APPENDIX A

Summary of Available and Relevant Toxicity Data from Ecological Risk Assessment Literature Review for Tebuthiuron

Appendix A

Summary of Available and Relevant Toxicity Data from Ecological Risk Assessment Literature Review for Tebuthiuron

Introduction

A literature review and ecological data evaluation was conducted on nine herbicides that are currently being used or are proposed for use by the Bureau of Land Management (BLM) for vegetation management on 261 million acres of public lands in the Western U.S., including Alaska. The information gathered from this evaluation will be included along with other collected data to derive toxicity reference values for use in the ecological risk assessment (ERA; ENSR 2005). The ERA was conducted in conjunction with the Vegetation Treatments Programmatic Ecological Impact Statement (PEIS) for the BLM. Scientific papers were gathered during this process to provide data on acute and chronic toxicity of selected herbicides to the non-target species. The review process included consideration of U.S. Fish and Wildlife Service (USFWS) draft literature search guidance. The nine herbicides that were investigated during this evaluation were as follows:

- Diflufenzopyr
- Diquat
- Fluridone
- Imazapic
- Sulfometuron-methyl
- Bromacil
- Chlorsulfuron
- Diuron
- Tebuthiuron

This review process was carried out in three tiers: Tier I – Literature search and preliminary review to select individual manuscripts; Tier II – Screening to determine whether the manuscript is acceptable; and Tier III – Thorough review to obtain data for possible toxicity reference value (TRV) use. This report provides information for bromacil; the other chemicals are discussed in separate reports.

Literature Search Methodology

The literature review process was initiated by conducting a keyword search pertaining to each of the nine chemicals in selected databases. The keyword search for all databases, except for one (Chemical Abstracts/Scifinder Scholar), included the herbicide name but not the commercial name (i.e., some commercial names are common words). The search parameters for Chemical Abstracts consisted of the herbicide name and chemical abstracts service (CAS) registry number. The open literature search was conducted at Colorado State University, Fort Collins, CO. The search period for bromacil was from 1970 (the start of the database) to 2003. The following 12 databases were searched:

- AGRICOLA
- ASFA (Aquatic Sciences and Fisheries Abstracts)
- Biological Sciences
- BIOSIS / Biological Abstracts
- Chemical Abstracts / Scifinder Scholar
- Environmental Science and Pollution Management
- MedLine
- Safety Science and Risk

- Toxline
- Water Resources Abstracts
- Web of Science / Science Citation Index
- Zoological Records

All of the documents obtained in the open literature searches were then evaluated by a Senior Toxicologist to select manuscripts pertaining to the specific objectives of this project (Tier I). Relevant studies were those that were judged, to the extent possible while searching literature databases (i.e., relying on title and abstract, when available), to provide useful data for conducting the ERA. Relevant studies contained the following information at a minimum:

- Acute (mortality vs. survival) or chronic (largely growth or reproduction, although other sublethal data—if available—were also considered potentially relevant) toxicity data for the active ingredient.
- Verifiable numeric endpoint values (e.g., LC_{50}, NOEC) that could be used in the risk characterization process.
- Toxicity data for clinical test species (e.g., mice, rats) and species used for screening non-human impacts (all other mammals, birds, invertebrates, algae, plants).
- Field or mesocosm studies were also included, but only if effects from exposure to the single herbicide in question could be identified and separated from other stressors.

Literature that was excluded as part of this initial literature gathering process included:

- analytical chemistry studies;
- methods papers without specific toxicity data;
- modeling studies that contained no empirically-derived data; and
- reviews or reports that were not primary toxicity data sources (except as a source for obtaining primary literature).

These search criteria enhanced the ability to screen scientific papers for the type of toxicity information needed in the ERA. Hard copies of all manuscripts that met these criteria were then obtained for further evaluation. Once articles were obtained, they were incorporated into a comprehensive management database (EndNote®). There were 243 documents identified from this process and obtained for further consideration. The bibliography list of articles obtained for tebuthiuron is included in this report (Appendix A.1).

Literature Review Methodology

A cursory review (Tier II) was performed on each manuscript after a hard copy was obtained. Exclusion and inclusion criteria to determine acceptability for further review were developed prior to the process in conjunction with the BLM. Manuscripts were excluded that dealt only with the following subjects:

- Human health effects
- Effects on microorganisms: (e.g., fungi, bacteria)
- Genotoxic effects (mutagenic, carcinogenic)
- Bioassays on cells of a whole organism (e.g., rat hepatocytes, rat liver S9)
- Effects on target plants (efficacy testing)
- Non-toxic effects (e.g., fate, transport, leaching, analytical methods)
- Mixtures including herbicides other than the nine being reviewed

In addition, manuscripts that solely included data on marine receptors were originally excluded; however, these

data were later included because marine ecosystems could be adjacent to application areas on BLM lands.

Inclusion criteria and rating (on a scale of 1 [weak] to 5 [strong]) of issues that were to be emphasized (requiring a subsequent review step) were as follows:

1. Effects on nontarget receptors related to ERA protocol
2. Chronic, sub-lethal, or reproductive effects that may have adverse effects on populations
3. Effects form inerts, degradates, and metabolites
4. Studies with mixtures that include bromacil and any of the 8 other herbicides (i.e., not containing other herbicides)
5. Indirect effects to food supply or cover

Additional criteria that were used in reviewing papers (reviewers answered 'Yes' or 'No') are listed below:

- Were the corroborating studies described in sufficient detail (i.e., weight of evidence)?
- Did the study have a proper exposure dose, mechanism, and duration?
- Did the test include proper sample size, statistical analysis, and especially statistical endpoints (e.g., NOAEL, EC_{50}) or dose response curves?
- Were proper controls used and were they acceptable?
- Were the data published in a peer-reviewed journal?

Each of the 243 identified papers was scored on the selection criteria listed above, including documentation of the number of test organisms, statistical analysis, proper use, and performance of controls, and the study was classified as either "adequate" on "not adequate".

In Tier III, papers that were found to be acceptable for use were evaluated more thoroughly based on criteria developed with the BLM, and the following information is included as a second review form page for each manuscript (Appendix A.2):

- Author(s).
- Date of publication.
- Title of publication.
- Name of publication.
- Herbicide(s) used in the study.
- Receptor category: 20 g mammal, honey bee, 70 kg herbivore, small bird, large bird, non-target plants (monocot and dicot), warmwater fish, coldwater fish, aquatic invertebrate, aquatic plant, aquatic macrophyte). The specific life history stage was also recorded when available.
- Exposure conditions specifying the formulation, concentration, or amount of active ingredient and medium.
- Effect: Acute or sublethal effect end points of product formulations and breakdown products, and/or their component chemicals, such as: larval and embryonic developmental effects, endocrine disruption, reproductive impairment, changes in behavioral traits such as predator avoidance, feeding/appetite, lethargy or excitement, homing ability, swimming speed, or attraction to or repulsion from the chemicals.
- Toxicity endpoints (e.g., NOAEL, EC_{50}, LC_{50}, or dose response curve).
- Degradates, inerts, if available.
- Ecological conditions of study (e.g., mescosm, static/flow-through, water quality parameters).
- Comments (e.g., mixture effects: additive, synergistic, or antagonistic effect end points of multiple products, other observations).

The Tier II and III reviews for tebuthiuron were conducted by only one senior toxicologist (this is consistent with the scope of work outlined for the review process). In some cases, a second (or third) review of data adequacy took place when a separate senior toxicologist compiled the Tier III reviews and entered the pertinent information into a master spreadsheet documenting review findings for possible use in TRV derivation. The documents used in this

TRV derivation are designated in **bold** in the bibliography (Appendix A.1), and the derivation of TRVs from all available sources is reported in the ERA (ENSR 2005).

Results

Nine papers were discovered in the review of the open literature for tebuthiuron, and of these, six were reviewed as part of Tier III and incorporated into the spreadsheet for TRV derivation for bromacil (Table 1; Appendix A.3).

TABLE 1

Summary of the Results of the Open Literature Review for Tebuthiuron

Total number of papers obtained for bromacil	9
Total number of papers accepted for Tier II review	6
Total number of papers used in TRV derivation	6

The data collected during this review resulted in toxicity information for algae, macrophytes (duckweed), aquatic invertebrates (cladoceran, snail, crab, oyster, chironomid), amphibians (frogs), and fish (trout, bluegill, goldfish, minnow). Data were available on the chronic toxicity of tebuthiuron to several species including snails (Caux et al. 1997), algae (Meyerhoff et al. 1985; Price et al. 1989; Caux et al. 1997), as well as for a long-term mesocosm study (Temple et al. 1991). There were no studies found that examined the toxic effects of degradation products of tebuthiuron or that examined the toxicity of mixtures of tebuthiuron and any of the other eight herbicides. There are several studies that examined indirect effects of tebuthiuron on food supply via changes in algal density (Meyerhoff et al. 1985; Adams et al. 1986; Price et al. 1989; Temple et al. 1991; Peterson et al. 1994; Caux et al. 1997 and macrophyte biomass (Peterson et al. 1994).

References

Adams, N., K.H. Goulding, and A.J. Dobbs. 1986. Effect of acetone on the toxicity of four chemicals to *Selenastrum capricornutum*. Bulletin of Environmental Contamination and Toxicology 36:254-259.

Caux, P.Y., R.A. Kent, V. Bergeron, J.E. Warner, and J. Busharda. 1997. Canadian water quality guidelines for tebuthiuron. Journal of Environmental Toxicology and Water Quality 12(1):61-95.

ENSR. 2005. Tebuthiuron Ecological Risk Assessment Final Report. Prepared for the Bureau of Land Management. June 2005.

Meyerhoff, R.D., D.W. Grothe, S. Sauter, and G.K. Dorulla. 1985. Chronic toxicity of tebuthiuron to an alga *Selenastrum capricornutum*, a cladoceran *Daphnia magna*, and the fathead minnow *Pimephales promelas*. Environmental Toxicology and Chemistry 4:695-701.

Peterson, H.G., C. Boutin, P.A. Martin, K.E. Freemark, N.J. Ruecker, and M.J. Moody. 1994. Aquatic phyto-toxicity of 23 pesticides applied at expected environmental concentrations. Aquatic Toxicology 28:275-292.

Price, D.J., B.R. Murphy, and L.M. Smith. 1989. Effects of Tebuthiuron on characteristic green algae found in Playa Lakes. Journal of Environmental Quality 18:62-66.

Temple, A.J., B.R. Murphy, and E.F. Cheslak. 1991. Effects of tebuthiuron on aquatic productivity. Hydrobiologia 224(2):117-127.

APPENDIX A.1

BIBLIOGRAPHY LIST

Appendix A.1. Bibliography List

Adams, N., K.H. Goulding, and A.J. Dobbs. 1986. Effect of acetone on the toxicity of four chemicals to *Selenastrum capricornutum*. Bulletin of Environmental Contamination and Toxicology 36:254-259.

Blaise, C., and M. Harwood. 1991. Ecotoxicological assessment of tebuthiuron, a substituted urea class herbicide. Revue des Sciences de l'Eau 4(1):121-134.

Caux, P.Y., R.A. Kent, V. Bergeron, J.E. Warner, and J. Busharda. 1997. Canadian water quality guidelines for tebuthiuron. Journal of Environmental Toxicology and Water Quality 12(1):61-95.

Meyerhoff, R.D., D.W. Grothe, S. Sauter, and G.K. Dorulla. 1985. Chronic toxicity of tebuthiuron to an alga *Selenastrum capricornutum*, a cladoceran *Daphnia magna*, and the fathead minnow *Pimephales promelas*. Environmental Toxicology and Chemistry 4:695-701.

Morton, D.M., and D.G. Hoffman. 1976. Metabolism of a new herbicide, tebuthiuron {1-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-1,3 dimethylurea}, in mouse, rat, rabbit, dog, duck, and fish. Journal of Toxicology and Environmental Health 1(5):757-768.

Mumtaz, M.M., L.A. Knauf, D.J. Reisman, W.B. Peirano, C.T. DeRosa, V.K. Gombar, K. Enslein, J.R. Carter, B.W. Blake, K.I. Huque, and V.M.S. Ramanujam. 1995. Assessment of effect levels of chemicals from quantitative structure-activity relationship (QSAR) models. I. Chronic lowest-observed-adverse-effect level (LOAEL). Toxicology Letters 79:131-143.

Peterson, H.G., C. Boutin, P.A. Martin, K.E. Freemark, N.J. Ruecker, and M.J. Moody. 1994. Aquatic phyto-toxicity of 23 pesticides applied at expected environmental concentrations. Aquatic Toxicology 28:275-292.

Price, D.J., B.R. Murphy, and L.M. Smith. 1989. Effects of Tebuthiuron on characteristic green algae found in Playa Lakes. Journal of Environmental Quality 18:62-66.

Temple, A.J., B.R. Murphy, and E.F. Cheslak. 1991. Effects of tebuthiuron on aquatic productivity. Hydrobiologia 224(2):117-127.

APPENDIX A.2

TIER II AND III LITERATURE REVIEW FORMS

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	RZW 10/7/03
Title of Paper/Report:	Effect of acetone on the toxicity of four chemicals to Selenastrum Capricornutum
Author(s)	Adams, Goulding & Dobbs
Journal/Year/Vol:Pages	Bull Environ. Contam. Toxicol. 1986 36: 254-259

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	NO
Effects to microorganisms	Yes
Genotoxic effects (mutagenic, carcinogenic)	NO
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	NO
Effects to target plants (efficacy testing)	↓
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	NO
Mixtures including non-BLM herbicides	NO
Marine receptors	NO

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	2
Chronic effects (e.g., reproductive) that may affect populations	NO
Inerts, degradates, metabolite effects	NO
Mixtures of any of the five herbicides	NO (only w/ acetone)
Indirect effects (food supply, cover)	NO

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	yes
Was the test of proper exposure dose, mechanism, & duration?	- no measured conc
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	yes
Were proper controls used and was control performance acceptable?	yes appears so
Are the data presented in a peer-reviewed journal?	yes

Should evaluation of this paper continue in Task 2?	yes
Additional comments regarding acceptance/rejection:	

Task 2: Data Evaluation

Reviewer/Date:	RJW 10/7/03 DAP
Partial Title of Paper/Report:	Effect of acetone on the toxicity...

Herbicides tested:	tebuthiuron

20 g Mammal	Honey Bee	70 kg Herbivore	Large Bird
Small Bird	Aquatic Invertebrate	Warmwater Fish	Coldwater Fish
Non-Target Plants	Aquatic Plant (Macrophyte)	Other: green algae	
Test Species:	Selenastrum capricornutum		
Life Stage:	6 d		

Exposure Conditions	
Formulation:	NR
Concentration/amount of active ingredient:	NR
Medium (water, food, soil, etc.):	algal media
Test Concentrations (if appropriate):	0, 0.03, 0.05, 0.07, 0.10, 0.3 mg/ml
Test System (e.g., flow-thru, mesocosm, etc.):	static 250 ml Erlenmeyer flasks

n=3 Test System Monitoring			
Dissolved Oxygen:		Conductivity:	
Temperature:	22°C	Organic Carbon (D or T):	
pH:		Ammonia:	
Other (rpm):	175	Other ( ):	
Other ( ):		Other ( ):	

Biological and Statistical Endpoints					
Endpoint	**LC50/EC50**	**IC ( )**	**NOEC/NOAEC**	**LOEC**	**Other ( )**
Mortality/Survival cell growth (6d)			0.03	0.05	mg/ml
Growth					
Reproduction					
Embryo/Larval Develop.					

Degradates/Inerts:	
Additional Comments and Observations:	– stats Dunnett's – determined LOECs – 0.05 mg/ml LOEC ~~same~~ (w/o acetone) same for 3, 4 & 5 day as well – did not discuss measured concentrations (only for DDT)

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	10/7/03
Title of Paper/Report:	Ecotoxicological assessment of tebuthiuron, a substituted urea class herbicide.
Author(s)	Blaise & Harwood
Journal/Year/Vol:Pages	Revue des Sciences de l'Eau 1991: 50 121-134

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	No
Effects to microorganisms	No
Genotoxic effects (mutagenic, carcinogenic)	No
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	No
Effects to target plants (efficacy testing)	No
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	↓
Mixtures including non-BLM herbicides	↓
Marine receptors	↓

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	2
Chronic effects (e.g., reproductive) that may affect populations	?
Inerts, degradates, metabolite effects	?
Mixtures of any of the five herbicides	No
Indirect effects (food supply, cover)	No

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	
Was the test of proper exposure dose, mechanism, & duration?	
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	
Were proper controls used and was control performance acceptable?	
Are the data presented in a peer-reviewed journal?	

Should evaluation of this paper continue in Task 2?	
Additional comments regarding acceptance/rejection: data in abstract (English) but unable to evaluate data, journal written in French	

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	RJN 10/7/03
Title of Paper/Report:	Canadian water quality guidelines for tebuthiuron
Author(s)	Cox et al
Journal/Year/Vol:Pages	Journal of Environmental Toxicology & Water Quality ~~1997~~ 1997 12(1) 61-95

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	NO
Effects to microorganisms	
Genotoxic effects (mutagenic, carcinogenic)	
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	
Effects to target plants (efficacy testing)	
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	
Mixtures including non-BLM herbicides	
Marine receptors	~~Yes~~ Some

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	4
Chronic effects (e.g., reproductive) that may affect populations	4
Inerts, degradates, metabolite effects	No
Mixtures of any of the five herbicides	NO
Indirect effects (food supply, cover)	NO

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	No – completion!
Was the test of proper exposure dose, mechanism, & duration?	NA
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	
Were proper controls used and was control performance acceptable?	
Are the data presented in a peer-reviewed journal?	✓

Should evaluation of this paper continue in Task 2?	yes
Additional comments regarding acceptance/rejection: this is a summary of WQ Guidelines – should be sufficiently evaluated for our needs	

DAP comments on paper

see pages 72 (Table IV)
74 V
76 VI for various tox data

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	BJN 10/13/03
Title of Paper/Report:	Chronic toxicity of tebuthiuron to an alga (Selenastrum capricornutum), a cladoceran (D. magna) and the fathead minnow (Pimephales promelas)
Author(s)	Meyerhoff et al
Journal/Year/Vol:Pages	Environ Toxicol Chem 1985 4:695-701

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	NO
Effects to microorganisms	↓
Genotoxic effects (mutagenic, carcinogenic)	↓
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	↓
Effects to target plants (efficacy testing)	↓
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	↓
Mixtures including non-BLM herbicides	↓
Marine receptors	↓

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	3
Chronic effects (e.g., reproductive) that may affect populations	5
Inerts, degradates, metabolite effects	NA
Mixtures of any of the five herbicides	↓
Indirect effects (food supply, cover)	↓

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	yes
Was the test of proper exposure dose, mechanism, & duration?	yes
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	yes
Were proper controls used and was control performance acceptable?	yes
Are the data presented in a peer-reviewed journal?	yes

Should evaluation of this paper continue in Task 2?	yes
Additional comments regarding acceptance/rejection:	too high rank

Task 2: Data Evaluation

Reviewer/Date:	RJN 10/15/03
Partial Title of Paper/Report:	Chronic toxicity of tebuthiuron to an ...

Herbicides tested:	tebuthiuron

20 g Mammal	Honey Bee	70 kg Herbivore	Large Bird
Small Bird	Aquatic Invertebrate	~~Warmwater Fish~~	Coldwater Fish
Non-Target Plants	Aquatic Plant (Macrophyte)	Other: Algae	
Test Species:	Selenastrum capricornutum Daphnia magna Pimephales promelas		
Life Stage:	<24 h for D.m.		
Duration:	14 d for S.c., 21 d for D.m., 33 d Pp		

Exposure Conditions	
Formulation:	98% purity
Concentration/amount of active ingredient:	
Medium (water, food, soil, etc.):	
Test Concentrations (if appropriate):	
Test System (e.g., flow-thru, mesocosm, etc.):	static for S.c. static renewal for D.m. flow-thru P.

S.c. n=3 n=10 for D.m. n=2 for P.p.

Test System Monitoring			
Dissolved Oxygen:	9.1 DM 8.5	Conductivity:	100 / 253 / 277
Temperature: °C	Sc 25, 19.2 DM, 23.4 Pp	Organic Carbon (D or T):	
pH:	7.8, 8.4, 8.1	Ammonia:	
Other (light):	Continuous - Sc 16:8	Other (hardness):	≤19.1 Sc / 120 DM / 126 Pp
Other ( ):	flow	Other (alk):	110 149 139

Water qual in Table 1 p 697

Biological and Statistical Endpoints					
Endpoint	LC50/EC50	IC ( )	NOEC/NOAEC	LOEC	Other ( )
Mortality/Survival Sc.	307 µg/L	max sp. growth	1.5 mg/L	algistatic conc	
Growth D.M			21.8 ~~[illegible]~~ mg/L	44.2	# young/adult & length
Reproduction P.P.	total length		9.3 mg/L	18	
Embryo/Larval Develop.					

Degradates/Inerts:	
Additional Comments and Observations:	- analytical for all studies, results reported as measured - Stats ok

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	RJS 10/14/03
Title of Paper/Report:	Metabolism of a new herbicide, tebuthiuron ... in mouse, rat, rabbit, dog, duck and fish
Author(s)	Morton & Hoffman
Journal/Year/Vol:Pages	J Toxicol & Environ Health 1976/1: 757-768

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	NO
Effects to microorganisms	
Genotoxic effects (mutagenic, carcinogenic)	
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	
Effects to target plants (efficacy testing)	
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	
Mixtures including non-BLM herbicides	
Marine receptors	

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	NA
Chronic effects (e.g., reproductive) that may affect populations	
Inerts, degradates, metabolite effects	
Mixtures of any of the five herbicides	
Indirect effects (food supply, cover)	

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	Not evaluated
Was the test of proper exposure dose, mechanism, & duration?	
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	
Were proper controls used and was control performance acceptable?	
Are the data presented in a peer-reviewed journal?	yes

Should evaluation of this paper continue in Task 2?	NO
Additional comments regarding acceptance/rejection: metabolism data – no tox data	

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	MJN 10/14/03
Title of Paper/Report:	Effects of tebuthiuron on characteristic green algae found in playa lakes
Author(s)	Price et al
Journal/Year/Vol:Pages	J Environ Qual 1989 18: 62-66

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	No
Effects to microorganisms	algae
Genotoxic effects (mutagenic, carcinogenic)	
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	
Effects to target plants (efficacy testing)	
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	
Mixtures including non-BLM herbicides	
Marine receptors	

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	2
Chronic effects (e.g., reproductive) that may affect populations	2
Inerts, degradates, metabolite effects	NA
Mixtures of any of the five herbicides	
Indirect effects (food supply, cover)	2

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	yes
Was the test of proper exposure dose, mechanism, & duration?	~~yes~~ No only 1 trt
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	yes –
Were proper controls used and was control performance acceptable?	yes may have gotten into screen
Are the data presented in a peer-reviewed journal?	yes

Should evaluation of this paper continue in Task 2?	yes
Additional comments regarding acceptance/rejection:	– one conc. (0.18 µg/ml) – microcosm study low rank

Task 2: Data Evaluation

Reviewer/Date:	MJN 10/14/03
Partial Title of Paper/Report:	Effects of tebuthiuron on characteristic green ...

Herbicides tested:	tebuthiuron

20 g Mammal	Honey Bee	70 kg Herbivore	Large Bird
Small Bird	Aquatic Invertebrate	Warmwater Fish	Coldwater Fish
Non-Target Plants	Aquatic Plant (Macrophyte)	Other: algae	
Test Species: 11 sp.	Ankistrodesmus falcatus Bracteacoccus minor, Chlorella vulgaris, Euglena gracilis		
Life Stage:	Phacus pleuronectes Oocystis sp Staurastrum cristatum Golenkinia sp.		
Duration:	253 d Scenedesmus basilensis Scenedesmus quadricauda		

Exposure Conditions	
Formulation:	97.4% tech grade
Concentration/amount of active ingredient:	
Medium (water, food, soil, etc.):	water Bold's media
Test Concentrations (if appropriate):	0.18 µg/L TB
Test System (e.g., flow-thru, mesocosm, etc.):	400 ml beakers

n=3 each sampling day

Test System Monitoring			
Dissolved Oxygen:	~5-6	Conductivity:	
Temperature:	22.5 ± 1.7°C	Organic Carbon (D or T):	
pH:	~8.1	Ammonia:	
Other (photoperiod):	12h Light:dark	Other ( ):	
Other (hard):	≈ 60 mg/L	Other ( ):	

water chem Table 9 p 64

Biological and Statistical Endpoints					
Endpoint	**LC50/EC50**	**IC ( )**	**NOEC/NOAEC**	**LOEC**	**Other ( )**
Mortality/Survival				0.18	B minor 3@1st trt
Growth			0.18		other 10 sp:
Reproduction			0.18		All 11 sp @ 2nd trt
Embryo/Larval Develop.					

Degradates/Inerts:	
Additional Comments and Observations:	- single conc. w/ 2 treatments (1) before active growth (Day 2) 2) @ max cell # (Day 211) - stats conducted

- no analytical discussed - nominal conc

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	RZN 10/12/03
Title of Paper/Report:	Effects of tebuthiuron on aquatic productivity
Author(s)	Temple, Murphy, Cheslak
Journal/Year/Vol:Pages	Hydrobiologia 1991/224: 117-127

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	No
Effects to microorganisms	↓
Genotoxic effects (mutagenic, carcinogenic)	↓
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	↓
Effects to target plants (efficacy testing)	↓
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	↓
Mixtures including non-BLM herbicides	↓
Marine receptors	↓

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	2
Chronic effects (e.g., reproductive) that may affect populations	2
Inerts, degradates, metabolite effects	NA
Mixtures of any of the five herbicides	↓
Indirect effects (food supply, cover)	1

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	yes
Was the test of proper exposure dose, mechanism, & duration?	yes
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	yes, but n=1 for most trtments
Were proper controls used and was control performance acceptable?	yes
Are the data presented in a peer-reviewed journal?	yes

Should evaluation of this paper continue in Task 2?	yes
Additional comments regarding acceptance/rejection: measured conc. / mesocosm study / fate info mod rank	

Task 2: Data Evaluation

Reviewer/Date:	RJN 10/19/03
Partial Title of Paper/Report:	Effects of tebuthiuron on aquatic productivity

Herbicides tested:	tebuthiuron

20 g Mammal	Honey Bee	70 kg Herbivore	Large Bird
Small Bird	Aquatic Invertebrate ✓	Warmwater Fish ✓	Coldwater Fish
Non-Target Plants	Aquatic Plant (Macrophyte)	Other: phytoplankton, aq. inverts, fathead	
Test Species:	Pimephales promelas		
Life Stage:			
Duration:	108 d		

Exposure Conditions	
Formulation:	97.5% technical
Concentration/amount of active ingredient:	
Medium (water, food, soil, etc.):	water – spike water sediment present
Test Concentrations (if appropriate):	0, 10, 70, 200, 500, 1000 µg/L
Test System (e.g., flow-thru, mesocosm, etc.):	Mesocosm

n=1, except control & 200 n=3

Test System Monitoring			
Dissolved Oxygen:	5.9 – 7.6	Conductivity:	
Temperature:	21.5°C	Organic Carbon (D or T):	
pH:	~8.0	Ammonia:	
Other (hard):	~180–200 mg/L	Other ( ):	
Other (Alk):	~120–140 mg/L	Other ( ):	

Biological and Statistical Endpoints					
Endpoint	LC50/EC50	IC ( )	NOEC/NOAEC	LOEC	Other ( )
Mortality/Survival			<200	200	chironomid density
Growth			200	>200	primary production
Reproduction			200	>200	chironomid biomass
Embryo/Larval Develop.			200	>200	fish biomass

Degradates/Inerts:	
Additional Comments and Observations:	– mesocosm exp. – 30 d. colonization prior to dosing – fate study (H2O, sed)

endpts: 1° production, density & biomass of inverts, chironomids, fathead minnows

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	Pillard / 5-13-03
Title of Paper/Report:	Assessment of Effect levels of chemicals . . . .
Author(s)	M. M. Mumtaz . . . .
Journal/Year/Vol:Pages	Toxicol. Lett. / 1995 / 79: 131-143

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	No
Effects to microorganisms	
Genotoxic effects (mutagenic, carcinogenic)	
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	
Effects to target plants (efficacy testing)	
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	
Mixtures including non-BLM herbicides	
Marine receptors	

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	
Chronic effects (e.g., reproductive) that may affect populations	3 - Predicts chronic effects
Inerts, degradates, metabolite effects	
Mixtures of any of the five herbicides	
Indirect effects (food supply, cover)	

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	NA
Was the test of proper exposure dose, mechanism, & duration?	
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	
Were proper controls used and was control performance acceptable?	
Are the data presented in a peer-reviewed journal?	Yes - ?

Should evaluation of this paper continue in Task 2?	No
Additional comments regarding acceptance/rejection: No new tox data - prediction of Chronic LOAEL only - Fluridone	

BLM National Vegetation EIS

Literature Review Form

Reviewer/Date:	Pillard / 5-20-03
Title of Paper/Report:	Aquatic phyto-toxicity of 23 posticides applied at expected ....
Author(s)	H. G. Peterson et al.
Journal/Year/Vol:Pages	Aquat. Toxicol. / ~~23~~ 1994 / 28: 275-292

Task 1: Application of Selection Criteria

A. Indicate if the paper meets these exclusion criteria

Issue (deals only with)	Indicate Yes or No
Human health effects	No
Effects to microorganisms	
Genotoxic effects (mutagenic, carcinogenic)	
Bioassays to cells of a whole organism (e.g., rate hepatocytes, rat liver S9)	
Effects to target plants (efficacy testing)	
Nontoxic effects (e.g., fate, transport, leaching, analytical methods)	
Mixtures including non-BLM herbicides	
Marine receptors	

B. Issues to be emphasized

Issue	Rate Paper from 1 (Weak emphasis) to 5 (Strong)
Effects on nontarget receptors related to ERA protocol	
Chronic effects (e.g., reproductive) that may affect populations	3- Plant Growth
Inerts, degradates, metabolite effects	1
Mixtures of any of the five herbicides	1
Indirect effects (food supply, cover)	3 - Algae, duck weed

C. Other Criteria

Issue	Indicate Yes or No
Are corroborating studies described?	Yes
Was the test of proper exposure dose, mechanism, & duration?	Yes
Did the test include proper sample size, statistical analysis (especially NOAEL, or dose response curve)?	Yes
Were proper controls used and was control performance acceptable?	Not presented
Are the data presented in a peer-reviewed journal?	Yes

Should evaluation of this paper continue in Task 2?	Yes
Additional comments regarding acceptance/rejection: -only test 1 conc - Est environ. conc.	

Task 2: Data Evaluation

Reviewer/Date:	RSN 10/3/03
Partial Title of Paper/Report:	Aquatic phyto-toxicity of 23 pesticides applied at expected...

Herbicides tested:	~~Sulfometuron methyl~~ ~~Metsulfuron-methyl~~ (Oust) tebuthiuron diquat

20 g Mammal	Honey Bee	70 kg Herbivore	Large Bird
Small Bird	~~Aquatic Invertebrate~~	Warmwater Fish	~~Coldwater Fish~~
Non-Target Plants	Aquatic Plant (Macrophyte)	Other: diatoms algae & Cyanobacteria	not inclu
Test Species:	diatoms: Cyclotella meneghiana Nitzschia sp. algae: Scenedesmus quadricauda Selenastrum capricornutum Lemna minor (duck weed)		
Life Stage:	L. minor (3 mature leaves / plant)		
Duration:	7-d (L. minor) 22h algae 6h incubation w/ pesticide 16h incubation w/ 14C		

Exposure Conditions	
Formulation:	technical / analytical grade
Concentration/amount of active ingredient:	
Medium (water, food, soil, etc.):	
Test Concentrations (if appropriate):	3 µg/L Oust / 0.733 mg/L diquat / 5.867 mg/L teb
Test System (e.g., flow-thru, mesocosm, etc.):	algae test tube 7ml / L. minor 12 ml microplat

Test System Monitoring			
Dissolved Oxygen:		Conductivity:	
Temperature:		Organic Carbon (D or T):	
pH:		Ammonia:	
Other (reps):	n=3 algae n=4 duckweed	Other ( ):	
Other ( ):		Other ( ):	

Biological and Statistical Endpoints					
Endpoint	~~LC50/EC50~~	~~IC ( )~~	**NOEC/NOAEC**	**LOEC**	~~Other ( )~~
Mortality/Survival	Species	% inhibition		% inhibition (tebuthiuron)	
Growth	S. capri	27 *	3 µg/L Oust	~~Am~~ C.M.	98% *
Reproduction	L. minor	63 *		N.sp	99% *
Embryo/Larval Develop.	C.m.	99 *		S.q.	90 *
	N. sp	100 *		S.c.	100 *
	S.q.	53 *	diquat	L.m.	100 *
	S.c.	69 *			
	L.m.	100 *			

Degradates/Inerts:	
Additional Comments and Observations:	endpt was uptake of herbicides at est. environ. conc. - one conc (EEC) was tested - compared to control - endpts Algae: uptake of ^{14}C L. minor: increase in # leaves

APPENDIX A.3

SPREADSHEET OF TOXICITY DATA FOR TEBUTHIURON TRV

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron	> 97	amphibian	frog	*Rana catesbeiana*	6 w	Static	Water	96 hr	96 hr	Survival	LC_{50}	> 306	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	**> 97**	**amphibian**	**frog**	***Rana catesbeiana***	**6 w**	**Static**	**Water**	**96 hr**	**96 hr**	**Survival**	**LC_{50}**	**< 398**	**NR**	**mg/L**	**Yes/Yes**			**Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]**			
Tebuthiuron	97.4	aquatic invertebrate	water flea	*Daphnia magna*		Acute	Water		21 d		LOEC	NR	< 44.2	mg ai/L			NAOTEB01	In USEPA 1994, 2003.			Yes
Tebuthiuron		aquatic invertebrate	water flea			Acute	Water		48 hr		LC_{50}	NR	225	mg ai/L				In DOE 2000.			
Tebuthiuron	97.4	aquatic invertebrate	water flea	*Daphnia magna*		Acute	Water		21 d		NOEL	NR	> 21.8	mg ai/L			NAOTEB01	In USEPA 1994, 2003.			Yes
Tebuthiuron, technical	97.5	aquatic invertebrate	chironomid		larvae	Mesocosm	Water	108 d	108 d	Chrionomid density	NOEC[5]	< 200	NR	ug/L	Yes/Yes			Temple et al. 1991. Hydrobiologia. 224: 117-127.			
Tebuthiuron, technical	97.5	aquatic invertebrate	chironomid		larvae	Mesocosm	Water	108 d	108 d	Chrionomid density	LOEC[5]	200	NR	ug/L	Yes/Yes			Temple et al. 1991. Hydrobiologia. 224: 117-127.			
Tebuthiuron, technical	97.5	aquatic invertebrate	chironomid		larvae	Mesocosm	Water	108 d	108 d	Chrionomid biomass	NOEC[5]	200	NR	ug/L	Yes/Yes			Temple et al. 1991. Hydrobiologia. 224: 117-127.			
Tebuthiuron, technical	97.5	aquatic invertebrate	chironomid		larvae	Mesocosm	Water	108 d	108 d	Chrionomid biomass	LOEC[5]	> 200	NR	ug/L	Yes/Yes			Temple et al. 1991. Hydrobiologia. 224: 117-127.			
Tebuthiuron	99.2	aquatic invertebrate	Water flea	*Daphnia magna*	< 10 hr	Static	Water	24 hr	48 hr	Survival	EC_{50}	> 400	NR	mg/L	No/No			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	**99.2**	**aquatic invertebrate**	**Water flea**	***Daphnia magna***	**< 10 hr**	**Static**	**Water**	**48 hr**	**48 hr**	**Survival**	**EC_{50}**	**297**	**NR**	**mg/L**	**No/No**	**Lilly Research Laboratories**	**MRID 00041694**	**Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3,4]**	**C.M. Natella**	**1987**	**Yes**
Tebuthiuron	**> 97**	**aquatic invertebrate**	**Snail**	***Helisoma sp.***	**egg**	**Static**	**Water**	**8 m**	**8 m**	**Biomass**	**NOEL**	**> 0.1**	**NR**	**mg/L**	**Yes/Yes**			**Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]**			
Tebuthiuron	**> 97**	**aquatic invertebrate**	**Snail**	***Physa sp.***	**egg**	**Static**	**Water**	**8 m**	**8 m**	**Biomass**	**NOEL**	**> 0.1**	**NR**	**mg/L**	**Yes/Yes**			**Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]**			
Tebuthiuron	> 97	aquatic invertebrate	Fiddler crab	*Uca pugilator*	unknown	Unknown	Water	96 hr	96 hr	Survival	LC_{50}	> 320	NR	mg/L	Unknown			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3,4]			
Tebuthiuron	> 97	aquatic invertebrate	Eastern oyster	*Crassostrea virginica*	embryo	Unknown	Water	48 hr	48 hr	Development	NOEL	> 180	NR	mg/L	Unknown	EG & G Corp (Diamond Shamrock)	MRID 00041684	Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3,4]			Yes
Tebuthiuron	> 97	aquatic invertebrate	Eastern oyster	*Crassostrea virginica*	embryo	Unknown	Water	48 hr	48 hr	Development	LOEL	< 320	NR	mg/L	Unknown	EG & G Corp (Diamond Shamrock)	MRID 00041684	Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			Yes
Tebuthiuron	98	aquatic invertebrate	Water flea	*Daphnia magna*	< 24 hr	Static	Water	21 d	21 d	Growth & Repro	NOEC	21.8	NR	mg/L	Yes/Yes		NAOTEB01	Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			
Tebuthiuron	98	aquatic invertebrate	Water flea	*Daphnia magna*	< 24 hr	Static	Water	21 d	21 d	Growth & Repro	LOEC	44.2	NR	mg/L	Yes/Yes			Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			
Tebuthiuron		aquatic plant	Green algae	*Selenastrum capricornutum*	cells	Static	Water	6 d	6 d	Growth	NOEC	0.03	NR	mg/L	No/No			Adams et al. 1986. Bull. Environ. Contam. Toxicol. 36: 254-259.			Yes
Tebuthiuron		aquatic plant	Green algae	*Selenastrum capricornutum*	cells	Static	Water	6 d	6 d	Growth	LOEC	0.05	NR	mg/L	No/No			Adams et al. 1986. Bull. Environ. Contam. Toxicol. 36: 254-259.			Yes
Tebuthiuron	99.08	aquatic plant	algae			Acute	Water		5 d		EC_{50}	NR	4.060	ai ppm				In USEPA 1994.			Yes
Tebuthiuron	99.08	aquatic plant	diatom			Acute	Water		5 d		EC_{50}	NR	0.050	ai ppm				In USEPA 1994.			Yes
Tebuthiuron	99.08	aquatic plant	diatom			Acute	Water		5 d		EC_{50}	NR	0.081	ai ppm				In USEPA 1994.			Yes
Tebuthiuron	98	aquatic plant	algae			Acute	Water		5 d		EC_{50}	NR	0.050	ai ppm				In USEPA 1994.			Yes
Tebuthiuron	**98**	**aquatic plant**	**Green algae**	***Selenastrum capricornutum***		**Static**	**Water**	**14 d**	**14 d**		**EC_{50}**	**0.05**	**NR**	**mg/L**			**NAOTEB07**	**1983. In USEPA 2003.**	**M. Rostker**	**1984**	**Yes**
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*		Static	Water	14 d	14 d		NOEL	0.13	NR	mg/L			NAOTEB07	1983. In USEPA 2003.	M. Rostker	1984	Yes

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron, technical	99.08	aquatic plant	Marine diatom	*Skeletonema costatum*	culture	7 d alga growth	Water		7 d	growth and reproduc	EC_{25}	NR	0.036	mg ai/L		Lilly Research Laboratories	MRID 41080402	1989. In USEPA 1990, 2003.	Prapimpan Kosalwat	1/10/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Marine diatom	*Skeletonema costatum*	culture	7 d alga growth	Water		7 d	growth and reproduc	EC_{50}	NR	0.067	mg ai/L		Lilly Research Laboratories	MRID 41080402	1989. In USEPA 1990, 1992.	Prapimpan Kosalwat	1/10/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Marine diatom	*Skeletonema costatum*	culture	7 d alga growth	Water		7 d	growth and reproduc	NOEC	NR	0.036	mg ai/L		Lilly Research Laboratories	MRID 41080402	1989. In USEPA 1990, 2003.	Prapimpan Kosalwat	1/10/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Freshwater diatom	*Navicula pelliculosa*	culture	7 d alga growth	Water		7 d	growth and reproduc	EC_{25}	NR	0.111	mg ai/L		Lilly Research Laboratories	MRID 41080403	1989. In USEPA 1990, 2003.	Debra S. Segal	1/8/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Freshwater diatom	*Navicula pelliculosa*	culture	7 d alga growth	Water		7 d	growth and reproduc	EC_{50}	NR	0.193	mg ai/L		Lilly Research Laboratories	MRID 41080403	1989. In USEPA 1990, 2003.	Debra S. Segal	1/8/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Freshwater diatom	*Navicula pelliculosa*	culture	7 d alga growth	Water		7 d	growth and reproduc	NOEC	NR	0.056	mg ai/L		Lilly Research Laboratories	MRID 41080403	1989. In USEPA 1990, 2003.	Debra S. Segal	1/8/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Duckweed	*Lemna gibba*	culture	14 d growth	Water		14 d	growth and reproduc	EC_{25}	NR	0.066	mg ai/L		Lilly Research Laboratories	MRID 41080404	1989. In USEPA 1990, 2003.	Prapimpan Kosalwat	1/10/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Duckweed	*Lemna gibba*	culture	14 d growth	Water		14 d	growth and reproduc	EC_{50}	NR	0.135	mg ai/L		Lilly Research Laboratories	MRID 41080404	1989. In USEPA 1990, 2003.	Prapimpan Kosalwat	1/10/1990	Yes
Tebuthiuron, technical	99.08	aquatic plant	Duckweed	*Lemna gibba*	culture	14 d growth	Water		14 d	growth and reproduc	NOEC	NR	0.066	mg ai/L		Lilly Research Laboratories	MRID 41080404	1989. In USEPA 1990, 2003.	Prapimpan Kosalwat	1/10/1990	Yes
Tebuthiuron, technical	97.4	aquatic plant	algae	*Bracteacoccus minor*	cells[7]	Static	Water	189 d[8]	210 d	Growth	LOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Ankistrodesmus falcatus*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Chlorella vulgaris*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Euglena gracilis*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Gloeocystis ampla*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Golenkinia sp.*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Oocystis sp.*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Phacus pleuronectes*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Scenedesmus basilensis*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Scenedesmus quadricauda*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Staurastrum cristatum*	cells[7]	Static	Water	189 d[8]	210 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Bracteacoccus minor*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Ankistrodesmus falcatus*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Chlorella vulgaris*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Euglena gracilis*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Gloeocystis ampla*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Golenkinia sp.*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Oocystis sp.*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Phacus pleuronectes*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Scenedesmus basilensis*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	Green algae	*Scenedesmus quadricauda*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			
Tebuthiuron, technical	97.4	aquatic plant	algae	*Staurastrum cristatum*	cells	Static	Water	42 d	253 d	Growth	NOEC	0.18	NR	ug/ml	No/No			Price et al. 1989. J. Environ. Qual. 18: 62-66.			

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron, technical	97.5	aquatic plant	phytoplankton		various	Mesocosm	Water	108 d	108 d	Primary production	NOEC[5]	200	NR	ug/L	Yes/Yes			Temple et al. 1991. Hydrobiologia 224: 117-127.			
Tebuthiuron, technical	97.5	aquatic plant	phytoplankton		various	Mesocosm	Water	108 d	108 d	Primary production	LOEC[5]	> 200	NR	ug/L	Yes/Yes			Temple et al. 1991. Hydrobiologia 224: 117-127.			
technical or analytical		aquatic plant	diatom	*Cyclotella meneghiana*	cells	Static	Water	22 hr	22 hr	^{14}C uptake	98% inhibition at EEC	NR	NR		No/No			Peterson et al. 1994. Aquatic Toxicology 28: 275-292.			
technical or analytical		aquatic plant	diatom	*Nitzschia spp*	cells	Static	Water	22 hr	22 hr	^{14}C uptake	99% inhibition at EEC	NR	NR		No/No			Peterson et al. 1994. Aquatic Toxicology 28: 275-292.			
technical or analytical		aquatic plant	Green algae	*Scenedesmus quadricauda*	cells	Static	Water	22 hr	22 hr	^{14}C uptake	90% inhibition at EEC	NR	NR		No/No			Peterson et al. 1994. Aquatic Toxicology 28: 275-292.			
technical or analytical		aquatic plant	Green algae	*Selenastrum capricornutum*	cells	Static	Water	22 hr	22 hr	^{14}C uptake	100% inhibition at EEC	NR	NR		No/No			Peterson et al. 1994. Aquatic Toxicology 28: 275-292.			
technical or analytical		aquatic plant	Duckweed	*Lemna minor*	plant	Static	Water	7 d	7 d	Frond growth	100% inhibition at EEC	NR	NR		No/No			Peterson et al. 1994. Aquatic Toxicology 28: 275-292.			
Tebuthiuron		aquatic plant	Green algae	*Selenastrum capricornutum*	1000 cells/ml	Static	Water	1-6 d	1-6 d	Growth	NOEL	0.01-0.05	NR	mg/L	No/No			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	> 97	aquatic plant	Green algae	*Selenastrum capricornutum*	unknown	Static	Water	96 hr	96 hr	Growth	EC_{50}	0.08	NR	mg/L	No/No			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Green algae	*Selenastrum capricornutum*	unknown	Static	Water	96 hr	96 hr	Growth	EC_{50}	0.102	NR	mg/L	No/No			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	**98**	**aquatic plant**	**Green algae**	***Selenastrum capricornutum***	**1000 cells/ml**	**Static**	**Water**	**14 d**	**14 d**	**Population density**	**NOEL**	**0.013**	**NR**	**mg/L**	**Yes/Yes**			**Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]**			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	1000 cells/ml	Static	Water	14 d	14 d	Population density	LOEL	0.016	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	1000 cells/ml	Static	Water	14 d	14 d	Growth	LOEL	0.079	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	1000 cells/ml	Static	Water	14 d	14 d	Biomass	LOEL	0.168	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Freshwater diatom	*Navicula pelliculosa*	1000 cells/ml	Static	Water	7 d	7 d	Growth	NOEL	0.056	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Freshwater diatom	*Navicula pelliculosa*	1000 cells/ml	Static	Water	7 d	7 d	Growth	LOEL	0.11	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Freshwater diatom	*Navicula pelliculosa*	1000 cells/ml	Static	Water	7 d	7 d	Growth	EC_{50}	0.213	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Duckweed	*Lemna gibba*	3 frond/ plant	Static-renewal	Water	14 d	14 d	Growth	NOEL	0.091	NR	mg/L	Unknown			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Duckweed	*Lemna gibba*	3 frond/ plant	Static-renewal	Water	14 d	14 d	Growth	LOEL	0.19	NR	mg/L	Unknown			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	Duckweed	*Lemna gibba*	3 frond/ plant	Static-renewal	Water	14 d	14 d	Growth	EC_{50}	0.235	NR	mg/L	Unknown			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	marine diatom	*Skeletonema costatum*	10,000 cells/ml	Static	Water	7 d	7 d	Growth	NOEL	0.038	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	99	aquatic plant	marine diatom	*Skeletonema costatum*	10,000 cells/ml	Static	Water	7 d	7 d	Growth	LOEL	0.076	NR	mg/L	Yes/Yes			Caux et al. 1997. Environ. Toxicol. Water Qual. 12: 61-95. [3]			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	9 d old culture	Static	Water	14 d	14 d	Growth[6]	EC_{50}	NR	0.307	mg ai/L	Yes/Yes			Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	9 d old culture	Static	Water	14 d	14 d	Growth[6]	EC_{50}	NR	0.033	mg ai/L	Yes/Yes			Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	9 d old culture	Static	Water	14 d	14 d	Growth[6]	LOEL	NR	0.079	mg ai/L	Yes/Yes			Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			
Tebuthiuron	98	aquatic plant	Green algae	*Selenastrum capricornutum*	9 d old culture	Static	Water	14 d	14 d	Growth	Algistatic conc.	NR	1.5	mg ai/L	Yes/Yes			Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			
Tebuthiuron	98	bird	Mallard duck	*Anas platyrhynchos*	9 mos	Acute	Oral		14 d	mortality	LD_{50}	NR	2000	mg ai/kg		Lilly Research Laboratories	MRID 00041692	1986. In USEPA 1993, 2003.	C.M. Natella	1986	Yes
Tebuthiuron		**bird**	**Hen (species?)**				**Diet**		**30 d**		**NOEL**	**NR**	**1000**	**mg ai/kg/d**				**In PIP 1993.**			**Yes**

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron	98	bird	Chicken	*White Rock Cross*	Adult	Acute	Oral				LD_{50}	NR	500	mg ai/kg		EG & G Corp (Diamond Shamrock)	MRID 00020661	1972. In USEPA 1994, 2003.	C.M. Natella	1986	Yes
Tebuthiuron		bird	Bobwhite quail	*Colinus virginianus*		Subacute	Diet				LC_{50}	NR	5000	ai ppm				In USEPA 1994.			Yes
Tebuthiuron		bird	Mallard duck	*Anas platyrhynchos*		Subacute	Diet			mortality	LC_{50}	NR	5000	ai ppm				In USEPA 1994.			Yes
Tebuthiuron	98	bird	Mallard duck	*Anas platyrhynchos*	7 day	Acute	Oral		8 d	mortality	LD_{50}	2500	NR	mg/kg		Lilly Research Laboratories	MRID 00041680	1976. In USEPA 2003.	C.M. Natella	1986	Yes
Tebuthiuron	98	bird	Bobwhite quail	*Colinus virginianus*	7 day	Acute	Diet		8 d		LC_{50}	2500	NR	ppm		Lilly Research Laboratories	MRID 00041681	1976. In USEPA 2003.	C.M. Natella	1986	Yes
Tebuthiuron	98	bird	Mallard duck	*Anas platyrhynchos*	12 m	Acute	Oral		14 d	mortality	LD_{50}	500	NR	mg/kg		Lilly Research Laboratories	MRID 00020661	1972. In USEPA 2003.	C.M. Natella	1986	Yes
Tebuthiuron	98	bird	Bobwhite quail	*Colinus virginianus*	> or = 4 m	Acute	Oral		14 d		LD_{50}	500	NR	mg/kg		Lilly Research Laboratories	MRID 00020661	1972. In USEPA 2003.	C.M. Natella	1986	Yes
Tebuthiuron	96.4	bird	Mallard duck	*Anas platyrhynchos*	early life	Chronic	Reproductive		22 w	mortality	LOEL	100	NR	ppm		Lilly Research Laboratories	MRID 00093690	1972. In USEPA 2003.	C.M. Natella	1987	Yes
Tebuthiuron	96.4	bird	Mallard duck	*Anas platyrhynchos*	early life	Chronic	Reproductive		22 w		NOEL	NR	100	ai ppm		Lilly Research Laboratories	MRID 00093690	1972. In USEPA 1994, 2003.	C.M. Natella	1987	Yes
Tebuthiuron	96.4	bird	Bobwhite quail	*Colinus virginianus*	early life	Chronic	Reproductive		22 w		LOEL	NR	100	ai ppm		Wildlife International	MRID 00104243	1978. In USEPA 1994, 2003.	C.M. Natella	1987	Yes
Tebuthiuron	96.4	bird	Bobwhite quail	*Colinus virginianus*	early life	Chronic	Reproductive		22 w		NOEL	100	NR	ppm		Wildlife International	MRID 00104243	1978. In USEPA 2003.	C.M. Natella	1987	Yes
Tebuthiuron, technical	**99.1**	**bird**	**Bobwhite quail**	***Colinus virginianus***	**11 d**	**8 d acute w growth**	**Diet**		**8 d**		**LC_{50}**	**NR**	**5113**	**ai ppm**		**Lilly Research Laboratories**	**MRID 40601001**	**1988. In USEPA 1991a, 1994, 2003.**	**Tracy L. Perry**	**1/10/1990**	**Yes**
Tebuthiuron, technical	**99.1**	**bird**	**Mallard duck**	***Anas platyrhynchos***	**4 d**	**8 d acute w growth**	**Diet**		**8 d**	**mortality**	**LC_{50}**	**NR**	**5093**	**ai ppm**		**Lilly Research Laboratories**	**MRID 40601002**	**1988. In USEPA 1991a, 1994, 2003.**	**Tracy L. Perry**	**5/29/1991**	**Yes**
pellet	20	fish	Fathead minnow	*Pimephales promelas*	unknown	Static	Water	7 d	7 d	Survival	LOEL	70	NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
powder	80	fish	Fathead minnow	*Pimephales promelas*	unknown	Static	Water	7 d	7 d	Survival	NOEL	90	NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
powder	80	fish	Fathead minnow	*Pimephales promelas*	unknown	Static	Water	7 d	7 d	Survival	LOEL	110	NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	98	fish	Rainbow trout	*Oncorhynchus mykiss*		Acute	Water		96 hr		LC_{50}	143	NR	mg/L		EG & G Corp (Diamond Shamrock)	MRID 00020661	1972. In USEPA 2003.	C.M. Natella	1986	Yes
Tebuthiuron		fish	trout			Acute	Water		96 hr		LC_{50}	NR	87	mg ai/L				In DOE 2000.			
Tebuthiuron	98	fish	Bluegill sunfish	*Lepomis macrochirus*		Acute	Water		96 hr		LC_{50}	NR	106	mg ai/L		EG & G Corp (Diamond Shamrock)	MRID 00020661	1972. In USEPA 1994, 2003.	C.M. Natella	1986	Yes
Tebuthiuron		fish	Bluegill sunfish	*Lepomis macrochirus*		Acute	Water		96 hr		LC_{50}	NR	87	mg ai/L				In DOE 2000.			
Tebuthiuron	98	fish	Fathead minnow	*Pimephales promelas*	Juv	Acute	Water		96 hr		LC_{50}	180	NR	mg/L		Lilly Research Laboratories	MRID 00041685	1976. In USEPA 2003.	C.M. Natella	1987	Yes
Tebuthiuron	80	fish	Fathead minnow	*Pimephales promelas*	Juv	Acute	Water		96 hr		LC_{50}	180	NR	mg/L		Lilly Research Laboratories	41685	1976. In USEPA 2003.	C.M. Natella	1987	Yes
Tebuthiuron	20	fish	Fathead minnow	*Pimephales promelas*	Juv	Acute	Water		96 hr		LC_{50}	180	NR	mg/L		Lilly Research Laboratories	41685	1976. In USEPA 2003.	C.M. Natella	1987	Yes
Tebuthiuron, technical	97	fish	Goldfish	*Carassius auratus*	5 cm	Static	Water	96 hr	96 hr	Survival	LC_{50}* >	160	NR	mg/L	No/No	Lilly Research Laboratories	MRID 00020661	Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]	C.M. Natella		Yes
Tebuthiuron, technical	97	fish	Fathead minnow	*Pimephales promelas*	adult	Static	Water	96 hr	96 hr	Survival	LC_{50} >	160	NR	mg/L	No/No			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron, technical	97	fish	Fathead minnow	*Pimephales promelas*	unknown	Static	Water	7 d	7 d	Survival	LOEL <	70	NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron, technical	97.5	fish	Fathead minnow	*Pimephales promelas*	1.6 cm	Mesocosm	Water	108 d	108 d	Fish biomass	NOEC[5]	0.2	NR	mg/L	Yes/Yes			Temple et al. 1991. Hydrobiologia 224: 117-127.			Yes
Tebuthiuron, technical	97.5	fish	Fathead minnow	*Pimephales promelas*	1.6 cm	Mesocosm	Water	108 d	108 d	Fish biomass	LOEC[5] >	0.2	NR	mg/L	Yes/Yes			Temple et al. 1991. Hydrobiologia 224: 117-127.			Yes

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]		Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron	**> 97**	**fish**	**Rainbow trout**	***Oncorhynchus mykiss***	**10 g**	**Static**	**Water**	**96 hr**	**96 hr**	**Survival**	**LC_{50}**		**115**	**NR**	**mg/L**	**No/No**			**Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]**			**Yes**
Tebuthiuron	~ 100	fish	Rainbow trout	*Oncorhynchus mykiss*	1.5 g	Static	Water	24 hr	96 hr	Survival	LC_{50}	>	160	NR	mg/L	No/No			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	~ 100	fish	Rainbow trout	*Oncorhynchus mykiss*	1.5 g	Static	Water	96 hr	96 hr	Survival	LC_{50}		144	NR	mg/L	No/No			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	97.5	fish	Rainbow trout	*Oncorhynchus mykiss*	9 w	Static	Water	24 hr	5 d	Survival	LC_{50}		193	NR	mg/L	No/No			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	97.5	fish	Rainbow trout	*Oncorhynchus mykiss*	9 w	Static	Water	5 d	5 d	Survival	LC_{50}		126	NR	mg/L	No/No			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	**98**	**fish**	**Rainbow trout**	***Oncorhynchus mykiss***	**larvae**	**Flow through**	**Water**	**45 d**	**45 d**	**Survival**	**NOEL**		**26**	**NR**	**mg/L**	**Unknown**	**Lilly Research Laboratories**	**MRID 00090083**	**Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]**			**Yes**
Tebuthiuron	98	fish	Rainbow trout	*Oncorhynchus mykiss*	larvae	Flow through	Water	45 d	45 d	Survival	LOEL		52	NR	mg/L	Unknown	Lilly Research Laboratories	MRID 00090083	Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	**98**	**fish**	**Rainbow trout**	***Oncorhynchus mykiss***	**larvae**	**Flow through**	**Water**	**45 d**	**45 d**	**Growth**	**NOEL**		**26**	**NR**	**mg/L**	**Unknown**	**Lilly Research Laboratories**	**MRID 00090083**	**Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]**			**Yes**
Tebuthiuron	98	fish	Rainbow trout	*Oncorhynchus mykiss*	larvae	Flow through	Water	45 d	45 d	Growth	LOEL		52	NR	mg/L	Unknown	Lilly Research Laboratories	MRID 00090083	Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	~ 100	fish	Bluegill sunfish	*Lepomis macrochirus*	36 mm	Static	Water	24 hr	96 hr	Survival	LC_{50}	>	160	N NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	**~ 100**	**fish**	**Bluegill sunfish**	***Lepomis macrochirus***	**36 mm**	**Static**	**Water**	**96 hr**	**96 hr**	**Survival**	**LC_{50}**		**112**	**NR**	**mg/L**	**Yes/Yes**			**Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]**			**Yes**
Tebuthiuron	~ 100	fish	Bluegill sunfish	*Lepomis macrochirus*	36 mm	Static	Water	96 hr	96 hr	Survival	NOEL		50	NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	97.5	fish	Bluegill sunfish	*Lepomis macrochirus*	young	Unknown	Water	10 d	10 d	Survival	LOEL	</=	120	</= NR	mg/L	Yes/Yes			Caux et al.1997. Environ. Toxicol. Water Qual. 12: 61-95.[3]			Yes
Tebuthiuron	**98**	**fish**	**Fathead minnow**	***Pimephales promelas***	**< 24 hr**	**Flow through**	**Water**	**33 d**	**33 d**	**Length**	**NOEC**		**NR**	**9.3**	**mg ai/L**	**Yes/Yes**	**Lilly Research Laboratories**	**MRID 00090084**	**Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.**			**Yes**
Tebuthiuron	98	fish	Fathead minnow	*Pimephales promelas*	< 24 hr	Flow through	Water	33 d	33 d	Length	LOEC		NR	18	mg ai/L	Yes/Yes	Lilly Research Laboratories	MRID 00090084	Meyerhoff et al. 1985. Environ. Toxicol. Chem. 4: 695-701.			Yes
Tebuthiuron		**insect**	**Honeybee**	***Apis mellifera***	**worker**	**Acute dermal contact**	**Dermal**		**48 hr**		**LD_{50}**		**NR**	**30**	**ug ai/bee**				**In DOE 2000.**			**Yes**
Tebuthiuron, technical	99.1	insect	Honeybee	*Apis mellifera*	1-7 d	Acute dermal contact	Dermal		48 hr		LD_{50}		NR	> 100	ug ai/bee	Yes/Yes	Wildlife International	MRID 40840401	1988. In USEPA 1989a, 2003.	Allen W. Vaughan	3/31/1989	Yes
Tebuthiuron		mammal	rat			Acute	Oral				LD_{50}		NR	644	mg ai/kg				In DOE 2000.			No[9]
Tebuthiuron		mammal	rabbit			Acute	Dermal				LD_{50}		NR	200	mg ai/kg/d				In DOE 2000.			No[9]
Tebuthiuron		mammal	rat			Carcinogenicity	Diet		2 y		NOEC		NR	1600	ai ppm				In DOE 2000.			No[9]
Tebuthiuron		mammal	rat			Developmental	Diet				NOEC		NR	1800	ai ppm				In DOE 2000.			No[9]
Tebuthiuron		mammal	rabbit			Developmental	Diet				NOEC		NR	825	ai ppm				In DOE 2000.			No[9]
Tebuthiuron		mammal	rat			Reproductive	Diet?				NOEC		NR	20	mg ai/kg/d				In DOE 2000.			No[9]
Tebuthiuron		mammal	rabbit			Acute	Dermal				LD_{50}		NR	> 5000	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	rabbit			Subchronic	Dermal		21 d		NOEL		NR	< 1000	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Reproductive	Diet		2-generation		LOEL		NR	200	ai ppm				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Reproductive	Diet		2-generation		NOEL		NR	100	ai ppm				In USEPA 1994.			Yes
Tebuthiuron		mammal	dog			Acute	Oral				LD_{50}		NR	> 500	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	dog			Subchronic	Oral		90 d		LOEL		NR	1000	ai ppm				In USEPA 1994.			Yes
Tebuthiuron		**mammal**	**dog**			**Subchronic**	**Oral**		**90 d**		**NOEL**		**NR**	**500 (12.5)**	**ppm (mg ai/kg/d)**				**In USEPA 1994.**			**Yes**
Tebuthiuron		mammal	rabbit			Developmental	Diet				NOEL		NR	> 825	ai ppm				In Information Ventures, Inc. 1995.			Yes
Tebuthiuron		mammal	rat			Reproductive	Water				NOEL		NR	> 20	mg ai/kg/d				In Information Ventures, Inc. 1995.			Yes
Tebuthiuron		**mammal**	**mouse**			**Acute**	**Oral**				**LD_{50}**		**NR**	**58**	**mg ai/kg**				**In PIP 1993.**			**Yes**
Tebuthiuron		mammal	rabbit			Acute	Oral				LD_{50}		NR	286	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	rat			Chronic	Diet		2 y		NOEL		NR	80	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	mouse			Chronic	Diet		Life		NOEL		NR	200	mg ai/kg				In PIP 1993.			Yes

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source [2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron		mammal	rat			Reproductive	Diet		3-generations pregnancy		NOEL	NR	56	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	rabbit			Reproductive	Water		Pregnancy		NOEL	NR	25	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	rat			Reproductive	Water		Pregnancy		NOEL	NR	180	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	rat			Teratogenic	Diet				NOEL	NR	800	mg ai/kg BW				In PIP 1993.			Yes
Tebuthiuron		mammal	rat			Teratogenic	Diet				NOEL	NR	90	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	rabbit			Teratogenic	Water		Gestation d 6-18		NOEL	NR	< 25	mg ai/kg/d				In PIP 1993, USEPA 1994.			Yes
Tebuthiuron	97	mammal	mouse			Carcinogenicity	Diet		2 y		NOEL	NR	240	mg ai/kg				In PIP 1993, DPR 2003.			Yes
Tebuthiuron		mammal	rat			Subchronic	Diet		90 d		NOEL	NR	50	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Subchronic	Diet		90 d		LOEL	NR	125	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Systemic	Diet		2 y		NOEL	NR	40	mg ai/kg				In PIP 1993.			Yes
Tebuthiuron		mammal	rat		Male	Acute	Oral				LD_{50}	NR	477	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	mouse		Male	Acute	Oral				LD_{50}	NR	528	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	mouse		Female	Acute	Oral				LD_{50}	NR	620	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	rabbit			Acute	Oral				LD_{50}	NR	286	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	rabbit			Subchronic	Dermal		6 hr/day 21 d		LOEL	NR	1000	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	mouse			Carcinogenicity	Diet		2 y		NOEL	NR	228	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Developmental	Diet		6-15 gestation d	Maternal toxicity	LOEL	NR	45	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Developmental	Diet			Developmental toxicity	NOEL	NR	45	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		**mammal**	**rat**			**Reproductive**	**Diet**		**2-generation**	**systemic toxicity**	**NOEL**	**NR**	**100 (7)**	**ppm (mg ai/kg/d)**			**MRID 00090108**	**In USEPA 1994.**			**Yes**
Tebuthiuron		mammal	rat			Reproductive	Diet		2-generation		LOEL	NR	200 (14)	**ppm (mg ai/kg/d)**			MRID 00090108	In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Reproductive	Diet		2-generation		NOEL	NR	28	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	rat			Reproductive	Diet		3-generation		LOEL	NR	28	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	dog			Chronic	Oral		1 y	systemic toxicity	NOEL	NR	25	mg ai/kg/d				In DPR 2003.			Yes
Tebuthiuron		mammal	dog			Chronic	Oral		1 y		LOEL	NR	50	mg ai/kg/d				In DPR 2003.			Yes
Tebuthiuron		mammal	cat			Acute	Oral				LOEL	NR	< 200	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron		mammal	dog			Subchronic	Diet		90 d		LOEL	NR	25	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	dog			Subchronic	Diet		90 d		NOEL	NR	12.5	mg ai/kg/d				In USEPA 1994.			Yes
Tebuthiuron		mammal	mouse			Carcinogenicity	Diet		2 y		NOEC	NR	1600	ai ppm				In DOE 2000.			No
Tebuthiuron		mammal	rat		Female	Acute	Oral				LD_{50}	NR	387	mg ai/kg				In USEPA 1994.			Yes
Tebuthiuron	**99.6**	**terrestrial plant**	**crop plants**	***10 species***	**seedlings**	**Germination**			**5 d**		**NOEL**	**NR**	**> 6**	**lb ai/acre**		**Lilly Research Laboratories**	**MRID 41066902**	**In USEPA 1994, 2003.**	**R. Petrie**	**1989**	**Yes**
Tebuthiuron	99.6	terrestrial plant	Radish	*Rhaphanus sativus*	seedlings	Emergence /vigor			7-21 d	Emergence/ vigor	EC_{25}	NR	0.05	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b, 1994, 2003.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron	99.6	terrestrial plant	Cucumber		seedlings	Emergence /vigor			7-21 d	Emergence/ vigor	EC_{25}	NR	0.06	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b, 1994, 2003.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron	99.6	terrestrial plant	Wheat	*Triticum aestivum*	seedlings	Emergence /vigor			7-21 d		EC_{25}	NR	0.07	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b, 1994, 2003.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	*Rhaphanus sativus*	seed	Plant emergence	Soil			Emergence	EC_{25}	NR	0.13	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	**99.6**	**terrestrial plant**	**Cabbage**	***Brassica oleracea***	**seed**	**Plant emergence**	**Soil**			**Emergence**	**EC_{25}**	**NR**	**0.03**	**lb ai/acre**		**Lilly Research Laboratories**	**MRID 41066901**	**In USEPA 1989b, 1994, 2003.**	**Richard C. Petrie**	**10/23/1989**	**Yes**
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber		seed	Plant emergence	Soil			Emergence	EC_{25}	NR	0.13	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*	seed	Plant emergence	Soil			Emergence	EC_{25}	NR	0.1	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	*Rhaphanus sativus*	seed	Plant emergence	Soil			Emergence	EC_{50}	NR	0.23	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*	seed	Plant emergence	Soil			Emergence	EC_{50}	NR	0.07	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cotton		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	> 0.64	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	0.24	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]		Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron, technical	99.6	terrestrial plant	Sunflower		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	>	0.64	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Soybean		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	>	0.64	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*	seed	Plant emergence	Soil			Emergence	EC_{50}	NR		0.16	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Corn		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	>	1.28	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Sorghum		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	>	1.28	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Rice		seed	Plant emergence	Soil			Emergence	EC_{50}	NR	>	1.28	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	*Rhaphanus sativus*		Plant height	Soil			Height	EC_{25}	NR		0.06	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*		Plant height	Soil			Height	EC_{25}	NR		0.05	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	cotton			Plant height	Soil			Height	EC_{25}	NR		0.27	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber			Plant height	Soil			Height	EC_{25}	NR		0.08	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sunflower			Plant height	Soil			Height	EC_{25}	NR		0.3	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	soybean			Plant height	Soil			Height	EC_{25}	NR		0.74	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*		Plant height	Soil			Height	EC_{25}	NR		0.09	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	corn			Plant height	Soil			Height	EC_{25}	NR		0.39	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sorghum			Plant height	Soil			Height	EC_{25}	NR		0.89	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	rice			Plant height	Soil			Height	EC_{25}	NR		0.83	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	*Rhaphanus sativus*		Plant height	Soil			Height	EC_{50}	NR		0.14	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*		Plant height	Soil			Height	EC_{50}	NR		0.1	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	cotton			Plant height	Soil			Height	EC_{50}	NR		0.91	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber			Plant height	Soil			Height	EC_{50}	NR		0.2	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sunflower			Plant height	Soil			Height	EC_{50}	NR		1.03	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	soybean			Plant height	Soil			Height	EC_{50}	NR		1.7	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*		Plant height	Soil			Height	EC_{50}	NR		0.15	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	corn			Plant height	Soil			Height	EC_{50}	NR		1.3	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sorghum			Plant height	Soil			Height	EC_{50}	NR		1.84	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	rice			Plant height	Soil			Height	EC_{50}	NR		1.85	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	Rhaphanus sativus		Fresh Weight	Soil			Weight	EC_{25}	NR		0.05	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*		Fresh Weight	Soil			Weight	EC_{25}	NR		0.03	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	cotton			Fresh Weight	Soil			Weight	EC_{25}	NR		0.43	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber			Fresh Weight	Soil			Weight	EC_{25}	NR		0.06	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sunflower			Fresh Weight	Soil			Weight	EC_{25}	NR		0.36	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source [2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*		Fresh Weight	Soil			Weight	EC_{25}	NR	0.07	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	corn			Fresh Weight	Soil			Weight	EC_{25}	NR	1.02	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sorghum			Fresh Weight	Soil			Weight	EC_{25}	NR	1.12	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	rice			Fresh Weight	Soil			Weight	EC_{25}	NR	0.74	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	Rhaphanus sativus		Fresh Weight	Soil			Weight	EC_{50}	NR	0.09	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*		Fresh Weight	Soil			Weight	EC_{50}	NR	0.06	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	cotton			Fresh Weight	Soil			Weight	EC_{50}	NR	4.82	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber			Fresh Weight	Soil			Weight	EC_{50}	NR	0.13	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sunflower			Fresh Weight	Soil			Weight	EC_{50}	NR	1.19	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	soybean			Fresh Weight	Soil			Weight	EC_{50}	NR	> 0.64	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*		Fresh Weight	Soil			Weight	EC_{50}	NR	0.11	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	corn			Fresh Weight	Soil			Weight	EC_{50}	NR	1.85	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sorghum			Fresh Weight	Soil			Weight	EC_{50}	NR	1.42	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	rice			Fresh Weight	Soil			Weight	EC_{50}	NR	1.26	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	Rhaphanus sativus		Vegetative Vigor	Soil			Weight	EC_{25}	NR	0.09	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*		Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.07	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	cotton			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.31	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.11	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sunflower			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.25	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	soybean			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.31	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*		Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.09	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	corn			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.65	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sorghum			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	1	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	rice			Vegetative Vigor	Soil			Vigor	EC_{25}	NR	0.53	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Radish	Rhaphanus sativus		Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.15	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cabbage	*Brassica oleracea*		Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.1	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	cotton			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.58	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Cucumber			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.18	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sunflower			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.57	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	soybean			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.9	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	Wheat	*Triticum aestivum*		Vegetative Vigor	Soil			Vigor	EC_{50}	NR	0.12	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes

Formulation	% purity a.i.	General Taxonomic Group	Common Name	Scientific Name	Age	Test Type	Means of Exposure	Exposure Duration	Test Duration	Biological Endpoint	Statistical Endpoint	Toxicity Value (tested product) [1]	Toxicity Value (ai) [1]	Units	Chemical Analysis Done/ Reported?	Lab	Study Number	Data Source[2]	EPA Reviewer	Date Reviewed	Used for TRV derivation
Tebuthiuron, technical	99.6	terrestrial plant	corn			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	1.39	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	sorghum			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	1.43	lb ai/acre		Lilly Research Laboratories		In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes
Tebuthiuron, technical	99.6	terrestrial plant	rice			Vegetative Vigor	Soil			Vigor	EC_{50}	NR	1.22	lb ai/acre		Lilly Research Laboratories	MRID 41066901	In USEPA 1989b.	Richard C. Petrie	10/23/1989	Yes

Boldface indicates study selected for derivation of toxicity reference value (TRV) used in risk assessment.

[1]Toxicity values relate the dose of a compound with a potentially adverse effect. Values are reported as they were presented in the reviewed source.

[2]See the bibliography of this ERA document, Appendix A of the associated Literature Review document, and source footnote for complete citations.

[3]Review and evaluation of scientific literature for use in derivation of Canadian water quality guidelines.

[4]As cited in USEPA 2003.

[5]Nominal concentration.

[6]Maximum specific growth rate.

[7]Before active growth at 333 cells/ml.

[8]Treatment at 21 d.

[9]Pesticide Fact Sheet states that EPA is requiring additional studies; reliability of the data is uncertain.

Abbreviations

m - male

f - female

a.i. - active ingredient

NR - Not reported.

MRID - Master Record Identification Number

Endpoints

EC_{25} - 25% effect concentration

EC_{50} - 50% effect concentration

LC_{50} - median lethal concentration, 50% mortality

LD_{50} - median lethal dose, 50% mortality

LOEC - lowest-observable-effect concentration

LOEL - lowest-observable-effect level

MATC - maximum acceptable toxicant concentration

NOEC - no-observable-effect concentration

NOEL - no-observable-effect level

Durations

hr - hours

d - days

w - weeks

m - months

y - years