DP Barcode: D178317/D178754
D182898/D184406
D184487
PC Code No.: 129016

Date out of EFGWB: 12 MAR 1993

12 MAR 1993

TO: J. Miller/S. Robins
Product Manager #23
Registration Division (H7505C)

FROM: Paul Mastradone, Ph.D., Chief
Environmental Chemistry Review Section #1
Environmental Fate and Ground Water Branch

THRU: Hank Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Flumetsulam

Attached, please find the EFGWB review of ...

Reg./File #:

Chemical Name: N-(2,6-difluorophenyl)-5-methyl-1,2,4-triazolo[1,5a]pyrimidine-2-sulfonamide

Type Product: Herbicide

Common Name: XRD-498

Company Name: DowElanco

Purpose: To review response to DERs, EUP, and new chemical screen; minutes of meeting; waiver request; and review of environmental fate studies to support registration

Action Code: 710/711 EFGWB #(s): 92-0883/0943 92-1385 93-0100/0137 Total Review Time: 5.8 days

EFGWB Guideline/MRID Summary Table : The review in this package contains									
161-1		162-1		163-3		165-1	41931738 42512502	166-1	
161-2		162-2		164-1		165-2		166-2	
161-3		162-3		164-2		165-3		166-3	
161-4		162-4		164-3		165-4		167-1	
201-1		163-1	42512501	164-4		165-5		167-2	
202-1		163-2		164-5					

1. CHEMICAL:

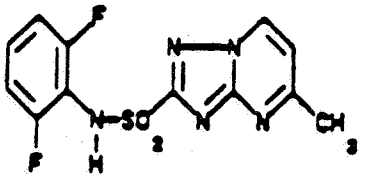
Chemical name: N-(2,6-difluorophenyl)-5-methyl-1,2,4-triazolo[1,5a] pyrimidine-2-sulfonamide

CAS no.: 98967-40-9

Common name: XRD-498; XRM-5019

Trade name: Flumetsulam

Chemical structure:



Physical/Chemical properties of active ingredient:

Physical characteristics:	Light tan power
Molecular formula:	$C_{12}H_9F_2N_5O_2S$
Molecular weight:	325.3
Melting point:	253°C
Vapor Pressure:	0.8 X 10^{-15} mm Hg at 20°C
Solubility:	49.1 mg/L at pH 2.5 (25°C) 5.65 g/L at pH 7.0 (25°C)
Octanol/water partition coefficient:	= 1.62

2. TEST MATERIAL:

See individual DERs.

3. STUDY/ACTION TYPE:

To review response to DERs, EUP, and new chemical screen; minutes of meeting; waiver request; and to review of environmental fate studies to support registration.

4. STUDY IDENTIFICATION:

Lade, D.H. CORRESPONDENCE TO J. MILLER: DE-498 (FLUMETSULAM)-ENVIRONMENTAL FATE AND GROUNDWATER REVIEW-3 APRIL 1992. DowElanco, Indianapolis, IN, 30 April 1992; Received by EPA 5 May 1992.

Lade, D.H. CORRESPONDENCE TO J. MILLER: DE-498 (FLUMETSULAM) - WAIVER REQUEST FOR SPRAY DRIFT STUDIES (201-1 AND 202-1). DowElanco, Indianapolis, IN, 4 November 1992; Received by EPA 5 November 1992.

Lade, D.H. CORRESPONDENCE TO J. MILLER: DE-498 (FLUMETSULAM) - WAIVER REQUEST FOR VOLATILITY STUDIES (161-4, 163-2, 163-3). DowElanco, Indianapolis, IN, 4 November 1992; Received by EPA 5 November 1992.

Lade, D.H. CORRESPONDENCE TO J. MILLER: FLUMETSULAM (DE-498) - MINUTES OF 27 MAY 1992 MEETING WITH U.S. EPA/EFGWB. DowElanco, Indianapolis, IN; 17 August 1992; Received by EPA 19 August 1992.

Wolt, Jeffrey; Shapler, K.; Estigoy, L. AGED LEACHING OF [^{14}C]DE-498 IN A CANADIAN FIELD SOIL. Sponsored and Submitted by DowElanco, Midland, MI; Performed by PTRL-West, Inc., Richmond, CA under Project No. 367W; Study completed on 23 September 1992; Received by EPA 15 October 1992; MRID No. 42512501.

Hamburg, A.W. and Byrne, S.L. OVERVIEW FOR THE STUDIES ON THE ACCUMULATION IN IN CONFINED ROTATIONAL CROPS SUBMITTED FOR FLUMETSULAM (MRID 41263232, 41931738, AND 41931739). Sponsored and Performed by DowElanco, Midland MI under Laboratory Study ID MET90069.01; Study completed on 28 September 1992; Received by EPA 15 October 1992; MRID No. 42512502.

Hamburg, A.W.; Miller, J.H.; Lardie, T.S.; and Baldwin, W.S. [^{14}C]XRD-498: CONFINED ACCUMULATION STUDY ON ROTATIONAL CROPS PLANTED AT 365 DAYS AFTER SOIL TREATMENT. Performed and Submitted by DowElanco; Midland, MI under Project ID GH-C 2244 and Protocol 87058; Study completed on 18 September 1989; Received by EPA 19 June 1991; MRID No. 41931738.

5. REVIEWED BY:

Gail Maske
Chemist, Review section #1
OPP/EFED/EFGWB

Signature: _____
Date: 12 MAR 1993

6. APPROVED BY:

Paul Mastradone, Chief
Review section #1
OPP/EFED/EFGWB

Signature: _____
Date: 12 MAR 1993

7. CONCLUSIONS:

The following responses to DERs, EUP, and new chemical screen (Part A); minutes of 27 May 1992 meeting (Part B); waiver request (Part C); and environmental fate studies (Part D) were submitted for review and/or to support registration of XRD-498.

Part A-1: Responses to DERs

1. The registrant, DowElanco, is requesting a review of their response to deficiencies found in the new chemical screen (discussed at the 27 May 1992 meeting). Additional data were submitted for the aerobic soil metabolism, anaerobic aquatic metabolism, terrestrial field dissipation, and confined rotational data requirements, as well.

2. EFGWB's Conclusions:

   a. Aerobic soil metabolism (162-1)

      The additional data reviewed in this submission is scientifically valid and provides information on the pattern of formation and decline of parent and degradates. Furthermore, the combined aerobic soil metabolism studies (MRID 41931731 and 41931732), along with the additional data, are acceptable to fulfill the data requirement (162-1). No further aerobic soil metabolism data are needed for XRD-498 at this time. (See DISCUSSION for details.)

      The aerobic soil metabolism data indicates that XRD-498 degrades into multiple metabolites all present at low concentrations. XRD-498 was reported to have a half-life of 2 month in separate studies (MRID 41931731 and 41931732) using ^{14}C labels in each of the respective rings and applied to clay, sandy clay loam, or silt loam soils.

   b. Anaerobic aquatic metabolism (162-3)

      The additional data submitted is scientifically valid and provides information on the major components and the anaerobic aquatic degradation pathway. Furthermore, the anaerobic aquatic metabolism study (MRID 41931733) combined with the additional data is acceptable to fulfill the data requirement (162-3). No futher anaerobic aquatic metabolism data are needed for XRD-498 at this time. (See DISCUSSION for details.)

      The anaerobic aquatic metabolism data indicates that XRD-498 degrades into multiple metabolites all present at concentration of ≤ 0.01 ppm and $<10\%$ of applied test material. XRD-498 was reported to have a half-life of ≈ 183 days in separate studies (MRID 41931733) using separate radiolabelled rings when applied to clay soils.

c. Terrestrial field dissipation (164-1)

Since no degradates comprised ≥10% of applied (or ≥0.01 ppm) in laboratory studies, there are no identified metabolites to address in the terrestrial field dissipation study. Therefore, the terrestrial field dissipation is acceptable to fulfill the data requirement. No further terrestrial field dissipation data are needed XRD-498 at this time. (See DISCUSSION for details.)

The terrestrial field dissipation confirms the laboratory data which indicated that XRD-498 is persistent and has the poten- to leach. XRD-498 had reported half-lives of 1.5 months, <1 week, 3 months, and 1.5 months when applied to sandy clay loam, silty clay loam, silt loam, and silt loam soils, respectively. Based on soil core analysis of these soils, XRD-498 was reported to leach in well drained and low organic matter soil (<1%). In this type soil, XRD-498 was reported found at levels of 7 ppb in the 12-18" soil depth samples after 2 weeks and once at a level of 2.5 ppb in the 3-4 foot soil depth samples. However, in the other soils, XRD-498 was not reported below the 12" depth at a detection limit of 2.5 ppb.

d. Confined rotational crop (165-1)

The additional data submitted is scientifically valid and provides information on the accumulated degradates. The data indicates that unknown Components A, B, and C are comprised of at least two or more components and that rotational crops grown at 30, 120, and 365 days posttreatment accumulate XRD-498 residues (MRID 41263232 and 41931738) below the tolerance (0.05 ppm). The combined confined rotational crop studies (MRID Nos. 41263232, 41931738, and 41931739) along with the additional data can be used to fulfill the data requirement (165-1). No further confined rotational crop data are needed for XRD-498 (See DISCUSSION for details). However, it should be noted that the results for 30-day and 120-day rotational crop intervals reported in one study (MRID 41931739) showed slightly higher accumulations (up to ≈0.08 ppm for soybean trash) of ^{14}C-XRD-498 residues in some rotational crop tissues.

The results of the 30 day, 120 day, and 365 day rotational crops intervals indicated that total ^{14}C-XRD-498 residue accumulation in lettuce, carrot roots and tops/turnip roots and tops, and soybeans was <0.01 ppm. However, total ^{14}C-XRD-498 residues reported in green bean plants, wheat grain, and wheat straw/ chaff ranged from 0.010 to 0.047 ppm. In a separate study, (MRID 41931739) wheat forage, soybean forage, soybean trash, and wheat straw/chaff had reported total ^{14}C-resiudes of 0.039, 0.056, 0.082, and 0.060 ppm, respectively. Therefore, for leafy and root crops, a 30 day rotational crop interval is satisfac-

tory. For small grains crops, a 120 day rotational crop interval is needed.

Part A-2: EUP and New Chemical Screen Status

Based on the fact that XRM-5019 contains only the active ingredient XRD-498, the registrant is requesting clarification of the status of the EUP and new chemical screen for XRM-5019.

EFGWB Conclusions:

In the EUP (WGM;03/24/92) and the new chemical screen (WGM; 07/23/92) reviews, XRM-5019 was not considered a mixture of two or more active ingredients. Furthermore, in the review of these actions, sufficient data were found to support an EUP and new chemical screen for XRM-5019 for use on corn and soybeans. Therefore, there is no change in the status of the EUP and new chemical screen for XRM-5019 which is that there is sufficient data to support the EUP and new chemical screem for XRM-5019.

For additional comments see DISCUSSION-Part A-2

Part B: Minutes of 27 May 1992 meetings

DowElanco submitted the minutes to the 27 May 1992 meeting between representatives of DowElanco and the Agency were submitted for review. The purpose of the meeting was to discuss the environmental fate assessment (WGM;03/24/92) for XRD-498.

EFGWB's Conclusion:

The minutes accurately reflect the discussions of the meeting and conclusions of the meeting. The conclusions of the meeting being that DowElanco would resubmit their 30 April response and would provide additional confined rotational crop data and aged mobility data which has been submitted and reviewed in this action.

For additional comments see DISCUSSION - Part B

Part C: Waiver Request for Spraydrift and Volatility studies

C-1 Waiver of Spraydrift Studies

Because DowElanco is an active member of the Spray Drift Task Force, the registrant is requesting a waiver for the stray-drift studies [droplet size spectrum (201-1) and the drift field evaluation (202-1)] data requirements.

EFGWB's Conclusion:

There is not sufficient data to support a waiver of the spray drift studies (droplet size spectrum (201-1) and the drift field evaluation (202-1)) data requirements at this time. However, because DowElanco is a member of the Spray Drift Task Force, EFGWB does not require droplet size spectrum or drift field evaluation data on XRD-498 presently. If needed in the future, the registrant may work with the Spray Drift Task Force which is scheduled to submit its final report in December 1994. This assumes, however, that neither EEB, TOX, nor any other entity within OPP requires these data in advance of the Task Force's final report.

C-2 Waiver of Volatility Studies

Based on the low vapor pressure (0.8×10^{-15} mm Hg) and toxicological classification of ≥3 of XRD-498, the registrant is requesting a waiver of the following volatility studies:

161-4 Photodegradation in air
163-2 Volatility - lab
163-3 Volatility - field

EFGWB's Conclusion

Due to the low vapor pressure (0.8×10^{-15} mm Hg) of XRD-498, there is sufficient data to support a waiver of the above volatility data requirements. Unless there are hazardous volatiles involved to which users are exposed, EFGWB does not generally need volatility data for pesticides having vapor pressures $<10^{-6}$ mm Hg.

Part D: Environmental Fate Studies Reviewed

1. The registrant submitted an aged leaching study (163-1) and confined rotational crops study (165-1) to support registration of XRD-498.

EFGWB Conclusions

a. Aged leaching study (163-1)

The soil column study (MRID 42512501) is scientifically valid and provides supplemental data on aged XRD-498. However, the study can not be used to fulfill the aged mobility data requirement for the following reasons:

Residues characterization was not provided. Therefore, the mobility of individual degradates is not fully understood.

Only one soil texture was used for the study.

However, based on supplemental data reviewed in rebuttal to the aerobic and anaerobic metabolism reviews (WGM;03/24/92), it is believed that residues labelled unknown actually are comprised of two or more individual degradates. Therefore, since no metabolites were present at concentrations ≥10% of applied (or ≥0.01 ppm), no further aged mobility data is needed at this time.

Radioactive XRD-498 was reported to be highly mobile (K_d (distribution coefficient = 1.33 L/kg^{-1}), leachate contained 39.8% of applied) in both silt loam soil columns. The 0-6 cm soil fraction of soil columns contained >44.6% (0.021 ppm) of the applied radioactivity. Whereas, the lower fractions each contained <4% (0.001 ppm) of the applied radioactivity which was determined by mean recovered from aged soil flasks. Analysis of radioactivity present in the leachate indicated that XRD-498 degradates are mobile, as well. Unchanged parent XRD-498 comprised 75% of radioactivity found in leachate with the other 25% being comprised of unidentified residues.

Material balances were reported to be ≈100% (105.2% and 97.4% for duplicate samples) of applied radioactivity which included radioactivity found in leachate, soil, and volatile traps. See DER for further details.

b. Confined rotational crops study (165-1)

The confined rotational crops study is scientifically valid and can be used as supplemental data. Because an outside nonconfined system was use and the validity of the data for the root crop is uncertain, it can not be used to fulfill the data requirement (165-1). However, based on the additional data furnished in the 27 May 1992 meeting and in a rebuttal to the earlier review (WGM;03/24/92) of XRD-498 studies, no further confined rotational crop data for XRD-498 is needed at this time.

^{14}C-Residues appeared to not accumulate (≤10 ppb) in lettuce, turnips, green beans, and spring wheat when planted in treated soil at 365 days posttreatment. Residues levels were considered to low for characterization. In soil samples, approximately 84% of the radioactive residues found in 0 - 48 cm soil cores appeared to be in the 0 - 15 cm segment. Furthermore, the majority (68%) of the recovered soil radioactive residues were found in the 0 -7.6 cm segment. The ^{14}C-residue in soil samples was reported to be 21 ppb at 365 days posttreatment a majority of which was present as unextractable residues. This can be compared with ^{14}C-residue levels at 30 and 118 days

posttreatment of 66 and 18 ppb. XRD-498 was tentatively identified by co-chromatography at 1.4 ppb (or ≈2% of initial application rate) in treated soil aged for 365 days. See DER for further details.

ENVIRONMENTAL FATE ASSESSMENT

Based on acceptable environmental fate data submitted from the 1989 new chemical screen to present, XRD-498 (flumetsulam) appears to be persistent and mobile in soil and aquatic enviroments. However, XRD-498 does appear to degrade slowly through abiotic processes (photolysis ($t_{½}$=≈90 days for photogradation on soil and $t_{½}$=≈150 days in light exposed sterile water, hydrolysis=<1% degradation at 66 days) and biotic ($t_{½}$=2 months and 183 days for aerobic soil and anaerobic aquatic metabolism, respectively). The mobility of XRD-498 was demonstrated in two supplemental batch equilibrium data (K_d on twenty-three soils ranged from 0.05 - 2.42; K_{oc} values for the same twenty-three soils ranged from 5 to 182). However, desorption has not been adequately addressed. Furthermore, terrestrial field dissipation data confirms the above and indicate that XRD-498 is persistent ($t_{½}$=≈1.5 to 3 months on sandy loam and silt loam soils) and mobile (leached to a depth of 18" in some soils). Therefore, field and laboratory data are consistent and along with physical data indicate that XRD-498 may be of concern for groundwater and surface water contamination.

Since XRD-498 is applied at such a low concentration (0.0078 to 0.13 lb ai/A) and adsorption appears to increases with decreasing pH and increasing organic matter content, no degradates above 0.01 ppm (<10% of applied) were detected and identified in laboratory and field data. However, aged column leaching data (MRID 42512501) indicated that XRD-498 residues are mobile. Forty percent of applied test material was reported found in leachate of which 25% was determined not to be parent material.

Based on the octanol/water coefficient (1.62), XRD-498 is not expected to accumulate in fish. In addition, acceptable and supplemental confined rotational crop data indicate that XRD-498 is accumulated at very low concentrations in most rotational crops (≤0.01 ppm).

8. RECOMMENDATIONS:

The registrant should be notified of the following:

a. The aerobic soil metabolism (MRID 41931732), anaerobic aquatic metabolism (MRID 41931733), terrestrial field dissipation (MRID 41931735), and confined rotational crops (combined MRID 41263732, 41931738, and 41931739) studies are acceptable to fulfill the respective data requirements.

b. The status of the EUP ((WGM;03/24/92) and new chemical screen for XRM-5019 (WGM;07/23/92) is as previously reported in the respective reviews. There is sufficient data to support the EUP for use on corn and soybeans

and to pass the new chemical screen for the terrestrial field dissipation use pattern.

c. The minutes of the 27 May 1992 meeting adequately reflect the discussion and conclusions of the meeting.

d. The aged mobility study can be used as supplemental data in the enviromental fate assessment.

e. The status of the Environmental Fate Data Requirements for terrestrial food and feed crops use pattern is on the following page:

Environmental Fate Data Requirement	Status of Data Requirement	MRID No.
Degradation Studies-Lab		
161-1 Hydrolysis	Fulfilled (WGM;02/02/90)	41263229
161-2 Photodegradation in water	Fulfilled (GJT;03/24/92)	41931726 41931727
161-3 Photodegradation on soil	Fulfilled (WGM;03/24/92)	41931728 41931729 41931730
161-4 Photodegradation in air	Not Required[1]	
Metabolism Studies-Lab		
162-1 Aerobic soil	Fulfilled (WGM;06/22/90) (WGM;03/24/92) (WGM;03/10/93)	41263230 41931731 41931732
162-3 Anaerobic aquatic	Fulfilled (WGM;03/24/92) (WGM;03/10/93)	41931733
Mobility Studies		
163-1 Leaching, Adsorption/ Desorption	Not Fulfilled[2] (WGM;06/22/90)	40673501 41263231 41290403
163-2 Volatility-lab	Not Required[1]	
163-3 Volatility-field	Not Required[1]	
Dissipation Studies-field		
164-1 Soil	Fulfilled (WGM;03/24/92) (WGM;03/10/93)	41931735

Con't--	Environmental Fate Data Requirement	Status of Data Requirement	MRID No.
	Accumulation Studies		
	165-1 Rotational crops-confined	Fulfilled (WGM;02/02/90) (WGM;03/24/92) (WGM;03/10/93)	41263232 41931738 41931739
	165-4 in Fish	Not Required (WGM;06/22/90)	

[1] Based on the low vapor pressure (0.8×10^{-15} mm Hg), there is sufficient data to support a waiver request for these studies.

[2] Desorption has not been adequately address for unaged XRD-498.

9. BACKGROUND:

XRD-498 is a selective herbicide proposed for use to control broadleaf weeds in soybeans and field corn. The single active ingredient formulations is 75% G. XRD-498 may be applied using preplant incorporation, preemergence, or postemergence treatment. Proposed application rates are 0.03-0.13 lb ai/A for preplant incorporation and preemergence treatment; postemergence rates on field corn are 0.015-0.062 lb ai/A, and postemergence rates on soybeans are 0.0078-0.015 lb ai/A. Application is by ground spray; sufficient agitation should be maintained during mixing and spraying to ensure a uniform spray mixture. When applied for preplant incorporation, XRD-498 should be incorporated into the top 2 to 3 inches of the final seedbed. Preemergence and postemergence applications are made by broadcast spraying. Livestock should not be allowed to graze in treated areas, and harvest-treated silage or grain should not be fed to meat or dairy animals.

10. DISCUSSION:

See individual DERs

Part A: Registrant's response to DERs, EUP, and new chemical screen Reviews

Part A-1 Registrant's response to DERs:

a. Aerobic soil metabolism (162-1)

a.1 Citation For Studies Under Discussion:

Lehmann, R.G.; Holbrook, D.L.; Altscheffel, S.A.; Batzer, F.R.; Brown, S.M.; White, F.H. AEROBIC SOIL METABOLISM OF ANILINE-LABELED DE-498 IN HOYTVILLE SOIL. Preformed and Submitted by DowElanco; Midland, MI under Dow Protocol No. 89002; Study completed on 31 May 1991; Received by EPA 19 June 1991; MRID No. 41931731.

Havens, P.L. and Miller, J.R. AEROBIC SOIL METABOLISM OF $_{14}$C-(ANILINE)-DE-498 IN TWO SOILS. Preformed and Submitted by DowElanco; Midland, MI under Laboratory Project ID ENV-91006.00; Study completed on 7 June 1991; Received by EPA 19 June 1991; MRID No. 41931732.

a.2 Original EFGWB Comments:

In the previous review (WGM;03/24/92), the aerobic soil metabolism studies (MRID 41931731 & 41931732) were found supplemental. The patterns of formation and decline of degradates and XRD-498 were not addressed.

a.3 DowElanco's Response:

Four to five unknown peaks have been traced with time in the organic extracts of all aerobic metabolism studies. The leading peak (Peak 1) typically dominates the unknown fractions and does accumulate at 10% of applied or ≥1 ppb when XRD-498 is applied to soils at 0.07 to 0.23 µg/kg (1X to 3X rates; Table 3). Patterns of decline of these degradates are reported in Figures 1 to 8.

An elevated rate study (MRID 4193173) was conducted in an attempt to identify degradates. Extensive ion pair reverse phase LC chromatography in combination with derivation reactions and MS were employed in an effort to identify the unknown(s) associated with the principal metabolite peak (Peak I). This work demonstrated that Peak I was comprised of at least 2 and possibility 5 separate compounds.

Therefore, concentrations associated with any on unknown peak in elution profiles of acetone extracts appear not exceed 10% of applied or 10 or 10 ppb under the LC conditions employed for any of >20 soils reported. Elevated rate studies have been employed in an effort to identify unknown peaks associated with acetone extracts. These studies show that the primary metabolite peak is in fact comprised of multiple peaks. Furthermore, unknowns associated with the available fraction are all significantly below 10% of applied or 10 ppb.

a.4 EFGWB's Rejoiner:

The data submitted is scientifically valid and provides further information on the aerobic metabolism degradation of XRD-498 and its degradation pathway.

a.5 EFGWB's Overall Conclusion:

Based on further understanding of the aerobic metabolism of XRD-498 and of the pattern of formation and decline of XRD-498 and its residues, there is sufficient data to satisfy this data requirement. The combined aerobic soil metabolism studies (MRID 41931731 and 41931732), along with the additional data, are acceptable to fulfill the data requirement (162-1). No further aerobic soil metabolism data are needed for XRD-498 at this time.

b. Anaerobic aquatic metabolism (162-3)

b.1 Citation For Study Under Discussion:

Wolt, J.D.; Schwake, J.D.; Batzer, F.R.; Brown, S.M.; McKendry, L.H.; Miller, J.R.; Roth, G.A.; and Stanga, M.A. ANAEROBIC AQUATIC METABOLISM OF XRD-498 [N-(2,6-DIFLUOROPHENYL)-5-METHYL-(1,2,4)TRIAZOLO(1,5-a)PYRIMIDINE-2-SULFONAMIDE. Preformed and Submitted by DowElanco; Midland, MI under Dow Protocol No. 89080; Study completed on 14 June 1991; Received by EPA 19 June 1991; MRID No. 41931733.

b.2 Original EFGWB Comments:

In the previous review (WGM;03/24/92), the anaerobic aquatic metabolism study (MRID 41931733) was found supplemental. The metabolite (degradate [12]), which reached a concentration of 52% of applied radioactivity by day 360 posttreatment, was only tentatively identified.

b.3 DowElanco's Response:

The degradate of anaerobic aquatic metabolism is unstable under aerobic conditions. The reduction of XRD-498 results in a complex equilibrium mixture of the enamine, imine, hydrate, and ketoamine (Figure 9). The author states that these products cannot be separated from this mixture and slight variations in reaction conditions may favor differing distributions of the mixture components.

The anaerobic degradate was stable as long as it was maintained in the organic rich mother solution in which it was formed without undo aeration. Preparatory work to clean the isolated degradate fraction from the organic-rich mother solution for MS workup resulted in loss of the degradate. Therefore, the quality of

direct probe MS results was limited. Since a suitable degradate standard was lacking, the assignment of reduced-flumetsulam-hydrate was made indirectly on the basis of (1) reductive chemistry of XRD-498, (2) the nature of the test system (3) the ability to react reduced product mixtures and the isolated degradate peak (Figure 9), and (4) interpretation of negative ion chemical mass spectra. Based on these preliminary results, the anaerobic degradate was subjected to particle beam and thermospray liquid chromatography mass spectrometry which supported the assignment of reduced-flumetsulam-hydrate.

b.4 EFGWB's Rejoiner:

The data submitted is scientifically valid and provides further data on the major degradate found in the anaerobic aquatic metabolism study.

b.5 EFGWB's Overall Conclusion:

Based on further understanding of the anaerobic metabolism of XRD-498, there is sufficient data to satisfy this data requirement. The anaerobic aquatic metabolism study (MRID 41931733) combined with the additional data is acceptable to fulfill the data requirement (162-3). No futher anaerobic aquatic metabolism data are needed for XRD-498 at this time.

c. Terrestrial field dissipation (164-1)

c.1 Citation For Study Under Discussion:

Lehmann, R.G.; Balcer, J.L.; Duebelbeis, D.O.; Flora, E.A.; Foster, D.R.; Harnick, B.J.; Olberding, E.L.; Swanson, M.; and Wray, M.W. TERRESTRIAL FIELD DISSIPATION OF DE-498. Preformed and Submitted by DowElanco; Midland, MI under Laboratory Project ID ENV87034/AN and ENV88075/AN; Study completed on 12 June 1991; Received by EPA 19 June 1991; MRID No. 41931735.

c.2 Original EFGWB Comments:

In a previous review (WGM;03/24/92), the terrestrial field dissipation study (MRID 41931735) was supplemental. The data were reported as total residues. Therefore, the pattern of decline and formation of parent and degradates was not addressed by the author.

c.3 DowElanco's Response:

Based on the low levels of degradates found in the metabolism studies, the data submitted in the terrestrial field dissipation study which reported the degradates as total residues is sufficient.

c.4 EFGWB's Rejoiner:

The data submitted is scientifically valid and is consistent with the terrestrial field dissipation guidelines.

c.5 EFGWB's Overall Conclusion:

Since no degradates comprised ≥10% of applied (or ≥0.01 ppm) in laboratory studies, there are no identified metabolites to address in the terrestrial field dissipation study. Therefore, the terrestrial field dissipation is acceptable to fulfill the data requirement. No further terrestrial field dissipation data are needed XRD-498 at this time.

d. Confined Rotational Crops (165-1)

d.1 Citation For Studies Under Discussion:

Hamburg, A.W.; Miller, J.H.; Lardie, T.S.; and Baldwin, W.S. [^{14}C] XRD-498: CONFINED ACCUMULATION STUDY ON ROTATIONAL CROPS PLANTED AT 30 AND 120 DAYS AFTER SOIL TREATMENT. Performed and Submitted by DowElanco; Midland, MI under Project ID GH-C 2170; Study completed on 28 September 1989; MRID No. 41263232.

Hamburg, A.W., Byrne, S.L., and Harding, R.M. [5-^{14}C]DE-498 CONFINED ACCUMULATION STUDY IN ROTATIONAL CROPS: CONFIRMATION OF THE VALIDITY OF THE RESULTS FROM THE ORIGINAL STUDY STARTED ON MAY 5, 1987, AND REPORTED ON GH-C 2170 (30- AND 120-DAY PHASES) AND GH-C 2244 (365-DAY PHASE. Performed and Submitted by DowElanco; Midland, MI under Project ID 90069; Study completed on 14 June 1991; Received by EPA 19 June 1991; MRID No. 41931739.

d.2 Original EFGWB Comments:

The confined rotational crop study (MRID 41263232) was scientifically valid and could be used as supplemental data. However, it could not be used to fulfill the confined rotational crop data requirement because no storage stability for soil and plant substrates was furnished, most samples were only analyzed for total ^{14}C-residue, and the application rate was not confirmed.

In the previous review (WGM;03/24/92), the confined rotational crop study (MRID 41931739) was found scientifically valid and could be used as supplemental data. The degradates (Components

A and B), which reached a concentration of ≥0.01 ppm, were not identified.

d.3 DowElanco's Response:

The concentrations of components A, B, and C were 19, 31, and 20 ppb, respectively. At these low concentrations, positive identification will be difficult. An exaggerated rate (3-4X) metabolism study with application immediately preceding soybean planting is currently being drafted for submission to the Agency where the ^{14}C-residue level is adequate for identification of components. From this study, Components A, B, and C were found to be composed of at least two, acid- and enzyme-labile conjugates.

For all phases of the confined rotational crops studies (MRID Nos. 41263232, 41931738, 41931739), the ^{14}C residue in lettuce, carrot tops and roots, wheat grain, and soybeans was very low at ≤0.01 ppm. The residues found in wheat forage and straw and soybean forage and trash were low at 0.02-0.08 ppm These residues were characterized by neutral solvent extractability, acid extractability, and/or lignin and cellulose isolation. The neutral solvent extractable ^{14}C-residue was further characterized by chromatographic comparison of the extractable residue components to reference standards. With the exception of the neutral extractable fraction from soybean forage, the concentrations of the extractable components varied from <0.001 to 0.015 ppm. At these concentrations identification is very difficult. In the mature tissues, wheat straw/chaff and soybean trash, the lignin fraction contained the majority of the residue, 0.021 and 0.033 ppm, respectively. The soybean forage extractable residue (0.04 ppm was shown to be multicomponent in nature with at least five components ranging in concentration from 0.005 to 0.01 ppm. The chromatographic behavior of these components were compared to that of XRD-498 and two hydroxylated XRD-498 standards.

d.4 EFGWB's Rejoiner:

This data submitted is scientifically valid and can be used as supplemental data. EFGWB's agrees with DowElanco's response.

d.5 EFGWB's Overall Conclusions:

The additional data submitted is scientifically valid and provides information on the accumulated degradates. The data indicates that Components A, B, and C are comprised of at least two or more components and that rotational crops grown at 30, 120, and 365 days posttreatment accumulate XRD-498 residues (MRID 41263232 and 41931738) below the tolerance (0.05 ppm). The combined confined rotational crop studies (MRID Nos. 41263232, 41931738, and 41931739) along with the additional data can be used to fulfill the data requirement (165-1). No further confined rotational crop data are needed for XRD-498. However, it should be noted that the results for 30-day and 120-day rotational crop intervals reported in one study (MRID 41931739) showed slightly higher accumulations (up

to ≈0.08 ppm for soybean trash) of ^{14}C-XRD-498 residues in some rotational crop tissues.

Part A-2 Registrant's Response to EUP and New Chemical Screen reviews:

a.1 EFGWB's Original Comments to EUP review:

Because the degradates are of limited toxicological concern (verbal conversation with E. Doyle; EPA:Tox Branch; 7 February 1991) and the use area for the EUP request is restricted, there are sufficient data to support the EUP for XRD-498 (XRM-5019) on corn and soybeans (WGM;03/24/92).

a.2 EFGWB's Original Comments to New Chemical Screen review:

The July 1992 review (WGM;07/23/92) stated that upon reevaluating the data base for the terrestrial food and feed use pattern, there was sufficient data for XRD-498 and XRM-5019 to marginally pass the new chemical screen.

b. Registrant's Response:

In order to confirm that XRM-5019 does not contain a second active ingredient, the registrant submitted a copy of the label for XRM-5019. Based on the fact that XRM-5019 contains only the active ingredient XRD-498, the registrant is requesting clarification of the status of the EUP and the new chemical screen for XRM-5019.

c. EFGWB Overall Conclusions:

c.1 EUP Status:

EUP review (WGM;03/24/92) found there was sufficient data to support the EUP request for use of XRM-5019 on corn and soybeans. The content of XRM-5019 was <u>not</u> considered to be a mixture of two active ingredients at that time. Therefore, the status of the EUP is not changed.

c.2 New Chemical Screen Status:

The fact that XRM-5019 is not a mixture of XRD-498 and trifluralin does not change the status of the new chemical screen. However, based on data submitted to support the concerns in the new chemical screen, XRD-498 passes the new chemical screen at this time.

Part B: Minutes of 27 May 1992 meeting

On 27 May 1992, DowElanco (Jeff Wolt, Arlene Hamburg, Phil McCall, Dennis Laskowski, Alex McGibbon, and Dennis Lade) and the Agency [Paul Mastradone (EFGWB), Jim Hetrick (EFGWB), and Steve Robbins

(RD)] met to discuss EFGWB reviews (WGM;03/24/92) on XRD-498 environmental fate data.

The discussion and description of the environmental fate of XRD-498 was led by Dr. Wolt. He emphasized the points of concerns reflected in the EFGWB review. Dr. Wolt felt that the concerns found in the review were answerable for the various environmental fate studies. Therefore, the discussion centered on the concerns found in the review of the following studies:

162-1	Aerobic soil metabolism study
162-3	Anaerobic aquatic metabolism study
163-1	Aged mobility study
164-1	Terrestrial field dissipation study
165-1	Confined rotational crop study

The Agency expressed concern there were inadequate data to address the degradation pathway, degradate identification, and the environmental fate of XRD-498 degradates.

The registrant demonstrated that XRD-498 exhibits low to moderate rates of degradation (average $t_{1/2}$=≈2 months) to form principally CO_2 and soil bound residues. The bound residue consisted of components with high molecular weights (1800 to 8000D). In addition, the unidentified degradates were comprised of multiple low level metabolites occurring in the extractable phase, all at <10% of applied material or <10 ppb.

Based on the data presented, Dr. Mastradone suggested several approaches to provide acceptable data to fulfill the individual data requirements.

1. The registrant determines a rotational crop interval by choosing an interval at the maximum (1X) the application rate is expected to give a "clean" plant residue picture. The registrant then conducts a confined rotational crop study at this one plant-back interval. If the results demonstrate a "clean" plant residue picture, this interval will then become the rotational crop interval used on the label. No further confined rotational data for XRD-498 is then needed by the Agency.

2. If, a "clean" plant residue picture does not exist, a study should be conducted at both an exaggerated application rate and a 1X application rate at the desired rotation interval. The degradates identification would come from the exaggerated rate study. The 1X study would provide information on the concentration of the degradates at normal use rates.

3. Since metabolites are more easily identified in metabolism studies than in the confined rotational crop study, metabolism studies are frequently conducted at exaggerated rates.

The registrant can then include metabolite identifications from metabolism studies to support residue characterization in the confined rotational crop study.

4. The registrant can demonstrate that the residue can be fractionated into multiple components at low concentrations (≤10% of applied and/or ≤0.01 ppm) which are not significant residues of concern.

Furthermore, Dr. Mastradone concluded from the data that DowElanco presented that the previous review of December 1991 was replaced by the March/April 1992 review and should be disregarded at this time. It was also indicated that XRD-498 should now pass the new chemical screen and that this would be followed up with the Registration Division (RD). However, DowElanco could submit their response to the March 1992 review and provide a confined rotational crop study overview document and additional (aged) mobility data.

Part C: Waiver Request of Spraydrift and Volatility Studies

C-1 Waiver of Spraydrift Studies

Because DowElanco is an active member of the Spray Drift Task Force, the registrant is requesting a waiver for the spraydrift studies (droplet size spectrum (201-1) and the drift field evaluation (202-1)) data requirements.

EFGWB's Conclusion:

There is not sufficient data to support a waiver of the spray drift studies (droplet size spectrum (201-1) and the drift field evaluation (202-1)) data requirements at this time. However, because DowElanco is a member of the Spray Drift Task Force, EFGWB does not require droplet size spectrum or drift field evaluation data on XRD-498 presently. If needed in the future, the registrant may work with the Spray Drift Task Force which is scheduled to submit its final report in December 1994. This assumes, however, that neither EEB, TOX, nor any other entity within OPP requires these data in advance of the Task Force's final report.

C-2 Waiver of Volatility Studies

Based on the low vapor pressure (0.8×10^{-15} mm Hg) and toxicological classification of ≥3 of XRD-498, the registrant is requesting a waiver of the following volatility studies:

161-4 Photodegradation in air
163-2 Volatility - lab
163-3 Volatility - field

EFGWB's Conclusion

Due to the low vapor pressure (0.8×10^{-15} mm Hg) of XRD-498, there is sufficient data to support a waiver of the above volatility data requirements. Unless there are hazardous volatiles involved to which users are exposed, EFGWB does not generally need volatility data for pesticides having vapor pressures $<10^{-6}$ mm Hg.

11: COMPLETION OF ONE-LINER:

See attached one-liner.

12: CBI APPENDIX:

N/A