

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 22 1994

MEMORANDUM

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

SUBJECT: Waiver Request for Aerobic Soil Metabolism (162-1)
with Thiadiazol-labelled Thidiazuron
DP BARCODE D202913
PC #120301
Reregistration Case #4092

FROM: Silvia C. Termes, Ph.D., Chemist
Graybeard Committee, EFGWB/EFED

TO: Kathryn Davis/Bill Wooge
Product Manager 52
Accelerated Reregistration Branch (SRRD)

THRU: Henry M. Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division

According to the registrant's (NOR-AM) letter, a study with the thiadiazol-labelled thidiazuron is being submitted. According to the registrant, this study will adequately define the degradative pathway of both rings (phenyl an thiadiazol).- In addition, a new terrestrial field dissipation study is ongoing in which 1,2,3-thiadiazol-5-yl-urea is included as a target.

IF A STUDY WITH THE THIADIAZOL-LABELLED MATERIAL HAS BEEN (OR IS BEING) SUBMITTED, THEN THE REQUEST FOR A WAIVER FOR FURTHER STUDIES WITH THE THIADIAZOL-LABELLED MATERIAL CANNOT BE GRANTED UNTIL:

- The submitted study can be evaluated.
- The registrant's response to the study conducted with the phenyl-labelled thidiazuron is reviewed.
- The data from the thiadiazol- and phenyl labelled are integrated.

IF THE EFGWB CONSIDERS THAT A FURTHER STUDY WITH THE THIADIAZOL-LABELLED MATERIAL IS NEEDED, THIS STUDY WOULD BE A CONFIRMATORY STUDY.

cc: Paul Mastradone
Thidiazuron File (PC #12301)

S.C. Termes File
L. Dye File



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REREG CASE # 4092

CASE: 816515
SUBMISSION: S464786

DATA PACKAGE RECORD
BEAN SHEET

DATE: 05/05/94
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REREGISTRATION ACTION: 614 DATA WAIVER REQUEST
CHEMICALS: 120301 Thidiazuron 100.00 %

ID#: 120301-045639
COMPANY: 045639 NOR-AM CHEMICAL CO
PRODUCT MANAGER: 52 KATHRYN DAVIS 703-308-8156 ROOM: CS1 3F3
PM TEAM REVIEWER: BILL WOOGIE 703-308-8794 ROOM: CS1 4F6
RECEIVED DATE: 01/05/94 DUE OUT DATE: 03/16/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 202913 EXPEDITE: N DATE SENT: 05/05/94 DATE RET.: / /
CHEMICAL: 120301 Thidiazuron
DP TYPE: 999 Miscellaneous Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT	ADMIN DUE DATE:
DIV : EFED	05/17/94	/ /	06/24/94
BRAN: EFGB	/ /	/ /	NEGOT DATE: / /
SECT:	/ /	/ /	PROJ DATE: / /
REVR :	/ /	/ /	
CONTR:	/ /	/ /	

* * * DATA REVIEW INSTRUCTIONS * * *

Please review the following waiver request:

Guideline 162-1
Aerobic Soil Metabolism

The Agency has accepted a study under this guideline (MRID 41950101) using phenyl-labeled Thidiazuron. The Agency then requested a further study using thidiazol labeled Thidiazuron. The registrant is requesting a waiver from this study. If you have any questions, call me (Bill Wooge) at 308-8794 or contact me via cc:Mail.

Thanks! Bill W.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
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NOR-AM Chemical Company

WAIVER REQUEST FOR STUDY W-75 Guideline Reference 162-1: The Aerobic Soil Metabolism study for Thidiazuron

STUDY MRID 41950101

Feyerabend, M. 1991. Aerobic degradation of [UL-¹⁴C]-phenyl-thidiazuron in a sandy loam soil at 21°C. Unpublished study performed by Schering AG, Berlin, Federal Republic of Germany, and submitted by NOR-AM Chemical Company, Laboratory Project ID UPSR 21/91.

BACKGROUND

The EPA's conclusions about this study were that:

1. The study is acceptable and partially fulfills the aerobic soil metabolism data requirement (162-1) for thidiazuron.
2. In a 361-day study conducted in a German sandy loam soil incubated aerobically in darkness at 21°C, phenyl-labeled thidiazuron (nominal concentration 0.3 ppm) degraded with a half-life of 111 days. The principal compound identified throughout the study was parent thidiazuron. Three identified degradates were detected in very small quantities ($\leq 0.8\%$ of the applied radioactivity [0.002 ppm]) and one unidentified polar degradate was present at a maximum of 1.6% of the applied (0.005 ppm). At the end of the study, bound residues represented 44.7% of the applied radioactivity and ¹⁴CO₂ accounted for 21.2%.
3. To completely fulfill the data requirement, acceptable aerobic soil metabolism data are required for thidiazol-labeled thidiazuron. The study should be conducted in a typical U.S. cotton soil. See Discussion for details.

The acceptable phenyl-labeled study was a repeat designed to answer specific questions raised by individual states from an earlier study.¹ The conclusions which can be drawn from the initial study are very similar to those cited above for the repeat. Namely:

In a 360-day study conducted in a German loamy sand soil incubated aerobically in darkness at 25°C, phenyl-labeled thidiazuron (nominal concentration 2 ppm) degraded with a half-life of 144 days. The principal compound identified throughout the study was parent thidiazuron. One

unidentified degradate was detected in very small quantities ($\leq 1.6\%$ of the applied radioactivity [0.032 ppm]). At the end of the study, bound residues represented 43.1 % of the applied radioactivity and $^{14}\text{CO}_2$ accounted for 27%.

It should be noted that the maximum seasonal application of thidiazuron is 0.3 lb ai/acre, which assuming even mixing through the 0-3" soil layer equates to a residue of approximately 0.3 ppm. The repeat study was therefore conducted at a rate close to field rate. The initial study was conducted significantly above field rate and therefore the trace level residue of 0.032 ppm will be present at far lower under actual use conditions.

Despite the difference in rates the two studies in different soil types confirm the same basic pattern of aerobic breakdown of phenyl-labeled thidiazuron: mineralization or binding to soil as non-extractable residues with no significant extractable intermediates being formed. The trace level metabolite, 1-m-hydroxyphenyl-3-[1,2,3-thiadiazol-5-yl]-urea, characterized in the repeat study indicates that hydroxylation of the phenyl ring is an initial step prior to mineralization.

EPA's CONCERN

The EPA's concern that prompted the request for a thidiazol-labeled study was specifically stated in the Discussion section of the Data Evaluation Record:

The study provided data only on phenyl-labeled thidiazuron. The fate of the thidiazol moiety (and degradates which contain this moiety and not the phenyl group) in aerobic soil conditions cannot be assessed from the study. The evolution of $^{14}\text{CO}_2$ (21.2 % of the applied radioactivity was present as $^{14}\text{CO}_2$ at Day 361 - Figure 4) indicates that the phenyl ring was degrading, but only small quantities of degradates similar in structure to the parent compound (1-phenyl-3-[1,2,5-thiadiazol-5-yl]urea and 1-m-hydroxyphenyl-3-[1,2,3-thiadiazol-5-yl]urea) were detected. It appears, then, that thidiazol-containing degradates were being formed, but their presence was not detected. EFGWB believes that data for thidiazol-labeled thidiazuron are needed to adequately understand the compound's aerobic soil metabolism. Also, a degradation pathway based on the studies' results should be proposed which shows the structures of parent and metabolites.

NOR-AM's RESPONSE

At approximately the same time that the initial study discussed above was being performed an additional study using thidiazol-labeled thidiazuron was also performed.² This study was conducted for 359 days in the same German loamy sand soil incubated aerobically in darkness at 25°C, at a nominal concentration of 2 ppm. The soil was handled slightly differently to that used in the phenyl-labeled study in that alfalfa was grown in the soil for four weeks prior to use to maintain microbially viability. This is justifiable in that alfalfa is

a typically rotation in cotton cultivation.

The thiadiazol-labeled study yielded a more rapid degradation rate for thidiazuron ($t_{1/2} = 26$ days) than observed in the phenyl-labeled study, most probably due to the soil maintenance regimen prior to treatment. The profile of degradation, however, was consistent with the phenyl-labeled study. Thidiazuron underwent predominantly conversion to non-extractable residues and mineralization to $^{14}\text{CO}_2$. Several minor unknown metabolites (each $\leq 1.1\%$ of applied) were extracted but one major extractable metabolite, 1,2,3-thiadiazol-5-ylurea, was identified (up to 21.2% of applied). Formation of this metabolite is consistent with mineralization of the phenyl ring as shown in the proposed metabolic profile in Figure 1. After 359 days the level of non-extractable residues was 46.6% of applied which is very consistent with the level found in the phenyl-labeled study, indicating that the non-extractable residue is probably being formed by the direct binding of thidiazuron, although further modification of the bound residue is likely.

Although the thiadiazol-labeled study was run at a somewhat higher rate than normal field applications the equivalence of results in the two phenyl-labeled studies gives confidence that degradation of thidiazuron is similar within the range of conditions being studied.

NOR-AM asks that the request for a further aerobic soil metabolism study with thiadiazol-labeled thidiazuron be waived based on the fact that the thiadiazol labeled study now being submitted adequately fills the data gap by defining the pathway of degradation of both rings of the molecule. No new scientific information would be obtained from a repeat study. It should also be noted that a full repeat terrestrial field dissipation program is ongoing and 1,2,3-thiadiazol-5-ylurea has been included as a target.

REFERENCES

1. Bruehl, R. 1980. Report on Degradation of SN 49537 in Soil. Final Report. Performed by Schering AG, Berlin, Federal Republic of Germany. Laboratory ID R & S 41/80.

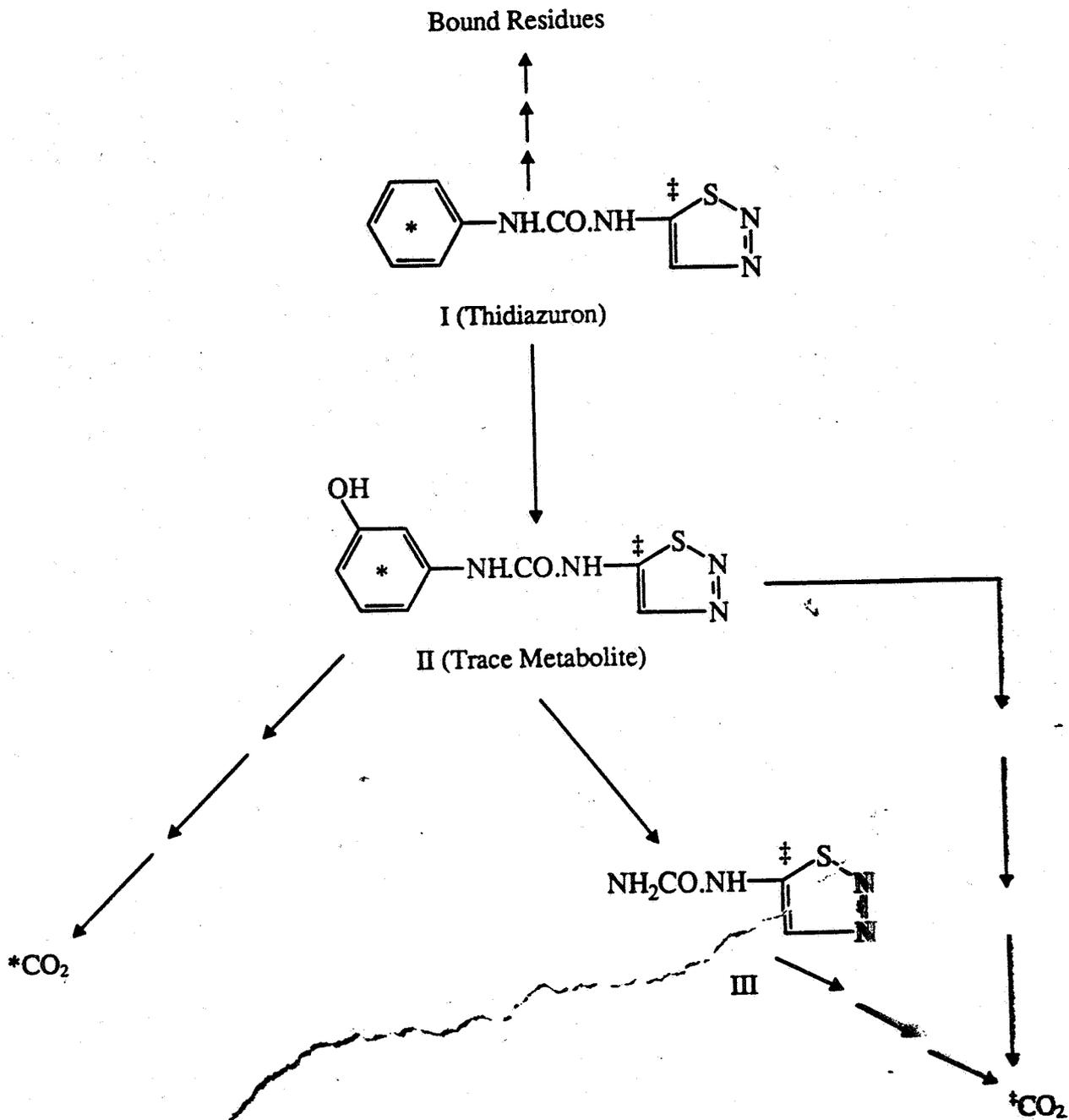
Registration Reference: THIDIAZURON/W26

2. Bruehl, R. 1980. Degradation of SN 49537 in an Activated loamy sand (including Appendix: Isolation and Identification of a Conversion Product of Thidiazuron in Soil). Performed by Schering AG, Berlin, Federal Republic of Germany. Laboratory ID R & S 7/80.

Registration Reference: THIDIAZURON/W25

Figure 1

Proposed Degradation of Thidiazuron in Soil under Aerobic Conditions



KEY

- I = Thidiazuron
N-phenyl-N'-1,2,3-thiadiazol-5-ylurea (CA)
- II = 1-m-hydroxyphenyl-3-(1,2,3-thiadiazol-5-yl)urea
N-(3-hydroxyphenyl)-N'-1,2,3-thiadiazol-5-ylurea (CA)
- III = 1,2,3-thiadiazol-5-ylurea (CA)