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

PRODUCT ASSESSMENT REPORT OF A BIOCIDAL PRODUCT FOR NATIONAL AUTHORISATION APPLICATIONS

Product identifier in R4BP	Stichfrei Animal
Product type(s):	19
Active ingredient(s):	Ethyl butylacetylaminopropionate (IR3535)
Case No. in R4BP	BC-QX020702-16
Asset No. in R4BP	DE-0013962-0000
Evaluating Competent Authority	DE (BAuA)
Internal registration/file no	5.0-710 05/19.00004 710-05-19-00004-00-00-00-0000
Date	11.07.2019

Table of content

1 Conclusion

The assessment presented in this report has shown the efficacy but no unacceptable risks, if the ready-to-use spray “Stichfrei Animal” with the active substance Ethylbutylacetylaminopropionat (IR3535. 20%) is used as repellent (product-type 19) against horse flies (*Tabanus* spp., *Haematopota* spp.) on horses.

The conditions for granting an authorisation according to Article 19 of Regulation (EU) No 528/2012[1] are fulfilled.

Please find detailed information on the uses appropriate for authorisation in chapter 2.4.
General directions for use of the product are summarised in chapter 2.5.

A classification according to Regulation (EC) No 1272/2008[2] is not necessary. Detailed information on classification and labelling is provided in chapter 2.3.

Approval of the active substance
The active substance Ethylbutylacetylaminopropionat (IR3535) is included in the Union list of approved active substances.

Composition and formulation
The ready-to-use spray “Stichfrei Animal” contains the active substance Ethylbutylacetylaminopropionat (IR3535).
No substance of concern has been identified.
Please refer to chapter 2.2 (Composition and formulation) and 5.1 (Full composition of the product) for detailed information.

Physical, chemical and technical properties
The physical, chemical and technical properties have been determined and deemed acceptable (please find more information in chapter 3.3).

---

[1] Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products, last amended by Regulation (EU) No 334/2014 of the European Parliament and of the Council of 11 March 2014.
[2] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Physical hazards and respective characteristics

The biocidal product was classified as Flammable liquid, Category 3 based on GHS/CLP criteria and does not fulfil further criteria for classification for physical hazard classes (please find more information in chapter 3.4).

Methods for detection and identification

Information on the analytical methods for the active substance is provided in chapter 3.5. The evaluation is based on the residue definitions and action levels derived from the Assessment Report or Competent Authority Report.

Efficacy against target organisms

The product has been shown to be efficacious for the uses appropriate for authorisation listed in chapter 2.4.

The intended label claim “repellent against ticks (*Ixodes ricinus*) on dogs and horses, and on horses against horse flies (*Tabanus* spp., *Haematopota* spp.) and black flies (*Simulium* spp.) to prevent biting and bloodsucking” was not supported by the submitted studies.
However, sufficient efficacy was shown against horse flies (*Tabanus* spp., *Haematopota* spp.) on horses for up to two hours after product application (application dose: 5 g / m² fur).
Please find more information on efficacy of the product in chapter 3.6 Efficacy against target organisms

Risk assessment for human health

Since no substance of concern has been identified the human health risk assessment for this product is based on the active substance.

A human health risk assessment has been carried out for non-professional use of the product (see chapter 3.7) for all intended uses (see chapter 3.1).

Based on the risk assessment it is unlikely that the intended use cause any unacceptable acute or chronic risk to non-professional users, bystanders and residents.

Regarding non-professional users health protection, there are no objections against the intended uses if the directions for use according to chapter 2.5 are followed.

Risk assessment for animal health

Since no substance of concern has been identified the animal health risk assessment for this product is based on the active substance.

An animal health risk assessment has been carried out for non-professional use of the product (see chapter 3.8) for all intended uses (see chapter 3.1).

Based on the risk assessment it is unlikely that the intended use cause any unacceptable acute or chronic risk to the animals. Regarding animals health protection, there are no objections against the intended uses if the directions for use according to chapter 2.5 are followed.

Risk assessment for the environment

Since no substance of concern has been identified the risk assessment for the environment for this product is based on the active substance.

A risk assessment for the environment has been carried out for non-professional outdoor and indoor use of the product (see chapter 3.9) for all intended uses (see chapter 3.1).

Based on the risk assessment it is unlikely that the intended uses cause any unacceptable risk for the environment if the directions for use according to chapter 2.5 are followed.

Comparative Assessment

A comparative assessment has not been necessary (see chapter 3.11) since no candidate for substitution were identified (see chapter 2.2.4).

2 Summary of the product assessment

2.1 Administrative information

2.1.1 Identifier in R4BP

Stichfrei Animal

2.1.2 Product type(s)

19 (Repellents and attractants)

2.1.3 Manufacturer(s) of the product

Name of manufacturer	F.W. Klever GmbH
Address of manufacturer	Hauptstrasse 20 84168 Aham Germany
Location of manufacturing sites	Hauptstrasse 20 84168 Aham Germany

2.1.4 Manufacturer(s) of the active substance(s)

Active substance	Ethyl butylacetylaminopropionate (IR3535)
Name of manufacturer	Merck S.L.U.
Address of manufacturer	Calle Maria de Molina 28006 Madrid Spain
Location of manufacturing sites	Poligono Merck 08100 Mollet de Vallés Barcelona, Spain

Active substance	Ethyl butylacetylaminopropionate (IR3535)
Name of manufacturer	Merck KGaA.

Address of manufacturer	Frankfurter Strasse 250 64293 Darmstadt Germany
Location of manufacturing sites	Poligono Merck 08100 Mollet de Vallés Barcelona, Spain

2.2 Composition and formulation

2.2.1 Qualitative and quantitative information on the composition

Table 1

Common name	IUPAC name	Function	CAS number	EC number	Content (%)
Ethyl butylacetylaminopropionate (IR3535)	3-(N-acetyl-N-butyl) aminopropionic acid ethyl ester	Active substance	52304-36-6	257-835-0	20

- Information on the full composition is provided in the confidential[3] annex (see chapter 5).

- 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 ☒

- According to the information provided the product contains no nanomaterial as defined in Article 3 paragraph 1 (z) of Regulation No. 528/2012:

2.2.2 Information on technical equivalence

- Is the source of the active substance(s) the same as the one 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 ☐ (The technical equivalence of the active substance from the new source was established by ECHA)

[3] Access level: "Restricted" to applicant and authority

2.2.3 Information on the substance(s) of concern

No substance of concern was identified.

- More information on the substance(s) of concern is provided in the confidential[3] annex (see chapter 5).

For the environment, no substance of concern was identified.

2.2.4 Candidate(s) for substitution

No candidate for substitution was identified.

2.2.5 Type of formulation

AL Any other liquid

2.3 Classification and Labelling according to the Regulation (EC) No 1272/2008[4]

A harmonised classification for the active substance Ethylbutylacetylaminopropionate (IR3535) does not exist. Based on the available effect data (96 h-LC_{50} > 100 mg/L for *Danio rerio*, 48 h-EC_{50} > 100 mg/L for *Daphnia magna* and a 72 h-E_rC_{50} > 100 mg/L for *Desmodesmus subspicatus*) described in the CAR (RMS BE, 2013) the active substance is not classified as hazardous for the environment. As also the other components do not affect the classification of the product, environmental classification of the product pursuant to the Regulation (EC) 1272/2008 is not required.

Table 2

Classification **Hazard classes, Hazard categories**	**Hazard statements**
Flam. Liq. 3	H226: Flammable liquid and vapour
Eye Irrit. 2	H319
Labelling **Code**	**Pictogram / Wording**

4 Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

	GHS02	
Signal word	-	Warning
Hazard statements	H226	H226: Flammable liquid and vapour
	H319	Causes serious eye irritation.
Supplemental hazard information	EUH208	Contains linalool and dipentene. May produce an allergic reaction.
Supplemental label elements	-	-
#Precautionary statements	P101	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.
	P233	Keep container tightly closed.
	P264	Wash hands thoroughly after handling.
	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/attention.
	P403	Store in a well-ventilated place.
Note	-	-

In fact, H319 would trigger P280 (Wear protective gloves/protective clothing/eye protection/face protection.). However, it was not included by the German CA because it is considered sufficient to advise the user to avoid contact with eyes and an advice what is to do if contact to eyes occurs. The prescription of eye protection because of local reversible effects, which occur only accidentally and which can be treated by simple measures is not appropriate for non-professional users.

For labelling according to Article 69 of Regulation 528/2012, in particular precautionary and risk mitigation measures (RMM), please refer to chapter 2.5.

Labelling has to be in accordance with article 69 of Regulation (EU) No. 528/2012 and with Regulation (EU) No. 1272/2008.
It is within the responsibility of the authorisation holder to comply with the legal provisions for classification and labelling.

2.4 Use(s) appropriate for authorisation[5]

2.4.1 Use 1 appropriate for authorisation – Spraying (Non-professional user)

Product Type(s)	19 (Repellents and attractants)
Where relevant, an exact description of the use	The biocidal product is a ready-to-use spray for the topical application on the fur of horses. The biocidal product is intended to be used by the general public (outdoors or in well ventilated areas) in temperate regions as a repellent against horse flies (*Tabanus* spp., *Haematopota* spp.) on horses to prevent biting.
Target organism(s) (including development stage)	On horses: *Tabanus* spp., *Haematopota* spp.(horse fly; adults)
Field(s) of use	Outdoor (only on paved/sealed grounds) well ventilated areas
Application method(s)	Spraying
Application rate(s) and frequency	Application rate (in g, mL and in strokes, rounded): Horses: 90 kg: 10 g 10 mL 170 strokes 200 kg: 17 g 20 mL 290 strokes 300 kg: 22 g 25 mL 370 strokes 400 kg: 27 g 30 mL 450 strokes 500 kg: 31 g 35 mL 520 strokes 600 kg: 35 g 40 mL 590 strokes 700 kg: 39 g 40 mL 650 strokes 800 kg: 42 g 45 mL 700 strokes 1000 kg: 49 g 50 mL 820 strokes Application frequency: Once per day
Category(ies) of users	Non-professional user
Pack sizes and packaging material	Bottle >=100 ml - <=600 ml HDPE screw cap PPH (Polyproylene homopolymer)

2.4.1.1 Use-specific instructions for use

See chapter 2.5

5 Member States might refuse to grant an authorisation or adjust the terms and conditions of the authorisation to be granted according to Article 37 BPR.

2.4.1.2 Use-specific risk mitigation measures

See chapter 2.5

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

See chapter 2.5

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

See chapter 2.5

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

See chapter 2.5

2.5 General directions for use

2.5.1 Instructions for use

1) Spray evenly on the fur of the horses from a distance of 20 cm. The application rates and frequencies and the corresponding animal species have to be clearly indicated on the label in an easily understandable form. This must include application rates for different breeds of weight ranges. If appropriate, the user has to be informed about the number of strokes from the spraying device he can apply per animal and application. Alternatively or for bigger animals, the amount of biocidal product can be given in mL. In this case the bottle has to be fitted with an appropriate scaling, which allows the user to determine the recommended application rates. For details refer to 2.4 Use(s) appropriate for authorisation

2.5.2 Risk mitigation measures

1) Avoid contact to eyes.
2) Apply sparingly.
3) The biocidal product is not intended for use on humans.
4) Use only outdoors or in well-ventilated areas.
5) Do not breathe spray.
6) To protect the soil, the outdoor application of the product is restricted to areas with paved/sealed ground.
7) Wash horses treated with the biocidal product only on paved/sealed ground connected to the waste water system.
8) Keep away from food, drink or feeding stuff.
9) Do not apply directly onto livestock.

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

1) In case of spillage, remove the spilled product with wipes and dispose the wipes in a safe way.

2.5.4 Instructions for safe disposal of the product and its packaging

1) Keep residues of the biocidal products in its container. Do not empty into drains.
2) Do not contaminate ground, waterbodies or watercourses with the biocidal product or its used container.
3) Residues of the biocidal product and its container must be disposed of in a safe way and in accordance with national and regional rules and under consideration of the EU Waste Framework (2008/98/EG).

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

Storage stability of 3 years can be granted.

2.5.6 Other information

-

2.6 Packaging

Table 3

Type of packaging	Size/volume of the packaging	Material of the packaging	Type and material of the closure(s)	Intended user (e.g. professional, non-professional)	Compatibility of the product with the proposed packaging materials
Bottle	>=100 ml - <=600 ml	HDPE	-	Non-professional	Yes
Srew cap		PPH (Polypropylene homopolymer)		Non-Professional	Yes

3 Assessment of the product

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

3.1.1 Intended use 1 – application to skin

Product Type(s)	19 (Repellents and attractants)
Where relevant, an exact description of the use	The biocidal product is a ready-to-use spray for the topical application on dogs and horses. The biocidal product is intended to be used by the general public (outdoors or in well ventilated areas) in temperate regions as a repellent against ticks (*Ixodes ricinus*) on dogs and horses, and on horses against horse flies (*Tabanus* spp., *Haematopota* spp.) and black flies (*Simulium* spp.) to prevent biting and bloodsucking.
Target organism(s) (including development stage)	On dogs: *Ixodes ricinus* (Ticks; adults and nymphs) On horses: *Ixodes ricinus* (Ticks; adults and nymphs) *Simulium* spp. (blackfly; adults) *Tabanus* spp., *Haematopota* spp.(horse fly; adults)
Field(s) of use	Outdoor (only on paved/sealed grounds) well ventilated areas
Application method(s)	Spraying

	Product is filled in a white plastic bottle fitted with a spray nozzle / trigger. When you use the spray nozzle product comes out, distributed on a local area.
Application rate(s) and frequency	Application rate (in g, mL and in strokes, rounded): Dogs: 0.5 kg 0.3 g 0.3 mL 5 strokes 1 kg 0.5 g 0.5 mL 8 strokes 2 kg 0.8 g 0.8 mL 13 strokes 3 kg 1.0 g 1.0 mL 17 strokes 4 kg 1.2 g 1.3 mL 21 strokes 5 kg 1.4 g 1.5 mL 25 strokes 7.5 kg 1.9 g 2.0 mL 30 strokes 10 kg: 2.3 g 2.5 mL 40 strokes 20 kg: 3.7 g 4 mL 60 strokes 30 kg: 4.8 g 5 mL 80 strokes 40 kg: 5.9 g 6 mL 100 strokes 50 kg: 6.8 g 7 mL 115 strokes 60 kg: 7.7 g 8 mL 130 strokes 70 kg: 8.6 g 9 mL 145 strokes 80 kg: 9.4 g 10 mL 155 strokes Horses: 90 kg: 10 g 10 mL 170 strokes 200 kg: 17 g 20 mL 290 strokes 300 kg: 22 g 25 mL 370 strokes 400 kg: 27 g 30 mL 450 strokes 500 kg: 31 g 35 mL 520 strokes 600 kg: 35 g 40 mL 590 strokes 700 kg: 39 g 40 mL 650 strokes 800 kg: 42 g 45 mL 700 strokes 1000 kg: 49 g 50 mL 820 strokes Application frequency: Once per day
Category(ies) of users	Non-professional
Pack sizes and packaging material	Bottle >=100 ml - <=600 ml HDPE Screw cap PPH (Polypropylene homopolymer)

3.2 *Intended* use(s) as applied for by the applicant

Use	PT	Where relevant, an exact description of the use	Target organism(s) (including development stage)	Field(s) of use	Application method(s)	Application rate(s) and frequency	Category(ies) of users	Pack sizes and packaging material

001	19	The biocidal product is a ready-to-use spray for the topical application on dogs and horses. The biocidal product is intended to be used by the general public (outdoors or in well ventilated areas) in temperate regions as a repellent against ticks (Ixodes ricinus) on dogs and horses, and on horses against horse flies (Tabanus spp., Haematopota spp.) and black flies (Simulium spp.) to prevent biting and bloodsucking.	On dogs: Ixodes ricinus (Ticks; adults and nymphs) On horses: Ixodes ricinus (Ticks; adults and nymphs) Simulium spp. (blackfly; adults) Tabanus spp., Haematopota spp.(horse fly; adults)	Outdoor well ventilated areas	Spraying	Application rate (in g, mL and in strokes, rounded): Dogs: 0.5 kg 0.3 g 0.3 mL 5 strokes 1 kg 0.5 g 0.5 mL 8 strokes 2 kg 0.8 g 0.8 mL 13 strokes 3 kg 1.0 g 1.0 mL 17 strokes 4 kg 1.2 g 1.3 mL 21 strokes 5 kg 1.4 g 1.5 mL 25 strokes 7.5 kg 1.9 g 2.0 mL 30 strokes 10 kg: 2.3 g 2.5 mL 40 strokes 20 kg: 3.7 g 4 mL 60 strokes 30 kg: 4.8 g 5 mL 80 strokes 40 kg: 5.9 g 6 mL 100 strokes 50 kg: 6.8 g 7 mL 115 strokes 60 kg: 7.7 g 8 mL 130 strokes 70 kg: 8.6 g 9 mL 145 strokes 80 kg: 9.4 g 10 mL 155 strokes Horses: 90 kg: 10 g 10 mL 170 strokes 200 kg: 17 g 20 mL 290 strokes 300 kg: 22 g 25 mL 370 strokes 400 kg: 27 g 30 mL 450 strokes 500 kg: 31 g 35 mL 520 strokes 600 kg: 35 g 40 mL 590 strokes 700 kg: 39 g 40 mL 650 strokes 800 kg: 42 g 45 mL 700 strokes 1000 kg: 49 g 50 mL 820 strokes Application frequency: Once per day	Non-professional	>=100 ml - <=600 ml HDPE

Intended use name(s)

1. application to skin

3.3 Physical, chemical and technical properties

Table 4: Physical, chemical and technical properties of the Biocidal product

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Physical state at 20 °C and 101.3 kPa	Visual inspection	BP, charge No. 15/0715; 16/0715; 17/0815; 18/0815; 19/0815	Clear liquid	Moosner S., Prüfbericht Stichfrei Animal, report no.2/2015, 2015
Colour at 20 °C and 101.3 kPa	Visual inspection	BP, charge No. 15/0715; 16/0715; 17/0815; 18/0815; 19/0815	Colourless with minimal yellowness	Moosner S., Prüfbericht Stichfrei Animal, report no.2/2015, 2015
Odour at 20 °C and 101.3 kPa	olfactory inspection	BP, charge No. 15/0715; 16/0715; 17/0815; 18/0815; 19/0815	Mostly perfume fragrance	Moosner S., Prüfbericht Stichfrei Animal, report no.2/2015, 2015

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Acidity / alkalinity	OECD 111	BP, charge No. 15/0715; 16/0715; 17/0815; 18/0815; 19/0815	BP, charge No. 15/0715: pH 6.1; 16/0715: pH 6.4; 17/0815: pH 6.5; 18/0815: pH 6.7; 19/0815: pH 6.6 Regulation (EU) No 528/2012, Annex III, Title 1: Test not necessary, since pH of product (average =6.47) is inside of range 4-10.)	Moosner S., Prüfbericht Stichfrei Animal, report no.2/2015, 2015
Relative density / bulk density	OECD 109 (oscillating densitometer)	BP, charge No. 18/0815	0.939 g/mL, 20°C	Dr. H Zettler, Prüfbericht Stichfrei Animal, report no. 1/2015, 2015
Storage stability test – **accelerated storage**	CIPAC MT 46.3	Read across from BP "Pump Spray Lice IR 3535 20%"	BP "Pump Spray Lice IR 3535 20%": AS-content: 19.3% before, 18.8% after storage, loss of 2.6%. Hydrolysis product of AS (IR3535 free acid): <0.5% before and <0.5% after storage	Meinerling, M., Herrmann, S., report no. 63172204, 08.08.2011

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			pH decreased from pH 6.2 to pH 4.8	
Storage stability test – **long term storage at ambient temperature**	OPPTS 830.6317, test item stored for 24 months at 25°C	Read across from BP "Insect Repellent"	BP "Insect Repellent": AS-content: 20.1% before, 17.9% after storage, loss of 2.2%; Hydrolysis product of AS (IR3535 free acid): increase from 0.1% to 2.1% pH decreased from pH 5 to pH 4.4	Meinerling, M., EUS26-15 INSECT REPELLENT SPRAY – DETERMINATION OF THE STORAGE STABILITY AT AMBIENT TEMPERATURES, report no. 31232204, 2009
		BP Stichfrei Animal	Batch 20/12.14 in 100mL packaging: T=0 active substance content: 20.1%, Density: 0.940 g/cm^2, refraction index: 1.394	Zettler, H., Haltbarkeitsstudie, Klever GmbH, 2018

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			T = 37 months a.s.: 20.8% (gain of 3.5%) Density: 0.938 g/cm^2, refraction index: 1.394 Batch 01/02.15 in 100mL packaging: T=0 active substance content: 20.2% Density: 0.939 g/cm^2, refraction index: 1.394 T = 36 months a.s.: 20.3% (gain of 0.5%) Density: 0.938 g/cm^2, refraction index: 1.394 Batch 01/02.15 in 600mL packaging: T=0 active substance content:	

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			20.2% Density: 0.939 g/cm^2, refraction index: 1.394 T = 36 months a.s.: 19.9% (loss of 1.5%) Density: 0.940 g/cm^2, refraction index: 1.393 In all tests no significant change in colour, odour, and fragrance observed. To gain data for intermediate results , tests with different batches/charges after shorter time periods (31 months, 24 months and 12 months were conducted:	

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			Batch 13/06.15 in 600mL packaging: T=0 active substance content: 20.6% Density: 0.939 g/cm^2, refraction index: 1.394 T = 31 months a.s.: 20.3% (loss of 1.5%) Density: 0.940 g/cm^2, refraction index: 1.393 Batch 2/02.16 in 100mL packaging: T=0 active substance content: 20.1% Density: 0.939 g/cm^2, refraction index: 1.394 T = 24 months a.s.: 20.1%	

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			Density: 0.938 g/cm^2, refraction index: 1.394 Batch 1/02.17 in 100mL packaging: T=0 active substance content: 20.1% Density: 0.940 g/cm^2, refraction index: 1.393 T = 12 months a.s.: 20.0% (loss of 0.5%) Density: 0.939 g/cm^2, refraction index: 1.393	
Storage stability test – **low temperature stability test for liquids**	CIPAC MT 39.3	Read across from BP "Insect Repellent"	Before and after the storage period the test item remained the same clear homogeneous liquid. No precipitation or separated material was observed.	Meinerling. M., Determination of the Low Temperature Stability of Pump Spray IR 3535® 20 %, report no. 63164204, 2011

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 - **light**	Product is stored in lightproof packaging.			
Effects on content of the active substance and technical characteristics of the biocidal product – **temperature and humidity**		Read across from BP “Insect Repellent”	Temperature: During accelerated storage at elevated temperature (40°C for two weeks) no influence on content of active substance was observed. The low temperature stability test for liquids showed no effects on the BP. Therefore, no effects of temperature on content of active substance are expected. Humidity: water-based products	Waivng
Effects on content of the			The data about the	Dangerous Goods

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
active substance and technical characteristics of the biocidal product - **reactivity towards container material**			Packaging material is sufficient.	Database http://www.dgg.bam.de/en/
Wettability	Waiving		BP is not a solid preparation which is to be dispersed in water	
Suspensibility, spontaneity and dispersion stability	Waiving		The BP is not a formulation forming a suspension on dilutions with water.	
Wet sieve analysis and dry sieve test	Waiving		The BP is a ready to use preparation.	
Emulsifiability, re-emulsifiability and emulsion stability	Waiving		The BP is not a emulsion.	
Disintegration time	Waiving		The BP is not a tablet.	
Particle size distribution, content of dust/fines, attrition, friability	Droplet size distribution	Read across from BP “Insect Repellent”	<5 µm: 0.6%, d10: 24.4 µm, d50: 46.8 µm, d90: 126.3 µm	Bericht zu den Tests mit dem Produkt INSECT REPELLENT im Auftrag der Fa. Merck KGaA, 2005

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Persistent foaming	Waiving		The BP is not intended to be applied in water for use.	
Flowability/Pourability/Dust ability	Waiving		Flowability: The BP is not a granular formulation. Pourability: The BP is no suspension concentrate, capsule suspension and suspoemulsion. Dustability: The ready to use impregnated pad is no formulation that may be applied as a dust.	
Burning rate — smoke generators	Waiving		The BP is no smoke generator.	
Burning completeness — smoke generators	Waiving		The BP is no smoke generator.	
Composition of smoke — smoke generators	Waiving		The BP is no smoke generator.	
Spraying pattern — aerosols	Waiving		The BP is no aerosol.	
Physical compatibility			The BP is not intended to	

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
			be used in combination with any other product.	
Chemical compatibility	Waiving		The BP is not to be mixed with other products.	
Degree of dissolution and dilution stability	Waiving		Not applicable.	
Surface tension	OECD 115 (OECD harmonised ring method)	BP, charge No. 03/0314; 11/0515; 14/0715; 16/0715; 18/0815	BP, charge No. 03/0314: 29.1 mN/m; 11/0515: 29.2 mN/m; 14/0715: 28.9 mN/m; 16/0715: 29.5 mN/m; 18/0815: 28.9 mN/m Mean value: 29.12 mN/m	Moosner S., Prüfbericht Stichfrei Animal, report no.2/2015, 2015
Viscosity	OECD 114 (Viscosity of Liquids)	Representative BP, AS content 20%	7.1 mm^2/sec (kinematic), 20°C	Dr. H Zettler, Prüfbericht Stichfrei Animal, report no. 1/2015, 2015

Table 5

Conclusion on the physical, chemical and technical properties
The data provided by the applicant was acceptable. The biocidal product Stichfrei Animal is a clear colourless liquid with perfume like odour. The pH of the undiluted product is 6.47. The relative density is D_4^{20} = 0.939 g/cm^2. At ambient temperature the product has a shelf life of 37 months and is stable under cold and accelerated storage conditions. The product should be protected from direct exposition to light and has therefore a lightproof packaging.

At 20°C the surface tension is 29.12 mN/m and the kinematic viscosity is 7.1 mm^2s^{-1}.
Physical and compatibility with other products is not relevant.

3.4 Physical hazards and respective characteristics

Table 6: Physical hazards and respective characteristics of the product

Hazard class / characteristics	Guideline and Method	Purity of the test substance (% (w/w)	Parameter	Results	Reference
Explosives	study scientifically not necessary			The study does not need to be conducted because there are no chemical groups present in the molecule which are associated with explosive properties.	IUCLID [6]
Flammable gases	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Flammable aerosols	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Oxidising gases	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Gases under pressure	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]

[6] Data waiving was acceptable (see justification(s)/annotation(s) in IUCLID dossier).

Hazard class / characteristics	Guideline and Method	Purity of the test substance (% (w/w)	Parameter	Results	Reference
Flammable liquids	DIN 51758	BP, Batch No. 17/0815	Flash point: 32 °C	Flammable liquid, Category 3 based on GHS/CLP criteria	Zettler, C., 2015, Stichfrei Animal Study No. 01-2015
Flammable solids	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Self-reactive substances and mixtures	study scientifically not necessary			The mixture does not contain any substances known to self-react or with chemical groups present in their molecules that are associated with explosive or self-reactive properties. So for the mixture no self-reaction must be expected either. This conclusion is in line with the long-year experience with this and similar mixtures.	IUCLID[6]
Pyrophoric liquids	study scientifically not necessary			The mixture does not contain any substances known to react with air so the mixture is no pyrophoric liquid. This conclusion is in line with the long-year experience with this and similar mixtures.	IUCLID[6]
Pyrophoric solids	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Self-heating substances and mixtures	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Substances and mixtures which in contact with	study scientifically not necessary			The study does not need to be conducted because the experience in production or handling shows that the substance does not react with water (the	IUCLID[6]

Hazard class / characteristics	Guideline and Method	Purity of the test substance (% (w/w)	Parameter	Results	Reference
water emit flammable gases				substance is manufactured with water).	
Oxidising liquids	study scientifically not necessary			The study does not need to be conducted because there are no chemical groups present in the molecule which are associated with oxidising properties and hence, the classification procedure does not need to be applied.	IUCLID[6]
Oxidising solids	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Organic peroxides	study scientifically not necessary			None of the ingredients in the mixture is an organic peroxide, so a test for the properties of organic peroxides is scientifically not justified.	IUCLID[6]
Corrosive to metals	study scientifically not necessary			None of the ingredients in the mixture is classified as corrosive or suspected from a chemical point of view to be able to react with metals and thus, the mixture is also not corrosive to metal. This conclusion is in line with the long-year experience with this and similar mixtures.	IUCLID[6]
Auto-ignition temperature (liquids and gases)	EU mehod A.15		Auto-ignition temperature: 440 °C		IUCLID 4.17
Relative self-ignition temperature for solids	study scientifically unjustified			The study does not need to be conducted because the product is a liquid	IUCLID[6]
Dust explosion hazard	study scientifically			The study does not need to be conducted because the product is a liquid	IUCLID[6]

Hazard class / characteristics	Guideline and Method	Purity of the test substance (% (w/w)	Parameter	Results	Reference
	unjustified				

Table 7

Conclusion on the physical hazards and respective characteristics
The data provided by the applicant was acceptable. Experimental data on flash point (32 °C) and auto-ignition temperature (440 °C) were provided for the product. The Biocidal product Stichfrei Animal is not expected to have any explosive or oxidising properties. Based on experience in production and handling it can be concluded that the product is not pyrophoric, does not evolve flammable gases in contact with water and is not considered as being corrosive to metals. Therefore, the biocidal product is classified as Flammable liquid, Category 3 based on GHS/CLP criteria.

3.5 Methods for detection and identification

Table 8

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**	**Specificity**	**Linearity (range, R^2)**	**Fortification range / Number of measurements**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Ethyl butylacetylaminopropionate (IR3535)	GC-FID	Is given, no relevant interferences were observed.	R^2 = 0.9985	70-170%, 7 samples measures, n=4	99.2% - 101 %	99.9%	1	Not relevant; method for determination of active substance in the products.	Zettler, H., Gehaltsbestimmung von IR3535 in Stichfrei Animal, 2013

Table 9

Relevant residue definitions for monitoring and levels for which compliance is required			
Matrix	**Residue definition**	**Limit / MRL**	**Reference / Remarks**
Soil	no relevant residues expected		AR for PT19, list of endpoints, 03/2014
Drinking water	IR3535	0.1 µg/L	minimal requirement of the Drinking Water Act (Trinkwasser-VO)
Surface water	IR3535	0.1 mg/L	$PNEC_{water}$, based on EC_{50} of >100 mg/L for fish, daphnia and algae, AF: 100, CAR for PT19, Doc IIA chapter 4.3.1.1, 03/2014
Air	not residue relevant, since IR3535® -based insect repellents spray applications involve large droplets which are not respirable		AR for PT19, list of endpoints, 03/2014
Animal and human body fluids and tissues	not residue relevant, since not classified as toxic or very toxic		AR for PT19, list of endpoints, 03/2014
Food of plant origin	no relevant residues expected for the intended use		AR for PT19, list of endpoints, 03/2014
Food of animal origin	no relevant residues expected for the intended use		AR for PT19, list of endpoints, 03/2014

Table 10

Analytical methods for drinking water									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Specificity**	**Linearity (range, R^2)**	**Fortification range / Number of measurements**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
IR3535	UPLC-MS/MS, Acquity UPLC BEH C18 column, ESI+, m/z 216→86, 216→128	m/z 216→86	0.5 – 30 µg/L R^2>=0.992	0.1 µg/L / 5 1 µg/L / 5	108 – 113 99 - 102	110 100	2.1 1.1	0.1 µg/L	Buttler, 2012, CAR, Doc IIIA, 4.2(c)/01
		m/z 216→128		0.1 µg/L / 5 1 µg/L / 5	107 – 112 96 - 101	109 98	2.0 1.8		

Table 11

Analytical methods for soil									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Specificity**	**Linearity (range, R^2)**	**Fortification range / Number of measurements**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
IR3535	UPLC-MS/MS, Acquity UPLC BEH C18	m/z 216→86	0.5 – 30 µg/L R^2>=0.992	0.1 µg/L / 5 1 µg/L / 5	108 – 113 99 - 102	110 100	2.1 1.1	0.1 µg/L	Buttler, 2012, CAR, Doc IIIA, 4.2(c)/01

	column, ESI+, m/z 216→86, 216→128	m/z 216→128		0.1 µg/L / 5 1 µg/L / 5	107 – 112 96 - 101	109 98	2.0 1.8		

Table 12

Data waiving was acceptable for the following information requirements	
Information requirement	1. 5.2.1. Soil 2. 5.2.2. Air 3. 5.2.3. Body fluids and tissues 5.3. Analytical methods for monitoring purposes including recovery rates and the limit of quantification and detection for the active substance, and for residues thereof, in/on food of plant and animal origin or feeding stuffs and other products where relevant
Justification	See justification(s)/annotation(s) in IUCLID dossier

Table 13

Conclusion on the methods for detection and identification
The method provided for residues of the active substance in drinking and surface water was acceptable. Methods regarding residues in soil, air, body fluids and tissues, food and feeding stuff, and substances of concern were not necessary.

3.6 Efficacy against target organisms

3.6.1 Function and field of use

The product “Stichfrei Animal” is a repellent (PT 19), which contains the active substance IR3535 (20%). The repellent is a ready-to-use spray for the topical application on dogs and horses (application dose: 5 g / 1 m² body surface). The biocidal product is intended to be used by the general public in temperate regions as a repellent against ticks (*Ixodes ricinus*) on dogs and horses, and on horses against horse flies (*Tabanus* spp., *Haematopota* spp.) and black flies (*Simulium* spp.) to prevent biting and bloodsucking.
However, the submitted studies are only suitable to support the claim against horse flies (*Tabanus* spp., *Haematopota* spp.) on horses.

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

The product “Stichfrei Animal” is intended to be used as a repellent against the target organisms ticks (*Ixodes ricinus*) on dogs and horses, and on horses against the target organisms horse flies (*Tabanus* spp., *Haematopota* spp.) and black flies (*Simulium* spp.). However, the submitted studies are only suitable to support the claim against horse flies (*Tabanus* spp., *Haematopota* spp.) on horses.

The products should be used topically on the fur of dogs and horses.

3.6.3 Effects on target organisms, including unacceptable suffering

The product has an adverse effect on the target organisms and prevents landing or biting of horse and black flies or causes ticks to let themselves drop off the skin within a few minutes without attaching to the host.

3.6.4 Mode of action, including time delay

The mode of action of the active substance IR3535 is not a passive masking of an attracting odour of a host. Instead the adverse effect (repellency) of IR3535 acts via the olfactory sense by inhibition of

odorant receptors of the target organism (Bohbot & Dickens, 2010)[7]. The repellent action starts immediately after application onto the skin without delay.

3.6.5 Efficacy data

The applicant submitted 5 studies (detailed study summary see table 19).
However, the German CA evaluates two studies (Carroll 2006, Lüpkes 2012) as unreliable to prove the efficacy of the product "Stichfrei Animal" as these studies were conducted with human volunteers against ticks (*Ixodes scapularis*) (Carroll 2006) and against mosquitoes (*Culex quinquefasciatus, Aedes aegypti*) (Lüpkes 2012). In accordance with the TNsG for PT 18/19 (2012), the submitted studies should demonstrate the efficacy of the product based on the submitted label claim. Therefore, products intended for use as repellents on horses and dogs should demonstrate repellency against the specific target species (biting flies, ticks) on the target animals (TNsG chapter 13.2.3). Furthermore, the composition of the products used in the studies by Carroll (2006) and Lüpkes (2012) is unclear, the application dose does not comply with the requested amount of 5 g / m². Moreover, in the simulated-use test by Lüpkes (2012) the number of human volunteers is very low (only one untreated control) and treated sleeves are used.

Ticks:
Laboratory tests were conducted with the product "Stichfrei Animal" and the product without perfume (determining a possible influence of the perfume) against adult female ticks (*Ixodes ricinus*) on dogs and horses ([redacted][8], 2017a). In the tests the product was applied in the requested application dose of 5 g / m² on the animals' fur. For dogs, a repellency of at least 90% (as requested in the TNsG 2012, chapter 7.3.1) was demonstrated for up to 7 hours with the product "Stichfrei Animal" and also with the product without perfume. A repellency of at least 90% was also shown for horses for up to 7 hours independently of the presence or absence of perfume.
However, the study design does not comply with the criteria stated in the TNsG (2012, chapter 7.2.2.2) for laboratory tests dealing with tick repellents. In the TNsG it is stated that ticks should be placed on the untreated skin and their walking behaviour should be observed for 5 minutes, whereas in the study by [redacted][8] (2017a) the ticks are placed for 1 minute in the middle of the treated area. It is also

[7] Bohbot J.D., Dickens J.C. (2010) Insect Repellents: Modulators of Mosquito Odorant Receptor Activity. PLoS ONE 5(8).

[8] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

unclear whether tick activity and the attractiveness of the test dogs and horses was tested during an exposure of 3 to 5 minutes as required by the TNsG.

The applicant argues that the study design in the TNsG describes the testing of tick repellents on human skin. Therefore, the applicant states that the design described for humans should not be used for testing on animals, as ticks do not crawl on top of the fur, but crawl immediately towards the skin along the hairs.

The German CA does not share the opinion of the applicant, especially as in the "Guideline for the testing and evaluation of the efficacy of antiparasitic substances for the treatment and prevention of tick and flea infestation in dogs and cats" (EMEA 2016) it is stated that "for studying repellency it should be observed that the induced infestation should not be performed near the application site of the test product". Therefore, the German CA evaluates the study by [redacted][3] (2017a) as unreliable to prove the efficacy of the product "Stichfrei Animal" against ticks on dogs and horses.

Black flies:

In the field tests ([redacted][3] 2017b) two trials were conducted to demonstrate the effect of the perfume in the product "Stichfrei Animal" (trial 1) and to determine the protection time (trial 2). In the first trial, four horses were treated with the product "Stichfrei Animal" on the left body side and on the right with the product without perfume. One untreated horse acted as control. More than 90% repellency was demonstrated with the product "Stichfrei Animal" for up to 5 hours. Without perfume, the repellency was 88.9% after 3 hours, but after 4 hours the repellency was again 100% and remained on this level for up to 5 hours after the treatment.

In the second trial, the product "Stichfrei Animal" was also applied on the left body side of the horses (n = 5), but the right side was used as the untreated control. A repellency of more than 90% was shown for up to 5 hours.

However, the German CA does not evaluate this study as reliable to demonstrate sufficient efficacy of the product "Stichfrei Animal" against black flies on horses, as in the first trial (effect of perfume) only one horse was observed per hour. Therefore, for each observation period only one data point is available. Also, in the second trial (determination of the protection time) the number of flies was only determined for three horses per hour, which is in our opinion an insufficient sample size (see table 19).

The applicant argues that black flies have a highly variable flying activity in daytime (high activity in the morning and the late afternoon), therefore single horses were treated in temporal intervals during the day. Such a methodological approach is acceptable to ensure a sufficient amount of black flies in the field. However, a sample size of one or three data points per observation period is still unacceptable. The test should have been conducted with more horses.

Horse flies:

The field tests against horse flies ([redacted][8] 2017c) were also divided into two trials. In the first trial, four horses were treated with the product “Stichfrei Animal” on the left body side and on the right with the product without perfume. One untreated horse acted as control. A repellency of at least 90% was observed for at least two hours for the product “Stichfrei Animal”. The product without perfume showed a repellency of 89.3% after two hours. Therefore, perfume additives are not repellents at the tested concentration and are not to be considered active ingredients.

In the second trial, the product “Stichfrei Animal” was also applied on the left body side of the horses (n = 8), but the right side served as the untreated control. A repellency of more than 90% was shown for up to 2 hours, too.

The German CA considers this field trial as sufficient to prove the efficacy of the product “Stichfrei Animal” against horse flies for at least 2 hours.

Table 14

Experimental data on the efficacy of the biocidal product against target organism(s)							
Func-tion	**Field of use envisaged**	**Test sub-stance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
PT 19	Repellent against ticks	"Insect Repel-lent Pump Spray IR3535® 20 %"	*Ixodes scapularis* nymphs	Laboratory test: - 10 volunteers (6 male and 4 female) - one forearm treated, other one untreated as control - product was applied whereby the lowest 3 cm near the wrist remained untreated - 1 tick every 15 min, starting 15 min after product application - complete protection time (CPT): period between application of the product and the time when two ticks within a 30 minute test period are not repelled (confirmed crossing) - temperature: 19 - 26°C - moisture: 31 - 52%	- application dose: 0.00071 ml / 1 cm²	average CPT was 12.1 ± 2.8 hours Subject no. / CPT[1] / FCC[2]? / Total Crossings[3] 46 / 15.00 / No / 1 49 / 15.00 / No / 1 51 / 14.50 / No / 2 44 / 13.00 / No / 1 14 / 13.00 / No / 0 19 / 13.00 / No / 2 32 / 11.50 / No / 3 31 / 11.25 / No / 0 45 / 8.25 / No / 1 40 / 6.50 / Yes / 4 CPT: complete protection time, FCC: first confirmed crossing	Carroll (2006)
PT 19	Repellent	"Product	*Culex*	Simulated-use ("arm-in-cage")	- application dose:		Lüpkes

<table>
<tr>
<td></td>
<td>against mosquitoes</td>
<td>D”</td>
<td>quinque-fasciatus, Aedes aegypti
- sex: female and male
- age: at least 7 days</td>
<td>test:
- 5 volunteers
- temperature: 25°- 26°C
- relative humidity: 58 - 70%
- test cage: 90 x 30 x40 cm (108,000 cm³) with 1000 mosquitoes (approx. 500 females; . average density: 1 female / 216 cm³)
- test: starts 60 minute after product application; arm in cage for 5 minutes; recording of landings and bites
- tests were repeated hourly
- tests were stopped when one bite was observed and confirmed by a second one
- control: 1 untreated volunteer</td>
<td>150 µl on 90 cm² forearm
(1.67 µl / cm²)
200 µl on sleeves</td>
<td>
<table>
<tr><td rowspan="2">species</td><td colspan="5">CPT (in hours)
test person
1 2 3 4 5</td></tr>
<tr><td>Culex quinque-fasciatus</td><td>6 h</td><td>5 h</td><td>> 8 h</td><td>> 8 h</td><td>> 8 h</td></tr>
<tr><td colspan="6">Ø > 7.0 h</td></tr>
<tr><td>Aedes aegypti</td><td>3 h</td><td>2 h</td><td>4 h</td><td>4 h</td><td>4 h</td></tr>
<tr><td colspan="6">Ø > 3.4 h</td></tr>
</table>
</td>
<td>(2012)</td>
</tr>
</table>

<table>
<tr>
<td>PT 19</td>
<td>Repellent against ticks</td>
<td>“Stichfrei Animal”, product without perfume</td>
<td>Ixodes ricinus (adult females)</td>
<td>Laboratory test:
- 12 dogs (different breed, sex, age, hair length, fur colour)
- 10 horses (different breed, sex, age, fur colour)
- application of the product “Stichfrei Animal” in a 600 cm² test area on the left flank of the test individual
- application of the product without perfume in a 600 cm² test area on the right flank of the test individual
- after product application, a single tick was placed in the middle of the treated area and was observed for a maximum of 1 minute
- 5 ticks were tested per hour and test individual
- repellency: ticks are repelled when they fall off within 1 minute; ticks are not repelled if they do not detach or start to infiltrate between the hairs
- percentage repellency: dividing</td>
<td>- application dose: 5 g / m²</td>
<td>application on dogs:
<table>
<tr><th>% repellency</th><th colspan="7">hours after application</th></tr>
<tr><td></td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>“Stichfrei Animal”</td><td>98.3</td><td>100.0</td><td>98.3</td><td>95.0</td><td>96.7</td><td>93.3</td><td>95.0</td></tr>
<tr><td>product without perfume</td><td>100.0</td><td>100.0</td><td>96.7</td><td>98.3</td><td>98.3</td><td>96.7</td><td>96.7</td></tr>
</table>
<table>
<tr><th>% repellency</th><th colspan="6">hours after application</th></tr>
<tr><td></td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>“Stichfrei Animal”</td><td>90.0</td><td>91.6</td><td>86.7</td><td>65.0</td><td>68.3</td><td>26.7</td></tr>
<tr><td>product without perfume</td><td>93.3</td><td>88.3</td><td>85.0</td><td>71.7</td><td>46.7</td><td>35.0</td></tr>
</table>
application on horses:
<table>
<tr><th>% repellency</th><th colspan="7">hours after application</th></tr>
<tr><td></td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>“Stichfrei Animal”</td><td>100.0</td><td>100.0</td><td>98.0</td><td>100.0</td><td>98.0</td><td>94.0</td><td>92.0</td></tr>
<tr><td>product without perfume</td><td>100.0</td><td>100.0</td><td>100.0</td><td>100.0</td><td>96.0</td><td>94.0</td><td>92.0</td></tr>
</table>
<table>
<tr><th>% repellency</th><th colspan="6">hours after application</th></tr>
<tr><td></td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>“Stichfrei Animal”</td><td>92.0</td><td>86.0</td><td>80.0</td><td>66.0</td><td>26.0</td><td>22.0</td></tr>
<tr><td>product without perfume</td><td>88.0</td><td>74.0</td><td>70.0</td><td>56.0</td><td>52.0</td><td>28.0</td></tr>
</table>
</td>
<td>[redacted][8]
(2017a)</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td></td><td></td><td>the number of repelled ticks by the total number of ticks and multiplying by 100
- before the test screening for tick activity by light breathing which causes walking activity and raising the forelegs; activity on untreated fur area</td><td></td><td></td><td></td></tr>
<tr><td>PT 19</td><td>Repellent against black flies</td><td>“Stichfrei Animal”</td><td>Simulium spp.</td><td>field test in Germany (two locations):
- testing period: June
- daily maximum temperature: 26 – 35°C
- rel. humidity: 48 – 62%
- max. wind velocity: 7 – 15 m/s
- 10 horses (different breed, sex, age, fur colour: medium to dark brown)
- product application: one whole body side
- test area: 80 x 60 cm on the flank
- 30 minutes after product application horses were lunged for 10 minutes</td><td>- application dose: 5 g / m²</td><td><u>identification of black flies:</u>
location 1 (Ratingen-Hörsel):
84 Simulium erythrocephalum, 3 Simulium ornatum
location 2 (Neuss-Selikum):
67 Simulium erythrocephalum

<u>effect of perfume:</u>
<table><tr><th>hours after application</th><th>day/horse</th><th>n black flies “Stichfrei Animal”</th><th>n black flies without perfume</th><th>% repellency “Stichfrei Animal”</th><th>% repellency without perfume</th></tr><tr><td>0</td><td>2/1</td><td>0</td><td>0</td><td>100</td><td>100</td></tr><tr><td>1</td><td>2/2</td><td>0</td><td>0</td><td>100</td><td>100</td></tr><tr><td>2</td><td>2/3</td><td>0</td><td>0</td><td>100</td><td>100</td></tr><tr><td>3</td><td>2/4</td><td>0</td><td>1</td><td>100</td><td>88.9</td></tr><tr><td>4</td><td>1/1</td><td>0</td><td>0</td><td>100</td><td>100</td></tr><tr><td>5</td><td>1/2</td><td>1</td><td>0</td><td>91.3</td><td>100</td></tr><tr><td>6</td><td>1/3</td><td>2</td><td>1</td><td>77.7</td><td>88.9</td></tr><tr><td>7</td><td>1/4</td><td>5</td><td>6</td><td>56.5</td><td>47.8</td></tr><tr><td>control</td><td>2/5</td><td>8 left</td><td>10 right</td><td></td><td></td></tr><tr><td></td><td>1/5</td><td>12 left</td><td>11 right</td><td></td><td></td></tr></table>
n: number of flies
location 1 (Ratingen-Hörsel)</td><td>[redacted][8]
(2017b)</td></tr>
</table>

<table>
<tr>
<td></td><td></td><td></td><td></td>
<td>- number of sitting black flies per test area within 10 minutes after lunging
- percentage relative reduction: $(n_{untreated\ area} - n_{treated\ area})/n_{untreated\ area} * 100$
- after the trials, black flies were caught by nets for identification

<u>trial 1: effect of perfume</u>
- 4 horses were treated with the product “Stichfrei Animal” on the left body side and with the product without perfume on the right body side
- control: 1 untreated horse

<u>trial 2: determination of the protection time</u>
- 5 horses were treated with the product “Stichfrei Animal” on the left body side, the right body side remained untreated</td>
<td></td>
<td><u>determination of the protection time:</u>
<table>
<tr><th>hours after application</th><th>day/horse</th><th>n black flies "Stichfrei Animal"</th><th>mean</th><th>n black flies untreated control</th><th>mean</th><th>% repellency</th></tr>
<tr><td>0</td><td>2/10</td><td>0</td><td>0.00</td><td>4</td><td>13.33</td><td>98.0</td></tr>
<tr><td></td><td>4/6</td><td>0</td><td></td><td>17</td><td></td><td></td></tr>
<tr><td></td><td>6/7</td><td>0</td><td></td><td>9</td><td></td><td></td></tr>
<tr><td>1</td><td>2/6</td><td>0</td><td>0.33</td><td>7</td><td>12.33</td><td>97.3</td></tr>
<tr><td></td><td>4/7</td><td>1</td><td></td><td>29</td><td></td><td></td></tr>
<tr><td></td><td>6/8</td><td>0</td><td></td><td>14</td><td></td><td></td></tr>
<tr><td>2</td><td>2/7</td><td>0</td><td>0.67</td><td>8</td><td>16.00</td><td>97.3</td></tr>
<tr><td></td><td>4/8</td><td>1</td><td></td><td>18</td><td></td><td></td></tr>
<tr><td></td><td>6/9</td><td>0</td><td></td><td>11</td><td></td><td></td></tr>
<tr><td>3</td><td>2/8</td><td>1</td><td>0.67</td><td>12</td><td>12.33</td><td>94.6</td></tr>
<tr><td></td><td>4/9</td><td>0</td><td></td><td>17</td><td></td><td></td></tr>
<tr><td></td><td>6/10</td><td>1</td><td></td><td>8</td><td></td><td></td></tr>
<tr><td>4</td><td>2/9</td><td>0</td><td>0.33</td><td>16</td><td>16.67</td><td>95.8</td></tr>
<tr><td></td><td>4/10</td><td>2</td><td></td><td>23</td><td></td><td></td></tr>
<tr><td></td><td>6/6</td><td>0</td><td></td><td>9</td><td></td><td></td></tr>
<tr><td>5</td><td>1/6</td><td>0</td><td>1.00</td><td>6</td><td>12.00</td><td>91.7</td></tr>
<tr><td></td><td>3/7</td><td>3</td><td></td><td>25</td><td></td><td></td></tr>
<tr><td></td><td>5/8</td><td>0</td><td></td><td>5</td><td></td><td></td></tr>
<tr><td>6</td><td>1/7</td><td>2</td><td>2.33</td><td>9</td><td>13.33</td><td>82.5</td></tr>
<tr><td></td><td>3/8</td><td>3</td><td></td><td>18</td><td></td><td></td></tr>
<tr><td></td><td>5/9</td><td>2</td><td></td><td>13</td><td></td><td></td></tr>
<tr><td>7</td><td>1/8</td><td>5</td><td>7.33</td><td>10</td><td>15.00</td><td>51.3</td></tr>
<tr><td></td><td>3/9</td><td>8</td><td></td><td>26</td><td></td><td></td></tr>
<tr><td></td><td>5/10</td><td>9</td><td></td><td>9</td><td></td><td></td></tr>
<tr><td>8</td><td>1/9</td><td>9</td><td>10.67</td><td>8</td><td>13.00</td><td>17.9</td></tr>
<tr><td></td><td>3/10</td><td>17</td><td></td><td>19</td><td></td><td></td></tr>
<tr><td></td><td>5/6</td><td>6</td><td></td><td>12</td><td></td><td></td></tr>
</table>
n: number of flies
location 2 (Neuss-Selikum)</td>
<td></td>
</tr>
<tr>
<td>PT 19</td><td>Repellent against</td><td>“Stichfrei Animal”</td><td>Haematopota pluvialis,</td>
<td>field test in Germany (three locations) conducted in adoption</td>
<td>- application dose: 5 g / m²</td>
<td><u>identification of horse flies:</u>
location 1 (Ratingen-Hörsel):</td>
<td>[redacted][8]
(2017c)</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td>horse flies</td>
<td></td>
<td>Tabanus bromius</td>
<td>to the publication by Herholz et al. (2016) [9]:
- testing period: July/August
- daily maximum temperature: 29 – 30°C
- rel. humidity: 58 – 67%
- max. wind velocity: 11 – 12 m/s
- 13 horses (different breed, sex, age, fur colour: medium brown to black)
- product application: one whole body side
- test area: 80 x 60 cm on the flank
- 30 minutes after product application horses were lunged for 10 minutes
- number of sitting (mind. 5 seconds) horse flies per test area within 20 minutes
- percentage relative reduction:</td>
<td></td>
<td>19 Haematopota pluvialis, 1 Tabanus bromius
location 2 (Neuss-Selikum):
14 Tabanus bromius
location 3 (Hülser Bruch):
7 Haematopota pluvialis, 7 Tabanus bromius

effect of perfume:
<table>
<tr><th>hours after application</th><th>horse</th><th>n horse flies "Stichfrei Animal"</th><th>n horse flies without perfume</th><th>% repellency "Stichfrei Animal"</th><th>% repellency without perfume</th></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td><td>97.1</td><td>97.1</td></tr>
<tr><td></td><td>2</td><td>0</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>3</td><td>0</td><td>0</td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>1</td><td>0</td><td></td><td></td></tr>
<tr><td></td><td>control</td><td>9</td><td>8</td><td></td><td></td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>0</td><td>100.0</td><td>89.3</td></tr>
<tr><td></td><td>2</td><td>0</td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>3</td><td>0</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>0</td><td>0</td><td></td><td></td></tr>
<tr><td></td><td>control</td><td>6</td><td>8</td><td></td><td></td></tr>
<tr><td>3</td><td>1</td><td>3</td><td>0</td><td>60.7</td><td>60.7</td></tr>
<tr><td></td><td>2</td><td>4</td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>3</td><td>1</td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>3</td><td>6</td><td></td><td></td></tr>
<tr><td></td><td>control</td><td>10</td><td>4</td><td></td><td></td></tr>
<tr><td>4</td><td>1</td><td>8</td><td>3</td><td>5.6</td><td>27.8</td></tr>
<tr><td></td><td>2</td><td>6</td><td>5</td><td></td><td></td></tr>
<tr><td></td><td>3</td><td>9</td><td>10</td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>11</td><td>8</td><td></td><td></td></tr>
<tr><td></td><td>control</td><td>7</td><td>11</td><td></td><td></td></tr>
<tr><td>5</td><td>1</td><td>7</td><td>12</td><td>20.6</td><td>8.8</td></tr>
<tr><td></td><td>2</td><td>7</td><td>9</td><td></td><td></td></tr>
<tr><td></td><td>3</td><td>7</td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>6</td><td>7</td><td></td><td></td></tr>
<tr><td></td><td>control</td><td>8</td><td>9</td><td></td><td></td></tr>
</table>
n: number of flies</td>
<td></td>
</tr>
</table>

[9] Herholz et al. (2016) “Efficacy of the repellent N,N-diethyl-3-methyl-benzamide (DEET) against tabanid flies on horses evaluated in a field test in Switzerland”, Veterinary Parasitology, Volume 221.

				($n_{untreated\ area} - n_{treated\ area}$)/$n_{untreated\ area}$ * 100 - during the tests, horse flies were caught by traps and after the trials flies were caught by nets for identification <u>trial 1: effect of perfume</u> - 4 horses were treated with the product “Stichfrei Animal” on the left body side and with the product without perfume on the right body side - control: 1 untreated horse <u>trial 2: determination of the protection time</u> - 8 horses (at 2 locations) were treated with the product “Stichfrei Animal” on the left body side, the right body side remained untreated		location 1 (Ratingen-Hörsel) <u>determination of the protection time:</u> n: number of flies location 2 (Neuss-Selikum)	

hours after application	horse	$n_{horse\ flies}$ "Stichfrei Animal"	$n_{horse\ flies}$ untreated control	% repellency
1	6	0	4	100.0
	7	0	7	
	8	0	6	
	9	0	5	
2	6	0	8	95.5
	7	0	2	
	8	1	4	
	9	0	8	
3	6	1	7	84.8
	7	4	9	
	8	0	7	
	9	0	10	
4	6	4	5	46.9
	7	3	10	
	8	5	9	
	9	5	8	
5	6	6	8	14.8
	7	7	8	
	8	6	6	
	9	4	5	

hours after application	horse	n horse flies "Stichfrei Animal"	n horse flies untreated control	% repellency
1	10	0	7	**98.0**
	11	0	21	
	12	1	9	
	13	0	13	
2	10	1	23	**92.7**
	11	2	18	
	12	0	12	
	13	2	16	
3	10	6	11	**50.0**
	11	12	4	
	12	6	33	
	13	9	18	
4	10	13	29	**34.9**
	11	19	40	
	12	19	9	
	13	20	31	
5	10	9	11	**9.7**
	11	21	19	
	12	21	19	
	13	16	20	

n: number of flies

location 3 (Hülser Bruch)

3.6.6 Occurrence of resistance and resistance management

Development of resistance is not a point of concern for a repellent. Since a repellent only repels organisms and does not kill them, no selection pressure for the development of resistance is built up.

3.6.7 Known limitations

No limitations and no undesirable or unintended side-effects have been observed during the efficacy studies.

3.6.8 Evaluation of the label claims

The submitted studies are suitable to support the claim against horse flies (*Tabanus* spp., *Haematopota* spp.) for up to two hours.
However, efficacy against ticks (*Ixodes ricinus*) on horses and dogs and against black flies (*Simulium* spp.) on horses was not sufficiently demonstrated by the submitted studies.

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

The biocidal product is not intended to be used with other products including other biocidal products.

3.6.10 Data waiving and conclusion

Table 15

Data waiving was acceptable for the following information requirements	
Information requirement	No data waiving.
Justification	See justification(s)/annotation(s) in IUCLID dossier

Table 16

Conclusion on the efficacy
The intended label claim “repellent against ticks (*Ixodes ricinus*) on dogs and horses, and on horses against horse flies (*Tabanus* spp., *Haematopota* spp.) and black flies (*Simulium* spp.) to prevent biting and bloodsucking” is not supported by the submitted studies.

However, sufficient efficacy was shown against horse flies (*Tabanus* spp., *Haematopota* spp.) on horses for up to two hours after product application (application dose: 5 g / m² fur).

3.7 Risk assessment for human health

3.7.1 Assessment of effects of the active substance on human health

Table 17

IR3535	Value	Study	Safety factor
AEL long-term	5 mg/kg bw/d	Rabbit, oral, developmental toxicity study; Rabbit, oral, 28-days toxicity study	100
AEL medium-term	5 mg/kg bw/d	Rabbit, oral, developmental toxicity study; Rabbit, oral, 28-days toxicity study	100
AEL acute	5 mg/kg bw/d	Rabbit, oral, developmental toxicity study; Rabbit, oral, 28-days toxicity study	100

Table 18

IR3535	Value	Reference
Inhalative absorption	100 %	Default value
Oral absorption	100 %	Assessment-Report (RMS BE (2014)
Dermal absorption[1]	Water/ethanol-based 20 % IR3535® market formulations (lotion/cream): 14 % for 12/24 hour exposure; human volunteer study	Assessment-Report (RMS BE (2014))

[1] The water/ethanol-based 20 % IR3535® market spray formulation used in the volunteer study represents a worst case formulation with regard to skin penetration (main component is ethanol, and in addition contains other well-known enhancers of skin penetrating properties of substances). Therefore, a dermal absorption of 14 % derived from this study is also relevant for 20 % IR3535® lotion/cream formulations.

3.7.2 Assessment of effects of the product on human health

3.7.2.1 Skin corrosion and irritation

Table 19

Summary table of in vitro studies on skin corrosion/irritation					
Method, Guideline, GLP status, Reliability	**Species, Strain, Sex, No/group**	**Relevant information about the study**	**Results**	**Remarks**	**Reference**
OECD 404, GLP: yes, Reliability: 1	Rabbit, New Zealand White, 2 m / 1f, 3 animals	EUS26-15, Application of the undiluted test substance, 4 h	Erythema (Average of 24 h, 48 h and 72 h) Animal 1: 1 Animal 2: 0.67 Animal 3: 1 Edema: (Average of 24 h, 48 h and 72) Animal 1: 0.67 Animal 2: 0.33 Animal 3: 1 Point of onset: 0.5 - 1 h Very slight erythema (grade 1) persisted in two animals until the end of the observation period (14 d).	Although erythema persisted in 2 animals for 14 d the biocidal product was considered non-irritating in CAR due to the low severity of these effects. This study was already submitted for active substance evaluation. The biocidal product is almost identical to the test substance. Deviating from the test substance the biocidal product contains 0.9 % of a perfume and 0.001 % denatonium benzoate. The content of solvent is correspondingly lower.	[redacted][10], 2006

Table 20

Conclusion used in Risk Assessment – Skin corrosion and irritation	
Value/conclusion	Not irritating
Justification for the value/conclusion	Based on the results of an animal study ([redacted][10], 2006) the biocidal product is considered as not irritating to the skin.
Classification of the	None

[10] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

product according to CLP	

3.7.2.2 Eye irritation

Table 21

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**	**Reference**
OECD 405, GLP: yes, Reliability: 1	Rabbit, New Zealand White, 2 m/ 1f, 3 animals	EUS26-15, Application of the undiluted test substance, 4 h	Cornea opacity Animal 1: 1 Animal 2: 2 Animal 3: 1.33 Iris: Animal 1: 0 Animal 2: 0 Animal 3: 0 Conjunctiva redness Animal 1: 2.67 Animal 2: 3 Animal 3: 2.67 Conjunctiva chemosis Animal 1: 2.67 Animal 2: 1.67 Animal 3: 2.33 Point of onset: First effects are visible at the first examination (after 1 h) Effects are fully reversible within 14 d.	This study was already submitted for active substance evaluation. The biocidal product is almost identical to the test substance. Deviating from the test substance the biocidal product contains 0.9 % of a perfume and 0.001 % denatonium benzoate. The content of solvent is correspondingly lower.	[redacted][10], 2006

Table 22

Conclusion used in Risk Assessment – Eye irritation	
Value/conclusion	Eye irritating
Justification for the value/conclusion	Based on the results of an animal study ([redacted][10], 2006) the biocidal product is considered as irritating to the eyes.

Classification of the product according to CLP	Eye Irrit. 2, H319

3.7.2.3 Respiratory tract irritation

Table 23

Data waiving was acceptable for the following information requirements	
Information requirement	Annex III of BPR, point 8.7.1, “other endpoints”
Justification	A study on respiratory tract irritation is no standard requirement for biocidal product authorisation.

Table 37

Conclusion used in Risk Assessment – Respiratory tract irritation	
Value/conclusion	Irritation of the respiratory tract is not expected.
Justification for the value/conclusion	Components of the biocidal product family are not known to produce respiratory irritation in concentrations found in the formulations.
Classification of the product according to CLP	None

3.7.2.4 Skin sensitisation

Table 24

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**	**Results**	**Remarks**	**Reference**
OECD 406 (Buehler), GLP: yes, Reliability: 1	Guinea Pigs, Hartley albino Test / Control animals: 20/10	EUS26-15 Undiluted test substance, Topical application for induction and challenge, Exposure duration: each 6 h	Test animals: No skin reaction): 17/20 (24 h) 16/20 (48 h) Skin reaction < 1: 3/20 (24 h) 4/20 (48 h) Skin reaction ≥ 1: 0/20 (24 h) 0/20 (48 h) Control animals: No skin reaction): 10/10 (24 h) 9/10 (48 h) Skin reaction < 1: 0/10 (24 h) 1/10 (48 h) Skin reaction ≥ 1: 0/10 (24 h) 0/10 (48 h)	In the CAR, the effects observed after challenge were considered as skin reactions below grade 1. Thus, classification was considered not relevant. Since the biocidal product is almost identical to the test substance and example biocidal product of active substance evaluation this view is adopted. This study was already submitted for active substance evaluation. The biocidal product is almost identical to the test substance. Deviating from the test substance the biocidal product contains 0.9 % of a perfume and 0.001 % denatonium benzoate. The content of solvent is correspondingly lower. The perfume does not contain skin sensitisers in concentrations relevant for classification.	[redacted][10], 2006

Table 25

Conclusion used in Risk Assessment – Skin sensitisation	
Value/conclusion	Not skin sensitising.
Justification for the value/conclusion	Based on the results of an animal study ([redacted][10], 2006) the biocidal product is considered as not sensitising to the skin.

	However, the biocidal product contains linalool (CAS No. 78-70-6) and dipentene (CAS No 80-56-3), which are classified as Skin Sens. 1 or 1B in concentrations ≥ 0.1 % above the generic concentration limit. Thus, labelling with EUH208 (Contains linalool and dipentene. May produce an allergic reaction.) is required.
Classification of the product according to CLP	None

3.7.2.5 Respiratory sensitisation (ADS)

Table 26

Data waiving was acceptable for the following information requirements	
Information requirement	8.4. Respiratory sensitisation
Justification	A study on respiratory tract sensitisation is no standard requirement for biocidal product authorisation.

Table 27

Conclusion used in Risk Assessment – Respiratory sensitisation	
Value/conclusion	Respiratory sensitisation is not expected.
Justification for the value/conclusion	Data on respiratory sensitisation are not available.
Classification of the product according to CLP	None

3.7.2.6 Acute toxicity

3.7.2.6.1 Acute toxicity by oral route

Table 28

Data waiving was acceptable for the following information requirements	
Information requirement	8.5.1. By oral route
Justification	Study not required. Sufficient information on acute oral toxicity of the single components is available for conclusions on this endpoint.

Table 29

Value used in the Risk Assessment – Acute oral toxicity	
Value	LD_{50} (oral): > 2000 mg/kg bw

Justification for the selected value	Based on Regulation (EC) No 1272/2008 and toxicological information on the single components.
Classification of the product according to CLP	None

3.7.2.6.2 Acute toxicity by inhalation

Table 30

Data waiving was acceptable for the following information requirements	
Information requirement	8.5.2. By inhalation
Justification	Study not required. Sufficient information on acute inhalation toxicity of the single components (including information by bridging from oral toxicity data according to the Guidance on the Application of the CLP Criteria, 2015) is available for conclusions on this endpoint.

Table 31

Value used in the Risk Assessment – Acute inhalation toxicity	
Value	LC_{50} (inhal.): > 5 mg/L (aerosol/dust)
Justification for the selected value	Based on Regulation (EC) No 1272/2008 and toxicological information on the single components.
Classification of the product according to CLP	None

3.7.2.6.3 Acute toxicity by dermal route

Table 32

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)*	**LD_{50}**	**Remarks** *(e.g. major deviations)*	**Reference**
OECD 402, GLP: yes, Reliability: 1	Rats, Albino, 5 m / 5 f	EUS26-15 Undiluted test substance on 10 % of the total body surface	Clinical findings: Abnormal excretion: small/soft feces Various discoloured areas around mouth, nose, urogenital tract	> 5000 mg/kg bw	This study was already submitted for active substance evaluation. The biocidal product is almost	[redacted][10], 2006

			Dermal observations: Very slight erythema and pinpoint scabbing at dose sites. Erythema persisted to study determination (14 d). Necropsy: No macroscopic findings		identical to the test substance. Deviating from the test substance the biocidal product contains 0.9 % of a perfume and 0.001 % denatonium benzoate. The content of solvent is correspondingly lower.	

Table 33

Value used in the Risk Assessment – Acute dermal toxicity	
Value	LD_{50} (dermal): > 5000 mg/kg bw
Justification for the selected value	Based on the results of an animal study ([redacted][10], 2006) the biocidal product is of low dermal toxicity.
Classification of the product according to CLP	None

3.7.2.7 Information on dermal absorption

Table 34

Summary table of in vitro studies on dermal absorption					
Method, Guideline, GLP status, Reliability	**Species, Age/Sex, Localisation, No. of skin samples and donors tested per dose Exposure and post-exposure time, Other relevant information about the study**	**Test substance, Formulation details incl. identity and concentration, Doses (total volume/mass applied per area, amount of a.s. applied per area)**	**Absorption data for each compartment (mean and SD as percentage of dose), Absorption (percentage of dose) calculated in accordance with EFSA Guidance on Dermal Absorption (2012) and final absorption value**	**Remarks (e.g. major deviations statements on variability and time-course, justification of non-inclusion of certain compartments, other relevant information, e.g. receptor fluid)**	**Reference**
No Guideline No GLP Not reliable	Species: Dog (Beagle) / Horse Age: 3 month (dogs), unknown (horses Sex: unknown No. Skin samples/donors: 6/6 (dogs, horses) Exposure time: 24 h Post-exposure time: 0 h Amount of receptor fluid in the cell: 12 mL	Test substance is identical to the biocidal product: Dose: 1 mL b.p. per 1.77 cm^2; 187.8 mg/ 1.77 cm^2	Data according to EFSA Guidance are not available. Amount in the receptor fluid: 0, 2, 4 and 6 h: < 0.0074 mg a.s./g receptor fluid (LoD); all animals 24 h: 0.73, 1.64, and 1.64 mg a.s./g receptor fluid (horses 1 to 3) <0.0074 mg a.s./g receptor fluid (horses 4 to 6 and all dogs) No information on other compartments	The study was not performed according to EFSA Guidance on Dermal Absorption and OECD 428, the applied dose is far above recommended dose and even far above the potential exposure. Only data for the receptor fluid were reported. No data on the other compartments (e.g. skin, tape strips, donor fluid, donor chamber) or on recovery were reported. In conclusion no dermal	[redacted][10], 2017

				absorption values for horses or dogs can be derived.	

In its first documentation the applicant proposed to use the dermal absorption value derived from the *in vivo* dermal absorption study with test formulation EUS26-15 (Dekant, W.; 2010) submitted for active substance evaluation of IR3535. However, this study is considered applicable only for human exposure and risk assessment. It cannot be used for the assessment of animal exposure by use of this biocidal product. The applicant assumed in its documentation that the dermal absorption for animals will be lower than for humans since the biocidal product is normally applied on the fur and not directly on the skin. However, this effect is not related to the actual dermal absorption process. Nevertheless the potential effect of the fur on dermal exposure has been considered in the corresponding exposure assessment in section 3.8 of this PAR. Dermal absorption is a species-specific process. It is very well established that for example rats have a higher dermal absorption rate than humans. This might be attributed to the fur of rats and the corresponding higher number of hair follicles. Quantification of species-depended differences in dermal absorption was neither provided nor is possible based on the submitted information. As a result the applicant agreed to perform a dermal absorption study with the biocidal product for the most relevant animal species dogs and horses. However, this study ([redacted][10], 2017) even does not fulfill the basic standards of the EFSA Guidance on Dermal Absorption (2012) and the OECD Guideline 428. Hence, no dermal absorption values could be derived from this study. In conclusion, a default dermal absorption value of 100 % has to be used for animals. A refinement for fur surface has been integrated into the exposure assessment.

For human exposure assessment the study from the active substance evaluation (Dekant, W.; 2010) can be used. The biocidal product is almost identical to the test substance. Deviating from the test substance the biocidal product contains 0.09 % of a perfume and 0.001 % denatonium benzoate. The concentrations of the solvents ethanol and water have been reduced accordingly. It is expected that these minor changes has no significant influence on dermal absorption for humans.

Table 35

Value(s) used in the Risk Assessment – Dermal absorption			
Substance exposure scenario	Human exposure	Animal exposure	
Value(s)	14 %	100 %	
Justification for the selected value(s)	Dermal absorption human skin *in vitro* study with a comparable test substance	Default, in the absence of reliable data	

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

Not relevant.

3.7.2.9 Available toxicological data relating to a mixture

Not relevant.

3.7.2.10 Other

Not relevant.

3.7.2.11 Summary of effects assessment

Table 36

Endpoint	Brief description
Skin corrosion and irritation	Based on results of an animal study the biocidal product is not skin-irritating.
Eye irritation	Based on results of an animal study the biocidal product is eye-irritating and classified as Eye Irrit. 2, H319.
Respiratory tract irritation	Based on information for the single components the biocidal product is not irritating to the respiratory tract.
Skin sensitisation	Based on results of an animal study the biocidal product is not skin-sensitising. However, the biocidal product contains linalool (CAS No. 78-70-6) and dipentene (CAS No 80-56-3), which are classified as Skin Sens. 1 or 1B in concentrations ≥ 0.1 %. Thus, labelling with EUH208 is required.
Respiratory sensitization (ADS)	No data available. For the single components respiratory sensitisation was not reported.
Acute toxicity by oral route	Based on information provided for the single components the LD_{50} (oral) of the biocidal product is > 2000 mg/kg bw. Classification is not required for acute oral toxicity.
Acute toxicity by inhalation	Based on information provided for the single components the LC_{50} (inhal.) of the biocidal product is > 5 mg/L (aerosol/dust). Classification is not required for acute inhalation toxicity.
Acute toxicity by dermal route	Based on the results of an animal study for the biocidal product the LD_{50} (dermal) is > 2000 mg/kg bw. Classification is not required for acute dermal toxicity.
Information on dermal absorption	Humans: based on a dermal absorption human skin *in vitro* study with a comparable test substance: 14 % Animals (dogs, horses): in the absence of reliable data: 100 %
Available toxicological data relating to non-active substance(s)	See above.

Available toxicological data relating to a mixture	Not relevant.
Other relevant information	Not available.

3.7.3 Exposure assessment

3.7.3.1 Identification of main paths of human exposure towards active substance(s) and substances of concern from its use in biocidal product

Table 37

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			yes			yes	n.a.
Dermal			yes			yes	n.a.
Oral			no			no	no

List of scenarios

Table 38

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.	Direct application	Primary exposure, application, trigger spray	Non-professional user
2.	Indirect exposure	Secondary exposure, toddlers, contact to contaminated surfaces	Bystanders

3.7.2.1.1 Non-professional exposure

Non-professional users might be exposed when applying the biocidal product to their dogs or horses. The exposure will predominantly occur via the dermal and the inhalation route. An appropriate model is presented in the Consexpo database (Pest control products, sprays, general surface, trigger spray). The model is in principle for indoor application. This represents a worst case for the biocidal product, which is assumed to be used normally outdoors or in areas with high ventilation rates. For this reason assessment of exposure to volatile residues was not performed.

- **Scenario 1**

Table 39

Description of Scenario 1		
Application of the biocidal product to animals by non-professional users. Exposure is estimated with Consexpo 4.1 in general with parameters proposed by the model or in corresponding Consexpo fact sheet. The ethanol fraction of the biocidal product was considered as volatile.		
	Parameters	Value
Tier 1	Weight fraction compound (concentration a.s.)	20 %
	Spray duration (Consexpo)	10 min
	Exposure duration (Consexpo)	240 min
	Room volume (Consexpo)	58 m^3
	Room height (Consexpo)	2.5 m
	Ventilation rate (Consexpo)	0.5 per h
	Mass generation rate (Consexpo)	0.8 g/s
	Airborne fraction (Consexpo)	0.8 %
	Weight fraction non-volatile (see above)	64 %
	Density non-volatile(Consexpo)	1.8 g/cm^3
	Inhalation cut-off diameter (Consexpo)	15 µm
	Inhalation absorption (default)	100 %
	Inhalation rate (HEAdhoc recommendation No. 14, 2017)	1.25 m^3/h
	Oral absorption (default)	100 %
	Contact rate (Consexpo)	46 mg/min
	Release duration (Consexpo)	10 min
	Body weight (HEAdhoc recommendation No. 14, 2017)	60 kg

Calculations for Scenario 1

For details refer to section 4.3.2 (Consexpo reports)

Inhalation exposure (incl. oral exposure of non-respirable fraction)

Systemic inhal. exposure = 0.126 mg/kg bw/d

Dermal exposure:

Systemic dermal exposure = 0.215 mg/kg bw/d

Total systemic exposure

Total systemic exposure = 0.341 mg/kg bw/d

Further information and considerations on scenario 1

Table 40

Summary table: systemic exposure from non-professional uses					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake** (mg/kg bw/d)	**Estimated oral uptake (mg/kg bw/d)**	**Estimated total uptake (mg/kg bw/d)**
Scenario [1], non-professional user, application, trigger spray	1	0.126	0.215	-	0.341

- **Combined scenarios**
- Not relevant.

3.7.2.1.2 Secondary exposure of the general public

- **Scenario 2**

Table 41

Description of Scenario 2

Contact of toddlers to residues on the floor and other surfaces.
The contact of toddlers is estimated with Consexpo 4.1. Exposure may occur if toddlers stay in areas where animals have been treated. For horses this is considered unlikely since they are treated in or next to stables or outdoors on paddocks or yards. For dogs, which are treated in living areas such an exposure cannot be excluded. It is assumed that as worst case a big dog (e.g. Saint Bernard) with a body surface of about 1.88 m^2 (for reference refer to Table 49) is treated with 5 g biocidal product/m^2 resulting in a total amount of 9.4 g. It is assumed that 10 % of this amount ends on the floor and is evenly distributed on a surface of 1.88 m^2.
For oral exposure it is assumed that 50 % of the dermal external dose is taken up orally. As a conservative approach no correction is performed for the lower dermal dose after oral ingestion.
The exposure of toddlers is considered as a worst case for all other persons.

	Parameters	Value
Tier 1	Weight fraction compound (concentration a.s.)	20 %
	Transfer coefficient (Consexpo)	0.6 m^2/h
	Dislodgeable amount (see above)	0.5 g/m^2
	Rubbed surface (Consexpo)	22000 cm^2
	Contact time (Consexpo)	1 h
	Dermal absorption (PAR 0)	14 %
	Orally ingested amount (see above)	150 mg b.p.
	Oral absorption (default)	100 %
	Body weight (HEAdhoc recommendation No. 14, 2017)	100 %

Calculations for Scenario 2

For details refer to section 4.3.2 (Consexpo reports)

Dermal exposure:

Systemic dermal exposure = 0.84 mg/kg bw/d

Oral exposure

Systemic oral exposure = 3.00 mg/kg bw/d

Total systemic exposure

Total systemic exposure = 3.84 mg/kg bw/d

Table 42

Summary table: systemic exposure of the general public					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake (mg/kg bw/d)**	**Estimated oral uptake (mg/kg bw/d)**	**Estimated total uptake (mg/kg bw/d)**
Scenario [2], Toddlers, contact to contaminated surfaces	1	-	0.84	3.00	3.84

- **Combined scenarios**
- Not relevant.

Dietary exposure

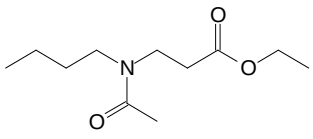
The intended use descriptions of the ethyl butylacetylaminopropionate-containing biocidal product for which authorisation is sought indicate that these uses are not relevant in terms of residues in food and feed. The product is to be used on animals as repellent that does not come into direct contact with food or feeding stuff.

In order to avoid indirect contact of ethyl butylacetylaminopropionate to food or feeding stuff following label restrictions are proposed:

- Keep away from food, drink or feeding stuff.
- Do not apply directly onto livestock.

3.7.2.1.3 General information on active substance(s)

Table 43

Active substance (Common Name)	Ethylbutylacetylaminopropionate (IR3535)
CAS number	52304-36-6
Chemical structure	
Molecular formular	$C_{11}H_{21}NO_3$
Molar mass	215.29 g/mol

Log Po/w	1.7 (23-24°C)
Active substance approval	PT19 RMS: Belgium
Restrictions	- Keep away from food, drink or feeding stuff. - Do not apply directly onto livestock.
Current regulations on MRLs	No MRLs derived.

3.7.2.1.3.1 Information of non-biocidal use of the active substance

- Information on the residue definitions is provided in chapter 3.5 Methods for detection and identification

Not relevant.

3.7.2.1.3.2 Monitoring data

Not relevant.

3.7.2.1.4 Nature of residues

Not relevant

Aggregated exposure

Not relevant.

Summary of exposure assessment

Table 44

Scenarios and values to be used in risk assessment			
Scenario number	**Exposed group (e.g. professionals, non-professionals, bystanders)**	**Tier/PPE**	**Estimated total uptake [mg/kg bw/d]**
1.	Primary exposure, non-professional user, application, trigger spray	1	0.341
2.	Secondary exposure, toddlers, contact to contaminated surfaces	1	3.84

3.7.4 Risk characterisation for human health

Reference values to be used in Risk Characterisation

Reference values have been derived during assessment of the active substance(s) for the purpose of approval and are reported in the respective Assessment Report(s) as in **3.7.1** Assessment of effects of the active substance on human health

Maximum residue limits or equivalent

No MRLs are required.

Specific reference value for groundwater

No specific reference values for groundwater were derived.

Risk for industrial users

Not relevant

Risk for professional users

Not relevant

Risk for non-professional users

Table 45: 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], Primary exposure, non-professional user, application, trigger spray	1	500	5	0.341	6.8	yes

- **Local effects**

The biocidal product is classified as eye-irritating. Based on this classification the German CA proposes the precautionary statements as given in **2.3 Classification and Labelling according to the Regulation (EC) No 1272/2008** of this PAR. H319 normally triggers also P280. However, it was not included by the German CA because it is considered sufficient to advise the user to avoid contact with eyes and an advice what is to do if contact to eyes occurs. The prescription of eye protection because of local reversible effects, which occur only accidentally and which can be treated by simple measures is not appropriate for non-professional users.

- Hence, labelling with “Avoid contact to eyes” and the other precautionary statements relevant for H319 are considered sufficient to protect the non-professional user against hazards resulting from this classification.

Conclusion

With respect to systemic and local exposure during application the biocidal product is considered safe for the non-professional user if used as intended.

Risk for the general public

Table 46: 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 [2], Secondary exposure, toddlers, contact to contaminated surfaces	1	500	5	3.84	77	yes

- **Local effects**

Not relevant.

Conclusion

With respect to secondary systemic and local exposure the biocidal product is considered safe for the general public (bystanders and residents) if used as intended.

Risk for consumers via residues in food

The acute or chronic exposure to residues in food resulting from the intended uses is unlikely to cause a risk to consumers. Regarding consumer health protection, there are no objections against the intended uses.

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

Risk characterisation from combined exposure to several active substances or substances of concern within the biocidal product is not required as the product contains only the active substance IR3535 and no SoC.

Summary of risk characterisation

3.7.2.1.5 Summary of risk characterisation for industrial user

Not relevant

3.7.2.1.6 Summary of risk characterisation for professional user

Not relevant

3.7.2.1.7 Summary of risk characterisation for non-professional user

Table 47

Scenario, Tier	**Relevant reference value** (mg/kg bw/d)	**Estimated uptake** (mg/kg bw/d)	**Estimated uptake/ reference value** (%)	**Acceptable** (yes/no)
Scenario [1], Primary exposure, non-professional user, application, trigger spray	5	0.341	6.8	yes

3.7.2.1.8 Summary of risk characterisation for indirect exposure

Table 48

Scenario, Tier	**Relevant reference value** (mg/kg bw/d)	**Estimated uptake** (mg/kg bw/d)	**Estimated uptake/ reference value** (%)	**Acceptable** (yes/no)
Scenario [2], Secondary exposure, toddlers, contact to contaminated surfaces	5	3.84	77	yes

3.8 Risk assessment for animal health[11]

IR3535	**AEL**	**Study**	**Safety factor**
dog	50 mg/kg bw/d	Expert judgement[1]	10
horse	5 mg/kg bw/d	Assessment Report (RMS BE (2014))	100

[1)] Due to the highest organism sensitivity the NOAEL value of 500 mg/kg bw/d derived from the 28-day toxicological studies performed with rabbits (Assessment Report BE). Since a dog shows lower sensitivity than a rabbit the assessment factor of 1 (instead of 10) has been used.

Exposure assessment

The biocidal product is intended for application on dogs and horses. According to the applicant the maximum use concentration is 5 g biocidal product/m^2.

The applicant submitted anthropometric data for the specific animal. These values were completed by additional information and are summarised in the table below and were used for the risk assessment. The anthropometric data among one species is very broad. Hence, the exposure and risk assessment was always performed for small animals and for big animals

Table 49 Anthropometric data for dogs and horses

	Small dog (e.g. Chihuahua)	Big dog (e.g. St. Bernard)	Small horse (e.g. mini horse)	Big horse (Belgian draught horse)
Body weight (kg)	0.5 [1)]	80 [1)]	90 [1)]	1000 [1)]
Body surface (m^2)	0.06 [2)]	1.88 [2)]	2.05 [2)]	9.80 [2)]
Hair length (cm)	2.5 - 10 cm [3)]		1.5 cm [4)]	
Hair diameter (cm)	0.00108 - 0.0027 [3)]		Primary hair: 0.010 [4)] Secondary hair: 0.005 [4)]	
Hair density (cm^{-1})	1000 - 9000 [3)]		Primary hair: 500 [4)] Secondary hair: 1000 [4)]	
Hair surface per m^2 skin (m^2) and ratio hair surface to skin surface (%)	Tier 1: 8.5 (= 11.8 %) Tier 2: 53 (= 1.9 %) [5)]		4.7 (= 21.3 %) [5)]	
Inhalation rate (m^3/h)	0.018 [6)]	0.72 m^3/h [6)]	4.8 m^3/h for a big horse of about 500 kg [7)]	

[1)] Information as provided by the applicant. No reference is given.
[2)] Calculated from the body weights with equations given below.

11 Pets and domestic animals. Regarding wild animals, please refer to chapter 3.9

[3] Budras, K-D.; Fricke, W.; Richter, R. Atlas der Anatomie der Hunde, Schlüterscher Verlag, 8th edition, 2007).
[4] Meyer, W. (1997): Haut und Hautorgane.In: Wissdorf, H., H.Gerhards, B. Huskamp (Hrsg.): Praxisorientierte Anatomie des Pferdes.Verlag Schaper, Alfeld, p. 19-48
[5] The hair surface per m^2 skin is calculated from the surface of one hair (hair circumference (2 x radius x π) x hair length) and the hair density. The value of 8.5 m^2 hair/ m^2 skin for dogs is based on multiplication of worst case factors. However, it must be expected that the lowest value for hair density is only reached with the thickest hair. In addition, a hair length of 10 cm is considered as over- conservative for the whole population particularly in the summer season, when the biocidal product is applied. Hence, the average value of the span (6.25 cm) is used for Tier 3.
[6] Calculated from a respiration frequency of 40 min^{-1} and 10 min^{-1} for small dogs and big dogs, respectively, and a tidal volume of 15 mL/kg. Information as provided by the applicant.
[7] Gillespie, J.R. et al.. J. Appl. Physiol.; 21(2) 416-422; 1966

The body surface is calculated according the following equations:

Dogs: body surface = 0.097 x body weight$^{0.6758}$ (Plumb D.C., Conversion tables for weight in kilograms to body surface area (m^2) Veterinary Drug Handbook. Ames, Iowa State University Press, 1995, p. 739)

Horses: body surface = 0.11 x body weight$^{0.65}$ (Wildlife Exposure Factors Handbook, Volume I, 3.4.2 . Mammals)

Exposure pathways

The animals are exposed via different pathways.

Dermal exposure:

Dermal exposure occurs directly by application. It might be reduced as the skin of the animal is normally covered by a fur. This is taken into account for a Tier 2 and Tier 3 approach.

Oral exposure:

Some animals tend to lick their fur. This may lead to significant exposure after treatment. This type of exposure is more relevant for dogs than for horses. However, it is expected that the bitter taste of the biocidal product leads to a significant reduction of exposure (in the CAR oral exposure of small children was considered as not relevant due to the bitter taste of the product). During active substance evaluation it was decided not to sum up oral and dermal exposure.

Inhalation exposure:

Comparable to the human user this may occur during application of the biocidal product by spraying. In principle also exposure to vapours is possible.

Dermal exposure

Table 93

Description of Scenario [1]		
Dermal exposure by application of the biocidal product. According to the applicant the biocidal product is applied in an amount of max. 5 g per m^2. Based on the anthropometric parameters given in the table above and a dermal absorption value of 100 % the following exposure can be estimated. In Tier 1 it is assumed that the whole amount applied on the fur of an animal reaches the skin. In Tier 2 it is assumed that the amount is evenly distributed on the skin and the fur. The amount on the skin can be calculated from the ratio of hair surface to skin surface.		
	Parameters	Value
Tier 1	Application rate (applicant)	5 g/m^2
	Application frequency (applicant)	1 d^{-1}
	Concentration a.s. in the b.p. (applicant)	20 % (w/w)
	Dermal absorption dogs and horses (default)	100 %
	Body surfaces	Refer to Table 49
	Body weights	Refer to Table 49
Tier 2	Fraction b.p. on skin, dogs (Table 49 and calculations below this table)	11.8 %
	Fraction b.p. on skin, horses (Table 49 and calculations below this table)	21.3 %
Tier 3	Fraction b.p. on skin, small dogs (Table 49)	1.9 %

Calculations for Scenario [1]

Tier 1

Dermal exposure:

Systemic dermal exposure = application rate x application frequency x concentration a.s. x skin surface x dermal absorption / body weight

Small dog = 5000 mg/m^2 x 1/d x 20 % x 0.06 m^2 x 100 % / 0.5 kg
= 120 mg/kg bw/d

Big dog = 5000 mg/m^2 x 1/d x 20 % x 1.88 m^2 x 100 % / 80 kg
= 23.5 mg/kg bw/d

Small horse = 5000 mg/m^2 x 1/d x 20 % x 2.05 m^2 x 100 % / 90 kg
= 22.8 mg/kg bw/d

Big horse = 5000 mg/m^2 x 1/d x 20 % x 9.80 m^2 x 100 % / 1000 kg
= 9.8 mg/kg bw/d

Tier 2

Dermal exposure:

Systemic dermal exposure = exposure Tier 1 x fraction on skin

Small dog = 120 mg(kg bw/d x 11.8 %

= 14.2 mg/kg bw/d

Big dog = 23.5 mg/kg bw/d x 11.8 %

= 2.8 mg/kg bw/d

Small horse = 22.8 mg/kg bw/d x 21.3 %

= 4.86 mg/kg bw/d

Big horse = 9.8 mg/kg bw/d x 21.3 %

= 2.1 mg/kg bw/d

Oral exposure

Table 94

Description of Scenario [2]		
Oral exposure by licking the fur Oral exposure may occur when animals lick their fur. The licking behaviour of dogs and horses is different. Dogs tend to lick some parts of their body, particularly intimate areas and feet. Although there are no data on the average licking behaviour of dogs it is not expected that these animals lick more than 20 % of their fur. Horses nibble each other on the back and the neck. Hence it is assumed that a horse ingest orally in maximum 10 % of the dermal external dose. In addition it is assumed that only the amount on the fur but not on the skin is available for oral uptake. In Tier 2 it is assumed that the bitter taste of the biocidal product reduces oral uptake to 10 %.		
	Parameters	Value
Tier 1	Application rate (applicant)	5 g/m^2
	Application frequency (applicant)	1 d^{-1}
	Concentration a.s. in the b.p. (applicant)	20 % (w/w)
	Body surfaces	Refer to Table 49
	Body weights	Refer to Table 49
	Fraction of the body surface reachable for oral intake, dogs (proposal of the applicant, adopted)	20 %

	Fraction of the body surface reachable for oral intake, horses (expert judgement)	10 %
	Fraction of b.p. in the fur, dogs (Table 49 and calculations below this table)	88.2 %
	Fraction of b.p. in the fur, horses (Table 49 and calculations below this table)	78.7 %
	Oral absorption dogs and horses (default)	100 %
Tier 2	Reduction factor for aversive taste (expert judgement)	10 %

Calculations for Scenario [2]

Tier 1

Oral exposure:

Systemic dermal exposure = application rate x application frequency x concentration a.s. x skin surface surface fraction for oral intake x fraction in the fur oral absorption / body weight

Small dog = 5000 mg/m^2 x 1/d x 20 % x 0.06 m^2 x 20 % x 88.2 % x 100 % / 0.5 kg
= 21.2 mg/kg bw/d

Big dog = 5000 mg/m^2 x 1/d x 20 % x 1.88 m^2 x 20 % x 88.2 % x 100 % / 80 kg
= 4.1 mg/kg bw/d

Small horse = 5000 mg/m^2 x 1/d x 20 % x 2.05 m^2 x 10 % x 78.7 % x 100 % / 90 kg
= 1.8 mg/kg bw/d

Big horse = 5000 mg/m^2 x 1/d x 20 % x 9.80 m^2 x 10 % x 78.7 % x 100 % / 1000 kg
= 0.77 mg/kg bw/d

Inhalation exposure

Table 95

Description of Scenario [3]		
Inhalation exposure during application of the biocidal product. Comparable to the human user the treated animal may exposed by the spray aerosol. As a worst case it can be assumed that the aerial concentration estimated for the non-professional user is identical for the treated animal. Specific inhalation rates for small and big horses were not available. For horses with a body weight of approximately 500 kg inhalation rates about 4.8 m^3/h were reported. Hence, for horses only inhalation exposure to such horses was estimated.		
	Parameters	Value

Tier 1	Inhalation mean event concentration a.s.(Refer to Scenario 1 and Consexpo Report in Annex 1)	1.49 mg/m^3
	Exposure duration (Refer to Scenario 1 of the human exposure assessment, section 3.7.3.1 Identification of main paths of human exposure towards active substance(s) and substances of concern from its use in biocidal product	240 min / 6 h
	Application frequency	1 d^{-1}
	Inhalation absorption dogs and horses (default)	100 %
	Inhalation rates animals	Refer to Table 49

Calculations for Scenario [3]

Inhalation exposure:

Systemic inhal. Exposure = Inhalation mean event concentration x inhal. rate x exposure duration x inhal. absorption / body weight

Small dog = 1.49 mg/m^3 x 0.018 m^3/h x 6 h x 100 % / 0.5 kg
= 0.32 mg/kg bw/d

Big dog = 1.49 mg/m^3 x 0.72 m^3/h x 6 h x 100 % / 80 kg
= 0.080 mg/kg bw/d

Horses = 1.49 mg/m^3 x 4.8 m^3/h x 6 h x 100 % / 500 kg
= 0.086 mg/kg bw/d

Table 94

Description of Scenario [4]		
Inhalation exposure after application of the biocidal product. Inhalation exposure after application was assessed with the Consexpo model. Exposure to vapour: evaporation. For dogs it was assumed that they stay indoors in living rooms with a volume of 58 m^3 and a worst case ventilation rate of 0.6 h^{-1}. For horses it is assumed that they stay in stables with a worst case dimension of 3 m x 3 m x 3 m resulting in total volume of 27 m^3. Since stables are normally open and well vented a ventilation rate of 2 h^{-1} is set. For the release rate it is assumed that the active substance is released in the pure form since the solvents will evaporate more quickly. As a worst case the mass transfer rate according to Langmuir is expected. Specific inhalation rates for small and big horses were not available. For horses with a body weight of approximately 500 kg inhalation rates about 4.8 m^3/h were reported. Hence, for horses only inhalation exposure to such horses was estimated. As worst case the skin surfaces as estimated for big horses is used.		
	Parameters	Value

Tier 1	Vapour pressure IR3535 (20 °C, CAR/AR)	0.15 Pa
	Exposure duration (Consexpo for application adopted for animals)	240 min / 6 h
	Weight fraction compound (concentration a.s.)	20 %
	Room volume dogs (see above)	58 m^3
	Room volume horse (see above)	27 m^3
	Ventilation rate dogs (Consexpo)	0,6 h^{-1}
	Ventilation rate horse (Consexpo)	2 h^{-1}
	Release area (body surface + hair surface)	Refer to Table 49
	Body weights of animals	Refer to Table 49
	Application duration (Consexpo)	10 min
	Mass transfer rate (Langmuir, Consexpo)	2550 m/min
	Inhalation absorption dogs and horses (default)	100 %
	Inhalation rates animals	Refer to Table 49

Calculations for Scenario [4]

For details refer to section 4.3.3 (Consexpo reports)

Inhalation exposure (vapours)

Small dogs

Systemic inhal. exposure = 0.056 mg/kg bw/d

Big dogs

Systemic inhal. exposure = 0.20 mg/kg bw/d

Horses

Systemic inhal. exposure = 0.085 mg/kg bw/d

Risk characterisation

In the absence of animal-specific reference values AEL derived for human exposure are applied for horses. For dogs reference value of 50 mg/kg bw can be applied. For more details, see above.

Table 97: Risk characterisation for animal exposure

Task/ Scenario	Tier	Systemic NOAEL	AEL mg/kg	Estimated uptake	Estimated uptake/ AEL	Acceptable (yes/no)

		mg/kg bw/d	bw/d	mg/kg bw/d	(%)	
Scenario 1, Application, dermal, small dog	1	500	50	120	240	no
Scenario 1, Application, dermal, big dog	1	500	50	23.5	47	no
Scenario 1, Application, dermal, small horse	1	500	5	22.8	456	no
Scenario 1, Application, dermal, big horse	1	500	5	9.8	196	no
Scenario 1, Application, dermal, small dog	2	500	50	14.2	28	no
Scenario 1, Application, dermal, big dog	2	500	50	2.8	6	yes
Scenario 1, Application, dermal, small horse	2	500	5	4.86	97	yes
Scenario 1, Application, dermal, big horse	2	500	5	2.1	42	yes
Scenario 2, oral, post application, licking fur, small dogs	1	500	50	21.2	42	no
Scenario 2, oral, post application, licking fur, big dog	1	500	50	4.1	8	yes
Scenario 2, oral, post application, licking fur, small horse	1	500	5	1.8	36	yes
Scenario 2, oral, post application, licking fur, big horse	1	500	5	0.77	15	yes
Scenario 3, inhalation, spray exposure from application, small dog	1	500	50	0.32	0.6	yes
Scenario 3, inhalation, spray exposure from application, big dog	1	500	50	0.080	0.2	yes
Scenario 3, inhalation, spray exposure from application, horse	1	500	5	0.086	1.7	yes
Scenario 4, inhalation, exposure to vapour from application, small	1	500	5	0.056	1.1	yes

dog						
Scenario 4, inhalation, exposure to vapour from application, big dog	1	500	50	0.20	0.4	yes
Scenario 4, inhalation, exposure to vapour from application, horse	1	500	50	0.085	0.2	yes

- **Local effects**

The biocidal product is classified as eye-irritating. Hence, also the eyes of animals have to be protected from exposure. Labelling with “Avoid contact to eyes” and the other precautionary statements relevant for H319 are considered sufficient to protect them against hazards resulting from this classification.

Conclusion

No risk to animal health was identified for all types of horses and for dogs in Tier 2 by dermal exposure by application of the biocidal product.

For oral exposure no risk was identified for horses and dogs in Tier 1.

No risk was identified from inhalation exposure. Combination of dermal and inhalation exposure to small horses leads to a slight exceedance of the AEL (101 %). However, taken into consideration the uncertainties of this risk assessment such a minimal exceedance is expected to be not relevant even if inhalation exposure was only assessed for relatively big horses.

Summarised it can be concluded that this biocidal product can be applied safely to dogs and horses if it is used as intended.

For correct use it is necessary to advice the non-professional user about the amounts, which has to be applied to the single animal. The exposure assessment is based on an application rate of 5 g biocidal product/m^2. However, it is not possible for the non-professional user to estimate the treated surface of the animal. Hence, he has to be informed in a more sophisticated way about the applied amount. The biocidal product is applied as a pump spray. According to the applicant one stroke is equivalent to 0.06 g. Based on this information the maximum number strokes for the most relevant animals or animal weights can be listed (note that the body weight of an animal can be determined easily even by non-professional users). The number of strokes is very high for animals with a higher body weight. For such animals it is more reasonable to give the application rate in mL. In this case the bottle should be fitted with scaling, which allows the user to estimate the applied amount. Such a list has to be part of the instructions of use. In addition it could include average body weights for specific breeding.

Table 99: Number of spray strokes applied to animals in relation to the body weight

Animal (breeding)	Body weight	Total amount	No. of strokes	Total amount

		for application [g]	(rounded)	for application (rounded) [mL]
Dog				
	0.5	0.3	5	0.3
	1	0.5	8	0.5
	2	0.,8	13	0.8
	3	1.0	17	1.1
	4	1.2	20	1,3
	7.5 kg	1.9	30	2.0
	10 kg	2.3	40	2.5
	20 kg	3.7	60	4
	30 kg	4.8	80	5
	40 kg	5.9	100	6
	50 kg	6.8	115	7
	60 kg	7.7	130	8
	70 kg	8.6	145	9
	80 kg	9.4	155	10
Horse				
Mini horse	90 kg	10.2	170	10
Shetland pony	200 kg	17.2	290	20
Welsh pony	300 kg	22.4	370	25
Icelander	400 kg	27.0	450	30
Arabian, thoroughbred	500 kg	31.2	520	35
Warmbloods	600 kg	35.2	590	40
Friesian horse	700 kg	38.9	650	40
Tinker	800 kg	42.4	700	45
Belgian horse	1000 kg	49.0	820	50

For calculation of the total amount the treated body surface is multiplied with the application rate of 5 g/m^2. The body surface can be calculated from the body weight with the following equations:

Dogs: body surface = 0.097 x body weight$^{0.6758}$ (Plumb D.C., Convertion tables for weight in kilograms to body surface area (m^2) Veterinary Drug Handbook. Ames, Iowa State University Press, 1995, p. 739)

Horses: body surface = 0.11 x body weight$^{0.65}$ (Wildlife Exposure Factors Handbook, Volume I, 3.4.2 . Mammals)

3.9 Risk assessment for the environment

3.9.1 General information

The biocidal product “Stichfrei Animal” contains the active substance Ethylbutylacetylaminopropionate (IR3535), that was approved for use as a repellent (PT 19) in November 2015.
The environmental risk assessment for the product is based on the information given in the Competent Authority Report (CAR) of the rapporteur member state (RMS) Belgium for the active substance (a. s.) IR3535 (CAS-No. 52304-36-6). Additional to the data in the CAR a soil degradation study is now available.
The biocidal product is not identical to the representative product in the CAR. No substances of concern were identified for the biocidal product, therefore the environmental risk assessment is based solely on the active substance.

3.9.2 Effects assessment

No new information on the environmental effects of the active substance was provided by the applicant. Therefore, the PNEC values that were already derived in the CAR are still valid for the effects assessment of the biocidal product “Stichfrei Animal”.

3.9.2.1 Mixture toxicity

The biocidal product contains only one active substance and no substances of concern. The metabolite IR3535-free acid shows a very similar structure compared to the a. s. and it was concluded in the CAR (2013) that the ecotoxicological assessment of IR3535-free acid is comprised in the evaluation of the parent compound. Therefore, the environmental risk assessment is solely based on the active substance and a mixture toxicity assessment is not necessary.

Aquatic compartment (including sediment and STP)

Derivation of PNECs for the aquatic compartment

No new data were presented for the authorisation of the biocidal product “Stichfrei Animal” and the environmental effect assessment is based on the information given in the CAR (2013).
The $PNEC_{water}$ derived in the CAR (based on the LC/EC_{50} > 100 mg/L with an assessment factor of 1000) is used for the risk assessment of the biocidal product.
$PNEC_{water}$ > 0.1 mg/L

As no ecotoxicological studies with sediment organisms were provided, the **$PNEC_{sediment}$** presented in the CAR was based on the $PNEC_{water}$ using the equilibrium partitioning method (EPM) as described in the Guidance on the BPR, Volume IV, Part B (ECHA, April 2015).

$PNEC_{sediment}$ > 1.11 mg/kg wwt

The effect of IR3535 on aerobic biological sewage treatment processes was assessed according to OECD 209. For the risk assessment the EC_{20} value of 1000 mg/L is used (≙ NOEC). Applying an assessment factor of 10 to the EC_{20} of the respiration inhibition test a **$PNEC_{STP}$ of 100 mg a.s./L** was derived.

Terrestrial compartment (including groundwater)

For the assessment of the active substance IR3535 no tests on terrestrial toxicity were available (see CAR, 2013) and no new studies were provided for the authorisation of the biocidal product.

Derivation of $PNEC_{soil}$

As no ecotoxicological studies with soil organisms were provided, the **$PNEC_{soil}$** presented in the CAR was based on the $PNEC_{water}$ using the equilibrium partitioning method (EPM) as described in the Guidance on the BPR, Volume IV, Part B (ECHA, April 2015).

$PNEC_{soil}$ > 0.851 mg/kg wwt

Atmosphere

This point was not deemed relevant during active substance approval as the vapour pressure of IR3535 is low (0.15 Pa at 20 °C), resulting in negligible exposure to the atmosphere (see Doc. IIB, chapter 8.3 in the CAR, 2013). Also, the calculation according to Atkinson indicates a relative short half-life of 13.16 hours (24-hour day) of IR3535 in the atmosphere (see Doc. IIIA, Section A7.3.1/01 in the CAR, 2013).

Non-compartment specific effects relevant to the foot chain (secondary poisoning)

This point was not deemed relevant during active substance approval as IR3535 has a low potential to bioaccumulate. For details on the bioaccumulation behaviour, please see chapter 3.9.3.

Summary of effects assessment

Table 50 summarises the PNECs used for the environmental risk assessment of the biocidal product “Stichfrei Animal ”.

Table 50

Summary table on calculated PNEC values	
Compartment	**PNEC**
Surface water	> 0.1 mg/L
STP	100 mg/L
Sediment	> 1.11 mg/kg wwt > 5.106 mg/kg dwt
Soil	> 0.851 mg/kg wwt

3.9.3 Fate and behaviour

Apart from a new aerobic soil metabolism/degradation study performed according to OECD 307 (see biodegradation in soil below), no new information for the assessment of fate and behaviour of Ethyl butylacetylaminopropionate (IR3535) compared to the AR and CAR has been provided within product authorisation for "Stichfrei Animal". Therefore, the fate and behaviour assessment is predominantly based upon data given in the AR (2014) and CAR (2013) of IR3535. The main parameters are summarised briefly in the subsequent paragraph. For detailed information, we refer to the above mentioned assessment reports.

IR3535 is a liquid at room temperature with a solubility in water of 70 g/L (at 20 °C). The Henry's law constant is $4.613*10^{-4}$ $Pa*m^3*mol^{-1}$

Terrestrial compartment (including groundwater)

According to the CAR (2013), the mean Koc of IR3535 in soil, determined with the batch equilibrium method, is 475.25 L/kg.

Biodegradation and dissipation in soil – Evaluation of degradation study

The route and rate of degradation of IR3535 were studied in four soils under aerobic conditions in the laboratory in the dark at 20 ± 2 °C and 42 - 50% of the maximum water holding capacity for 65 - 86 days according to OECD 307 (Fiebig, 2018). The submitted study was accepted as supplemental information as IR3535 was shown to be rapidly degraded. The calculated best fit DT_{50} values (SFO) ranged between 0.24 and 0.87 hours in the tested soils (at test temperature). The derived geomean DT_{50} was 43.9 minutes at 12°C (n=4).

Formation of carbon dioxide reached levels between 66.0 and 72.8% AR (mean values) at study end after 65 - 86 days. Besides carbon dioxide, one degradation product, IR3535 free acid, was identified with a maximum occurrence of 84.1% AR 4 hours after application, decreasing to a level of 3.3% AR on

hour 144. Non-extractable residues (NER) amounted to a maximum of 41.2% AR. As the mass balances varied between 84.3 – 148.6% applied radioactivity (mean values, n=4), the quality criteria according to the guideline OECD 307 were not met. Thus, the derived geomean was not accepted for use as modelling input for PEC calculations. Nevertheless, the study was accepted as supplemental information. The derived study results show, however, a significant reduction of the amount of active substance IR3535 as well as the major metabolite IR3535 free acid during the study period. Therefore, the RefMS decided to use the default DT_{50} value of 90 days for degradation in soil in the environmental exposure assessment. The value represents the default value for readily biodegradable substances which do not pass the 10 day-window. Despite the fact that IR3535 is not readily biodegradable according to two screening tests (OECD 301 D and 301 B), the high mineralisation rate within the study period of the soil degradation study (66.0 to 72.8% AR (mean values) at study end) shows that the chosen default DT_{50} value is appropriate. Moreover, the default value covers the study period (max. 86 days) during which the reduction could be shown. Thus, the DT_{50} value of 90 d represents a realistic worst case in view of the calculated geomean of 44.3 minutes of the study.
The calculated DT_{50} value for the metabolite derived from the study is 1.9 days (geomean, n=4). However, the assessment of the major metabolite IR3535 free acid is according to the AR on IR3535 (eCA BE, 2014) covered by the evaluation of the parent.
A summary of the half-lives in soil for IR3535 and its relevant metabolite as well as the chosen value for the environmental exposure assessment is given in Table 54 and Table 52.

Table 51

Summary table on half lives in soil					
Process	DT_{50} measured in test	DT_{50} at 12°C	Rate constant at 12°C	Remarks	Reference
Aerobic biodegradation IR3535	23.4 min	44.3 min	0.016 min^{-1}	Geomean (n=4); SFO	Fiebig, 2018; UUID: cce5371a-ecf1-4cde-bce1-8c4a400b756b Reliability = 3 supplemental information
Aerobic biodegradation IR3535 free acid	23.6 hours	1.9 days	0.365 d^{-1}	Geomean (n=4); SFO	

Table 52

Value used in Risk Assessment – Biodegradation and dissipation in soil	
Value	For the environmental exposure assessment of the soil compartment, a default DT_{50} of 90 days is used.
Justification for the value	The submitted study yield in a calculated DT_{50} of 44.3 minutes (geomean, n=4). As the study was accepted only as supplemental information due to a lack in mass balance, a reasonable default value was chosen (detailed explanation see above).

Aquatic compartment

Considering fate and behaviour in water, no photolysis was observed and hydrolysis only occurred slowly under alkaline conditions (DT_{50} = 866.13 h at pH 9, 12 °C). Under acidic and neutral conditions IR3535 is hydrolytically stable.
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.

In the STP, IR3535 is not readily biodegradable according to two screening tests (according to OECD 301 D and 301 B), but in a STP simulation test (according OECD 303A) 99 % elimination was measured. At the TM IV 2010 it was agreed that this value can be used for the STP-pathway in a higher tier evaluation. In the CAR this was implemented by considering that the fraction degraded in STP is 99%. Therefore, the faction directed to sludge was assumed to be 0% instead of leaving the value calculated by EUSES (1% to sewage sludge, 99% to water). The RefMS does not agree with this approach. This discrepancy should be corrected during renewal of a. s. approval. However, for this product, the assessment is consistent with the approach chosen in the CAR on IR3535 (2013).

The distribution of IR3535 in a STP is stated in the following table. It was recalculated by eCA according to Simple Treat 3.1 considering no biodegradation (as identified in OECD 301D/ OECD301A). The distribution stated in the CAR calculated with EUSES (1% to sewage sludge, 99% to water) was not reproducible by the RefMS.
The values in the second part of the table considering a degradation of IR3535 of 99% (identified in simulation test OECD 303A) are taken from the CAR 2013 and are used in the following exposure assessment.

Table 53

Calculated fate and distribution in the STP		
Compartment	Percentage [%] Scenario 1	Remarks
Distribution according to Simple Treat		
Air	0	
Water	94.4	
Sludge	5.6	
Degraded in STP	0	
Distribution considering OECD 303A results and decisions in CAR 2013		
Air	0	
Water	1	
Sludge	0	
Degraded in STP	99	

Air compartment

In air, the DT_{50} of the active substance is 13.16 hours (for OH-radical reaction, $5x10^5$ OH/cm³, 24-hr day). Thus, accumulation of IR3535 in air and long range transport is unlikely. The vapour pressure is low (0.15 Pa), resulting in a low exposure of the air compartment.
Another possible route into the air compartment is at local STP. Estimations of the behaviour of IR3535 in STP's with SimpleTreat modelling pointed out that 0.0% of the active substance is emitted to the air compartment.
No further consideration of the air compartment will be made in the exposure and risk assessment because of the negligible emissions to air and degradation processes.

Bioconcentration

The log Kow for the active substance is 1.7 (at 25°C), therefore no experimental data on aquatic bioaccumulation were provided for IR3535. Based on the log Kow a BCF_{fish} and $BCF_{eartworm}$ were calculated using QSAR (EUSES) and equation (74) (see Guidance on the BPR, Volume IV, Part B; ECHA, April 2015), resulting in a BCF_{fish} = 5.6 L/kg and a $BCF_{earthworm}$ = 1.44 kg/L. It was concluded in the CAR (2013) that the active substance has a low potential for bioaccumulation.

3.9.4 Exposure assessment

General information

The product "Stichfrei Animal" with the active substance IR3535 is intended to be used on horses and dogs to repel insects. The ready-to-use spray is applied to the animals once a day. An exposure assessment for products used on animals is not included in the CAR on IR3535 (2013).
Emissions to the environment occur during application of the product due to spray drift and during removal processes as the rolling of horses or the hosing of horses. Directly exposed environmental compartments are soil, surface water and sewage treatment plant (STP), resulting in further indirect emissions to terrestrial and aquatic compartment.
The relevant emission scenarios are summarised in the following table:

Table 54

Assessed PT	PT 19
Assessed scenarios	Scenario 1: Emission due to spray drift to bare soil Scenario 2: Emission due to spray drift to paved ground Scenario 3: Indoor application on dogs Scenario 4: Emissions to soil through rolling of horses

	Scenario 5: Emissions due to hosing of horses
ESD(s) used	Emission Scenario Document for Product Type 19: Repellents and attractants, May 2015
Approach	Scenario 1: Consumption based Scenario 2: Consumption based Scenario 3: Consumption based Scenario 4: Consumption based Scenario 5: Consumption based
Distribution in the environment	Calculated based on Guidance on the Biocidal Products Regulation, Volume IV Environment – Part B Risk Assessment (active substances), April 2015
Groundwater simulation	YES (refinement with FOCUS PEARL 4.4.4)
Confidential Annexes	NO
Life cycle steps assessed	Scenario 1-5: Production: No Formulation No Use: Yes Service life: Yes
Remarks	-

Fate and distribution in exposed environmental compartments

The potentially exposed environmental compartments for the five emission scenarios are summarised in Table 55.

Table 55

Identification of relevant receiving compartments based on the exposure pathway									
	Fresh-water	Freshwater sediment	Sea-water	Seawater sediment	STP	Soil	Ground-water	Air	Other
Scenario 1	no	no	no	no	no	yes	yes	no	no
Scenario 2	yes	yes	yes	yes	yes	yes	yes	no	no
Scenario 3	yes	yes	yes	yes	yes	yes	yes	no	no
Scenario 4	no	no	no	no	no	yes	yes	no	no
Scenario 5	no	no	no	no	no	yes	yes	no	no

Aquatic compartment

Surface water is exposed both directly and indirectly via the STP. Emissions to freshwater bodies are expected to be the worst-case scenario compared to seawater considering the higher dilution factor in seawater. Therefore, only emissions to freshwater are taken into account in the following assessment.

Terrestrial compartment

Emissions of IR3535 to the terrestrial compartment after use of “Stichfrei Animal” can occur directly (scenarios 1+4+5) or indirectly (scenarios 2+3), the latter is the case where sewage sludge containing the active substance is applied to agricultural soil. Following the approach that 99% of the active substance IR3535 is degraded in the STP and 1% is remaining in the water phase (see 3.9.3 Fate and behaviour), IR3535 cannot be found in sewage sludge. Hence, an assessment of IR3535 in the terrestrial compartment is not necessary for these scenarios.

Atmosphere

Direct emissions to air by use of “Stichfrei Animal” are expected to be negligible due to the fate and behaviour of the a.s. (see 3.9.3 Fate and behaviour).

The following table shows relevant parameters for the exposure assessment derived from the CAR on IR3535 (2013) and the soil degradation study, including physical and chemical properties and degradation values. An exposure assessment for the major metabolite IR3535 free acid was not conducted, since it is, according to the AR on IR3535 (eCA BE, 2014), covered by the evaluation of the parent.

Table 56

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) *	$4.613*10^{-4}$	$Pa/m^3/mol$	
Biodegradability	not readily biodegradable		
DT_{50} for hydrolysis in surface water	866.13	hr (at 12ºC /pH9)	Value calculated. Not degradable at pH 4 and 7.
DT_{50} for photolysis in surface water	no degradation		
DT_{50} for degradation in soil *	90	d (at 12ºC)	Default value, based on supplemental information
DT_{50} for degradation in air	13.16	hr	for OH radical reaction, 24-hr day

* Parameters used as input values for environmental exposure assessment

Emission estimation

The product “Stichfrei Animal” is intended to repel insects on horses and dogs and is applied by spraying from a distance of 20 cm to the animal skin. The product is applied by rates of 2-5 g/m². It can be used by non-professional users outdoors or in well-ventilated areas. The emission assessment was conducted according to Emission Scenario Document for Product Type 19 (ESD PT19, May 2015), chapter 3.2. The maximum application rate of 5 g/m² was used for the consumption per application ($Qform_{appl}$) in the following assessment.

- **Scenario 1: Emission due to spray drift to bare soil**

When the product is applied to horses or dogs above bare soil or grassland, a certain amount of product is released to the surrounding environment due to spray drift. A further release to the groundwater compartment may occur. Emissions to soil are calculated according to ESD PT19, chapter 3.2.4.1 A), using the following input parameters:

Table 57

Input parameters for calculating the local emission			
	Value	**Unit**	**Remarks**
Scenario 1: Emission due to spray drift to bare soil			
Consumption per application ($Qform_{appl}$)	5	g/m²	S
Active substance in the product ($Cform_{weight}$)	200	g/kg	S
Number of applications per day (N_{appl})	1	d^{-1}	D
Treated area of skin ($AREA_{skin}$) a) horse b) dog	 58300 12100	cm²	P (ESD PT19, table 3-9)
Fraction released to soil by spray drift (F_{soil})	0.1	-	D
Soil volume (V_{soil}) a) horse b) dog	 3 0.75	m³	P (ESD PT19, table 3-9)
Bulk density of wet soil (RHO_{soil})	1700	kg_{wwt}/m^3	D
First order rate constant for biodegradation in soil (kdegsoil)	$7.702 * 10^{-3}$	d^{-1}	S
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 due to spray drift ($Elocal_{soil}$) a) horse b) dog	 $5.83 * 10^{-4}$ $1.21 * 10^{-4}$	kg/d	O
Local concentration of a.s. in soil resulting from one day ($Clocal_{soil,1d}$) a) horse b) dog	 0.114 0.095	mg/kg_{wwt}	O
Local concentration in soil over 91 days ($Clocal_{soil,91d}$) a) horse b) dog	 10.403 not relevant	mg/kg_{wwt}	O
Refined local concentration in soil over 91 days (including degradation) ($Clocal_{soil,91d\text{-}ref}$) a) horse b) dog	 7.507 not relevant	mg/kg_{wwt}	O

Origin of values: S – data Set, D – Default, O – Output, P – Pick list

The output values were calculated according to ESD PT19, eq. 3.16 – 3.19. It is assumed that product applications on horses take place at the same location, e.g. the place where the horse is prepared for riding, repeatedly, whereas applications on dogs are performed at different locations. Therefore, only for horses a repeating exposure of the same soil volume during the main bug season is considered. Consequently, $Clocal_{soil,91d\text{-}ref}$ of 7.507 mg/kg_{wwt} represents the predicted environmental concentration (PEC) in soil after use of the product on horses, whereas $Clocal_{soil,1d}$ of 0.095 mg/kg_{wwt} represents PEC soil after use on dogs. A further release to the groundwater compartment may occur.

- **Scenario 2: Emission due to spray drift to paved ground**

When the product is applied to horses above paved ground, e.g. in preparation for riding at paved outdoor grooming places, a certain amount of product is released to the surrounding ground due to spray drift. According to ESD PT19, a further release to the sewage treatment plant (STP) or directly to a surface water body due to wash-off by rainwater need to be assessed. Emissions to STP and surface water are calculated according to ESD PT19, chapter 3.2.4.1 B), using the following input parameters:

Table 58

Input parameters for calculating the local emission			
	Value	**Unit**	**Remarks**

Scenario 2: Emission due to spray drift to paved ground			
Consumption per application ($Qform_{appl}$)	5	g/m²	S
Active substance in the product ($Cform_{weight}$)	200	g/kg	S
Number of horses (N_{horses})	50	-	D
Fraction released to water by spray drift (F_{water})	0.1	-	D
Number of applications per day (N_{appl})	1	d^{-1}	D
Treated area of horse skin ($AREA_{skin}$)	58300	cm²	P (ESD PT19, table 3-9)
Fraction of riders treating the complete horse (F_{rider})	0.2	-	D
Volume of receiving water body ($FLOW_{surfacewater}$)	25920	m³/d	D
Output			
Local emission rate to wastewater ($Elocal_{water}$)	$5.83 * 10^{-3}$	kg/d	O
Local concentration after direct release to surface water ($Clocal_{water}$)	$2.249 * 10^{-4}$	mg/L	O

Origin of values: S – data Set, D – Default, O – Output, P – Pick list

The output values were calculated according to ESD PT19, eq. 3.20 and 3.21. The local emission rate to wastewater accounts for 5.83 * 10-3 kg/d. Emission to STP possibly results in a further release of IR3535 to surface water and sediment via the STP effluent.
For direct release to surface water, a local concentration ($Clocal_{water}$) of $2.25*10^{-4}$ mg/L was calculated. $Clocal_{water}$ represents PEC_{water}.

- **Scenario 3: Indoor application on dogs**

The product “Stichfrei Animal” can be applied indoors to dogs. Thus, a certain amount of product might reach the applicator and his clothes and the surrounding floor. A further emission to the STP might occur via washing of clothes or cleaning of the floor. The emission estimation was conducted according to ESD PT19, 3.2.4.1 C) and 3.3.4.1:

Table 59

Input parameters for calculating the local emission			
	Value	**Unit**	**Remarks**
Scenario 3: Indoor application on dogs			

Quantity of product applied (Q_{prod})	5	g/m²	S
Fraction of active substance in the commercial product (F_{AI})	0.2	-	S
Number of applications per day and building ($N_{appl,building}$)	1	d^{-1}	D
Fraction emitted to air ($F_{application,air}$)	0.02	-	D
Fraction emitted to applicator ($F_{application,applicator}$)	0.02	-	D
Fraction emitted to floor ($F_{application,floor}$)	0.11	-	D
Area treated with the product ($AREA_{treated}$) (corresponds to $AREA_{skin}$ (dog))	12100	cm²	P (ESD PT19, table 3-9)
Fraction emitted to wastewater from applicator after application ($F_{applicator,ww}$)	1	-	D
Fraction emitted to wastewater during the cleaning step (F_{ww})	1	-	D
Cleaning efficacy (F_{CE})	0.5	-	D
Number of houses contributing to STP (N_{houses})	4000	-	D
Simultaneity factor ($F_{simultaneity}$)	0.0552	-	D
Output			
Emission to air during the application step ($E_{application,air}$)	$2.42 * 10^{-5}$	kg/d	O
Emission to applicator during the application step ($E_{application,applicator}$)	$2.42 * 10^{-5}$	kg/d	O
Emission to floor during the application step ($E_{application,floor}$)	$1.331 * 10^{-4}$	kg/d	O
Emission from applicator to wastewater during cleaning step ($E_{applicator,ww}$)	$2.42 * 10^{-5}$	kg/d	O
Emission from floor to wastewater during cleaning step ($E_{floor,ww}$)	$6.655 * 10^{-5}$	kg/d	O
Combined emission from floor and applicator to wastewater during cleaning step for one house (E_{ww})	$9.075 * 10^{-5}$	kg/d	O
Local emission rate to wastewater ($Elocal_{water}$)	$2.004 * 10^{-2}$	kg/d	O

Origin of values: S – data Set, D – Default, O – Output, P – Pick list

Emissions during application step were calculated according to ESD PT19, eq. 3.24-3.27. The resulting emissions to STP during cleaning step were calculated according to ESD PT19, eq. 3.28-3.31.

As stated in ESD PT19 3.2.4.1 C), “Emissions to the treated surface (the pelt of the animals) do not result in quantifiable emissions to the environment.” Therefore, only those fractions emitted to the applicator and to the floor are relevant for assessing emissions of insect repellents used indoors on animals to the STP. Emissions to indoor air are not further assessed.
The local emission rate to wastewater accounts for 0.02 kg/d. Emission to STP possibly results in a further release of IR3535 to surface water and sediment via the STP effluent.

- **Scenario 4: Emissions to soil through rolling of horses**

According to ESD PT19, chapter 3.2.4.2, it is a common behaviour of horses to roll on pasture. It is assumed that only parts of the horses treated body surface gets in contact with the soil and usually certain areas (according to the properties of the ground) are preferred for rolling. The emission to soil is estimated using the following input parameters:

Table 60

Input parameters for calculating the local emission			
	Value	**Unit**	**Remarks**
Scenario 4: Emissions to soil through rolling of horses			
Consumption per application ($Qform_{appl}$)	5	g/m²	S
Active substance in the product ($Cform_{weight}$)	200	g/kg	S
Treated area of horse skin ($AREA_{skin}$)	17490	cm²	D
Number of horses kept per hectare (N_{horses})	4	-	D
Number of applications per day (N_{appl})	1	d^{-1}	D
Number of rollings per day ($N_{rolling}$)	2	-	D
Fraction released to soil by rolling (F_{soil})	0.01	-	D
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
Soil volume (V_{soil})	100	m³	D
Bulk density of wet soil (RHO_{soil})	1700	kg_{wwt}/m^3	D
First order rate constant for biodegradation in soil (kdegsoil)	$7.702 * 10^{-3}$	d^{-1}	S
Output			
Local emission due to rolling ($Elocal_{soil}$)	$1.399 * 10^{-4}$	kg/d	O
Local concentration of a.s. in soil resulting	$8.231 * 10^{-4}$	mg/kg_{wwt}	O

from one day ($Clocal_{soil,1d}$)			
Local concentration in soil over 91 days ($Clocal_{soil,91d}$)	0.075	mg/kg_{wwt}	O
Refined local concentration in soil over 91 days (including degradation) ($Clocal_{soil,91d\text{-}ref}$)	0.054	mg/kg_{wwt}	O

Origin of values: S – data Set, D – Default, O – Output, P – Pick list

$Elocal_{soil}$ was derived with eq. 3.22, ESD PT19. The local concentrations in soil were calculated according to ESD PT19, eq. 3.17 – 3.19. $Clocal_{soil,91d\text{-}ref}$ of 0.054 mg/kg_{wwt} represents the PEC in soil. A further release to the groundwater compartment may occur.

- **Scenario 5: Emissions due to hosing of horses**

The emission of the product to the environment due to hosing of horses was evaluated according to ESD PT19, chapter 3.2.4.3. The hosing is mainly conducted to remove sweat and to cool down the horses after exercise, but remaining product applied to the horse is also released to the ground. As described in ESD PT19, outdoor hosing usually takes place on paved ground with drainage of the washing water into the surrounding soil. The emission to soil is evaluated with the following input parameters:

Table 61

Input parameters for calculating the local emission			
	Value	**Unit**	**Remarks**
Scenario: Emissions due to hosing of horses (release to soil)			
Consumption per application ($Qform_{appl}$)	5	g/m²	S
Active substance in the product ($Cform_{weight}$)	200	g/kg	S
Number of horses (N_{horses})	50	-	D
Fraction released to soil (F_{soil})	0.01	-	D
Number of applications per day (N_{appl})	1	d^{-1}	D
Treated area of horse skin($AREA_{skin}$)	58300	cm²	P (ESD PT19, table 3-9
Fraction of riders hosing their horses ($F_{rider,hosing}$)	0.1	-	D
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

Soil volume (V_{soil})	2.75	m³	D
Bulk density of wet soil (RHO_{soil})	1700	kg_{wwt}/m^3	D
First order rate constant for biodegradation in soil (kdegsoil)	$7.702 * 10^{-3}$	d^{-1}	S
Output			
Local emission rate to soil ($Elocal_{soil}$)	$2.915 * 10^{-4}$	kg/d	O
Local concentration of a.s. in soil resulting from one day ($Clocal_{soil,1d}$)	0.062	mg/kg_{wwt}	O
Local concentration in soil over 91 days ($Clocal_{soil,91d}$)	5.674	mg/kg_{wwt}	O
Refined local concentration in soil over 91 days (including degradation) ($Clocal_{soil,91d-ref}$)	4.095	mg/kg_{wwt}	O

Origin of values: S – data Set, D – Default, O – Output, P – Pick list

$Elocal_{soil}$ was derived with eq. 3.23, ESD PT19. The local concentrations in soil were calculated according to ESD PT19, eq. 3.17 – 3.19. $Clocal_{soil,91d-ref}$ of 4.095 mg/kg_{wwt} represents the PEC in soil. A further release to the groundwater compartment may occur.

Refinement of Scenario 5 calculations

The calculated emissions of scenario 5 “Emissions due to hosing of horses” resulted in unacceptable risks for the soil compartment (PEC/PNEC >1) (see chapter Risk characterisation). Therefore, the refMS suggests to restrict the hosing of horses to hosing places connected to STP. According to ESD PT19, large and professional equestrian facilities usually possess washing facilities connected to STP. In the ESD it is stated that release to STP by washing of horses is covered by scenario 2. However, considering the limitation of washing of horses to paved areas connected to STP, the emission estimation is shown below.

An emission estimation was conducted using the following input parameters:

Table 62

Input parameters for calculating the local emission			
	Value	**Unit**	**Remarks**
Scenario: Emissions due to hosing of horses (release to STP)			
Consumption per application ($Qform_{appl}$)	5	g/m²	S
Active substance in the product ($Cform_{weight}$)	200	g/kg	S
Number of horses (N_{horses})	50	-	D
Fraction released to soil (F_{soil})	0.01	-	D

Number of applications per day (N_{appl})	1	d^{-1}	D
Treated area of horse skin($AREA_{skin}$)	58300	cm^2	P (ESD PT19, table 3-9
Fraction of riders hosing their horses ($F_{rider,hosing}$)	0.1	-	D
Output			
Local emission rate to wastewater ($Elocal_{water}$)	$2.915 * 10^{-4}$	kg/d	O

Origin of values: S – data Set, D – Default, O – Output, P – Pick list

The following equation was used to derive $Elocal_{water}$:

$$Elocal_{water} := N_{horses} \cdot N_{appl} \cdot Qform_{appl} \cdot AREA_{skin} \cdot Cform_{weight} \cdot F_{riderhosing} \cdot F_{water}$$

The local emission rate to wastewater accounts for $2.92*10^{-4}$ kg/d. Emission to STP possibly results in a further release of IR3535 to surface water and sediment via the STP effluent.

Non-compartment specific effects

- **Primary poisoning**

Due to the use of “Stichfrei Animal” as a repellent spray, consumption of the product by non-target species is very unlikely.

- **Secondary poisoning**

IR3535 released by use of “Stichfrei Animal” is unlikely to bioaccumulate in the aquatic or terrestrial environment. The active substance has a log Kow (1.7), which is below the relevant trigger value of 3 according to the Guidance on BPR, Vol. IV Environment- Part B Risk Assessment. The low accumulation potential is supported by the BCF and BMF for fish and earthworms determined by EUSES (CAR 2013). The BCF for fish is 5.6 L/kg. The BCF for earthworms is 1.44 kg/kg. No further assessment of secondary exposure via the food chain is therefore considered necessary.

Calculated PEC values

The derived predicted environmental concentrations (PEC’s) are listed in Table 63. For the scenarios with exposure of soil during the whole bug season (scenarios 1a, 4, 5), the $Clocal_{soil,91d\text{-}ref}$ represents the PECsoil considering biodegradation processes.

The PEC values for secondary exposed compartments were assessed following the equations in Guidance on the Biocidal Products Regulation, Vol. IV Environment, Parts B + C (Guidance BPR IV ENV B+C, 2017), chapter 2.3.6.7 and 2.3.7:

- PEC_{STP} (= $Clocal_{eff}$) according to equation 42, chapter 2.3.6.7
- $PEC_{local\_surfacewater}$ according to equation 51, chapter 2.3.7.3.1
- $PEC_{local\_sediment}$ according to equation 53, chapter 2.3.7.4
- PEC_{GW} according to equation 71, chapter 2.3.7.6

Table 63

Summary table on calculated PEC values							
		PEC_{STP}	**PEC_{water}**	**PEC_{sed}**	**PEC_{soil}**	**PEC_{GW}**	**PEC_{air}**
		[µg/L]]	[mg/L]	[mg/kg_{dwt}]	[mg/kg_{wwt}]	[µg/L]	[mg/m^3]
Scenario 1	a) horse	-	-	-	7.507	1226	-
	b) dog	-	-	-	0.095	11.16	-
Scenario 2	a) To STP	2.915	$2.91 * 10^{-6}$	$1.49 * 10^{-4}$	0	0	-
	b) to surface water	-	$2.249 * 10^{-4}$	0.0115	-	-	-
Scenario 3		10.02	$1.001 * 10^{-5}$	$5.1 * 10^{-4}$	0	0	-
Scenario 4		-	-	-	0.054	8.81	-
Scenario 5	a) to soil	-	-	-	4.095	667.22	-
	b) to STP (refinement)	0.146	$1.46 * 10^{-7}$	$7.46 * 10^{-6}$	0	0	-

The estimated concentration in groundwater is defined by the concentration of the a.s. in pore water of agricultural soils (Guidance BPR IV ENV B+C, 2017). This is a conservative approach, since degradation in soil, transformation and dilution in deeper soil layers are not taken into account. The calculated results of PEC_{GW} for the scenarios with direct soil exposure are above the maximum permissible concentration in groundwater of 0.1 µg/L for pesticides (Council Directives 98/83/EC).

3.9.4.1.1 Refinement of the PEC_{GW} using FOCUS PEARL

Since the PEC_{GW} of scenarios 1, 4 and 5 exceeds the maximum permissible concentration in groundwater of 0.1 µg/L for biocides (Council Directives 98/83 /EC), the groundwater assessment is refined with FOCUS PEARL v.4.4.4, taking into account adsorption, distribution and degradation of IR3535 in soil. Calculations were performed for the relevant FOCUS scenarios.

Application of “Stichfrei Animal” takes place in the main bug season, only. Therefore 10 applications yearly between 01/06 and 29/08 were assumed. Following table provides the required input parameters for FOCUS PEARL:

Table 64

Input	Value	Unit	Remarks
Molecular weight	215.29	g/Mol	
Vapour pressure (at 20°C)	0.15	Pa	
Water solubility (at 20°C)	70000	mg/L	
Half-life for degradation in soil	90	d	
Kom (coef. for sorption on organic matter) at 20°C	275.667	L/kg	
Freundlich exponent	0.9	-	
Plant uptake factor	0.0	-	
Direct exposure of soil			
Application type	-	-	To soil surface
Crops	-	-	Alfalfa
Target depth	1	m	
Annual incorporation	-	-	10 applications per year in the main bug season (01/06-29/08)

In FOCUS PEARL, the amount of substance entered into the leaching model is given by the dosage expressed in kg/ha. The dosage was estimated to be the daily emission ($Elocal_{soil}$) over the bug season (91 days), distributed to 10 application events:

Dosage = (Elocalsoil * 91 days)/10 application events

It is assumed that the dosage is distributed over one hectare (the spatial scale in FOCUS PEARL).

Applications on dogs (scenario 1b) are generally expected to be performed at different locations. For the groundwater assessment via FOCUS PEARL, it was estimated that all application within the main bug season take place within this hectare. Therefore the same approach for estimation of the dosage was chosen.

For the uses under consideration, the calculated application rates are given in Table 65.

Table 65

Scenario		Application rate [kg/ha]
1	a	0.0053053
	b	0.0011011
4		0.00127309
5		0.00265265

The results of the groundwater leaching models for the 9 EU scenarios using FOCUS PEARL v.4.4.4 are provided in the following tables. The relevant FOCUS scenarios/ EU-Locations for product authorisation in Germany are Hamburg, Kremsmuenster and Okehampton (highlighted in the following tables).

The refinement of the groundwater assessment for scenario 1 via FOCUS PEARL showed the following groundwater concentrations of IR3535 closest to the 80th percentile in the percolate at 1 m soil depth:

Scenario 1 – Emission due to spray drift to bare soil

a) Application on horse

Table 66

FOCUS Scenario	Grassland [µg/L]
Châteaudun	0.000000
Hamburg	0.000000
Jokioinen	0.000000
Kremsmuenster	0.000000
Okehampton	0.000000
Piacenza	0.000000
Porto	0.000000
Sevilla	0.000000

b) Application on dog

Table 67

FOCUS Scenario	Grassland [µg/L]
Châteaudun	0.000000
Hamburg	0.000000
Jokioinen	0.000000
Kremsmuenster	0.000000
Okehampton	0.000000
Piacenza	0.000000
Porto	0.000000
Sevilla	0.000000

Scenario 4 – Emission to soil through rolling of horses

Table 68

FOCUS Scenario	Grassland [µg/L]
Châteaudun	0.000000
Hamburg	0.000000
Jokioinen	0.000000
Kremsmuenster	0.000000
Okehampton	0.000000
Piacenza	0.000000
Porto	0.000000
Sevilla	0.000000

Scenario 5 – Emissions due to hosing of horses

Table 69

FOCUS Scenario	Grassland [µg/L]
Châteaudun	0.000000
Hamburg	0.000000
Jokioinen	0.000000
Kremsmuenster	0.000000
Okehampton	0.000000
Piacenza	0.000000
Porto	0.000000
Sevilla	0.000000
Thiva	0.000000

As shown for the relevant FOCUS PEARL scenarios, the concentration of IR3535 in groundwater (80th percentile at 1 m depth) is below the limit threshold criteria of 0.1 µg/L (Council Directives 2006/118/EC and 98/83/EC) for all scenarios in all EU-locations.

Aggregated exposure (combined for relevant emission sources)

An agreed guidance document for aggregated exposure assessment is not available, yet. Therefore, such an assessment was not conducted.

3.9.5 Risk characterisation

Aquatic compartment (incl. sediment and STP)

The aquatic compartment (surface water, sediment and STP) is exposed to the biocidal product both directly (scenario 2: emission due to spray drift to paved ground and wash-off by rainwater) and indirectly via the STP (scenario 2: emission due to spray drift to paved ground; scenario 3: indoor application on dogs; scenario 5 (refinement): emission due to hosing of horses). Therefore, the following table contains a risk characterisation for the relevant scenarios.

Table 70

Summary table on calculated PEC/PNEC values				
Surface water				
		PEC [mg/L]	**PNEC [mg/L]**	**PEC/PNEC**
Scenario 1	a) horse	-	0.1	-
	b) dog	-		-
Scenario 2	a) to STP	$2.91 * 10^{-6}$		$2.91*10^{-5}$
	b) to surface water	$2.249 * 10^{-4}$		$2.249*10^{-3}$
Scenario 3		$1.001 * 10^{-5}$		10^{-4}
Scenario 4		-		-
Scenario 5	a) to soil	-		-
	b) to STP (refinement)	$1.46 * 10^{-7}$		$1.46*10^{-6}$
Sediment				
		PEC [mg/kg dwt]	**PNEC [mg/kg dwt]**	**PEC/PNEC**
Scenario 1	a) horse	-	5.106	-
	b) dog	-		-
Scenario 2	a) to STP	$1.49 * 10^{-4}$		$2.92*10^{-5}$
	b) to surface water	0.0115		$2.25*10^{-3}$
Scenario 3		$5.1 * 10^{-4}$		$9.99*10^{-5}$
Scenario 4		-		-
Scenario 5	a) to soil	-		-
	b) to STP (refinement)	$7.46 * 10^{-6}$		$1.46*10^{-6}$

STP				
		PEC [mg/L]	**PNEC [mg/L]**	**PEC/PNEC**
Scenario 1	a) horse	-	100	-
	b) dog	-		-
Scenario 2	a) to STP	$2.915*10^{-3}$		$2.915*10^{-5}$
	b) to surface water	-		-
Scenario 3		$10.02*10^{-3}$		$10.02*10^{-5}$
Scenario 4		-		-
Scenario 5	a) to soil	-		-
	b) to STP (refinement)	$1.46*10^{-4}$		$1.46*10^{-6}$

Conclusion

All calculated PEC/PNEC values for the aquatic compartment (see Table 70) are below the trigger value of 1, indicating no unacceptable risks for surface water/sediment and for aquatic microorganisms in the STP after the use of the biocidal product “Stichfrei Animal”.

Terrestrial compartment (soil and groundwater)

The terrestrial compartment (soil and groundwater) is exposed by the biocidal product directly (scenario 1: spray drift to bare soil; scenario 4: horses rolling on pasture, scenario 5: emission due to hosing of horses) and indirectly (scenario 2: emission due to spray drift to paved ground; scenario 3: indoor application on dogs; scenario 5 (refinement): emission due to hosing of horses), when sewage sludge containing the active substance is applied to agricultural soil.

Table 71

Summary table on calculated PEC/PNEC values				
Soil				
		PEC [mg/kg wwt]	**PNEC [mg/kg wwt]**	**PEC/PNEC**
Scenario 1	a) horse	7.507	0.851	**8.81**
	b) dog	0.095		0.11
Scenario 2	a) to STP	0		0
	b) to surface water	-		-

Scenario 3		0		0
Scenario 4		0.054		0.06
Scenario 5	a) to soil	4.095		**4.81**
	b) to STP (refinement)	0		0

Table 72

Summary table on calculated PEC/PNEC values				
Groundwater				
		PEC [µg/L]	**Trigger value of Directive 98/83/EC**	**PEC/Trigger value**
Scenario 1	a) horse	1226 refinement*: 0	0.1	12260 refinement*: 0
	b) dog	11.16 refinement*: 0		111.6 refinement*: 0
Scenario 2	a) to STP	0		0
	b) to surface water	-		-
Scenario 3		0		0
Scenario 4		8.81 refinement*: 0		88.1 refinement*: 0
Scenario 5	a) to soil	667.22 refinement*: 0		6672 refinement*: 0
	b) to STP (refinement)	0		0

* refinement of groundwater assessment with FOCUS PEARL 4.4.4

Conclusion

Soil

The calculated PEC/PNEC values for the soil compartment showed unacceptable risks in scenario 1 for horses (spray drift to bare soil) and scenario 5 (hosing of horses). A refinement of the exposure assessment for scenario 1 is not possible. For scenario 5, a refinement regarding the release of washing water to STP was conducted, showing acceptable risks for the environment. For the effects assessment a refinement of the $PNEC_{soil}$ would theoretically be possible by performing studies with terrestrial organisms, as the PNECsoil is based on EPM. However, from the available data it seems not very likely that the performance of additional studies would lead to an acceptable risk for these

scenarios. Therefore, the following measures should be applied to reduce the risks from these two scenarios:
Scenario 1:
‘To protect the soil the outdoor application of the product is restricted to areas with paved/sealed ground.’
Scenario 5:
‘Wash horses treated with the biocidal product only on paved/sealed ground connected to the waste water system.’
The calculated PEC/PNEC values of the Scenarios 2, 3 and 4 are below the trigger value of 1, indicating no unacceptable risks for the soil after the use of the biocidal product “Stichfrei Animal”.

Groundwater
After refinement (FOCUS calculations; calculation of the emission pathway via STP for scenario 5) all calculated PEC values for the groundwater were below the trigger value of 0.1 µg/L given in Directive 98/83/EC, indicating no unacceptable risks for all scenarios after the use of the biocidal product “Stichfrei Animal” for the groundwater.

Atmosphere

Exposure of the air compartment for use of the biocidal product “Stichfrei Animal” is not relevant. For a detailed justification see chapter 3.9.2 and 3.9.4.

Non-compartment specific

- **Primary poisoning**

The direct intake of the biocidal product by non-target organisms is not considered as likely, therefore primary poisoning is not further considered.

- **Secondary poisoning**

As the bioaccumulation potential and the potential of accumulation in the food chain of the active substance IR3535 is low, secondary poisoning is not further considered.

PBT assessment

No new data are available for fate and behaviour in the environment for the active substance IR3535. Therefore, the PBT assessment in the CAR (2013) is still valid. In the CAR it was concluded, that the active substance does not meet any of the criteria for (very) Persistent, (very) Bioaccumulative and/or Toxic.

Endocrine disrupting properties

The CAR (2013) gives no information on the possible endocrine disrupting properties of the active substance. No new data were presented to conclude on this point. However, the active substance IR3535 is not listed on the ED candidate list of the European Commission. Additionally, a literature search was done, revealing no information of potential endocrine disrupting properties of IR3535. The criteria to identify endocrine disruptors are developed by the European Commission and published as Commission Delegated Regulation (EU) 2017/2100. The regulation must be bindingly applied from June 7, 2018; a detailed evaluation should take place when the approval of the active substance is renewed.

Summary of risk characterisation

Due to the use of the biocidal product “Stichfrei Animal” the aquatic and the soil compartment are exposed directly and indirectly. Overall, five emission scenarios were considered:
Scenario 1: Emission due to spray drift to bare soil
Scenario 2: Emission due to spray drift to paved ground
Scenario 3: Indoor application on dogs
Scenario 4: Emissions to soil through rolling of horses
Scenario 5: Emissions due to hosing of horses

An exposure of the air compartment is not relevant and primary and/or secondary poisoning of non-target organisms is unlikely and has not be considered further. The following table contains a summary on calculated PEC/PNEC values of the assessed five scenarios for all relevant environmental compartments.

Table 73

Summary table on calculated PEC/PNEC values					
	PEC_{STP}/ $PNEC_{STP}$	**PEC_{water}/ $PNEC_{water}$**	**PEC_{sed}/ $PNEC_{sed}$**	**PEC_{soil}/ $PNEC_{soil}$**	**PEC_{GW}/ Trigger value**
Scenario 1 - horses	-	-	-	**8.81**	0
- dogs	-	-	-	0.11	0

Scenario 2 - to STP - to surface water	$2.92*10^{-5}$ -	$2.91*10^{-5}$ $2.25*10^{-3}$	$2.92*10^{-5}$ $2.25*10^{-3}$	0 -	0 0
Scenario 3	$10.02*10^{-5}$	10^{-4}	$9.99*10^{-5}$	0	0
Scenario 4	-	-	-	0.06	0
Scenario 5 - to soil - to STP (refinement)	- $1.46*10^{-6}$	- $1.46*10^{-6}$	- $1.46*10^{-6}$	**4.81** 0	0 0

The calculated PEC/PNEC values for the aquatic compartment are all below the trigger value of 1, indicating no unacceptable risks for surface water/sediment and for aquatic microorganisms in the STP after the use of the biocidal product “Stichfrei Animal”.

The calculated PEC/PNEC values for the soil compartment showed unacceptable risks in scenario 1 for horses and in scenario 5. A refinement of the exposure assessment for scenario 1 is not possible. For scenario 5, a refinement regarding the release of washing water to STP was conducted, showing acceptable risks for the environment. For the effects assessment a refinement of the $PNEC_{soil}$ would theoretically be possible, however, it seems not very likely that this would lead to an acceptable risk for these scenarios. Therefore, the following measures should be applied to reduce the risks from these two scenarios:
Scenario 1:
‘To protect the soil the outdoor application of the product is restricted to areas with paved/sealed ground.’
Scenario 5:
‘Wash horses treated with the biocidal product only on paved/sealed ground connected to the waste water system.’
The calculated PEC/PNEC values of the Scenarios 2, 3 and 4 are below the trigger value of 1, indicating no unacceptable risks for the soil after the use of the biocidal product “Stichfrei Animal”.

After refinements all calculated PEC values for the groundwater were below the trigger value of 0.1 µg/L given in Directive 98/83/EC, indicating no unacceptable risks for all scenarios after the use of the biocidal product “Stichfrei Animal” for the groundwater.

3.10 Assessment of a combination of biocidal products

A use with other biocidal products is not intended.

3.11 Comparative assessment

No candidate for substitution was identified (see chapter 2.2.4), hence a comparative assessment is not necessary.

4 Annexes

4.1 List of studies for the biocidal product

Table 74

Data set according to Annex III Regulation (EU) No 528/2012	Title	Author(s)	Year	Owner company
3.1. Appearance (at 20 °C and 101,3 kPa)	Prüfbericht: Stichfrei Animal	Moosner, S.	2015	F.W. KLEVER GmbH
3.2. Acidity/alkalinity The test is applicable when the pH of the biocidal product or its dispersion in water (1 %) is outside the pH range 4-10	Prüfbericht: Stichfrei Animal	Moosner, S.	2015	F.W. KLEVER GmbH
3.3. Relative density (liquids) and bulk, tap density (solids)	Prüfbericht: Stichfrei Animal	Zettler, H.	2015	F.W. KLEVER GmbH

3.4.1.1. Accelerated storage test	Determination of the Accelerated Storage Stability (8 weeks at 40°C) of Pump Spray Lice IR 3535 20%	Meinerling, M.; Herrmann, S.	2011	Merck KGaA
3.4.1.1. Accelerated storage test	EUS26-15 INSECT REPELLENT SPRAY-DETERMINATION OF THE ACCELERATED STORAGE STABILITY	Meinerling M.	2007	Merck KGaA
3.4.1.2. Long term storage test at ambient temperature	EUS26-15 INSECT REPELLENT SPRAY-DETERMINATION OF THE STORAGE STABILITY AT AMBIENT TEMPERATURES	Meinerling M.	2009	Merck KGaA
3.4.1.3. Low temperature stability test (liquids)	Determination of the Low Temperature Stability of Pump Spray IR3535®20%	Meinerling M.	2011	Merck KGaA
3.4.1.5. Storage stability test	Haltbarkeitsstudie Stichfrei Animal Ergänzung zur Haltbarkeitsstudie Stichfrei Animal	Dr. Chr. Zettler.	2018	F.W. KLEVER GmbH
3.5.12. Spraying pattern — aerosols	Bericht zu den Tests mit dem Produkt INSECT REPELLENT im Auftrag der Fa. Merck KGaA	Anonymous	2005	Merck KGaA
3.8. Surface tension	Prüfbericht Stichfrei Animal	S. Moosner	2015	F.W. KLEVER GmbH
3.9. Viscosity	Prüfbericht Stichfrei Animal	Dr. H. Zettler	2015	F.W. KLEVER GmbH
4.6. Flammable liquids	Prüfbericht: Stichfrei Animal , (Study No. 01-2015)	Zettler, H.	2015	F.W. Klever GmbH
4.17.1. Auto-ignition temperatures of products (liquids and gases)	Final Report (1st Original of 3) Pump Spray IR 3535®20% Batch No.: SM0-1-1/090211 AUTO IGNITION TEMPERATURE (LIQUID AND GASES) A.15	Dornhagen J.	2011	Merck KGaA

5.1. Analytical method including validation parameters for determining the concentration of the active substance(s), residues, relevant impurities and substances of concern in the biocidal product	Gehaltsbestimmung von IR 3535 in Stichfrei Animal Prüfbericht Stichfrei Animal	Dr. H. Zettler	2013 2015	F.W. KLEVER GmbH
6.3. Effects on representative target organisms	Test of Personal Insect Repellent: Study EMD 003.2 Replacement for MRID 6979002	Carroll, S.P.	2006	Merck KGaA
6.3. Effects on representative target organisms	Repellierende Wirkung eines Produktes am menschlichen Arm gegen Mücken	K.H.-Lüpke	2012	BioGeniusGmbH
6.7. Efficacy data to support these claims, including any available standard protocols, laboratory tests or field trials used including performance standards where appropriate and relevant	Test of Personal Insect Repellent: Study EMD 003.2 Replacement for MRID 6979002	Carroll, S.P.	2006	Merck KGaA

6.7. Efficacy data to support these claims, including any available standard protocols, laboratory tests or field trials used including performance standards where appropriate and relevant	Repellierende Wirkung eines Produktes am menschlichen Arm gegen Mücken	K.H.-Lüpke	2012	BioGeniusGmbH
6.7. Efficacy data to support these claims, including any available standard protocols, laboratory tests or field trials used including performance standards where appropriate and relevant	Studie zur Bewertung der Wirksamkeit des Biozidprodukts "Stichfrei Animal" gegen Bremsen (Tabanidae) bei Pferden Studie zur Bewertung der Wirksamkeit des Biozidproduktes "Stichfrei Animal" gegen Kriebelmücken (Simuliidae) bei Pferden [redacted] 1586 2017 Alpha-Biocare GmbH F.W. KLEVER GmbH 2017-08-24 Studie zur Bewertung der Wirksamkeit des Biozidprodukts "Stichfrei Animal" gegen Zecken (Ixodes ricinus) bei Hunden und Pferden [redacted] 1586 2017 Alpha-Biocare GmbH F.W. KLEVER GmbH 2017-08-24	[redacted] [12]	2017	F.W. KLEVER GmbH

[12] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

7.10.2. Information on environmental exposure associated with production and formulation, proposed/expected uses and disposal	Risikobewertung Stichfrei Animal	Dr. C. Zettler	2015	F.W. KLEVER GmbH
8.1. Skin corrosion or skin irritation The assessment of this endpoint shall be carried out according to the sequential testing strategy for dermal irritation and corrosion set out in the Appendix to Test Guideline B.4. Acute Toxicity- Dermal Irritation/Corrosion (Annex B.4. to Regulation (EC) No 440/2008)	Acute dermal irritation study of EUS26-15 Insect Repellent Spray in albino rabbits	[redacted] [13]	2006	Merck KGaA

[13] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

8.2. Eye irritation (1) The assessment of this endpoint shall be carried out according to the sequential testing strategy for eye irritation and corrosion as set down in the Appendix to Test Guideline B.5.Acute Toxicity: Eye Irritation/Corrosion (Annex B.5. to Regulation (EC) No 440/2008) (1) Eye-irritation test shall not be necessary where the biocidal product has been shown to have potential corrosive properties.	Acute eye irritation study of EUS26-15 Insect Repellent Spray in albino rabbits	[redacted] [14]	2006	Merck KGaA

[14] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

8.3. Skin sensitisationThe assessment of this endpoint shall comprise the following consecutive steps: 1. an assessment of the available human, animal and alternative data 2. in vivo testing The Murine Local Lymph Node Assay (LLNA) including, where appropriate, the reduced variant of the assay, is the first-choice method for in vivo testing. If another skin sensitisation test is used justification shall be provided	Skin sensitisation study of EUS26-15 Insect Repellent Spray in albino guinea pigs (Modified Buehler Method)	[redacted] [15]	2006	Merck KGaA
8.5.3. By dermal route	Acute dermal toxicity study of EUS26-15 Insect Repellent Spray in albino rats	[redacted] [16]	2006	Merck KGaA

[15] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).
[16] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

8.6. Information on dermal absorption Information on dermal absorption when exposure occurs to the biocidal product. The assessment of this endpoint shall proceed using a tiered approach	Biotransformation and toxicokinetics of IR3535® in humans after dermal exposure, , July 30, 2010 (unpublished report)	W. Dekant	2010	Merck KGaA
8.6. Information on dermal absorption Information on dermal absorption when exposure occurs to the biocidal product. The assessment of this endpoint shall proceed using a tiered approach	In-Vitro-Untersuchungen zur Penetration von IR3535 durch equine und canine Haut	[redacted][17]	2016	Merck KGaA

[17] Study with vertebrates. Please, refer to IUCLID file for the name of the author(s).

10.2.1 Laboratory study on rate and route of degradation including identification of the processes involved and identification of any metabolites and degradation products in one soil type (unless pH dependent route) under appropriate conditions. Laboratory studies on rate of degradation in three additional soil types	Insect Repellent 14C-IR3535 - Aerobic Transformation in Soil	Fiebig S.	2018	Merck KGaA

4.2 List of studies for the active substance(s)

4.2.1 Ethylbutylacetylaminopropionat (IR3535)

- The applicant has access to the data from the active substance approval (see chapter 4.1 for details).

Access to data from active substance approval

The applicant provided a letter of access to the dossier assessed for the approval (respectively the inclusion into Annex I of Directive 98/8/EC[18]) of the active substance Ethylbutylacetylaminopropionat (IR3535) for use in Repellents and attractants (product-type 19). Please, refer to the corresponding Assessment Report for a reference list.

18 Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market.

4.3 Output tables from exposure assessment tools

Output tables from human health exposure assessment tools

4.3.1 Safety for professional users

-

4.3.2 Safety for non-professional users and the general public

ConsExpo 4.1 report

Scenario [1], non-professional user, application, trigger spray
Report date: 18.07.2017

Product

Animal Stichfrei

Compound

Compound name :	IR3535	
CAS number :	52304-36-6	
molecular weight	215	g/mol
vapour pressure	0,15	Pascal
KOW	1,7	10Log

General Exposure Data

exposure frequency	1	1/day
body weight	60	kilogram

Inhalation model: Exposure to spray

weight fraction compound	0,2	fraction
exposure duration	240	minute
room volume	58	m3
ventilation rate	0,5	1/hr
mass generation rate	0,8	g/sec
spray duration	10	minute
airborn fraction	0,008	fraction
weight fraction non-volatile	0,62	fraction
density non-volatile	1,8	g/cm3
room height	2,5	meter
inhalation cut-off diameter	15	micrometer
non-respirable uptake fraction	1	fraction
Spraying away from exposed person		

Uptake model: Fraction

uptake fraction	1	fraction
inhalation rate	1,25	m3/hour

Dermal model: Direct dermal contact with product : constant rate

weight fraction compound	0,2	fraction
contact rate	46	mg/min
release duration	600	second

Uptake model: fraction

uptake fraction	0,14	fraction

Output

Inhalation (point estimates)

inhalation mean event concentration :	1,49	mg/m3
inhalation mean concentration on day of exposure:	0,249	mg/m3
inhalation air concentration year average :	0,249	mg/m3/day
inhalation acute (internal) dose :	0,124	mg/kg
inhalation chronic (internal) dose :	0,124	mg/kg/day

Dermal : point estimates

dermal load :	-	mg/cm2
dermal external dose :	1,53	mg/kg
dermal acute (internal) dose :	0,215	mg/kg
dermal chronic (internal) dose :	0,215	mg/kg/day

Oral non-respirable: point estimates

oral external dose :	0,00165	mg/kg
oral acute (internal) dose :	0,00165	mg/kg
oral chronic (internal) dose :	0,00165	mg/kg/day

Integrated (point estimates)

total external dose:	1,66	mg/kg
total acute dose (internal):	0,341	mg/kg
total chronic dose (internal):	0,341	mg/kg/day

ConsExpo 4.1 report

Scenario [2], Toddlers, contact to contaminated surfaces
Report date: 18.07.2017

Product

Animal Stichfrei

Compound

Compound name :	IR3535	
CAS number :	52304-36-6	
molecular weight	215	g/mol
vapour pressure	0,15	Pascal
KOW	1,7	10Log

General Exposure Data

exposure frequency	1	1/day
body weight	10	kilogram

Dermal model: Direct dermal contact with product : rubbing off

weight fraction compound	0,2	fraction
transfer coefficient	0,6	m2/hr
rubbed surface	2,2E5	cm2
release duration	1	hour
dislodgeable amount	0,5	g/m2

Uptake model: fraction

uptake fraction	0,14	fraction

Oral model: Oral exposure to product : direct intake

weight fraction compound	0,2	fraction
amount ingested	150	milligram

Uptake model: Fraction

uptake fraction	1	fraction

Output

Dermal : point estimates

dermal load :	-	mg/cm2
dermal external dose :	6	mg/kg
dermal acute (internal) dose :	0,84	mg/kg
dermal chronic (internal) dose :	0,84	mg/kg/day

Oral : point estimates

oral external dose :	3	mg/kg
oral acute (internal) dose :	3	mg/kg
oral chronic (internal) dose :	3	mg/kg/day

Integrated (point estimates)

total external dose:	9	mg/kg
total acute dose (internal):	3,84	mg/kg
total chronic dose (internal):	3,84	mg/kg/day

Output tables from animal safety exposure assessment tools

4.3.3 Safety for animals

ConsExpo 4.1 report

Scenario 4, inhalation, exposure to vapour from application, small dog
Report date: 18.07.2017

Product

Animal Stichfrei

Compound

Compound name :	IR3535	
CAS number :	52304-36-6	
molecular weight	215	g/mol
vapour pressure	0,15	Pascal
KOW	1,7	10Log

General Exposure Data

exposure frequency	1	1/day
body weight	0,5	kilogram

Inhalation model: Exposure to vapour : evaporation

weight fraction compound	0,2	fraction
exposure duration	240	minute
room volume	58	m3
ventilation rate	0,6	1/hr
applied amount	0,3	gram
release area	0,57	m2
application duration	10	minute
mass transfer rate	2,55E3	m/min

Uptake model: Fraction

uptake fraction	1	fraction
inhalation rate	0,018	m3/hour

Output

Inhalation (point estimates)

inhalation mean event concentration :	0,391	mg/m3
inhalation mean concentration on day of exposure:	0,0652	mg/m3
inhalation air concentration year average :	0,0652	mg/m3/day
inhalation acute (internal) dose :	0,0564	mg/kg
inhalation chronic (internal) dose :	0,0564	mg/kg/day

Integrated (point estimates)

total external dose:	0,0564	mg/kg
total acute dose (internal):	0,0564	mg/kg
total chronic dose (internal):	0,0564	mg/kg/day

ConsExpo 4.1 report

Scenario 4, inhalation, exposure to vapour from application, big dog
Report date: 18.07.2017

Product

Animal Stichfrei

Compound

Compound name :	IR3535	
CAS number :	52304-36-6	
molecular weight	215	g/mol
vapour pressure	0,15	Pascal
KOW	1,7	10Log

General Exposure Data

exposure frequency	1	1/day
body weight	80	kilogram

Inhalation model: Exposure to vapour : evaporation

weight fraction compound	0,2	fraction
exposure duration	240	minute
room volume	58	m3
ventilation rate	0,6	1/hr
applied amount	9,4	gram
release area	17,9	m2
application duration	10	minute
mass transfer rate	2,55E3	m/min

Uptake model: Fraction

uptake fraction	1	fraction
inhalation rate	0,72	m3/hour

Output

Inhalation (point estimates)

inhalation mean event concentration :	5,51	mg/m3
inhalation mean concentration on day of exposure:	0,918	mg/m3
inhalation air concentration year average :	0,918	mg/m3/day
inhalation acute (internal) dose :	0,198	mg/kg
inhalation chronic (internal) dose :	0,198	mg/kg/day

Integrated (point estimates)

total external dose:	0,198	mg/kg

total acute dose (internal):	0,198	mg/kg
total chronic dose (internal):	0,198	mg/kg/day

ConsExpo 4.1 report

Scenario 4, inhalation, exposure to vapour from application, big dog
Report date: 18.07.2017

Product

Animal Stichfrei

Compound

Compound name :	IR3535	
CAS number :	52304-36-6	
molecular weight	215	g/mol
vapour pressure	0,15	Pascal
KOW	1,7	10Log

General Exposure Data

exposure frequency	1	1/day
body weight	500	kilogram

Inhalation model: Exposure to vapour : evaporation

weight fraction compound	0,2	fraction
exposure duration	240	minute
room volume	58	m3
ventilation rate	2	1/hr
applied amount	49	gram
release area	55,9	m2
application duration	10	minute
mass transfer rate	2,55E3	m/min

Uptake model: Fraction

uptake fraction	1	fraction
inhalation rate	4,8	m3/hour

Output

Inhalation (point estimates)

inhalation mean event concentration :	2,2	mg/m3
inhalation mean concentration on day of exposure:	0,367	mg/m3
inhalation air concentration year average :	0,367	mg/m3/day
inhalation acute (internal) dose :	0,0846	mg/kg
inhalation chronic (internal) dose :	0,0846	mg/kg/day

Integrated (point estimates)

total external dose:	0,0846	mg/kg
total acute dose (internal):	0,0846	mg/kg
total chronic dose (internal):	0,0846	mg/kg/day

Output tables from environmental exposure assessment tools

-

Output tables from environmental exposure assessment tools

-