarios combined	Tier	Systemic NOAEL mg/kg bw/d	AEL mg/kg bw/d	Estimated uptake mg/kg bw/d	Estimated uptake/ AEL (%)	Acceptable (yes/no)
n.a.						

Local effects

n.a.

Conclusion

n.a.

(III) Risk for non-professional users

Systemic effects

Task/ Scenario	Tier	Systemic NOAEL [mg/kg bw/d]	AEL [mg/kg bw/d]	Estimated Uptake [mg/kg bw/d]	Estimated uptake/ AEL (%)	Acceptable (yes/no)
Scenario 1, dermal, adult	1	500	5	8.56	171.28	No
Scenario 1, dermal, child (6-12)	1	500	5	7.94	158.87	No
Scenario 1, dermal, child (2-6)	1	500	5	8.99	179.90	No
Scenario 1, dermal, toddler	1	500	5	4.95	99.05	Yes
Scenario 1, dermal, infant	1	500	5	5.29	105.76	No
Scenario 1, dermal, adult	2	500	5	5.71	114.19	No
Scenario 1, dermal, child (6-12)	2	500	5	3.97	79.43	Yes
Scenario 1, dermal, child (2-6)	2	500	5	4.50	89.95	Yes
Scenario 1, dermal, adult	3	500	5	2.85	57.09	Yes
Scenario 2, inhal +oral, adult	1	500	5	0.00875	0.175	Yes
Scenario 2, inhal +oral, child (6-12)	1	500	5	0.015646	0.31	Yes
Scenario 2, inhal +oral, child (2-6)	1	500	5	0.022615	0.45	Yes
Scenario 2, inhal +oral, toddler	1	500	5	0.01764	0.35	Yes
Scenario 2, inhal +oral, infant	1	500	5	0.0147	0.29	Yes
Scenario 2, inhal +oral, adult	2	500	5	0.005833	0.12	Yes
Scenario 2, inhal +oral, child (6-12)	2	500	5	0.007732	0.15	Yes
Scenario 2, inhal +oral, child (2-6)	2	500	5	0.011308	0.22	Yes
Scenario 2, inhal +oral, adult	3	500	5	0.002917	0.06	Yes
Scenario 3, hand- mouth transfer, adult	1	500	5	Up to 6.13 applications	n.a.	Reverse reference scenario
Scenario 3, hand- mouth transfer, child (6-12)	1	500	5	Up to 2.20 applications	n.a.	Reverse reference scenario

Scenario 3, hand- mouth transfer, child (2-6)	1	500	5	Up to 1.94 applications	n.a.	Reverse reference scenario
Scenario 3, hand- mouth transfer, toddler	1	500	5	Up to 1.77 applications	n.a.	Reverse reference scenario
Scenario 3, hand- mouth transfer, infant	1	500	5	Up to 1.65 applications	n.a.	Reverse reference scenario
Scenario 4, inhal+oral, adult	1	500	5	0.0204	0.4	Yes
Scenario 5, inhal, adult	1	500	5	2.12	42.4	Yes
Scenario 5, inhal, child	1	500	5	3.12	62.4	Yes
Scenario 5, inhal, child	1	500	5	3.37	67.4	Yes
Scenario 5, inhal, toddler	1	500	5	3.71	74.2	Yes
Scenario 5, inhal, infant	1	500	5	2.64	52.8	Yes

Combined scenarios

Scenarios combined	Tier	Systemic NOAEL [mg/kg bw/d]	AEL [mg/kg bw/d]	Estimated uptake [mg/kg bw]	Estimated uptake/ AEL (%)	Acceptable (yes/no)
Scenario 1+2, adult, 3 appl/d	1	500	5	8.57	171.45	No
Scenario 1+2, child (6-12), 2 appl/d	1	500	5	7.96	159.18	No
Scenario 1+2, child (2-6), 2 appl/d	1	500	5	9.02	180.36	No
Scenario 1+2, toddler, 1 appl/d	1	500	5	4.97	99.40	Yes
Scenario 1+2, infant, 1 appl/d	1	500	5	5.30	106.05	No
Scenario 1+2, adult, 2 appl/d	2	500	5	5.71	114.30	No
Scenario 1+2, child (6-12), 1 appl/d	2	500	5	3.98	79.59	Yes
Scenario 1+2, child (2-6), 1 appl/d	2	500	5	4.51	90.18	Yes
Scenario 1+2, adult, 1 appl/d	3	500	5	2.86	57.15	Yes

Local effects

The biocidal product is classified as eye damage/irritation cat 2, H319. However, appropriate risk mitigation measures will be imposed and taken up on the label: 'Do not spray into the eyes or apply to eye area. An adult should apply the product to children below 12 years of age. Do not use on children's hands.' Consequently, there is no need to consider local effects separately.

Conclusion

Safe uses are identified for this product, Insect Repellent Pump Spray IR3535® 20% :

- for adult, children and toddler when the product is applied **once per day**.
- There is **no safe use for infants.** The product should not be applied on child below 1 year old.

There is no concern for indirect secondary exposure for adults, children and infants from the use of the biocidal product as a Repellent Subtype PT19.01. Exposure via hand-to-mouth transfer is of minor concern when the product is used as intended (not to be applied to children's hands), and inhalation of volatilized residues after application is limited. Secondary exposure for a parent applying (spraying) the product on children and herself/himself is minor compared to primary dermal exposure.

Proper use, i.e. use in compliance with correct and complete conditions on the label, of Insect Repellent Pump Spray IR3535® 20% is considered safe for adults and children.

The following RMM are required:

- Use repellent safely. Always read the label and product information before use.
- Suitable for children older than 1 year. Keep out of reach of children. Avoid breathing vapours/spray. Use only outdoors or in a well-ventilated area.
- ONLY apply to uncovered parts of the arms, hands, legs, feet and face. For treatment of the face, spray the repellent solution onto the palm of the hand and distribute the solution over the skin of the face thereby taking care to protect the eyes. Do not spray into the eyes or apply to eye area. An adult should apply the product to children below 12 years of age. Do not use on children's hands. Do not apply over cuts, wounds, freshly shaven or irritated skin. Do not use under clothing.
- Maximum number of applications per day: once for adults and children above 1 year old. Product can be used only for children older than 1 year.
- Avoid contact with synthetic materials. Synthetic materials should be protected during spraying and the compatibility with textiles should be tested on a non-visible part of clothes before use.
- Applying sun care products or cosmetic formulations after repellent use will decrease the efficacy of the repellent considerably.

(IV) Risk for the general public

Systemic effects

Task/ Scenario	Tier	Systemic NOAEL mg/kg bw/d	AEL mg/kg bw/d	Estimated uptake mg/kg bw/d	Estimated uptake/ AEL (%)	Acceptable (yes/no)
n.a.						

Combined scenarios

Scenarios combined	Tier	Systemic NOAEL mg/kg bw/d	AEL mg/kg bw/d	Estimated uptake mg/kg bw/d	Estimated uptake/ AEL (%)	Acceptable (yes/no)
n.a.						

Local effects

n.a.

Conclusion

n.a.

- **MAJOR CHANGE APPLICATION (2021)**

The major change consists in the extension of use of the repellent product to horses and ponies. It is applied by professionals and non-professionals (adults) with a trigger spray. No spreading is needed.
All packagings are equipped with the trigger spray, except the 3L and 5L HDPE canister, for which a loading step is needed.

Therefore, exposure occurs during the application of the product (primary exposure) and when human is in contact with the treated animal (secondary exposure).

Table 2.1 Summary table: exposure scenarios

Summary table: exposure scenarios		
Scenario and task number	**Description of scenario and tasks**	**Exposed group**
Primary exposure		
[1]	***Application of the product on animals***	
Task 1	*Loading of the product in the trigger spray (for 3 and 5L HDPE canister)*	Professional and non-professional
Task 2	*Application by trigger spray*	
Task 3	*Cleaning of spray equipment*	
Secondary exposure		
[2]	***Contact with the treated animal***	General public

As the composition remains unchanged, the dermal absorption value of 14% agreed during the initial assessment is used. The same toxicological reference values are also used (AEL ST, MT and LT = 5 mg/kg bw/d.

Primary exposure

Professional

Scenario [1]: Application of the product on animals by an adult

Description and input parameters

Description of Scenario [1]
Three tasks are considered: - Task 1.1: Loading of the product in the trigger spray for 3 and 5 L HDPE canister - Task 1.2: Application by trigger spray - Task 1.3: Cleaning of the spray equipment **Task 1.1: Loading of the product in the trigger spray for 3 and 5 L HDPE canister** Exposure is determined via the mixing and loading model 4. **Task 1.2: Application by trigger spray** Exposure is determined via Consumer spraying and dusting model 2. **Task 1.3: Cleaning of the spray equipment** Exposure is determined via BEAT model.

Input parameters for Scenario [1]			
Common parameters	Parameters	Value	Reference and justification[3]
	Density of the product	0.955	See part 2.2.3 of PAR
	Concentration in active substance of the product	20%	Applicant data
	Dermal absorption	14%	See dermal absorption part
	Inhalation absorption	100%	Default value
	Body weight	60 kg	Recommendation 14 of the BPC ad hoc Working Group on Human Exposure
Task 1.1: Loading of the product in the trigger spray for 3 and 5 L HDPE canister			
	Parameters	Value	Reference and justification[3]
Tier 1 (no PPE)	Hand contamination	0.2 ml of product	Mixing and loading model 4 (BHHEM[1])
Task 1.2: Application by trigger spray			
	Parameters	Value	Reference and justification[3]
Tier 1 (no PPE)	Hand exposure	36.1 mg/min	Consumer spraying and dusting model 2 (BHHEM)
	Body exposure	9.7 mg/min	
	Inhalation exposure	10.5 mg/m^3	
	Task duration	30 min	Expert judgement
	Inhalation rate	1.25 m^3/h	Recommendation 14 of the BPC ad hoc Working Group on Human Exposure
Task 1.3: Cleaning of spray equipment			
	Parameters	Value	Reference and justification[3]
Tier 1 (no PPE)	Hand exposure	35.87 µl/min	BEAT model (BHHEM)
	Body exposure	19.28 µl/min	
	Task duration	10 min	Expert judgement

[1] Biocides Human Health Exposure Methodology (ECHA)

Outcome of systemic exposure and risk characterisation

Summary table: estimated systemic exposure and risk characterisation for professional users

Summary table: estimated systemic exposure and risk characterisation for professional users							
Exposure scenario	**Tier/PPE**	**Estimated oral uptake [mg/kg bw/day]**	**Estimated dermal uptake [mg/kg bw/day]**	**Estimated inhalation uptake [mg/kg bw/day]**	**Estimated total uptake [mg/kg bw/day]**	**Estimated uptake/ AEL (%)** AEL = 5 mg/kg bw/d	**Acceptable (Yes/No)**
Scenario [1]	1/no PPE	nr	9,76E-01	2,19E-02	9,98E-01	20%	Yes

Nr: not relevant

This assessment considers a mixing and loading and a cleaning steps, which are relevant only for 3 and 5L HDPE canisters. Therefore, this assessment covers the assessment of the other packaging.

Non-professional

As the risk is acceptable without PPE, the assessment for professional covers also the risk for non-professional.

Secondary exposure

Secondary exposure is determined considering a contact via hands with the treated animals. In this context, exposure occurs via the dermal route for adults and children and via the oral route for children (hand to mouth transfer).
The scenario of a person who rides the treated horses is considered as not relevant. In common practice the rider wears long trousers and gets on the horse with a saddle. Therefore, no direct exposure is expected.

Scenario [2]: hands contact with treated animal

Description and input parameters

Description of Scenario [2]
Exposure after a contact with the treated animal is assessed for adult, child and toddler (exposure of two palms). The maximum application rate of 0.334 mg of as/cm^2 and a coefficient transfer of 100% are considered. According to the consexpo pest control fact sheet, it is assumed that 50% of amount on hands is taken orally due to hand mouth contact.

Input parameters for Scenario [2]			
	Parameters[1]	Value	Reference and justification[3]
	Dermal absorption	14%	See dermal absorption part
	Oral absorption	100%	CAR
	Surface of two palms for adult	410 cm^2	Recommendation 14 of the BPC ad hoc Working Group on Human Exposure
	Surface of two palms for toddler	115 cm^2	
	Surface of two palms for child (2-6 years)	165 cm^2	
	Surface of two palms for child (6-12 years)	214 cm^2	
	Body weight adult	60 kg	
	Body weight toddler	10 kg	
	Body weight child (2-6 years)	15.6 kg	
	Body weight child (6-12 years)	23.9 kg	

Outcome of systemic exposure and risk characterisation

Summary table: estimated systemic exposure and risk characterisation for general public

Summary table: estimated systemic exposure and risk characterisation for general public							
Exposure scenario	**Population**	**Estimated oral uptake [mg/kg bw/day]**	**Estimated dermal uptake [mg/kg bw/day]**	**Estimated inhalation uptake [mg/kg bw/day]**	**Estimated total uptake [mg/kg bw/day]**	**Estimated uptake/ AEL (%)** AEL = 5 mg/kg bw/d	**Acceptable (Yes/No)**
2	Adult	nr	3,20E-01	nr	3,20E-01	6%	Yes
	Toddler	1,92	2,69E-01	nr	2,19	44%	Yes
	Child (2-6 years)	1,77	2,48E-01	nr	2,02	40%	Yes
	Child (6-12 years)	1,49	2,09E-01	nr	1,70	34%	Yes

Nr: not relevant

The risk is acceptable for all populations.

Local risk assessment:

As the product is classified H319 the following RMMs are needed:

- Spray the product outdoor or in a well ventilated area
- Spray the product downward , below the eyes level
- Wash hand after application of the product

(V) Risk for consumers via residues in food

Not applicable.

(VI) Risk characterisation from combined exposure to several active substances or substances of concern within a biocidal product

Not applicable.

2.2.8 Risk assessment for animal health

Not applicable.

- **MAJOR CHANGE APPLICATION (2021)**

The product is used as repellent at different application rates on the horse or pony bodies:

- 5 g of product/m^2
- 10 g of product /m^2
- 16.7 g of product /m^2

Systemic risk assessment:

Systemic exposure is estimated considering that the product is applied all over the body and that 100% of the applied dose is absorbed. Considering the intended uses, this scenario is very conservative.

According to the data provided by the applicant, the surface areas are calculated using the following formula:

Body surface = 0.11 x Body weight^0.65 *as mentioned in Wildlife Exposure Factors Handbook, Volume I, 3.4.2. Mammals.*

Body weights and body surface areas of horses and ponies

Parameters	Large Adult Horse	Adult Horse	Adult Pony	Foal
Body weight [kg]	1000	500	250	60
Total Body surface [m2]	9.80	6.25	3.98	1.57

Maximum systemic exposure (mg/kg/d)

Parameters	Large Adult Horse	Adult Horse	Adult Pony	Foal
16.7 g of product/m^2	33	42	53	87
10 g of product/m2	20	25	32	52
5 g of product/m2	10	13	16	26

As no guidance is currently available to determine the risk for animals, eCA proposes to compare the systemic exposure to the systemic NOAEL of the active substance and determine a Margin of Exposure (MOE) (NOAEL/systemic expo).

The same NOAEL as the NOAEL used to determine the toxicological reference values for human is used: 500 mg/kg/d issued from a rabbit oral developmental study.

Margin of Exposure (MOE)

Parameters	Large Adult Horse	Adult Horse	Adult Pony	Foal
16.7 g of product/m^2	15	12	9	6
10 g of product/m2	26	20	16	10
5 g of product/m2	51	40	31	19

For all scenario, except foal at 16.7 g of product/m^2, the MOE are superior or close to 10. Considering that 10 is generally used as interspecies factor and that NOAEL is issued from a developmental study (sensitive population), the MOEs are considered as sufficient to consider the risk as acceptable for animals.
For foal, after an application rate of 16.7 g/m2, a MOE of 6 is obtained. However, this scenario is very conservative as it is considered that the product is applied all over the body and that 100% of the amount applied will be absorbed. In the real life, the product will not be absorbed at 100% considering :

- the skin plays its barrier role (only 14% is absorbed on humans)
- all amount of the product will not reach the skin as it is applied on fur and it will dry

quickly on fur (please see composition).
Moreover, this MOE is superior to 5, which is used in the EFSA guidance: risk assessment for birds and mammals.

Therefore, the risk is acceptable for animals mentioned above.

Local risk assessment:

As the product is classified H319 the following RMMs are needed:
- Avoid the animal's eyes and the contour area.

- **MAJOR CHANGE APPLICATION (2021)**

Based on intended uses, no direct or indirect exposure via food is expected.

2.2.9 Risk assessment for the environment for the use on human skin (2019)

For the product Insect Repellent Pump Spray IR3535® 20 % no new studies or additional information for the environment have been provided. The active substance contained in this product is the same as evaluated in the CAR for IR3535® and therefore no new data/information on the active substance is required.

The composition of the representative product from the CAR is not identical to that of Insect Repellent Pump Spray IR3535® 20 %. However, the intended use is identical as well as the amount of active substance in both products. Only the active substance is of relevance for the environmental exposure assessment of this product.

2.2.9.1 Effects assessment on the environment

All data used for the effect assessment of Insect Repellent Pump Spray IR3535® 20% is based on the available information on the active substance IR3535®, such as it is presented in its respective CAR.

No new data relevant for the environmental evaluation, nor on the product, nor on the active substance, have been submitted. Apart from the active substance, the product does not contain any formulants that are of ecotoxicological concern.

Following the referral conclusions for this product, it has been decided that Ethanol should be considered as a substance of concern, since it is responsible for the classification of the biocidal product as a flammable liquid.

However, from an ecotoxicological point of view, ethanol is not considered relevant. Based on its harmonized classification, ethanol is not classified for any environmental hazards. Therefore, ethanol was not considered during the environmental risk assessment.

An overview of the environmental fate and behaviour for the active substance, taken from the EU CAR, is presented in the first two titles below.

Environmental fate and behavior of the active substance

IR3535® is used in insect repellents (PT19) that are applied on uncovered human skin. Products containing IR3535® will be used indoors and outdoors. However the main emission pathway to the environment is assumed to be indirect due to bathing and showering of treated people. Based on the physico-chemical properties it is expected that the emissions primarily will affect the aquatic compartment.

IR3535® is not ready biodegradable according to two screening tests, but in a Sewage Treatment Plant (STP) simulation test 99 % elimination was measured. In an aerobic water/sediment degradation study, IR3535® was shown to remain mainly in the water phase. There it was first rapidly degraded to its free acid, after which this metabolite ultimately degraded after a lag phase.

No photolysis was observed in water and hydrolysis only occurred slowly under alkaline conditions (DT_{50} = 176.5 h at 25 °C and pH 9 or 866.13 h at 12 °C). Under acidic and neutral conditions IR3535® is hydrolytically stable.

The vapour pressure of IR3535® is low (0.15 Pa at 20 °C) which results in low exposure to the atmosphere. The half-life of IR3535® in air was calculated to be about 0.5482 days or 13.16 hours due to reaction with OH-radicals (24-hr day). Thus, accumulation of IR3535® in air and long range transport is unlikely.

IR3535® is a liquid at room temperature and the solubility in water is 70 g/L (at 20 °C). The log P_{ow} is 1.7 (at 23-24 °C) indicating that IR3535® has a low potential for bioaccumulation.

Based on the adsorption/desorption test a mean (arithmetic) K_{oc} form 475.25 L/kg was registered.

Effect assessment of the active substance

No toxic effects where observed during the acute toxicity studies on fish (*Brachydanio rerio*), *Daphnia magna* and algae (*Desmodesmus subspicatus*) (LC_{50} >100 mg/L). Therefore IR3535® is considered as not toxic for the aquatic environment.

The effect on aerobic biological sewage treatment processes was assessed by determining inhibition of respiration of the micro-organisms present in activated sludge following 3 hours contact. No inhibitory effect on aquatic microbial activity was registered for IR3535® (EC_{50} > 1000 mg/L).

Long term aquatic tests were not required because no acute toxicity was observed for the aquatic environment and the substance is primarily emitted to the STP before reaching the aquatic environment. Besides the Sewage Treatment Plant (STP) simulation test showed an elimination of 99 % in the STP.

No marine species were tested based on the presence of studies performed on freshwater species, all suggesting low toxicity and because no major emissions to the marine environment are expected.

In the absence of any long-term toxicity endpoints and marine data, the TGD on Risk Assessment prescribes an assessment factor of 1000 for the freshwater environment and 10000 for the marine environment.

For the sediment compartment, there are also no toxicity data available. The $PNEC_{sediment}$ was calculated based on equilibrium partitioning method and $PNEC_{water}$.

No terrestrial toxicity tests were performed for IR3535®. Due to the method of application directly on the skin only limited and very local emissions to the soil are expected. IR3535® is not likely to become accumulated in the soil in large amounts. $PNEC_{soil}$ has been calculated based on the equilibrium partitioning method.

The physicochemical properties of IR3535® do not suggest that this substance will pose a risk to the atmospheric environment. Therefore no PNECs where calculated for this compartment.

The low BCF values suggest that IR3535® has a low bioaccumulation potential. Therefore the risk of secondary poisoning via ingestion of contaminated food (eg. earthworms or fish) by birds or mammals is also low and no avian dietary tests were required.

Summary of PNEC values for the active substance	
Compartment	**PNEC value**
$PNEC_{aquatic}$	> 0.1 mg/l
$PNEC_{sediment}$	> 1.11 mg/kg wwt
$PNEC_{micro\text{-}organisms\ (STP)}$	100 mg/l
$PNEC_{soil}$	> 0.85 mg/kg wwt

$PNEC_{saltwater}$	> 0.01 mg/l
$PNEC_{marine\text{-}sediment}$	> 0.111 mg/kg wwt

(I) Information relating to the ecotoxicity of the biocidal product which is sufficient to enable a decision to be made concerning the classification of the product is required

The product does not contain any substance at such a concentration that it has an effect on the environmental classification of the product. No additional information on the biocidal product is required.

Conclusion on the environmental classification and labelling of the product
Insect Repellent Pump Spray IR3535® 20% does not require any environmental classification or labelling.

Further Ecotoxicological studies

The assessment of the active substance in the CAR showed that there is no concern for the aquatic and terrestrial environment and thus no further ecotoxicological studies are required according to the CAR.

For this particular product, there is no direct exposure to the environment and the product does not contain formulants other than the active substance that could be of ecotoxicological concern, thus the data on the active substance are sufficient for the evaluation of the ecotoxicological effects of the biocidal product.

Effects on any other specific, non-target organisms (flora and fauna) believed to be at risk (ADS)

No further data is available.

Supervised trials to assess risks to non-target organisms under field conditions

The product is not in the form of bait or granules, so none such data is required.

Studies on acceptance by ingestion of the biocidal product by any non-target organisms thought to be at risk

The product is not in the form of bait or granules, so none such data is required.

Secondary ecological effect e.g. when a large proportion of a specific habitat type is treated (ADS)

Not relevant.

Foreseeable routes of entry into the environment on the basis of the use envisaged

The foreseeable routes of entry into the environment have been described in the CAR for the active substance and are also valid for this product.

Direct release to soil is not considered relevant, whereas direct release to surface water (swimming lake scenario) is considered relevant, but was not yet assessed in the CAR due to the lack of an endorsed scenario.

Secondary release via wastewater and STP through showering and bathing is also a relevant route of emission.

Further studies on fate and behavior in the environment (ADS)

No new data was submitted or is required. Information on the active substance suffices for the environmental risk assessment of the product. Moreover, the product does not contain any other substances relevant for the environment apart from the active substance.

(II) Leaching behaviour (ADS)

Not relevant.

Testing for distribution and dissipation in soil (ADS)

Since there is no direct release to soil and the soil compartment is not envisioned as a compartment of interest in the evaluation of this product, none such additional data is submitted or required.

Testing for distribution and dissipation in water and sediment (ADS)

No new data was submitted or is required.

Testing for distribution and dissipation in air (ADS)

No new data was submitted or is required.

If the biocidal product is to be sprayed near to surface waters then an overspray study may be required to assess risks to aquatic organisms or plants under field conditions (ADS)

No new data was submitted or is required.

If the biocidal product is to be sprayed outside or if potential for large scale formation of dust is given then data on overspray behaviour may be required to assess risks to bees and non-target arthropods under field conditions (ADS)

No new data was submitted or is required.

2.2.9.2 Exposure assessment

Insect Repellent Pump Spray IR3535® 20% is not exactly the same product as the representative product in the CAR, however for all intends and purposes of an environmental exposure assessment it can be seen as the same. This is because the proposed use of the product and the amount of active substance in the product is identical to that presented the environmental exposure assessment of the CAR and the only component of the product possibly affecting the risk to the environment is the active substance itself.

However, since the finalisation of the CAR for IR3535® a new ESD for PT19 biocides has been endorsed and published, which contains scenarios which were not yet assessed during the evaluation of the active substance, such as direct emissions to surface water by swimmers, which is named as an element to be taken into account at product authorisation stage in the assessment report of the active substance.

Therefore the evaluation presented below will be based on this new ESD.

(I) General information

Assessed PT	PT 19
Assessed scenarios	Scenario 1: Removal via showering and bathing of humans (ESD PT19, May 2015, §3.1.4.1) Scenario 2: Release to surface water bodies via swimming (ESD PT19, May 2015, §3.1.4.2)
ESD(s) used	Emission Scenario Document for Product Type 19: Repellents and attractants, May 2015 (ECHA-15-B-10-EN)
Approach	Scenario 1: Average consumption Scenario 2: Average consumption
Distribution in the environment	Calculated based on TGD 2003
Groundwater simulation	Not applicable
Confidential Annexes	None
Life cycle steps assessed	Scenario 1: Showering & bathing • Production: No • Formulation: No • Use: Yes • Service life: No Scenario 2: Swimming • Production: No • Formulation: No • Use: Yes • Service life: No
Remarks	/

(II) Emission estimation

Scenario 1: Removal via showering and bathing

Consumption based scenario

For estimating the emission for products applied on human skin following showering or bathing one could either use a tonnage based scenario or a consumption based scenario.

Tonnage based approaches are mostly only appropriate for assessing an active substance for approval and not so much for the authorisation of biocidal products. Therefore only the consumption based approach is assessed here.

However, the tonnage based approach was calculated in the IR3535® CAR and can be consulted in the confidential annex of said CAR. Anyway when considering the break-even tonnage, the consumption based scenario is deemed to be the most appropriate scenario.

Amount of product per application ($Qform_{appl}$)

The most important input parameter for the consumption based scenario is the amount of product that will be used per application ($Qform_{appl}$). As a default value in the ESD 0.6 mg product/cm² skin is proposed.

However, the ESD also mentions that the value for $Qform_{appl}$ must coincide with the efficacy of the product and must be adapted accordingly.

The validated efficacious dose for the product 'Insect Repellent Pump Spray IR3535 20%' is 0.67 mg product per cm² of skin. This value will be considered in the environmental risk assessment instead of the default value from the ESD.

$Qform_{appl}$ = 0.67 mg product/cm² skin

Number of applications per day (N_{appl})

Another important parameter is the number of applications per day (N_{appl}), which the ESD also links to the efficacy of the product.

The conclusion for efficacy of 'Insect Repellent Pump Spray IR3535 20%' is that the product will remain efficacious for 8 hours against mosquitoes, when used at the application rate of 0.67 mg/cm². Following the ESD Table 3-2, 2 applications per day will be used in the further assessment.

N_{appl} = 2 d^{-1}

Treated area of human skin ($AREA_{skin}$)

Following the agreement of the ENV WG-V-2018 to harmonise the value for the treated skin area with that of the Human Health assessment, a value of 55% of the total body surface area will be applied.

$AREA_{skin}$ = 9130 cm²

Input parameters for calculating the local emission				
Input	**Nomenclature**	**Value**	**Unit**	**Remarks**
Scenario: Release of repellents used on human skin based on the average consumption				
Number of inhabitants feeding one STP	Nlocal	10 000	cap	D
Active substance in product	(B) Cformweight	200	g/kg	(20 %)
Consumption per application	(D2) Qformappl	0.67	mg/cm²	(see above)
Number of applications per day	Nappl	2	d^{-1}	(see above)
Treated area of human skin	$AREA_{skin}$	9130	cm²	(see above)
Fraction realeased to air	Fair	0	[-]	D

Fraction dermally absorbed	Fskin	0	[-]	D

Fraction released to wastewater	Fwater	1	[-]	D
Fraction of inhabitants using a repellent product	Finh	0.2	[-]	D
Market share of repellent	Fpenetr	0.5	[-]	D
Specific density of the product	RHOform	1000	kg/m³	D

Calculations for Scenario 1

→ B and D2

$$Elocal_{wastewater} = Nlocal \times N_{appl} \times Qform_{appl} \times AREA_{skin} \times Cform_{weight} \times F_{inh} \times F_{water} \times Fpenetr \times 10^{-9}$$

Resulting local emission to relevant environmental compartments		
Compartment	**Local emission ($Elocal_{compartment}$) [kg/d]**	**Remarks**
Waste water	2.45	/

Scenario 2: Release to surface water bodies via swimming

In the assessment report for IR3535®, in the paragraph on the elements to be taken into account when authorising products, it is mentioned that direct emissions to surface water by swimmers should be kept in mind and assessed. With this new scenario for the ESD for PT19, this requisite is taken into account.

Amount of product per application ($Qform_{appl}$)

Similarly as with scenario 1, the most important input parameter for this scenario is the amount of product that will be used per application ($Qform_{appl}$).

The same notes and thoughts can be applied as with scenario 1. Therefore, also here it is decided that the efficacious dose will be applied.

Qformappl = 0.67 mg product/cm² skin

Treated area of human skin ($AREA_{skin}$)

Concerning the body surface to which the product is applied ($AREA_{skin}$), according to the applicant the product should only be applied to the face, arms, hands and legs. However, when repellent products are used when swimming, one could assume the swimmer would apply it also to their feet and trunk. Therefore, for a worst case calculation, it is assumed the product is applied to the full body surface.

AREAskin = 16600 cm²

Input parameters for calculating the local emission				
Input	**Nomenclature**	**Value**	**Unit**	**Remarks**
Scenario: Release of repellents used on human skin due to swimming activities in surface water bodies				
Daily number of swimmers	$N_{swimmer}$	1500	[-]	D
Fraction of swimmers using repellent product	F_{swim}	0.1	[-]	P (worstcase)
Number of applications per day	N_{appl}	1	d^{-1}	D
Fraction released to surface water body	$F_{waterbody}$	1	[-]	D
Active substance in the product	(B) $C_{formweight}$	200	g/kg	(20%)
Consumption per application	(D2) $Qform_{appl}$	0.67	mg/cm²	(see above)
Treated area of human skin	$AREA_{skin}$	16600	cm²	(see above)
Specific density of product	RHOform	1000	kg/m³	D

Intermediate calculation for Scenario 2

→ B and D2

$$Elocal_{water} = N_{swimmer} \times N_{appl} \times Qform_{appl} \times AREA_{skin} \times Cform_{weight} \times F_{swim} \times F_{waterbody} \times 10^{-9}$$

Resulting local emission to relevant environmental compartments		
Compartment	**Local emission ($Elocal_{compartment}$) [kg/d]**	**Remarks**
Surface water	0.334	/

Final calculation for scenario 2

In the intermediate calculation a local daily emission to the surface water body due to swimmers treated with the repellent, was calculated. In order to assess the impact of this emission on the aquatic life in this waterbody, the actual concentration in active substance in this waterbody should be calculated.

As a first TIER evaluation concentrations are calculated for emission periods of 1 day and 91 days, without taking into account possible degradation progresses, which represents the worst-case.

Input parameters for calculating surface water concentration				
Input	**Nomenclature**	**Value**	**Unit**	**Remarks**
Scenario: Release of repellents used on human skin due to swimming activities in surface water bodies				
Local emission to surface water body	$Elocal_{water}$	0.334	kg/d	O (Intermediate calculation)
Volume of water body	$V_{waterbody}$	435 000	m³	D
Number of emission days TIER 1	$T_{emission,\ 1d}$	1	d	D
Number of emission days TIER 2	$T_{emission,\ 91d}$	91	d	D
Number of emission events	$N_{emission,\ 91d}$	91	[-]	D

$$Clocal_{water,1d} = \frac{Elocal_{water} \times T_{emission,1d}}{V_{waterbody}}$$

$$Clocal_{water,91d} = \frac{Elocal_{water} \times T_{emission,91d}}{V_{waterbody}}$$

Resulting local concentrations in the waterbody		
Compartment	**Local concentration ($Clocal_{compartment}$) [kg/m³]**	**Remarks**
Surface water – after 1 day	7.67×10^{-7}	/
Surface water – after 91 days	6.98×10^{-5}	(without considering possible degradation)

(III) Fate and distribution in exposed environmental compartments

Scenario 1:

Applied product is removed from the body through showering or bathing. The wastewater from washing is then removed to the municipal waste water treatment plant, after which the effluent is emitted to the surface water where it can expose both fresh water and fresh water sediments.

Exposure to other compartments, such as soil and groundwater, is not considered relevant. The soil could be exposed through sludge application, but following the STP-distribution detailed in the third table below, sorption to sewage sludge is unlikely since IR3535 is almost completely degraded.

Scenario 2:

Applied product is removed from the body directly to the surface water through swimming, where it can expose both fresh water and fresh water sediments.

Exposure to other compartments is not considered relevant.

Identification of relevant receiving compartments based on the exposure pathway									
	Fresh-water	**Freshwater sediment**	**Sea-water**	**Seawater sediment**	**STP**	**Air**	**Soil**	**Ground-water**	**Other**
Scenario 1	yes	yes	no	no	yes	no	no	no	no
Scenario 2	yes	yes	no	no	no	no	no	no	no

Input parameters (only set values) for calculating the fate and distribution in the environment			
Input	**Value**	**Unit**	**Remarks**
Molecular weight	215.29	g/mol	
Melting point	-90	°C	
Boiling point	300	°C	
Vapour pressure (at 20 °C)	0.15	Pa	
Water solubility (at 20 °C)	70 000	mg/l	
Log Octanol/water partition coefficient	1.7	Log 10	
Organic carbon/water partition coefficient (Koc)	475.25	l/kg	
Henry's Law Constant (at 20 °C)	$4.613x10^{-4}$	Pa.m3/mol	
Biodegradability	Not readily biodegradable		

In the CAR for IR3535®, calculations according to EUSES are available for the distribution in the STP, which in this case is only relevant for scenario 1. As a worst-case assessment the distribution presented in the CAR is taken over for the assumption that there is no degradation. As a TIER 2 evaluation, 99% degradation in STP is taken into consideration.

Calculated fate and distribution in the STP				
Compartment	**Percentage [%]**			**Remarks**
	Scenario 1 TIER 1	**Scenario 1 TIER 2**	**Scenario 2**	
Air	0	0	Not relevant	
Water	99	1		
Sludge	1	0		
Degraded in STP	0	99		

(IV) Calculated PEC values

Neither for scenario 1, nor for scenario 2, calculations were made for the sediment, since the $PNEC_{sediment}$ was determined through the EPM-method. This means that the risk assessment for water is applicable for the sediment as well.

As mentioned before, for the scenario 2, possible degradation in surface water is not taken into account as a worst-case evaluation.

Summary table on calculated PEC values			
		PEC_{STP}	**PEC_{water}**
		[mg/l]	**[mg/l]**
Scenario 1	TIER 1	1.21	0.121
	TIER 2	$1.22x10^{-2}$	$1.22x10^{-3}$
Scenario 2	Day 1	n/a	$7.67x10^{-4}$
	Day 91	n/a	$6.98x10^{-2}$

(V) Primary and secondary poisoning

a) Primary poisoning

Not applicable, since this product is a repellent and has no intention of killing.

b) Secondary poisoning

Not relevant, since no bioaccumulation is expected.

2.2.9.3 Risk characterisation

(I) Atmosphere

Conclusion:

Only negligible exposure to the atmosphere is expected and no threat to the atmosphere is expected.

(II) Sewage treatment plant (STP)

Summary table on calculated PEC/PNEC values		
		PEC/PNEC$_{STP}$
Scenario 1	TIER 1	$1.21x10^{-2}$
	TIER 2	$1.22x10^{-4}$
Scenario 2	Day 1	Not relevant
	Day 91	Not relevant

Conclusion:

No adverse effect for the STP is expected

(III) Aquatic compartment

Neither for scenario 1, nor for scenario 2, calculations were made for the sediment, since the $PNEC_{sediment}$ was determined through the EPM-method. This means that the risk assessment for water is applicable for the sediment as well.

For the scenario 2, possible degradation in surface water is not taken into account as a worst-case evaluation.

Summary table on calculated PEC/PNEC values		
		PEC/PNEC$_{water}$
Scenario 1	TIER 1	**1.21**
	TIER 2	$1.22x10^{-2}$
Scenario 2	Day 1	$7.67x10^{-3}$
	Day 91	$6.98x10^{-1}$

For the scenario 1, when considering the worst-case assessment where no elimination from the STP is taken into account, then an adverse effect for the surface water is calculated. However when considering the TIER 2, where 99 % elimination from the STP is considered, no adverse effects are calculated.

For the scenario 2, no adverse effects are expected, neither at day 1 nor at day 91, without considering degradation in the surface water.

Conclusion:

No adverse effect for the aquatic compartment is expected

(IV) Terrestrial compartment

The terrestrial compartment is not considered a relevant receiving compartment (see point (III) above).

Exposure through sludge application is highly unlikely, since IR3535 almost completely degrades in the STP.

Conclusion

No adverse effects for the terrestrial compartment are expected

(V) Groundwater

Since no exposure of the terrestrial compartment is expected, it follows that neither exposure to the groundwater is expected.

Conclusion

No adverse effects for the groundwater are expected.

(VI) Primary and secondary poisoning

Primary poisoning is not applicable, since this product is a repellent and has no intention of killing.

Secondary poisoning is not relevant, since no bioaccumulation is expected.

(VII) Mixture toxicity

Not relevant, since the product does not contain other components other than the active substance that could give a risk to the environment.

- **MAJOR CHANGE APPLICATION (2021)**

The risk assessments presented in 2019 do not cover the use on horses added during the major change of 2021. Therefore, a new exposure assessment is conducted for the new use.

2.2.10 Risk assessment for the environment for the use on horses (2021)

The product is a RTU spray containing 20% w/w (technical) of active substance IR3535®. It is used under this major change on horse skin by professional and non-professional users once a day.

As for the authorization of 2019, the following risk assessment is carried out for the active substance only.

1.1.1.1 *Effects assessment on the environment*

No new information on the environmental effects of the active substance is available, therefore, the PNEC values already used in the risk assessment of 2019 are applied for the risk assessment and presented below:

Summary of PNEC values for the active substance	
$PNEC_{aquatic}$	> 0.1 mg/l
$PNEC_{sediment}$	> 1.11 mg/kg wwt
$PNEC_{micro\text{-}organisms\ (STP)}$	100 mg/l
$PNEC_{soil}$	> 0.85 mg/kg wwt

Further studies on fate and behavior in the environment (ADS)

As no use with direct emissions to soil were claimed for the representative product assessed in the CAR (2014), no degradation/dissipation study in soil has been requested at the substance approval and no $DT50_{soil}$ value is available in the harmonized LoEP. For indirect emission, this data was not necessary as well as a simulation study in the STP showed that no active substance was released

via sludge application.

For this product, direct emissions to soil are foreseen and therefore, a $DT50_{soil}$ value is needed to refine the risk assessment of the soil compartment, especially as risks are foreseen for groundwater with the default value of $DT50_{soil}$ = 1E06 days.

The active substance is not readily biodegradable according to two ready biodegradability screening tests assessed in the CAR (OCDE 301 B and 301 D). In this case, a $DT50_{soil}$ default value of 1E06 days should be used in the risk assessment. However, other harmonized data from the CAR indicates that this value is unrealistic, considering the e-fate profile of the substance.

Indeed, a simulation study in STP (OCDE 303A) is available and shows that:

- IR3535 rapidly and completely degrades under conditions which simulates the treatment in an activated sludge plant (99% of elimination in 28 days).
- The substance not eliminated in the process is located in the aqueous part and not in the sludge (F_{sludge} = 0%).

⇨ Considering these results, it was concluded at the TM IV 2010 that the substance possesses the ability to degrade. Therefore, this substance initially supposed to be classified as potentially persistent was defined <u>at least</u> as inherently biodegradable in the frame of the PBT assessment. However the degradation profile was not further investigated as not required for the substance approval.

A refinement of the default $DT50_{soil}$ value is thus relevant for the product and is investigated further.
When no data on soil degradation are available, table 6 of the Volume IV Part B+C (2017, see below) allows to determine a $DT50_{soil}$ value based on results from standardized ready biodegradation tests and adsorption properties. Besides, simulations with Simple Treat 4.0 were conducted based on the e-fate inputs of the active substance, in the case it would meet the conditions of inherently biodegradable or readily biodegradable failing the 10-d windows. These simulations are compared with experimental values from the simulation study in STP in the table below:

	Experimental (OECD 303A)	Simple Treat 4.0 simulations		
Fractions in the STP	For IR3535®	For readily biodegradable substances , failing 10-d window	For inherently biodegradable in MITI II and within the 10 d in the Zahn-Wellens*	For other inherently biodegradable substances
F_{water} (%)	1	22.52	46.57	99.97
F_{sludge} (%)	0	0.019209	0.021031	0.025077
Biodegradation (%)	99 (elimination)	77.46	53.41	0
DT50 in soil (d), with a $Kp_{,soil}$ = 9.51 < 100 L/kg according to table 6 of the Volume IV Part B+C (2017)	No data	90		300

* For inherently biodegradable substances that do not meet these conditions, no degradation is taken into account in the STP

The biodegradation fraction of the OECD 303 study is much higher than what would be expected if the substance was considered readily biodegradable failing the 10-d windows, and even more if the substance was considered only inherently biodegradable.

Retro-calculations show that no risks for groundwater are expected with $DT50_{soil}$ value as high as 235 days.

FR RMS considers that a $DT50_{soil}$ of 235 days appears to be a realistic and conservative worst-case value considering the degradation data in the STP. As the refinement has no impact on soil risk characterization conclusions, it is only used for the groundwater assessment.

Value used in Risk Assessment – Biodegradation and dissipation in soil	
Value	For the environmental exposure assessment of the groundwater compartment, a default $DT50_{soil}$ of 235 days is used.
Justification for the value	The weight of evidence mentioned above supports the refinement of the default $DT50_{soil}$ value of 1E06 days.

The other fate and behavior inputs of IR3535 are the same than in the CAR and the product authorization of 2019. They are summarized in the section "Fate and distribution in exposed environmental compartments".

1.1.1.2 *Exposure assessment*

General information

Assessed PT	PT 19
Assessed scenarios	**Application step:** Scenario 3a: Application – Direct emission to soil Scenario 3b: Application – Indirect emission *via* the STP Scenario 3c: Application – Direct emission to surface water **Service life step:** Scenario 4: Service life – Direct emissions to soil through rolling of horses Scenario 5: Service life – Direct emissions to soil due to hosing of horses
ESD(s) used	Emission Scenario Document for Product Type 19: Repellents and Attractants, May 2015
Approach	Scenarios 3/4/5: Consumption based
Distribution in the environment	Calculated based on Guidance for BPR IV Part B+C (2017). CAR: IR3535 (May 2014) Technical Agreements for Biocides of November, 2021
Groundwater simulation	Yes (Focus v4.4.4)
Confidential Annexes	No
Life cycle steps assessed	Scenarios 3a/3b/3c: Production: No Formulation No Use (Application): Yes Service life: No Scenarios 4/5: Production: No Formulation No

	Use: No Service life: Yes
Remarks	None

Emission estimation

The local emissions for each scenario were assessed according to the Emission Scenario Document for Product Type 19: Repellents and Attractants, May 2015. Updates of the Technical agreement for Biocides (November, 2021) were also taken into account.

General considerations:

Life cycle steps assessed:

Since the product is a spray, a certain amount is released to the surrounding environment during **Application** due to spray drift. Depending on where the horse is treated, emissions can reach the soil compartment (scenario 3a) but also the sewage treatment plant (scenario 3b) or directly the surface water (scenario 3c).

According to ESDPT19 (2015), significant emissions to the environment can happen during the **Service life** of the product. Direct emissions to the soil compartment are considered when the horse rolls to the ground (scenario 4) or when it is washed with water after training or riding while it is on bare soil (scenario 5). This last scenario also covers the potential emissions due to rain events on the treated animal. Depending on where the washing takes place, emissions *via* the STP or directly to surface water could be foreseen, but they are covered by the application step (scenarios 3b and 3c, ESDPT19, 3.2.4.3).

Worst-case application dose and skin area:

Three application rates are proposed to the users, depending on the pressure of biting insects.

- Case 1: 5 g of product/m² of skin, on the entire horses (58300 cm², ESDPT19, 2015), corresponding to a total of 29.15 g/horse
- Case 2: 10 g of product/m² of skin, on the main concerned areas of horses (25284 cm², refinement proposed by the applicant, see additional document in the confidential annex), corresponding to a total of 25.3 g/horse.
- Case 3: 16.7 g of product/m² of skin, on the main concerned, bite critical parts of horses (18428 cm², refinement proposed by the applicant, see additional document in the confidential annex), corresponding to a total of 30.8 g/horse.

Calculations were conducted for the three application rates. As the same conclusions apply in every case, only the worst case claimed by the applicant is presented in the exposure assessment (**16.7 g of product/m²** used to treat **18428 cm²**).

RCRs and conclusions for a use of the highest dose (16.7 g product/m²) on the surface proposed in the ESDPT19 (58 300 cm²) are also presented for completeness.

- **Application step:**

Scenario 3a: Application – Direct emission to soil

The following scenario estimates the emissions to soil when the product is applied to horses above bare soil (ESDPT19, Table 3-10, 2015).

Input parameters for calculating the local emission and concentrations				
Input	**Symbol**	**Value**	**Unit**	**Remarks**
Scenario 3a: Application – Direct emission to soil				
Active substance in the product	$Cform_{weight}$	200	[g/kg]	S
Consumption per application	$Qform_{appl}$	1.67	[mg/cm²]	S
Number of applications per day	N_{appl}	1	[/d]	D
Treated area of skin	$AREA_{skin}$	18428	[cm²]	S – See General considerations
Fraction released to soil by spray drift	F_{soil}	0.1	[-]	D
Soil volume	V_{soil}	3	[m^3]	D
First order rate constant for biodegradation in soil	$k_{degsoil}$	6.93E-07	[-]	D – Considering the worst-case value of $DT50_{soil}$ = 1E06 days
Number of emission days	$T_{emission,1d}$	1	[d]	D
Number of emission days	$T_{emission,91d}$	91	[d]	D
Number of emission events	$N_{emission,91d}$	91	[-]	D
Output				
Local emission of the active substance during application to soil	**$Elocal_{soil}$**	**6.15E-04**	**[kg/d]**	**O** $N_{appl} \times Qform_{appl} \times AREA_{skin} \times Cform_{weight} \times F_{soil} \times 1E\text{-}09$

Scenario 3b: Application – Indirect emission *via* the STP

The following scenario estimates the emissions to wastewater when the product is applied to horses above paved ground (ESDPT19, Table 3-12, 2015).

Input parameters for calculating the local emission and concentrations				
Input	**Symbol**	**Value**	**Unit**	**Remarks**
Scenario 3b: Application – Indirect emissions *via* the STP				
Number of horses	N_{horses}	50	[-]	D
Fraction released to water by spray drift	F_{water}	0.1	[-]	D
Active substance in the product	$Cform_{weight}$	200	[g/kg]	S
Consumption per application	$Qform_{appl}$	1.67	[mg/cm²]	S
Number of applications per day	N_{appl}	1	[/d]	D
Treated area of skin	$AREA_{skin}$	18428	[cm²]	S – See General considerations

Fraction of riders treating the complete horse	F_{rider}	0.2	[-]	D
Output				
Local emission of the active substance during application to wastewater	**$Elocal_{water}$**	**6.15E-03**	**[kg/d]**	**O N_{horses} x N_{appl} x $Qform_{appl}$ x $AREA_{skin}$ x $Cform_{weight}$ x F_{rider} x F_{water} x 1E-09**

Scenario 3c: Application – Direct emission to surface water

When the product is applied to horse above paved ground, options for disposal of the product include the discharge directly into surface water bodies. Therefore, a scenario for emission to a slow moving surface water is included in the ESD. The $Elocal_{surfacewater}$ value is the same than the one calculated and directed to the STP.

Volume of receiving surface body	$FLOW_{surfacewater}$	25920	[m^3/d]	D
Local emission of the active substance during application to surface water	**$Elocal_{surfacewater}$**	**6.15E-03**	**[kg/d]**	**O See scenario 3b**

- **Service life step:**

Scenario 4: Service life – Direct emissions to soil through rolling of horses

Input parameters for calculating the local emission and concentrations				
Input	**Symbol**	**Value**	**Unit**	**Remarks**
Scenario 4: Service life – Direct emission to soil through rolling of horses				
Active substance in the product	$Cform_{weight}$	200	[g/kg]	S
Consumption per application	$Qform_{appl}$	1.67	[mg/cm²]	S
Treated area of skin	$AREA_{skin}$	17490	[cm²]	D
Number of horses per hectare	N_{horses}	4	[-]	D
Number of applications per day	N_{appl}	1	[/d]	D
Number of rollings per day	$N_{rolling}$	2	[/d]	D
Fraction released to soil by rolling	F_{soil}	0.01	[-]	D
Soil volume	V_{soil}	100	[m^3]	D
First order rate constant for biodegradation in soil	$k_{degsoil}$	6.93E-07	[-]	D – Considering the worst-case value of $DT50_{soil}$ = 1E06 days
Number of emission days	$T_{emission,1d}$	1	[d]	D
Number of emission days	$T_{emission,91d}$	91	[d]	D
Number of emission events	$N_{emission,91d}$	91	[-]	D
Output				

Local emission of the active substance during application to soil	**$Elocal_{soil}$**	**4.67E-04**	**[kg/d/ha]**	**O N_{appl} x $Qform_{appl}$ x $AREA_{skin}$ x $Cform_{weight}$ x N_{horses} x $N_{rolling}$ x F_{soil} x 1E-09**

Scenario 5: Service life – Direct emissions to soil due to hosing of horses

Input parameters for calculating the local emission and concentrations				
Input	**Symbol**	**Value**	**Unit**	**Remarks**
Scenario 5: Service life – Direct emission to soil due to hosing of horses				
Number of horses	N_{horses}	50	[-]	D
Fraction released to soil	F_{soil}	0.01	[-]	D
Active substance in the product	$Cform_{weight}$	200	[g/kg]	S
Consumption per application	$Qform_{appl}$	1.67	[mg/cm²]	S
Number of applications per day	N_{appl}	1	[/d]	D
Treated area of skin	$AREA_{skin}$	18428	[cm²]	S – See General considerations
Fraction of riders hosing their horses	$F_{riders,hosing}$	0.1	[-]	D
Soil volume	V_{soil}	2.75	[m^3]	D
First order rate constant for biodegradation in soil	$k_{degsoil}$	6.93E-07	[-]	D – Considering the worst-case value of $DT50_{soil}$ = 1E06 days
Number of emission days	$T_{emission,1d}$	1	[d]	D
Number of emission days	$T_{emission,91d}$	91	[d]	D
Number of emission events	$N_{emission,91d}$	91	[-]	D
Output				
Local emission of the active substance during hosing to soil	**$Elocal_{soil}$**	**3.08E-04**	**[kg/d]**	**O N_{horses} x N_{appl} x $Qform_{appl}$ x $AREA_{skin}$ x $Cform_{weight}$ x $F_{rider,hosing}$ x F_{soil} x 1E-09**

Fate and distribution in exposed environmental compartments

Relevant receiving compartments based on the exposure pathway						
	STP	Freshwater	Sediment	Soil	Ground-water	Secondary poisoning
Scenario 3a – Application, direct emissions to soil	-	-	-	++	+	+
Scenario 3b – Application, indirect emissions *via* the STP	++	+	+	+	+	+
Scenario 3c – Application, direct emissions to surface water	-	++	+	-	-	+
Scenario 4 – Service life, rolling	-	-	-	++	+	+
Scenario 5 – Service life, hosing	-	-	-	++	+	+

++: direct exposure +: indirect exposure -: no exposure

As no direct emission to soil was considered in the CAR of the active substance and the previous product authorisation, no data or argumentation were provided concerning degradation in the soil compartment and therefore, no $DT50_{soil}$ value is available. As the substance is not readily biodegradable, the worst-case $DT50_{soil}$ value of 1E06 days and a k_{deg} of **6.93E-07** are therefore used in the exposure assessment for soil.

The other input parameters for calculating the fate and distribution in the environment and the fractioning of the active substance in the STP have not been modified since the last authorisation.

Input parameters (only set values) for calculating the fate and distribution in the environment			
Input	**Value**	**Unit**	**Remarks**
Molecular weight	215.29	g/mol	CAR (2014)
Vapour pressure (at 20 °C)	0.15	Pa	CAR (2014)
Water solubility (at 20 °C)	70 000	mg/L	CAR (2014)
Log Octanol/water partition coefficient	1.7	Log 10	CAR (2014)
Organic carbon/water partition coefficient (Koc)	475.25	L/kg	CAR (2014)
Henry's Law Constant (at 20 °C)	$4.613x10^{-4}$	Pa.m3/mol	CAR (2014)
$DT50_{soil}$	Default: 1E06	days	Default for no degradation
Biodegradability	Not readily biodegradable	-	CAR (2014)

Calculated fate and distribution in the STP		
Compartment	**Percentage [%]**	**Remarks**
Air	0	Refined with a STP simulation study (CAR of the active substance, 2014)
Water	1	
Sludge	0	
Degraded in STP	99	

1.1.1.3 *Calculated PEC values*

For the calculations of PECs, all inputs are included in the emission table of the corresponding scenario for clarity.

- For indirect emissions to environmental compartments (*via* the STP), there is no further specific guidance in the ESDPT19 for calculation of PEC values and hence the standard assumptions in the Volume IV Part B+C (2017) were used to develop concentrations in STP and surface water.
  Following the approach from the CAR (2014) that 99% of the active substance is degraded

in the STP and 1% is remaining in the water phase, IR3535 cannot be found in sewage sludge. Hence, PEC_{soil} and PEC_{GW} are set to 0 *via* indirect emissions to the STP.

- For direct emissions to soil, it is assumed that an insect repellent is applied daily at the same place during the peak bug season of 91 days. PEC_{soil} and PEC_{GW} are therefore calculated at t = 91 days with no degradation. Calculations are conducted with equation 3.18 as recommended in the ESD (2015) as no DT_{50} soil is available for this active substance and no degradation is considered.

A summary of the calculated PEC values for every scenarios and relevant environmental compartments is indicated in the following table.

Elocal and PEC values summary						
		Elocal [kg/d]	**PEC_{STP}** [mg/L]	**PEC_{water}*** [mg/L]	**PEC_{soil}** [mg/kg $_{ww}$]	**PEC_{GW}** [µg/L]
Application	**Scenario 3a**: Emission to soil T = 91 day, no degradation	6.15E-04	-	-	1.10E+01	**1291.57**
	Scenario 3b: Emissions *via* the STP	6.15E-03	3.08E-05	3.08E-06	0	0
	Scenario 3c: Emissions to surface water	6.15E-03	-	2.37E-04	-	-
Service life	**Scenario 4**: Rolling, t = 91 day, no degradation	4.67E-04	-	-	2.50E-01	**29.42**
	Scenario 5: Hosing, t = 91 day, no degradation	3.08E-04	-	-	5.99E+00	**704.49**

*$PEC_{sediment}$: The $PNEC_{sediment}$ was derived through the Equilibrium Partitioning Method, therefore, the risk for the sediment compartment is covered by the risk assessment for surface water.

Primary and secondary poisoning

No calculation is needed for primary and secondary poisoning, see the section Primary and secondary poisoning in the risk characterization section.

Groundwater

First estimations of the emissions to groundwater calculated with the Volume IV Part B+C (2017) indicated that resulting concentrations of the active substance in groundwater are largely higher than the threshold value of 0.1 µg/L for scenario 3a (application of the product on horses), scenario 4 (rolling) and scenario 5 (hosing).

As scenarios 3a and 5 also presents inacceptable risks for the soil compartment (see section Risk characterization), RMMs are already applied to prevent any emissions from this way of exposure.

Therefore, a simulation with FOCUS (v4.4.4) is conducted for scenario 4 only, for which no RMM can be proposed and risks for the terrestrial compartment are acceptable.

Emissions to Groundwater : Input for refinement (FOCUS PEARL 4.4.4)		
Input parameters related to the Active Substance		
	Value	**Reference**
Molecular weight (g/mol)	215.29	CAR (2014)

Vapour pressure (Pa) at 20°C	0.15	CAR (2014)
Water solubility (mg/L) at 20°C	70 000	CAR (2014)
Koc (L/kg)	475.25	CAR (2014)
DT50 in soil (d) at 12°C	Default: 1E06 Refinement: 235	Refinement: See "Fate and distribution in exposed environmental compartments"
Kom (=Koc/1.724) (L/kg)	275.7	TAB 2.0 ENV 23
1/n	1	TAB 2.0 ENV 22
Plant uptake factor	0	TAB 2.0 ENV 23
Molar activation energy (kJ/mol)	65.4	WGIV2019
Input parameters related to the Scenario		
DIRECT EXPOSURE – Scenario 4		
Crop	Grassland (alfalfa)	
Application date	Absolute application: 1st day of each month of the treatment season (01/06/1901, 01/07/1901, 01/08/1901)	
Incorporation depth (cm)	Application to the soil surface	
Elocalsoil (kg/d/ha)	4.67E-04	
Number of applications	3 (once a day distributed over 3 months)	
Elocalsoil (kg/ha/month) to use in FOCUS simulation	1.42E-02 = 4.67E-04 x 91 / 3	

Considering the $DT50_{soil}$ default value of 1E06 days, the resulting groundwater concentrations are higher than the threshold value of 0.1 µg/L. However, they are lower with a more realistic value of 235 days (see the tables below).

Emissions to Groundwater : PEC_{gw} in µg/L, (FOCUS PEARL 4.4.4)		
Output		
DIRECT EXPOSURE – Scenario 4		
Crop	Grassland (alfalfa), with a $DT50_{soil}$ = 1E06 days	Grassland (alfalfa), with a $DT50_{soil}$ = 235 days
CHATEAUDUN	**13.32519**	0.044074
HAMBURG	**13.617268**	0.095397
JOKIOINEN	**6.333156**	0.031808
KREMSMUENSTER	**10.778931**	0.060901
OKEHAMPTON	**10.243615**	0.08957
PIACENZA	**15.751203**	0.093338
PORTO	**6.375967**	0.053325
SEVILLA	**17.257402**	0.006876
THIVA	**18.689854**	0.025709

1.1.1.4 *Risk characterization*

A summary of the calculated RCR values for the worst-case application rate claimed by the applicant (16.7 g/m² on refined horse skin area of 18428 cm²) for the relevant environmental compartments is presented in the following table.
The RCRs related to a use of the highest dose of product on the entire surface of the horse (58 300 cm², value from the ESDPT19) are also shown *in italics* in the table for completeness and indicate that the conclusions are the same with both skin surface areas.

RCR and PEC_{GW} summary					
		RCR_{STP}	**RCR_{water*}**	**RCR_{soil}**	**PEC_{GW}**
		[-]	[-]	[-]	[µg/L]
Application	**Scenario 3a**: Emission to soil T = 91 day, no degradation	-	-	**1.29E+01** ***4.08E+01***	**1291.57** ***4086.09***
	Scenario 3b: Emissions *via* the STP	3.08E-07 *9.74E-07*	3.08E-05 *9.73E-05*	0	0
	Scenario 3c: Emissions to surface water	-	2.37E-03 *7.51E-03*	-	-
Service life	**Scenario 4**: Rolling, t = 91 day, no degradation***	-	-	2.94E-01 *2.94E-01*	<0.01** *<0.01***
	Scenario 5: Hosing, t = 91 day, no degradation	-	-	**7.04E+00** ***2.23E+01***	**704.49** ***2228.78***

**RCR*sediment:* The $PNEC_{sediment}$ was derived through the Equilibrium Partitioning Method, therefore, the risk for the sediment compartment is covered by the risk assessment for surface water.
**Refined with a FOCUS (v4.4.4) simulation considering a $DT50_{soil}$ of 235 days.
***In the "Rolling" scenario, the area of horse skin is a default value from the ESDPT19 and does not depend on the size of the initially treated skin area.

Atmosphere

The vapor pressure of IR3535® is low (0.15 Pa at 20 °C), which results in low exposure to the atmosphere. The half-life of IR3535® in air was calculated to be about 0.5482 days or 3.16 hours due to reaction with OH-radicals (24-hr day). Thus, accumulation of IR3535® in air and long range transport is unlikely. Therefore, no risks are foreseen for the atmosphere compartment.

Sewage Treatment plant

The RCR_{STP} value for the only scenario with emissions *via* the STP is <1. Therefore, the use leads to acceptable risks for the STP microorganisms.

Aquatic compartment

The RCR_{SW} value for all the scenarios with emissions to the surface water are <1 and risk assessment for surface water covers the risk assessment for the sediment compartment. Therefore, the uses lead to acceptable risks for the aquatic compartment.

Terrestrial compartment

The accumulation of active substance in soil over the bug season leads to unacceptable risks for this compartment after 91 days for scenario 3a (application of the product on horses) and 5 (hosing). Thus, the following two risk mitigation measures proposed by the applicant are proposed:

For the application step:

- *The animals must be treated on sealed/paved ground in order to prevent direct releases to soil.*

For the service-life:

- *Treated horses must be hosed/rinsed only on sealed/paved ground in order to prevent direct releases to soil*.

Groundwater

First estimations of the emissions to groundwater calculated with the Volume IV Part B+C (2017) indicated that resulting concentrations of the active substance in groundwater are largely higher than the threshold value of 0.1 µg/L for scenario 3a (application of the product on horses), scenario 4 (rolling) and scenario 5 (hosing).

As scenarios 3a and 5 also present inacceptable risks for the soil compartment, RMM are already applied to prevent any emissions from this way of exposure.

Therefore, a simulation with FOCUS (v4.4.4) was conducted for scenario 4, for which no RMM can be proposed. According to FOCUS output and considering a refined $DT50_{soil}$ value of 235 days, emissions of the product results in concentrations in groundwater lower than the threshold value of 0.1 µg/L for this scenario. Therefore, no risks are foreseen for this compartment.

Primary and secondary poisoning

Primary poisoning:
Due to the use of the product as a repellent spray, consumption of the product by non-target organisms is very unlikely and no risk assessment of the primary poisoning is deemed relevant.

Secondary poisoning:
IR3535 released by the use of the product is unlikely to bioaccumulate in the aquatic or terrestrial environment. Indeed, the active substance has a log Kow of 1.7 (below the relevant trigger value of 3 according to the Volume IV Part B+C, 2017), has a BCF for fish of 5.6 L/kg and a BCF for earthworms of 1.44 kg/kg.
Thus, no risk assessment of the secondary exposure via the food chain is considered necessary.

Mixture toxicity

Not relevant as no substance of concern has been defined for the environment.

Aggregated exposure (combined for relevant emission sources)

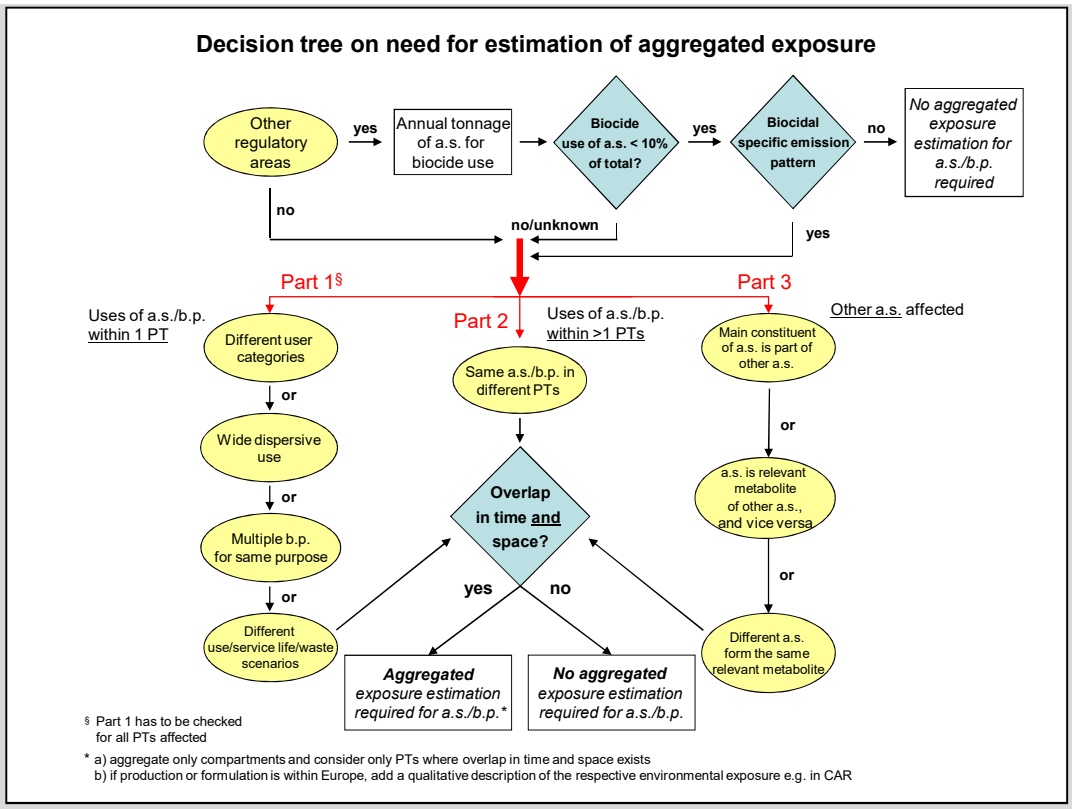

Figure 1: Decision tree on the need for estimation of aggregated exposure

Dispersive uses leading to emissions to the sewage treatment plant were considered in the aggregated exposure assessment, such as the initial use (on human skin) and the additional use claimed for this major change (on horse skin).

For the use on horse skin, the aggregated exposure considering the worst-case application rate claimed by the applicant (16.7 g of product/m² on refined horse skin area of 18428 cm²) is presented. The aggregated exposure related to a use of the highest dose of product on the entire surface of the horse (58 300 cm², default value from the ESDPT19) are also shown *in italics* in the table for completeness and indicate that the conclusions are the same with both skin surface areas.

Uses / Scenarios	**$Elocal_{STP}$ (kg/d)**	**$\Sigma Elocal_{STP}$ (kg/d)**	**ΣRCR_{STP}**	**ΣRCR_{water}**	**ΣRCR_{soil}**	**ΣPEC_{GW}**
Use 1 (scenario 1): Application on human skin	2.45E+00	2.45E+00	1.23E-04 *1.23E-04*	1.23E-02 *1.23E-02*	0 *0*	0 *0*
Use 2 (scenario 3b): Application on horse skin	6.15E-03					

Aggregated exposure of the use 1 (application on human skin) and 2 (application on horse skin) leads to acceptable risks for the environment.

Overall conclusion on the risk assessment for the environment of the product
The use of the product on horses leads to unacceptable risks for the soil compartment when

application of the product (application step) and hosing of horses (service life) takes place on bare soil.

A risk mitigation measure is proposed for the application step:

- *The animals must be treated on sealed/paved ground in order to prevent direct releases to soil.*

The following risk mitigation measure can be applied to reduce emissions to the environment during the hosing of horses (service-life):

- *Treated horses must be hosed/rinsed only on sealed/paved ground in order to prevent direct releases to soil*.

2.2.11 Measures to protect man, animals and the environment

Please see §2.1.4 and §2.1.5 above.

2.2.12 Assessment of a combination of biocidal products

Not applicable.

2.2.13 Comparative assessment

Not applicable.

3 ANNEXES

3.1 LIST OF STUDIES FOR THE BIOCIDAL PRODUCT

Author(s)	Year	Title	Report No.	Owner Company	Report date
Meinerling M.	2009	EUS26-15 INSECT REPELLENT SPRAY – DETERMINATION OF THE STORAGE STABILITY AT AMBIENT TEMPERATURES	31232204	Merck KGaA	2009-05-27
Meinerling M., Fieseler A.	2016	Statement to IBACON project	-	-	2016-21-06
Fieseler A.	2015	MDA-A-197-01 Verum 1: Accelerated Storage Stability	98322204	Merck KGaA	2015-08-04
Meinerling M.	2007	EUS26-15 INSECT REPELLENT SPRAY – DETERMINATION OF THE ACCELERATED STORAGE STABILITY	31231204	Merck KGaA	2007-02-28
Fieseler A.	2011	Determination of the Relative Density of Pump Spray IR 3535® 20 %	63163182	Merck KGaA	2011-06-27
Meinerling M.	2011	Determination of the Low Temperature Stability of Pump Spray IR 3535® 20 %	63164204	Merck KGaA	2011-06-27
Fieseler A.	2011	Determination of the Flash Point of Pump Spray IR 3535® 20 %	63161189	Merck KGaA	2011-06-28
Batz B.	2016	Bestimmung der Tröpfchengrößenverteilung per Laserbeugung Merck Prüfauftrag vom 30.03.2016	2016_04_26	Merck KGaA	2016-04-26
Zur Lage J.	2016	IR3535_Ref Formulations surface tension visco_Reg.Aff	009093 – PM – PFC - RT	Merck KGaA	
Dornhagen J.	2011	FINAL REPORT (1st Original of 3) Pump Spray IR 3535® 20 % Batch No.: SM-0-1-1/090211 AUTO-IGNITION TEMPERATURE (LIQUIDS AND GASES) A.15	20110103.01	Merck KGaA	2011-07-04
Meinerling M.	2007	IR3535® - VALIDATION OF AN ANALYTICAL METHOD FOR THE DETERMINATION OF IR3535® AND ITS HYDROLYSIS PRODUCT IN DIFFERENT FORMULATIONS	31211101	Merck KGaA	2007-03-19
Carroll, S.P.	2006	"Test of Personal Insect Repellents: Study EMD 003.2 - Replacement for MRID 46979002 - Volume 11"	336-1918	Merck KGaA	2006-11-08
Carroll, S.P.	2006	"Test of Personal Insect Repellents: EMD 004.2 Replacement for MRID 46979004"	336-1919	Merck KGaA	2006-11-06
Dippel, C. and Dautel, H.	2006	"Evaluation of 6 products against the European Sheep Tick, Ixodes ricinus, on human volunteers according to the EPA guidelines"	336-1921	Merck KGaA	2006-04-27
Lüpkes, K.-H.	2011	"Repellent Efficacy of Six Repellent Formulations on Human Arms against Mosquitoes"	336-1922	Merck KGaA	2011-07-04
[redacted] (a)	2006	Acute dermal irritation study of EUS26-15 Insect Repellent Spray in albino rabbits.	WIL-585006	Merck KGaA	2006-09-15
[redacted] (b)	2006	Acute Eye Irritation Study of EUS26-15 Insect Repellent Spray in albino rabbits.	WIL-585007	Merck KGaA	2006-09-08

[redacted] (c)	2006	Skin Sensitisation Study of EUS26-15 Insect Repellent Spray in albino guinea pigs (Modified Buehler Method).	WIL-585008	Merck KGaA	2006-09-08
[redacted] (d)	2006	Acute dermal toxicity study of EUS26-15 Insect Repellent Spray in albino rats.	WIL-585005	Merck KGaA	2006-09-15
Dr. Günter C. Müller	2021	Repellent efficacy of "IR3535 AL Spray 20%" for use on horses against the most eminent biting flies, mosquito and ticks, tested under simulated-use conditions	KC_FT_012_01	Arthur Schopf Hygiene GmbH & Co. KG	2021-05-11

3.2 OUTPUT TABLES FROM EXPOSURE ASSESSMENT TOOLS

3.2.1 Human exposure calculations

PT19 - calculation table.xlsx

3.3 NEW INFORMATION ON THE ACTIVE SUBSTANCE

Not applicable.

3.4 RESIDUE BEHAVIOUR

Not applicable.

3.5 SUMMARIES OF THE EFFICACY STUDIES (B.5.10.1-XX)

Not relevant, IUCLID file available.

3.6 CONFIDENTIAL ANNEX

See the confidential PAR.

3.7 OTHER

Not applicable.