

EUROPEAN COMMISSION
HEALTH & CONSUMER PROTECTION DIRECTORATE-GENERAL

Directorate E – Food Safety: plant health, animal health and welfare, international questions
E1 - Plant health

Thifensulfuron-methyl
SANCO/7577/VI/97-final

12 December 2001

**COMMISSION WORKING DOCUMENT - DOES NOT NECESSARILY REPRESENT
THE VIEWS OF THE COMMISSION SERVICES**

Review report for the active substance **thifensulfuron-methyl**

Finalised in the Standing Committee on Plant Health at its meeting on 29 June 2001 in view of the inclusion of thifensulfuron-methyl in Annex I of Directive 91/414/EEC.

1. Procedure followed for the re-evaluation process

This review report has been established as a result of the re-evaluation of thifensulfuron-methyl, made in the context of the work programme for review of existing active substances provided for in Article 8(2) of Directive 91/414/EEC concerning the placing of plant protection products on the market, with a view to the possible inclusion of this substance in Annex I to the Directive.

Commission Regulation (EEC) No 3600/92⁽¹⁾ laying down the detailed rules for the implementation of the first stage of the programme of work referred to in Article 8(2) of Council Directive 91/414/EEC, as last amended by Regulation (EC) No 1972/99⁽²⁾, has laid down the detailed rules on the procedure according to which the re-evaluation has to be carried out. Thifensulfuron-methyl is one of the 90 existing active substances covered by this Regulation.

In accordance with the provisions of Article 4 of Regulation (EEC) No 3600/92, Du Pont de Nemours (France) S.A.S. on 23 July 1993 notified to the Commission of their wish to secure the inclusion of the active substance thifensulfuron-methyl in Annex I to the Directive.

In accordance with the provisions of Article 5 of Regulation (EEC) No 3600/92, the Commission, by its Regulation (EEC) No 933/94⁽³⁾, as last amended by Regulation (EC) No 2230/95⁽⁴⁾, designated France as rapporteur Member State to carry out the assessment of thifensulfuron-methyl on the basis of the dossiers submitted by the notifiers. In the same Regulation the Commission specified furthermore the deadline for the notifiers with regard to the submission to the rapporteur Member States of the dossiers required under Article 6(2) of

¹ OJ No L 366, 15.12.1992, p.10

² OJ No L 244, 16.09.1999, p.41.

³ OJ No L 107, 28.4.1994, p.8.

⁴ OJ No L 225, 22.9.1995, p.1

Regulation (EEC) No 3600/92, as well as for other parties with regard to further technical and scientific information; for thifensulfuron-methyl this deadline was 30 April 1995.

Du Pont de Nemours (France) S.A.S. submitted a dossier to the rapporteur Member State which was considered as complete.

In accordance with the provisions of Article 7(1) of Regulation (EEC) No 3600/92, France submitted on 30 April 1996 to the Commission the report of its examination, hereafter referred to as the draft assessment report, including, as required, a recommendation concerning the possible inclusion of thifensulfuron-methyl in Annex I to the Directive. Moreover, in accordance with the same provisions, the Commission and the Member States received also the summary dossier on thifensulfuron-methyl from Du Pont de Nemours (France) S.A.S., on 9 December 1996.

In accordance with the provisions of Article 7(3) of Regulation (EEC) No 3600/92, the Commission forwarded for consultation the draft assessment report to all the Member States on 17 October 1996 as well as to Du Pont de Nemours (France) S.A.S. being the main data submitter, on 20 November 1996.

The Commission organised an intensive consultation of technical experts from a certain number of Member States, to review the draft assessment report and the comments received thereon (peer review), in particular on each of the following disciplines:

- Identity and physical /chemical properties ;
- fate and behaviour in the environment ;
- ecotoxicology ;
- mammalian toxicology ;
- residues and analytical methods ;
- regulatory questions

The meetings for this consultation were organised on behalf of the Commission by the Biologische Bundesanstalt für Land und Forstwirtschaft (BBA) in Braunschweig, Germany, from January to April 1997.

The report of the peer review (i.e. full report) was circulated, for further consultation, to Member States and the main data submitter on 14 April 1997 for comments and further clarification.

In accordance with the provisions of Article 7(3) of Regulation (EEC) No 3600/92, the dossier, the draft assessment report, the peer review report (i.e. full report) and the comments and clarifications on the remaining issues, received after the peer review were referred to the Standing Committee on Plant Health, and specialised working groups of this Committee, for final examination, with participation of experts from the 15 Member States. December 1999 to June 2001, and was finalised in the meeting of the Standing Committee on 29 June 2001.

The present review report contains the conclusions of this final examination; given the importance of the draft assessment report, the peer review report (i.e. full report) and the comments and clarifications submitted after the peer review as basic information for the final examination process, these documents are considered respectively as background documents A, B and C to this review report and are part of it.

These documents were also submitted to the Scientific Committee for Plants. No specific questions were addressed to the Committee. Following an exchange of views the Committee noted that there were no issues that it wished to raise regarding the active substances in the context of a possible inclusion in Annex I to the Directive⁵. The Committee reiterated its earlier statements that absence of comment should only be interpreted as an indication of no obvious reasons necessitating comment.

2. Purposes of this review report

This review report, including the background documents and appendices thereto, have been developed and finalised in support of the Directive 2001/99/EC concerning the inclusion of thifensulfuron-methyl in Annex I to Directive 91/414/EEC, and to assist the Member States in decisions on individual plant protection products containing thifensulfuron-methyl they have to take in accordance with the provisions of that Directive, and in particular the provisions of article 4(1) and the uniform principles laid down in Annex VI.

This review report provides also for the evaluation required under Section A.2.(b) of the above mentioned uniform principles, as well as under several specific sections of part B of these principles. In these sections it is provided that Member States, in evaluating applications and granting authorisations, shall take into account the information concerning the active substance in Annex II of the directive, submitted for the purpose of inclusion of the active substance in Annex I, as well as the result of the evaluation of those data.

In accordance with the provisions of Article 7(6) of Regulation (EEC) No 3600/92, Member States will keep available or make available this review report for consultation by any interested parties or will make it available to them on their specific request. Moreover the Commission will send a copy of this review report (not including the background documents) to all operators having notified for this active substance under Article 4(1) of this Regulation.

The information in this review report is, at least partly, based on information, which is confidential and/or protected under the provisions of Directive 91/414/EEC. It is therefore recommended that this review report would not be accepted to support any registration outside the context of Directive 91/414/EEC, e.g. in third countries, for which the applicant has not demonstrated to have regulatory access to the information on which this review report is based.

3. Overall conclusion in the context of Directive 91/414/EEC

The overall conclusion from the evaluation is that it may be expected that plant protection products containing thifensulfuron-methyl will fulfil the safety requirements laid down in Article 5(1)(a) and (b) of Directive 91/414/EEC. This conclusion is however subject to compliance with the particular requirements in sections 4, 5, 6 and 7 of this report, as well as to the implementation of the provisions of Article 4 (1) and the uniform principles laid down in Annex VI of Directive 91/414/EEC, for each thifensulfuron-methyl containing plant protection product for which Member States will grant or review the authorisation.

Furthermore, these conclusions were reached within the framework of the following uses, which were proposed and supported by the main data submitter:

⁵ Minutes of the plenary of the Scientific Committee on Plants from June 7, 2001

- herbicide against Grass and/or broad leaved weeds in cereals and pasture.

Extension of the use pattern beyond those described above will require an evaluation at Member State level in order to establish whether the proposed extensions of use can satisfy the requirements of Article 4 (1) and of the uniform principles laid down in Annex VI of Directive 91/414/EEC.

With particular regard to residues, the review has established that the residues arising from the proposed uses, consequent on application consistent with good plant protection practice, have no harmful effects on human or animal health. The Theoretical Maximum Daily Intake (TMDI; excluding water and products of animal origin) for a 60 kg adult is 3 % of the Acceptable Daily Intake (ADI), based on the FAO/WHO European Diet (August 1994). Additional intake from water and products of animal origin are not expected to give rise to intake problems.

The review has identified several acceptable exposure scenarios for operators, workers and bystanders, which require however to be confirmed for each plant protection product in accordance with the relevant sections of the above mentioned uniform principles.

The review has also concluded that under the proposed and supported conditions of use there are no unacceptable effects on the environment, as provided for in Article 4 (1) (b) (iv) and (v) of Directive 91/414/EEC, provided that certain conditions are taken into account as detailed in section 6 of this report.

4. Identity and Physical/chemical properties

The main identity and the physical/chemical properties of thifensulfuron-methyl are given in Appendix I.

The active substance shall comply with the specifications given in Appendix I of this report.

The review has established that for the active substance notified by the main data submitter Du Pont de Nemours (France) S.A.S., none of the manufacturing impurities considered are, on the basis of information currently available, of toxicological or environmental concern.

5. Endpoints and related information

In order to facilitate Member States, in granting or reviewing authorisations, to apply adequately the provisions of Article 4(1) of Directive 91/414/EEC and the uniform principles laid down in Annex VI of that Directive, the most important endpoints as identified during the re-evaluation process are set out under point 1 above. These endpoints are listed in Appendix II.

6. Particular conditions to be taken into account on short term basis by Member States in relation to the granting of authorisations of plant protection products containing thifensulfuron-methyl

On the basis of the proposed and supported uses, the following particular issues have been identified as requiring particular and short term attention from all Member States, in the framework of any authorisations to be granted, varied or withdrawn, as appropriate:

- Aquatic organisms: Member states must carefully consider the risk to aquatic plants if this active substance is applied adjacent to surface waters. The exposure input from drain flow with respect to local conditions should also be considered. Risk mitigation measures (e.g. buffer zones) should be applied where appropriate.
- Leaching to groundwater: Particular attention should be given to the potential for groundwater contamination, when the active substance is applied in regions with vulnerable soil and/or climatic conditions.

7. List of studies to be generated

No further studies were identified which were at this stage considered necessary in relation to the inclusion of thifensulfuron-methyl in Annex I under the current inclusion conditions. Some endpoints however may require the generation or submission of additional studies to be submitted to the Member States in order to ensure authorisations for use under certain conditions.

8. Information on studies with claimed data protection

For information of any interested parties, Appendix III gives information about the studies for which the main data submitter has claimed data protection and which during the re-evaluation

process were considered as essential with a view to Annex I inclusion. This information is only given to facilitate the operation of the provisions of Article 13 of Directive 91/414/EEC in the Member States. It is based on the best information available to the Commission services at the time this review report was prepared; but it does not prejudice any rights or obligations of Member States or operators with regard to its uses in the implementation of the provisions of Article 13 of the Directive 91/414/EEC neither does it commit the Commission.

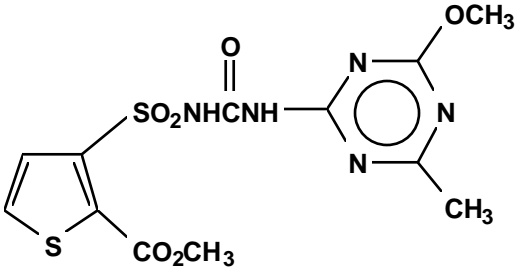
9. Updating of this review report

The technical information in this report may require to be updated from time to time in order to take account of technical and scientific developments as well as of the results of the examination of any information referred to the Commission in the framework of Articles 7, 10 or 11 of Directive 91/414/EEC. Such adaptations will be examined and finalised in the Standing Committee on Plant Health, in connection with any amendment of the inclusion conditions for thifensulfuron-methyl in Annex I of the Directive.

APPENDIX I

Identity, physical and chemical properties

THIFENSULFURON-METHYL

Common name (ISO)	Thifensulfuron-methyl
Chemical name (IUPAC)	Methyl 3-(4-methoxy-6-methyl-1,3,5-triazin-2-ylcarbamoylsulfamoyl)thiophene-2-carboxylate
Chemical name (CA)	3-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)=amino]carbonyl]amino]sulfonyl]-2-thiophenecarboxylic acid (- methylester)
CIPAC No	452
CAS No	79277-27-3 Methylester
EEC No	-
FAO SPECIFICATION	-
Minimum purity	960 g/kg
Molecular formula	C ₁₁ H ₁₁ N ₅ O ₆ S ₂ (C ₁₂ H ₁₃ N ₅ O ₆ S ₂)
Molecular mass	387.4
Structural formula	

Melting point	171 °C
Boiling point	decomposes
Appearance	White crystalline solid
Relative density	1.49 g/ml
Vapour pressure	7.5 · 10 ⁻⁹ Pa at 20 °C 1.7 X 10 ⁻⁸ Pa at 25 °C
Henry's law constant	1.3 · 10 ⁻¹² Pa·m ³ ·mol ⁻¹
Solubility in water	At 25 °C: pH 5: 0.223 g/l pH 7: 2.24 g/l pH 9: 8.83 g/l
Solubility in organic solvents	At 25 °C: acetone: 1.9 g/l acetonitrile: 7.3 g/l dichloromethane: 27.5 g/l ethanol: 0.9 g/l ethyl acetate: 2.6 g/l hexane: < 0.1 g/l methanol: 2.6 g/l xylene: 0.2 g/l
Partition co-efficient (log P_{ow}) Partition co-efficient (log P_{ow})	- 1.7 at pH 7 and 25 °C - 1.7 at pH 7 and 25 °C - 2.10 at pH 9 and 25 °C 1.06 at pH 5 and 25 °C
Hydrolytic stability (DT₅₀)	pH 5: 5.5 d pH 7: 190 d pH 9: 92 d
Dissociation constant	pK _a : 4.0
Quantum yield of direct photo-transformation in water at λ >290nm	Not determined as no absorption at λ > 300 nm
Flammability	Not flammable
Explosive properties	Not explosive
UV/VIS absorption (max.)	pH7 : λ _{max} = 233 nm ε=26100 l·mol ⁻¹ ·cm ⁻¹
	PH10 : λ _{max} = 234 nm ε=26500 l·mol ⁻¹ ·cm ⁻¹
	PH2 : λ _{max} = 224 nm ε=18300 l·mol ⁻¹ ·cm ⁻¹
	Absorption at 290 nm : ε=4440-6720 l·mol ⁻¹ ·cm ⁻¹ ; no absorption at λ > 300 nm
Photostability (DT₅₀)	pH 5: 98 h pH 7: 125 h pH 9: 97 h

APPENDIX II**END POINTS AND RELATED INFORMATION****THIFENSULFURON(-METHYL)****1 Toxicology and metabolism****Absorption, distribution, excretion and metabolism in mammals**

Rate and extent of absorption:	Rapid (70 - 80 %)
Distribution:	Widely
Potential for accumulation:	No accumulation
Rate and extent of excretion:	> 90 % in 96 h, urine
Toxicologically significant compounds:	Parent compound
Metabolism in animals:	Radioactivity mainly excreted as the parent compound in rat and goat

Acute toxicity

Rat LD ₅₀ oral:	LD ₅₀ > 5000 mg/kg bw
Rat LD ₅₀ dermal:	LD ₅₀ > 2000 mg/kg bw
Rat LC ₅₀ inhalation:	LC ₅₀ > 7.9 mg/l
Skin irritation:	Not irritating
Eye irritation:	Not irritating
Skin sensitization (test method used and result):	Not sensitising (Magnusson and Kligman test)

Short term toxicity

Target / critical effect:	No target identified / decreased body weight gain and food consumption
Lowest relevant oral NOAEL / NOEL:	7 mg/kg bw/d, 90 d oral rat The lowest NOEL was 1.3 mg/kg bw/d in the 1 y dog study but was not considered relevant for setting AOEL
Lowest relevant dermal NOAEL / NOEL:	No data, Not required

Lowest relevant inhalation NOAEL /
NOEL:

No data, Not required

Genotoxicity

Negative

Long term toxicity and carcinogenicity

Target / critical effect:

Not identified / decreased body weight gain

Lowest relevant NOAEL:

0.96 mg/kg bw/d, 2 y rat

Carcinogenicity:

Negative

Reproductive toxicity

Target / critical effect -
Reproduction:

Not identified / decreased body weight gain

Lowest relevant reproductive
NOAEL / NOEL:

43 mg/kg bw/d, maternal toxicity
175 mg/kg bw/d, reproductive toxicity

Target / critical effect -
Developmental toxicity:

Retarded ossification (rat)

Lowest relevant developmental
NOAEL / NOEL:

200 mg/kg bw/d, maternal and developmental
toxicity (rat)

Delayed neurotoxicity

No data, no concern from other studies

Other toxicological studies

No other studies submitted (not necessary)

Medical data

No occupational or accidental poisoning reported

Summary

	Value	Study	Safety factor
ADI:	0.01mg/kg bw/d	2 y rat	100
AOEL systemic:	0.07 mg/kg bw/d	90 d rat	100
AOEL inhalation:	Not allocated (not necessary)		
AOEL dermal:	Not allocated (not necessary)		
ARfD (acute reference dose):	Not allocated (not necessary)		

Dermal absorption

10% default value (no study required)
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2 Fate and behaviour in the environment

2.1 Fate and behaviour in soil

Route of degradation

Aerobic:

Mineralization after 100 days:

Non-extractable residues after 100 days:

Relevant metabolites above 10 % of applied active substance: name and/or code
% of applied rate (range and maximum)

¹⁴ C-thiophene thifensulfuron methyl, 2 soil types, 0.05 mg/kg, 25 °C
¹⁴ C-triazine amine, 1 soil type, 0.12 mg/kg, 25 °C
Thifensulfuron : 27 - 40 % (40 - 48 % at 52 weeks) Triazine amine : 10 % (38 % at 65 weeks)
Thifensulfuron : 30 - 37 % (19 - 34 % at 52 weeks) Triazine amine : 6 % (10 % at 65 weeks)
Lab. studies: (¹⁴ C-thiophene thifensulfuron)
IN-L9225 thifensulfuron acid ⁶ 25 %
IN-L9226 O-desmethyl thifen. methyl 15 %
IN-W8268 thiophene sulfonimide 28 % (usually < 10 % after 52 weeks)
Field studies : (¹⁴ C-triazine or thiophene thifensulfuron methyl)
IN-A4098 triazine amine 30 %
IN-L9225 56 %
IN-L9226 27 %
IN-W8268 4 %

Supplemental studies

Anaerobic:

¹⁴ C-triazine thifensulfuron methyl, 1 soil type, 0.05 mg/kg, 25 °C
CO ₂ 1.2 %
Bound 9.5 %
Major metabolite: IN-L9225 (thifensulfuron acid)

⁶ Including 2-acid-3-sulfonamide (not relevant in field contrary to thifensulfuron acid)

Soil photolysis:

¹⁴C-thiophene or triazine thifensulfuron methyl, 1 soil type, 83 g as/ha, 25 °C
 CO₂ < 8 %, bound < 6 %
 2-ester-3-sulfonamide: 20 - 24 %
 IN-A4098 triazine amine: 19 - 32 %
 DT₅₀ (darkness): 21 - 26 d
 DT₅₀ (sunlight) : 14 - 18 d

Remarks:

No

Rate of degradation**Laboratory studies**

DT₅₀lab (20 °C, aerobic):

¹⁴C-labelled substance : 2 soil types (25 °C)
 Unlabelled substance : 2 soil types (22 °C)

	1st order	non linear
Thifensulfuron methyl	2 - 6 d	< 1 - 2.6 d
IN-L9225 thifen. acid ⁷		2.2 - > 365 d
IN-L9226 O-desmethyl	10.8 - 15.3 d	
IN-W8268 thiophen sulf.		9.6 - 96.6 d
IN-A4098 triazine amine	8 months	176 d
2-ester-3-sulfonamide		6-7 d

New studies (20° C)
 IN-A4098 (triazine amine)
 DT₅₀ 22 - 43 d, mean 31.6 d (3 soils pH 5.7-7.7)
 IN-L9225 (thifensulfuron acid)
 DT₅₀ 20 - 157 d, mean 74 d (3 soils pH 5.9-7.5)
 IN-L9226 (O-desmethyl thifensulfuron methyl)
 DT₅₀ < 2.9 d (same soils)
 IN-W8268 (thiophene sulfonimide)
 DT₅₀ 41 - 69 d, mean 56 d (3 soils pH 5.7-7.8)

⁷ Including 2-acid-3-sulfonamide (not separated in laboratory studies only)

DT₉₀lab (20 °C, aerobic):

	non linear
Thifensulfuron methyl	3.1 - 29 d
IN-L9225 thifen. acid ²	> 365 d
IN-W8268 thiophen sulf.	324 - > 365 d
2-ester-3-sulfonamide	346 - > 365 d
New studies (20° C)	
IN-A4098 (triazine amine)	
DT ₉₀ 74 - 144 d, mean 105 d (soils as above)	
IN-L9225 (thifensulfuron acid)	
DT ₉₀ 68 - 522 d, mean 245 d (soils as above)	
IN-L9226 (O-desmethyl thifensulfuron methyl)	
DT ₉₀ < 9.6 d (soils as above)	
IN-W8268 (thiophene sulfonimide)	
DT ₉₀ 135 - 228 d, mean 185 d (soils as above)	
	6.2 - 18.6 d (according to Arrhenius equation)
	5 d (25 °C)

DT₅₀lab (10 °C, aerobic):DT₅₀lab (20 °C, anaerobic):**Field studies
(country or region)**DT_{50f} from soil dissipation studies:DT_{90f} from soil dissipation studies:

Soil accumulation studies:

Remarks

¹⁴ C-thiophene or triazine thifensulfuron methyl, 80 g as/ha, 9 US and Canada locations		
Thifensulfuron methyl : 3 - 20 d, mean 10 d IN-L9225 thifensulfuron acid : 8 - 49 d		
	1st order	non linear
Thif. methyl	10 - 66 d	< 1 - 50 d
Metabolites	not calculated	
No data, not required		
No		

Adsorption/desorptionK_{OC} / K_{OM}:

Soil type	pH	OC %	K _{OC}
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Soil type, pH, OC/OM content:

Sandy loam	6.6	0.64	13
Sandy loam	6.5	1.22	16
Silt loam	5.4	2.5	55
Silt loam	5.2	4.4	29
mean			28

New studies

IN-A4098 : Koc 46 - 226, mean 155

(4 soils OC 0.46 - 3.02 %, pH 5.3 - 6.3)

IN-L9225 : Koc 6.9 - 13.5, mean 11.2

(3 soils OC 1.2 - 2.6 %, pH 5.7 - 7.7)

IN-L9226 : Koc 34 - 199, mean 111 (same soils)

IN-W8268 : Koc 2.6 - 4.3

(3 soils OC 1.2 - 2.6 %, pH 5.7 - 7.7)

Mobility**Laboratory studies:**

Column leaching:

¹⁴C-thiophene (4 soils) and triazine (1 soil)
thifensulfuron methyl
(56 - 77 g as/ha), 500 mm water
Leachates: 67 - 98 %
Thifensulfuron methyl: 60 - 92 %
Thifensulfuron acid: 3 - 5 %

Aged residue leaching:

Silt loam soil, 56 - 77 g as/ha, aging period 6 d,
500 mm water
¹⁴C-thiophene: soil 23 % (bound), leachate 83 %, (thifensulfuron methyl 35 %, thifensulfuron acid 29 %)
¹⁴C-triazine: soil 19 % (bound, triazine amine 4 %), leachate 60 % (thifensulfuron methyl 24 %, thifensulfuron acid 26 %)

Field studies:

Lysimeter/Field leaching studies:

¹⁴C-thiophene or triazine thifensulfuron methyl (36 g as/ha), 3 soil types (loamy sand),
pH 5.6 - 5.9, OM 1 - 1.8 %, outdoor, 1 year, 1288 mm water

soil : no radioactivity below 30 cm (bound, triazine amine, polar metabolites)

leachate : volume 9 - 37 %, concentrations not detected-0.5 µg/l, average concentrations not detected-0.07 µg/l, amounts not detected-0.5 %

Remarks:

No

2.2 Fate and behaviour in water**Abiotic degradation**

Hydrolytic degradation:

¹⁴C-thiophene or triazine thifensulfuron methyl

DT ₅₀	pH 5	4 - 6 d
	pH 7	180 d
	pH 9	90 d (pH not stable)

Relevant metabolites:

2-ester-3-sulfonamide (up to 64 %)
Triazine amine
(2-ester-3-triuret 8 - 32 %)

Photolytic degradation:

¹⁴C-thiophene or triazine thifensulfuron methyl

DT ₅₀	pH	darkness	sunlight
		25 d	4.1 d
	pH 7	183 d	5.2 d
	pH 9	16 d	4 d

Triazine amine: 14 %
Triazine urea: 11 %
Methyl-3-(4-methoxy-6-methyl-1,3,5-triazine-2-yl-amino)-2-thiophene carboxylate: < 10 %

Biological degradation

Ready biological degradability:

No

Water/sediment study:

Relevant metabolites:

- residues in the water phase (% of applied)
maximum at day
at the end of the study at day....
- residues in the sediment (% of applied)
maximum at day....
at the end of the study at day....

¹⁴ C-thiophene or triazine thifensulfuron methyl, 2 systems from Netherland (91 d) DT ₅₀ (whole system): 15 - 16 d Metabolites in water - thifensulfuron acid: 80 % (91 d) - 2-acid-3-sulfonamide: 42 % (56 d) < 20 % (91 d) Metabolites in sediment - thifensulfuron acid: 32 % (91 d)
¹⁴ C-thiophene thifensulfuron methyl, 3 systems from USA, anaerobic condition DT ₅₀ (whole system): 18 - 21 d Metabolites (whole system) - thifensulfuron acid: 30 % (56 d), < 5 % (280 d) - 2-ester-3-sulfon.: 40 % (112 d), < 4 % (336 d) - 2-acid-3-sulfon.: 37 % (196 d), < 24 % (280 d) - 2-acid-3-sulfonic acid: 24 % (196 d) < 16 % (280 d)
New study (2 labels, 2 systems) DT ₅₀ water: 18 - 26 d DT ₉₀ water: 60 - 86 d DT ₅₀ whole system: 21 - 27 d DT ₉₀ whole system: 71 -91 d Mineralization: < 4 % (thiophene), < 9 % (triazine) after 182 d Bound residue: < 18 % (both labels) Metabolites in water - IN-L9225 (thifen. acid): 55 % (70 d), DT ₅₀ 66 - 109 d - IN-JZ789 (O-desmethyl thifen. acid): 21 % (125 d), DT ₅₀ 27 - 51 d - IN-L9223 (2-acid-3-sulfonamide): 39 % (182 d) - IN-V7160 (triazine urea): 25 % (182 d) - IN-A4098 (triazine amine): 19 %, DT ₅₀ 49 -

	71 d No major metabolite in sediment
Accumulation in water and/or sediment	Not expected

Degradation in the saturated zone

Remarks:

2.3 Fate and behaviour in air

Volatility

Vapour pressure:

Henry's law constant:

Photolytic degradation

Direct photolysis in air:

Photochemical oxidative degradation in air:

DT₅₀:

Volatilisation:

Remarks:

3 Ecotoxicology

Terrestrial Vertebrates

Acute toxicity to mammals:

LD₅₀ (rat) > 5000 mg/kg bw

LD₅₀ (rabbit) > 2600 mg/kg bw

Short term oral toxicity to mammals:

NOEL (10 doses oral, rat) = 2 200 mg/kg bw

Long term oral toxicity to mammals:

NOAEL (reproduction, rat) = 175 mg/kg bw

Acute toxicity to birds:

LD₅₀ (mallard duck) > 2510 mg/kg bw

Dietary toxicity to birds:

LC₅₀ (bobwhite quail and mallard duck) > 5620 ppm

Reproductive toxicity to birds:

NOEC (bobwhite quail) = 250 ppm

Aquatic Organisms

Thifensulfuron(-methyl)

Acute toxicity fish:

LC₅₀ > 100 mg/l

Long term toxicity fish:

NOEC = 250 mg/l

Bioaccumulation fish:

BCF < 0.8 (Annex VI trigger: 1000)

Acute toxicity invertebrate:

EC₅₀ (*Daphnia*) = 470 mg/l

Chronic toxicity invertebrate:

NOEC = 100 mg/l

Acute toxicity algae:

EC₅₀ (*S. capricornutum* - 72 h) = 0,0159 mg/l

Chronic toxicity sediment dwelling organism:

not required

Acute toxicity aquatic plants:

EC₅₀ (*L. gibba*) = 0.0013 mg/l

Metabolite : IN-L9225 (thifen. Acid)

Acute toxicity fish:

LC₅₀ (*O. mykiss*) > 1 mg/l

Acute toxicity invertebrate:

EC₅₀ (*Daphnia*) > 0.8 mg/l

Acute toxicity algae:

EC₅₀ (*S. capricornutum*) > 1.02 mg/l

Acute toxicity aquatic plants:

EC₅₀ (*L. gibba*) > 1 mg/l

Metabolite : IN-L9223 (2-acid-3-sulfonamid)

Acute toxicity fish:

LC₅₀ (*O. mykiss*) > 1.1 mg/l

Acute toxicity invertebrate:

EC₅₀ (*Daphnia*) > 1.2 mg/l

Acute toxicity algae:

EC₅₀ (*S. capricornutum*) > 1.3 mg/l

Acute toxicity aquatic plants:

EC₅₀ (*L. gibba*) > 1 mg/l

Metabolite : IN-JZ789 (O. desmethyl thifen. acid)

Acute toxicity fish:

LC₅₀ (*O. mykiss*) > 0.94 mg/l

Acute toxicity invertebrate:

EC₅₀ (*Daphnia*) > 1.1 mg/l

Acute toxicity algae:

EC₅₀ (*S. capricornutum*) > 1.28 mg/l

Acute toxicity aquatic plants:

EC₅₀ (*L. gibba*) > 1 mg/l**Metabolite : IN-V7160 (triazine urea)**

Acute toxicity fish:

LC₅₀ (*O. mykiss*) > 1 mg/l

Acute toxicity invertebrate:

EC₅₀ (*Daphnia*) > 1.3 mg/l

Acute toxicity algae:

EC₅₀ (*S. capricornutum*) > 11 mg/l

Acute toxicity aquatic plants:

EC₅₀ (*L. gibba*) > 10 mg/l**Formulated product : HARMONY 75 WG**

Acute toxicity fish:

LC₅₀ (*O. mykiss*) = 410 (a.s. 300) mg/l

Long term toxicity fish:

NOEC(*O. mykiss*) = 200 (a.s. 156) mg/l

Acute toxicity invertebrate:

EC₅₀ (*Daphnia*) = 320 (a.s. 250) mg/l**Honeybees**

Acute oral toxicity:

LD₅₀ > 7.1 µg as/bee

Acute contact toxicity:

LD₅₀ > 100 µg as/bee

Other arthropod species

Test species	% Effect
<i>Aphidius rhopalosiphi</i> (adults; lab. test)	Effect(mortality)= - 11% Effect(fecundity) : R = 1.3 (82 g/ha; test substance: WG 75%)
<i>Typhlodromus pyri</i> (protonymphs; lab. test)	Effect(mortality)= 4.6% Effect(fecundity) : R = 1.24 (82 g/ha; test substance: WG 75%)
<i>Poecilus cupreus</i> (adults; lab. test)	Effect (mortality) = 0 % Effect (food consumption) = 26 % (10 g/ha; test substance: WG 75%)
<i>Poecilus cupreus</i> (adults; lab. test)	Effect (mortality) = 3.3 % Effect (food consumption) : R = 0.69 (82 g/ha; test substance: WG 75%)
<i>Chrysoperla carnea</i> (larvae; lab. test)	Effect (mortality) = 3.6% Effect (reproduction) : R = 1.2 (82 g/ha; test substance: WG 75%)
<i>Aleochara bilineata</i> (adult; lab. Test)	Effect (mortality) = 0 % Effect (food consumption) = 0 % Effect (ovoposition) = 35 % Effect (hatching rate) = 6 % (10 g/ha; test substance: WG 75%)

Earthworms

Acute toxicity:	LC ₅₀ > 2000 mg as/kg soil
Reproductive toxicity:	not required

Soil micro-organisms

Nitrogen mineralization:	No effect up to 0.4 kg as/ha
Carbon mineralization:	No effect up to 0.4 kg as/ha

APPENDIX III**THIFENSULFURON (-METHYL)**

List of studies for which the main submitter has claimed data protection and which during the re-evaluation process were considered as essential for the evaluation with a view to Annex I inclusion¹.

B.1 Identity, B.2 Physical and chemical properties, B.3 Data on application and further information, B.4 Proposals for classification and labelling, B.5 Methods of analysis

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 2.1.	Anom.	-	DPX M6316 and DuPont Harmony Herbicide Physical and Chemical Characteristics 6316/PC31 DuPont Agricultural Products No GLP Unpublished	
All, 2.1.1	Huntley, K. and L. Edgar	1999	Determination of the melting temperature of thifensulfuron methyl. DuPont-1500 ABC Laboratories, Columbia, Missouri, USA. GLP Unpublished	
All, 2.5.1	Huntley, K. and J. Ambroz	1999	Determination of the ultraviolet- visible absorption of thifensulfuron methyl. DuPont-1498 ABC Laboratories, Columbia, Missouri, USA. GLP Unpublished	

¹ List based on a detailed analysis from RMS.

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 2.6.	Barefoot, A.C. and L.A. Cooke	1990	Water Solubility of DPX-M6316 Using Continuous Sample Agitation AMR 1662-90 DuPont Agricultural Products GLP Unpublished	
All, 2.8	Huntley, K.	2000	Determination of octanol/water partition coefficient (Shake flask method of thifensulfuron methyl). DuPont-1502 ABC Laboratories, Columbia, Missouri, USA. GLP Unpublished	
All, 2.9.4	Huntley, K. and P. Sarff	1999	Determination of the dissociation constant of thifensulfuron methyl. DuPont-1501 ABC Laboratories, Columbia, Missouri, USA. GLP Unpublished	
All, 2.9.2	Schmuckler, M.E.	2000	Photochemical oxidative degradation of thifensulfuron methyl. DuPont-3459 DuPont Agricultural Products. GLP Unpublished	
All, 2.9.1, 2.9.3	Peter, J. and N.-M. Frost	2000	Hydrolysis and photolysis rate of thifensulfuron methyl - DuPont Agricultural Products. Not applicable Unpublished	
All, 2.11- 2.15.	Gravell, R.L.	1995	Flammability-Explosive Properties- Oxidizing Properties of Thifensulfuron Methyl AMR 3100-94 DuPont Agricultural Products GLP Unpublished	

B.5 Methods of analysis

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 4.1.1.	Rodriguez, M.	1993	Validation of Analytical Method for the Determination of Thifensulfuron Methyl (M6316) in Harmony® Herbicide, Pinnacle® Herbicide and Technical Grade Thifensulfuron Methyl AMR 2937-94 DuPont Agricultural Products GLP Unpublished	
All, 4.1.1.	Styles, D.	1994	Validation of Analytical Method for the Determination of DPX-M6316 and DPX-T6376 in Harmony® M 75DF Herbicide AMR 2929-94 DuPont Agricultural Products GLP Unpublished	
All, 4.2.1	Powley, C.R. and N.L. Gagnon	2000	Analytical enforcement method for the determination of metsulfuron methyl and thifensulfuron methyl in cereal grain, straw, and forage and for the determination of thifensulfuron methyl in corn grain, forage and stover using liquid chromatography with ultraviolet detection DuPont-3715 DuPont Agricultural Products Not applicable Unpublished	
All, 4.2.1	Reichert, N.	2000	Independent Laboratory Validation of DuPont Method Report Number DuPont-3715, "Analytical Enforcement Method For The Determination of Metsulfuron Methyl and Thifensulfuron Methyl in Cereal Grain, Straw, and Forage And for the Determination of Thifensulfuron Methyl in Corn Grain, Forage and Stover using Liquid Chromatography with Ultraviolet Detection DuPont-3716 + supplement 1 Institut Fresenius GLP Unpublished	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 4.2.1	Powley, C.R. et al	1995	Analytical method for the determination of thifensulfuron methyl, metsulfuron methyl, chlorsulfuron, tribenuron methyl and DPX-KE 459 in soil AMR 2480-92 DuPont Agricultural Products Yes Unpublished	
All, 4.2.3	Powley, C.R. et al	1995	Analytical method for the determination of thifensulfuron methyl, metsulfuron methyl, chlorsulfuron, tribenuron methyl and DPX-KE 459 in water AMR 2479-92 DuPont Agricultural Products Yes Unpublished	
All, 4.2.5	De Bernard, P.A. and C.R. Powley	1993	Enforcement method for the determination of thifensulfuron methyl, and chlorsulfuron in milk and animal tissues AMR 2715-93 DuPont Agricultural Products Not applicable Unpublished	

B.6 Toxicology and metabolism

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 5.2.6.	Romanelli, P.	1993	Delayed Contact Hypersensitivity Test (Maximization Method) with DPX-M6316-121 in Guinea Pigs HLO 370-93 Biosearch Inc. GLP Unpublished	

B.7 Residue data

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 6.3.	Kennedy, S.M.	1987	Supplemental Data Concerning the Magnitude of the Residues on Grain and Straw from Wheat and Barley after Treatment with Harmony® Herbicide AMR 870-87 DuPont Agricultural Products GLP Unpublished	
All, 6.3..	Ciotti, M.	1998	The Determination of DPX-M6316 in Grass (From Switzerland) by Liquid Chromatography (Season 1987) BG-88-27 Battelle, Switzerland GLP DuPont Unpublished	

B.8 Environmental fate and behaviour

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 7.1.1.2.1	Scott, M.T.	2000	Rates of degradation of [¹⁴ C]IN-A4098, a metabolite of metsulfuron methyl, chlorsulfuron, and thifensulfuron methyl, in three aerobic soils. DuPont-1802 DuPont Agricultural Products. GLP Unpublished	
All, 7.1.1.2.1	Manjunatha, S.	2000	Rates of degradation of IN-L9225 and IN-L9226 (metabolites of thifensulfuron methyl in three aerobic soils) DuPont-2326 Rallis Research Centre, Bangalore, India. GLP	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
			Unpublished	
All, 7.1.2.	Li, Y. and R.D McFetridge	1996	Adsorption of Triazine Amine on four soils AMR 3656-95 DuPont Agricultural Products GLP Unpublished	
All, 7.1.1.2.1	Fang, C.	2000	Rates of degradation of IN-W8268, a metabolite of thifensulfuron methyl, in three aerobic soils. DuPont-3039 DuPont Agricultural Products. GLP Unpublished	
All, 7.1.2	Yeomans, P.	1999	[¹⁴ C]IN-A4098. Adsorption/desorption in soil. DuPont-1805 Covance Laboratories Europe, UK. GLP Unpublished	
All, 7.1.2	Yeomans, P.	1999	[¹⁴ C]IN-L9225. Adsorption/desorption in soil. DuPont-1812 Covance Laboratories Europe, UK. GLP Unpublished	
All, 7.1.2	Yeomans, P.	2000	[¹⁴ C]IN-L9226. Adsorption/desorption in soil. DuPont-1813 Covance Laboratories Europe, UK. GLP Unpublished	
All, 7.1.2	Yeomans, P.	2000	[¹⁴ C]IN-LW8268. Adsorption/desorption in soil. DuPont-3172 Covance Laboratories Europe, UK. GLP Unpublished	
All, 7.2.1.3.2	Spare, W.C.	2000	Degradability and fate of thifensulfuron methyl in the aerobic aquatic environment (water/sediment system). Revision 1. DuPont-1206 RV1 Agrisearch Inc., Maryland, USA. GLP	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
			Unpublished	
All, 7.2.1.3.2	Singles, S.K.	2000	Degradability and fate of thifensulfuron methyl in the aerobic aquatic environment (water/sediment system). DuPont-1206 RV1 SU1 DuPont Agricultural Products. GLP Unpublished	
All 9.2.1	Piyush, S.	2000	Model Assessment of the Potential Groundwater Concentrations of Thifensulfuron Methyl (DPX-M6316 75WG) and its Major Degradates for 20 Years of Continuous Use DuPont-4323 DuPont Agricultural Products GLP not applicable Unpublished	
All 9.2.3	Piyush, S. and M. Ball	2000	Predicted Environmental Concentrations of Thifensulfuron Methyl (DPX-M6316 75WG) and Metabolites in Animal Foods, Surface Water, Sediment, Soil and Air, Tier 1 Modelling for European Union DuPont-4319 DuPont Agricultural Products GLP not applicable Unpublished	

B.9 Ecotoxicology

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 8.1.3.1.	Beavers, J. et al.	1994	H-19,811 (M6316 [Thifensulfuron methyl]): A One-Generation Reproduction Study with the Northern Bobwhite (Colinus Virginianus) HLO 411-94 Wildlife International GLP Unpublished	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 8.1.3.2.	Beavers, J. et al.	1994	H-19,811 (M6316 [Thifensulfuron methyl]): A One-Generation Reproduction Study with the Mallard (<i>Anas platyrynchos</i>) HLO 410-94 Wildlife International GLP Unpublished	
All, 8.2.1	Samel, A.	1999	IN-L9225. Static-Renewal, Acute, 96-Hour, Limit Test to Rainbow Trout, <i>Oncorhynchus mykiss</i> . DuPont-3219 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.1	Samel, .A.	1999	IN-L9223. Static-Renewal, Acute, 96-Hour, Limit Test to Rainbow Trout, <i>Oncorhynchus mykiss</i> DuPont-3217 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.1	Hoke, R.A.	1999	IN-JZ789. Static-Renewal, Acute, 96-Hour, Limit Test to Rainbow Trout, <i>Oncorhynchus mykiss</i> DuPont-1655 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.1	Samel, .A.	1999	IN-V7160. Static-Renewal, Acute, 96-Hour, Limit Test to Rainbow Trout, <i>Oncorhynchus mykiss</i> DuPont-3561 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.4.	Hutton, D.G.	1989	Static Acute 48-Hour EC50 of INN9134-1 to <i>Daphnia magna</i> HLR 137-89 DuPont Haskell Laboratory GLP Unpublished	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 8.2.4	Samel, A.	1999	IN-L9225. Static, Acute, 48-Hour Limit Test to <i>Daphnia magna</i> . DuPont-3218 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.4	Samel, .A.	1999	IN-L9223. Static, Acute, 48-Hour Limit Test to <i>Daphnia magna</i> . DuPont-3216 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.4	Hoke, R.A.	1999	IN-JZ789. Static, Acute, 48-Hour Limit Test to <i>Daphnia magna</i> . DuPont-1654 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.4	Samel, .A.	1999	IN-V7160. Static, Acute, 48-Hour Limit Test to <i>Daphnia magna</i> . DuPont-3560 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.6	Hicks, S.L.	1995	Thifensulfuron methyl (DPX-M6316): Influence on growth and reproduction of flour select algae species AMR 2890-93 ABC Laboratories Inc. GLP Unpublished	
All, 8.2.6	Boeri, R.L, J.P. Magazu and T.J. Ward	1999	Thifensulfuron methyl technical. Growth and reproduction test with the freshwater algae, <i>Anabaena flos- aquae</i> . DuPont-2378 T.R. Wilbury Laboratories, Massachusetts, GLP UnpublishedUSA	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 8.2.6	Sloman, T.L.	1999	IN-V7160. Influence on Growth and Growth Rate of the Green Alga <i>Selenastrum capricornutum</i> . DuPont-3190 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.6	Sloman, T.L.	1999	IN-L9223. Influence on Growth and Growth Rate of the Green Alga <i>Selenastrum capricornutum</i> . DuPont-3012 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.6	Sloman, T.L.	1999	IN-JZ789. Influence on Growth and Growth Rate of the Green Alga <i>Selenastrum capricornutum</i> . DuPont-2850 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.6	Sloman, T.L.	1999	IN-L9225. Influence on Growth and Growth Rate of the Green Alga <i>Selenastrum capricornutum</i> . DuPont-2762 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.8	Sloman, T.L. and S.E. Leva	1997	IN-L9225. Influence on Growth and reproduction of <i>Lemna Gibba</i> G3. AMR 4302-97 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.8	Sloman, T.L.	1999	IN-JZ789. Influence on Growth and reproduction of <i>Lemna Gibba</i> G3. DuPont-2849 DuPont Haskell Laboratory GLP Unpublished	
All, 8.2.8	Sloman, T.L.	1999	IN-L9223. Influence on Growth and reproduction of <i>Lemna Gibba</i> G3. DuPont-3013 DuPont Haskell Laboratory GLP	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
			Unpublished	
All, 8.2.8	Sloman, T.L.	1999	IN-V7160. Influence on Growth and reproduction of <i>Lemna Gibba</i> G3. DuPont-3189 DuPont Haskell Laboratory GLP Unpublished	
All, 8.3.1.	Vinall, S.	1998	Thifensulfuron methyl technical. Acute oral and contact toxicity to the honeybee, <i>Apis mellifera</i> L. AMR 5091-98 University of Southampton, UK. GLP Unpublished	
All, 8.3.2	Austin, H.	1998	Thifensulfuron methyl 75WG (75DF). A laboratory study to evaluating the effects on the parasitic wasp <i>Aphidius rhopalosiphi</i> (Hymenoptera, Braconidae) AMR 5197-98 Ecotox Ltd., UK. GLP Unpublished	
All, 8.3.2	Tessier, C.	1999	Thifensulfuron methyl 75WG (75DF). A laboratory study to evaluating the effects on the predatory mite <i>Typhlodromus pyri</i> (Acari, Phytoseiidae) AMR 5198-98 Ecotox Ltd., UK. GLP Unpublished	
All, 8.3.2	Austin, H.	1998	Thifensulfuron methyl 75WG (75DF). A laboratory study to evaluating the effects on the green lacewing <i>Chrysoperla carnea</i> (Neuroptera, Chrysopidae) AMR 5200-98 Ecotox Ltd., UK. GLP Unpublished	

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
All, 8.3.2	Sankanu, A.	1999	Thifensulfuron methyl 75WG (75DF). A laboratory study to evaluating the effects on the beetle <i>Poecilus cupreus</i> (Coleoptera, carabidae). AMR 5199-98 Ecotox Ltd., UK. GLP Unpublished	

B.10 Confidential information

Annex point/ reference number	Author(s)	Year	Title Source (where different from company) Company, Report No. GLP or GEP status (where relevant) Published or not	Reports on previous use in granting national authorizations
<i>Doc.J, 1.8, 1.9</i>	<i>Davis, R.F.</i>	<i>1995</i>	<i>Thifensulfuron Methyl: Product Description and Composition AMR 3016-94 DuPont Agricultural Products GLP Unpublished</i>	
<i>Doc.J, 1.11</i>	<i>Waeghe, T.J.</i>	<i>1995</i>	<i>Technical Grade Thifensulfuron Methyl: Analysis and Certification of Product Ingredients AMR 2636-93 DuPont Agricultural Products GLP Unpublished</i>	