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

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

PC Code No.: 035506
DP Barcode(s): D168409, D168404, D179499, D181490, D177715, D193670
EFGWB#(s): 91-0929, 91-0930, 92-1045, 92-1273, 92-0824, 93-0953

MEMORANDUM

SUBJECT: Linuron RED Candidate - EFGWB Science Chapter

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The attached document contains the Environmental Fate and Groundwater Branch (EFGWB) Science Chapter for the List A Reregistration Eligibility Document (RED) for Linuron. The RED Science Chapter is divided into five sections -- Executive Summary; Summary of the Environmental Fate Assessment, Use Patterns and Environmental Fate Data Requirements; Technical Summaries in support of the Environmental Fate data requirements; Assessment of Linuron Detected in Ground Water; and Recommendations with Table A which summarizes the generic data requirements.

Acceptable information from environmental fate studies with respect to persistence of linuron under laboratory conditions has been reviewed. These studies (degradation and metabolism processes) indicate linuron is moderately persistent with degradation principally through biotic processes such as aerobic and anaerobic metabolism in contrast to abiotic processes such as hydrolysis and photolysis. The information on mobility in the environmental fate data base is either partially acceptable or supplemental.

At this time, the following environmental fate data requirements are not fulfilled -- Leaching/Adsorption/Desorption (163-1) and Terrestrial Field Dissipation (164-1). The Leaching/Adsorption/Desorption studies are required to provide information on mobility of the pesticide and major degradates. The Leaching/Adsorption/Desorption (163-1) data requirement is not fulfilled because information on the mobility of the major linuron degradates formed under anaerobic conditions (desmethoxy linuron, desmethoxy monolinuron, norlinuron) is not currently available. Studies of terrestrial field dissipation provide data to evaluate patterns of pesticide residue dissipation in field environments. The Terrestrial Field Dissipation (164-1) studies are partially acceptable at this time or supplemental because the patterns of formation and decline of total linuron residues could not be assessed; and field test procedures and analytical methodology were not completely described.

The additional data required for the mobility and terrestrial field dissipation studies will be used to help determine the principal routes and rates of dissipation of linuron and its significant degradates under typical use conditions. The mobility data (partitioning coefficients, K_ds) will be used to assess the mobility of the primary degradates of linuron and may be applied to complete computer simulation modeling of the fate and transport of the primary degradates. Additional data required for the terrestrial field dissipation studies are necessary to assess the rates and pathways of dissipation of parent linuron and its primary degradates. Information on the persistence, mobility, and dissipation pathways of several primary degradates of linuron is not currently available; therefore, the attached environmental fate assessment must be considered incomplete and tentative.

The environmental data base for parent linuron is essentially complete. Based on current information in the environmental fate data base, linuron is moderately persistent and relatively immobile. The principal route of dissipation of linuron is through biotic processes such as aerobic and anaerobic microbial degradation. Abiotic processes such as hydrolysis, photolysis, and volatilization do not appear to be significant routes of dissipation. Review of partially acceptable and supplemental information on the mobility of linuron suggests that linuron is

primarily sorbed to soil organic matter. Information obtained from the environmental fate studies indicates the potential for linuron to leach to ground water is limited by sorption and microbial degradation. Increased mobility of linuron may occur under specific environmental conditions (e.g., coarse textured soils; soils with low organic matter levels). For this reason, EFGWB recommends that prospective ground-water monitoring studies be conducted to determine the environmental fate of linuron in both vulnerable and representative use conditions. EFGWB also recommends the addition of a ground-water advisory statement to the linuron label, consideration of linuron for restricted use classification based on ground-water concerns, additional label restrictions, and the establishment of criteria for additional mitigation, suspension, and voluntary cancellation. Linuron, present as either dissolved species and/or sorbed to entrained sediments in surface runoff, could potentially also be transported to surface water bodies (lakes, streams, etc.).

ENVIRONMENTAL FATE SCIENCE CHAPTER FOR LINURON REREGISTRATION

SECTION 1. EXECUTIVE SUMMARY

Linuron (3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea), a pre- and post-emergent herbicide, is used for control of many annual grasses and broadleaf weeds in terrestrial food, terrestrial non-food, and forestry use areas. Following review of acceptable, partially acceptable and supplemental information in the environmental fate data base, linuron appears to be moderately persistent and relatively immobile. Increased mobility of linuron may occur under specific environmental conditions (e.g., coarse textured soils; soils with low organic matter levels). Linuron dissipates principally by biotic processes such as microbial degradation. Degradation of linuron by abiotic processes (hydrolysis, photolysis, volatilization) does not appear to be a significant route of dissipation. Partially acceptable and supplemental information on leaching and adsorption/desorption suggests that linuron is primarily adsorbed to soil organic matter with limited adsorption to the inorganic, mineral phase of soil. Linuron would tend to be more mobile in surface soils with low organic matter levels, subsoils or subsoils exposed on the land surface because of erosion. Decreased adsorption in low organic matter soil horizons may result in enhanced mobility and increased leaching potential of parent linuron. For surface soils with adequate organic matter levels, the combined processes of adsorption and microbial degradation would limit the potential for linuron to migrate to ground water. Transport of linuron dissolved in surface runoff and/or in suspended sediment through runoff to surface water bodies (lakes, streams, etc.) could result; however, based on degradation rates and by-products from anaerobic aquatic metabolism studies, fairly rapid degradation of parent linuron to three primary metabolites (desmethoxy linuron, desmethoxy monolinuron, norlinuron) would occur. Information on the mobility and persistence of these primary degradates is not currently available from the studies submitted for the environmental fate data base.

SECTION 2. SUMMARY OF THE ENVIRONMENTAL FATE ASSESSMENT

Following review of acceptable, limited and supplemental information in the environmental fate data base, linuron appears to be moderately persistent and relatively immobile. Increased mobility of linuron may occur under specific environmental conditions (e.g., coarse textured soils; soils with low organic matter levels). Degradation of parent linuron is primarily microbially-mediated with an aerobic soil half-life ($t_{1/2}$) of 49 days and an anaerobic aquatic t $_{1/2}$ <21 days. Abiotic processes such as hydrolysis ($t_{1/2}$ >30 days for pH 5, 7, 9; calculated average $t_{1/2}$?945 days) and photolysis (aqueous $t_{1/2}$ >30 days; soil $t_{1/2}$ >15 days) are of limited effectiveness in degrading linuron. The relatively low vapor pressure of linuron (1.5×10^{-5} mm Hg at 24° C) suggests that volatility and subsequent photolysis in the atmosphere would not be a significant route of dissipation. Partially acceptable and supplemental information from terrestrial field dissipation studies in California and Delaware reports $t_{1/2}$s ranging from 75 to 100 days for California and a terrestrial field dissipation $t_{1/2}$ of 57 days for Delaware. Linuron does not bioaccumulate in bluegill sunfish with bioconcentration factors (BCFs) ranging from ?40 for muscle, carcass and whole fish, to a maximum BCF of 240 for sunfish viscera. Elimination of [^{14}C] linuron was ?92% complete after a 14-day depuration period.

Based on partially acceptable and supplemental information in the data base, linuron is slightly mobile in coarse textured soils (K_{ads} = 2.7-5.0 mL/g) and relatively immobile in fine-textured soils (K_{ads} ?7.5 mL/g). Interpretation of mobility based on soil texture information alone may not be valid because linuron adsorption appears to be controlled by soil organic matter. Adsorption of linuron was positively correlated with soil organic matter; therefore, surface soil horizons with higher amounts of organic matter typically display greater adsorption of linuron. The adsorption of linuron primarily to soil organic matter may indicate a tendency for linuron to display enhanced mobility if the applied herbicide is transported from the surface horizons immediately following application. Enhanced mobility could result if linuron is applied to surface soils low in organic matter or if heavy rainfall occurs following field application. Furthermore, degradation of linuron is primarily microbially-mediated, thus movement of linuron into less biologically-active subsoils may increase persistence and the possibility of downward translocation (leaching) of linuron under specific environmental conditions. Linuron adsorbed to entrained soil particles or dissolved in surface runoff may also transport the applied herbicide from the targeted field areas to surface water bodies; however, based on the results from the anaerobic aquatic metabolism studies, relatively rapid metabolism to three primary degradates (desmethoxy linuron, desmethoxy monolinuron, norlinuron) is expected. Information on the persistence and mobility of these three degradates is necessary to complete a comprehensive environmental fate assessment.

Information reported in the "Pesticides in Ground Water Database" (Hoheisel et al., 1992) shows detections of linuron in 111 of the 1,666 wells sampled. Linuron concentrations in ground water ranged from 0.042-5.00 ?g/L with four states reporting detectable levels. Georgia reported linuron concentrations ranging from 1-5 ?g/L for 67 of 70 wells sampled; Missouri showed levels of 0.2-1.9 ?g/L for 38 of 269 wells sampled; Virginia listed linuron detections in 5 of 12 wells sampled with concentrations ranging from 0.04-3.8 ?g/L; and Wisconsin had 1 detection of 3.0 ?g/L in 26 sampled wells.

Chemical Information

Common Name: Linuron

Chemical Name: 3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea

Trade Name: Linex 50DF, Lorox Plus, Lorox L, Gemini

Structure:

Physical/Chemical Properties:

Molecular formula: $C_9H_{10}Cl_2N_2O_2$
Molecular weight: 249.1
Physical state: Colorless crystals
Melting point: 93-94° C
Vapor pressure: 1.5×10^{-5} mm Hg at 24° C
Solubility: 81 mg/L in water at 24° C

Use Patterns

The following information on use patterns was obtained from labeling material and the LUIS Report dated 5/15/92. Linuron (3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea) is a broad spectrum herbicide for control of many annual grasses and broadleaf weeds in terrestrial food, terrestrial non-food and forestry use areas. Linuron, a substituted urea herbicide, controls numerous weeds reportedly through inhibition of photosynthesis. Linuron is used as a pre- and post-emergent selective herbicide to control various broadleaf weeds and annual grasses such as annual ryegrass, buttonweed, canarygrass, chickweed, crabgrass, dog fennel, fall panicum, foxtail grasses, goosegrass, lambsquarters, morning glory, mustard, nettleleaf, pigweed, purslane, ragweed, smartweed, velvetleaf, wild buckwheat, wild radish and others in field corn, sweet corn (layby), grain sorghum, soybeans, asparagus, carrots, celery (post transplant), parsnips, potatoes, cotton (layby), and wheat (Pacific Northwest). Linuron has been proposed for use on parsley and is also for short-term control of annual weeds in terrestrial nonfood areas such as roadsides and fence rows. Additional application areas include ornamental herbaceous plants such as Dutch iris, daffodil, calla lily and tulip bulbs and weed control for hybrid poplar trees.

Field application of linuron is performed with ground spray equipment such as a tractor-mounted, fixed-boom sprayer. Aerial applications are prohibited. Single active ingredient formulations are emulsifiable and flowable concentrates, wettable powder, flowable liquid, and water dispersible granular (dry flowable). Multiple active ingredient formulations include other herbicides such as atrazine, chloramben, metribuzin, metolachlor, oryzalin,

paraquat, propachlor, propazine, and trietazine. Linuron may be tank mixed with 2,4-D and lenacil. Typical use rates range from 0.5-3.0 lb ai/A, depending on crop and soil type. According to label directions, maximum application rates of 4 lb ai/A are recommended for fine-textured soils such as clays and silty clays.

Status of Data Requirements

The environmental fate assessment was based on the following acceptable studies:

- 161-1: Hydrolysis (MRID# 40916201);
- 161-2: Photodegradation in Water (MRID# 40103601);
- 161-3: Photodegradation on Soil (MRID# 40171711);
- 162-1: Aerobic Soil Metabolism (MRID# 41625401);
- 162-3: Anaerobic Aquatic Metabolism (MRID# 40142501);
- 164-4: Bioaccumulation in Fish (Accession No. 258300).

The environmental fate assessment was based on the following partially acceptable studies:

- 163-1: Leaching/Adsorption/Desorption (MRID# 00148443; Acc. No. 257620);
- 163-1: Leaching/Adsorption/Desorption (Accession No. 255830);
- 164-1: Terrestrial Field Dissipation (MRID# 41734201).

The environmental fate assessment was based on the following supplemental studies:

- 163-1: Leaching/Adsorption/Desorption (MRID# 05016640);
- 163-1: Leaching/Adsorption/Desorption (MRID# 05019711);
- 163-1: Leaching/Adsorption/Desorption (MRID# 05019500);
- 164-1: Terrestrial Field Dissipation (MRID# 41734202).

SECTION 3. TECHNICAL SUMMARIES OF THE ENVIRONMENTAL FATE STUDIES

The following data summary is derived from studies considered **acceptable** by EFGWB:

161-1: Hydrolysis

Stevenson, I.E. 1988. Hydrolysis of [phenyl-^{14}C(U)]linuron in water buffered at pH 5, pH 7, and pH 9. MRID# 40916201

Phenyl-labeled [^{14}C] linuron (radiochemical purity 97%), at ?30 ppm, did not hydrolytically degrade in sterile aqueous 0.005-0.010 M buffer solutions adjusted to pH 5, 7, or 9 and incubated in the dark at 25 ± 1° C for 30 days. At 30 days posttreatment, 96.0-98.4% of the applied [^{14}C] linuron remained undegraded; the registrant calculated half-lives for linuron in the buffer solutions averaged 945 days. Minor degradates, each found at ?1% of the applied, were 3,4-dichlorobenzenamine (DCA), N-(3,4-dichlorophenyl)-N'-methylurea (DCPMU), N-(3,4-dichlorophenyl)-N'-methoxyurea (DML), and (3,4-dichlorophenyl)urea (DCPU). During the 30-day study, measured volatiles

were ≤ 0.04% of the applied radioactivity. Material balances ranged from 94.4 to 107% of the applied radioactivity.

161-2: Photodegradation in Water

Buchta, R.C. 1986. Photodegradation of [phenyl-^{14}C(U)]linuron in water. MRID# 40103601

Phenyl-labeled [^{14}C] linuron (radiochemical purity 99%), at 18 ppm, degraded with a half-life of >30 days (registrant-calculated half-life of 49 days) in a sterile aqueous pH 5 buffered solution irradiated with natural sunlight (May in Wilmington, DE) at 25° C. At 30 days posttreatment (total light intensity = 196,006 Watt-hours/m^2), linuron comprised 61.6% of the applied radioactivity: volatiles totaled 10.2% of the applied and unidentified degradates (at least 8 separate peaks) each accounted for up to 5.1% of the applied. In the dark control after 30 days, 92.1% of the recovered was undegraded parent linuron, suggesting the observed degradation was primarily photolytic rather than hydrolytic. The ultraviolet-visible light absorption spectrum for linuron at 18 ppm displayed absorption maxima at 210, 245, and 280 nm with some overlap at >290 nm, further supporting direct photolysis of the parent linuron.

161-3: Photodegradation on Soil

Brown, A.M. 1986. Photodegradation of [phenyl-^{14}C(U)]linuron on soil. MRID# 40171711

Phenyl-labeled [^{14}C] linuron (radiochemical purity >98%), at 7.5 lb ai/A (1.63 mg/plate), degraded with a half-life >15 days on silt loam soil irradiated continuously with a Pyrex glass-filtered xenon arc light at 25° C. After 15 days of irradiation, the soil contained 78.8% of the recovered radioactivity as parent linuron. Minor degradates identified were norlinuron, desmethyl linuron, and 3,4-dichloroaniline (each <8.4% of the recovered). Unidentified polar compounds comprised <4% of the recovered, unextractable compounds were <2.5% of the recovered, and volatiles were <0.1% of the recovered at all sampling intervals. In the dark controls, parent linuron accounted for 96.5% of the recovered radioactivity after 15 days, suggesting that degradation was primarily photolytic and not biologically-mediated. Material balance for all samples ranged from 95 to 123% of the applied and averaged 110% of the applied.

162-1: Aerobic Soil Metabolism

Schneiders, G.E. 1990. Aerobic soil metabolism of [phenyl-^{14}C(U)]linuron in Hanford sandy loam. MRID# 41625401

Linuron degraded with a half-life of 49 days in sandy loam soil that was incubated in the dark at 25° C and 75% of 0.33 bar moisture content. The primary nonvolatile degradate was 3-(3,4-dichlorophenyl)-1-methylurea (desmethoxy linuron; maximum average concentration of 3.0% of the applied at 120 days posttreatment, decreasing to 1.9% of the applied by 365 days); other nonvolatile degradates were 3-(3,4-dichlorophenyl)-1-methoxyurea (desmethyl linuron; maximum average concentration of 2.1% of the applied at 365 days posttreatment) and 1-(3,4-dichlorophenyl)urea (norlinuron; maximum average concentration of 1.9% of the applied

at 28 days). By 12 months posttreatment, unidentified polar [^{14}C]residues increased to 4.7% (0.20 ppm) of the applied and "other" unidentified [^{14}C]residues comprised 1.8% (0.07 ppm). At 12 months posttreatment, $^{14}CO_2$ was the major degradate (totaled 69% of the applied).

162-3: Anaerobic Aquatic Metabolism

Monson, K.D. 1986. Anaerobic aquatic metabolism of [phenyl-^{14}C(U)] linuron. MRID# 40142501

Phenyl-labeled [^{14}C] linuron (radiochemical purity 88%), at 5 ppm, degraded with a half-life of <3 weeks in nonsterile anaerobic (flooding plus N_2 atmosphere) silt loam or sand soil:water (1:1) system incubated in the dark at 24° C. [^{14}C] Linuron was not detected (detection limit not specified) in either system by 26 weeks posttreatment. In the silt loam soil system at three weeks posttreatment (first sampling interval following treatment), 10.8% of the applied radioactivity remained as parent linuron (registrant-calculated half-life of 1 week). The two major degradates were desmethoxy linuron (maximum of 46.7% of the applied at 3 weeks posttreatment) and desmethoxy monolinuron (maximum of 78% of the applied at 26 weeks). Minor degradates, each <5.7% of the applied, were desmethyl linuron, norlinuron, and dichloroaniline. Unidentified (polar compounds: unidentified compounds; background radioactivity) and unextractable [^{14}C] residues accounted for up to 21.8 and 27% of the applied, respectively. In the sand soil system, the major degradates were desmethoxy linuron (maximum of 84.6% of the applied at 26 weeks) and norlinuron (maximum of 33% of the applied at 52 weeks). Minor degradates, each found at <5% of the applied, were desmethyl linuron, dichloroaniline, and desmethoxy monolinuron. Unidentified and unextractable [^{14}C] residues comprised up to 28.4 and 16.4% of the applied, respectively. Except for the samples taken immediately posttreatment, the majority of the radioactivity in both soil:water systems was associated with the soil fraction.

In anaerobic sterile silt loam and sand soil systems, phenyl-labeled [^{14}C] degraded with half-lives of <4 weeks (registrant-calculated half-life of 3.5 weeks) and >52 weeks, respectively. In the sterile silt loam system, only 14.6% of the applied remained as undegraded parent linuron at 4 weeks posttreatment, whereas, in the sterile sand soil system, 62.4% of the applied remained as undegraded linuron at 52 weeks posttreatment. The registrant stated that the sterile silt loam system may not have been anaerobic (reported redox potential of 216 millivolts; pH unspecified); therefore, more rapid degradation was observed in the silt loam system relative to the sand soil system. Furthermore, the sterility of the silt loam system was not confirmed and microbial metabolic processes may have increased the degradation rate.

164-4: Bioaccumulation in Fish

Butler, L.D. 1985. Laboratory studies of phenyl-^{14}C linuron bioconcentration in bluegill sunfish. Accession #258300

[^{14}C] Linuron (>99% pure) at 0.1 and 1.0 ppm, accumulated in bluegill sunfish, with maximum bioconcentration factors of 34x, 39x, 49x, and 240x, in muscle, carcass, whole fish, and viscera, respectively. After 28 days of exposure, [^{14}C] linuron residues consisted of desmethyl linuron (?18-24%), linuron (15-22%), norlinuron (7-10%), and glucuronide residues (8-12%). No

analyses of [^{14}C] linuron residues were completed on the muscle tissue. Elimination of [^{14}C] linuron residues was >66% after a 1-day depuration period and 92% complete after a 14-day depuration period.

The following data summary is derived from studies considered **partially acceptable** by EFGWB:

163-1: Leaching/Adsorption/Desorption

Priester, T.M. 1985. Batch equilibrium (adsorption/desorption) and soil thin-layer chromatography studies with [phenyl-^{14}C(U)] linuron. MRID# 00148443; Accession No. 257620

Priester, T.M. 1988. Supplement #1: Batch equilibrium (adsorption/desorption) and soil thin-layer chromatography studies with [phenyl-^{14}C(U)] linuron. MRID# 40559001

Priester, T.M. 1992. Supplement #2: Batch equilibrium (adsorption/desorption) and soil thin-layer chromatography studies with [phenyl-^{14}C(U)] linuron. MRID# 42264601

Soil adsorption/desorption of uniformly-labeled [^{14}C] linuron (purity >99%) was studied using batch equilibrium tests of 4 soils. Measured K_{ads} suggest that linuron is slightly mobile in coarse textured soils (Woodstown sandy loam [DE]; fine-loamy, mixed, mesic Aquic Hapludults; 60% sand, 33% silt, 7% clay; pH = 6.6; Cecil sandy loam [NC]; clayey, kaolinitic, thermic Typic Kanhapludults; 61% sand, 21% silt, 18% clay; pH = 6.5) and relatively immobile in fine textured soils (Flanagan silt loam [IL]; fine, montmorillonitic, mesic, Aquic Argiudolls; 2% sand, 81% silt, 17 % clay; pH = 5.4; Keyport silt loam [DE]; clayey, mixed, mesic Aquic Hapludults; 12% sand, 83% silt, 5% clay; pH = 5.2). Interpretation of mobility based on soil texture information alone may not be valid because linuron adsorption appears to be controlled by soil organic matter. Adsorption of linuron was positively correlated with soil organic matter content.

Soil Type	Clay (%)	Organic Matter (%)	CEC (meq/100g)	K_{ads} (mL/g)	K_{des} (mL/g)	$K_{ads,om}$ (mL/g)	$K_{des,om}$ (mL/g)
Woodstown sl[1]	7	1.1	5.3	2.7	3.6	241	327
Cecil sl	18	2.1	6.6	5.0	4.5	238	214
Flanagan sil[2]	17	4.3	21.1	7.7	4.7	179	109
Keyport sil	5	7.5	15.5	7.2	4.8	96	65

Notes: [1]sl = sandy loam; [2]sil = silt loam

163-1: Leaching/Adsorption/Desorption

Chrzanowski, R.L. 1984. Soil column adsorption studies with Lorox linuron weed killer. Accession No. 255830

Based on the results of soil column leaching studies, linuron (unaged and "aged" 30 days) was slightly mobile to relatively immobile in Fallsington sandy loam (Glasgow, DE; 59% sand, 30% silt, 10% clay; 0.79% organic matter (OM); pH = 6.6; CEC = 5.2 meq/100g) and Flanagan silty clay loam (Rochelle, IL; 5% sand, 64% silt, 31% clay; 4.0% OM; pH = 5.0; CEC = 23.4

meq/100g) soil columns, respectively. For the unaged tests, after leaching 18-in. repacked soil columns (2-in. diameter) with 20 in. of water, 0.4% of the applied radioactivity was present in the leachate for both soils. For the "aged" tests under similar experimental conditions, 0.3 and 0.2% of the applied was measured in the leachate. For the unaged and "aged" tests on the Fallsington sandy loam, maximum linuron concentrations were found at the 6-8 in. depth (?25% of the applied) and 8-10 in. depth (?23% of the applied), respectively. The unaged and "aged" tests on the Flanagan silty clay loam exhibited maximum linuron concentrations at the 0-2 in. depth (?83 and 75% of the applied, respectively).

Additional data required for the leaching/adsorption/desorption studies will be used to help determine the mobility of linuron's significant degradates under typical use conditions. The mobility data (partitioning coefficients, K_ds) may be applied to complete computer simulation models assessing the fate and transport of the primary degradates.

164-1: Terrestrial Field Dissipation

Eble, J.E. 1990. Field soil dissipation of linuron herbicide. MRID# 41734201

Linuron dissipated with a calculated half-life of 100 days from the upper 15 cm of a plot of sandy loam soil in California after an application of linuron (Lorox DF, 50% dry flowable) at 6 lb ai/A, and with a half-life of 57 days from the upper 15 cm of a plot of silty clay loam soil in Delaware after an application of linuron (Lorox L, 4 lb ai/gallon flowable concentrate) at 1 lb ai/A. Total linuron residues (linuron plus its degradates desmethoxy-linuron, desmethyl-linuron, norlinuron, and 3,4-dichloroaniline hydrolyzed to 3,4-dichloroaniline) dissipated from the 0- to 15-cm soil depth with an observed half-life of approximately 9-12 months at both sites. Parent linuron was detected at low levels (?0.02 ppm) for one month posttreatment at both sites in soil samples collected from the 15-30 cm depth. Total linuron residues were detected in the 15- to 30-cm soil layer at both sites (<0.01-0.05 ppm); soil layers below 30 cm were not analyzed for total linuron residues. For sampling depths deeper than 30 cm, the 15-cm soil segments "for selected sampling intervals" were either analyzed as 30-45 cm samples or composited into 30- to 90-cm samples; parent linuron was not reported at concentrations above the detection limit (<0.01 ppm).

Studies of terrestrial field dissipation provide data to evaluate patterns of pesticide residue dissipation in field environments. Additional information is required for the terrestrial field dissipation studies because the patterns of formation and decline of total linuron residues could not be assessed; and field test procedures and analytical methodology were not completely described.

164-1: Freezer Storage Stability In Soil

Tomic, D.M. 1992. Freezer storage stability of linuron in soil. MRID# 42422801

Linuron appeared to be stable in silty clay loam soil that was treated with linuron [3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea; purity 98.8%] at 1 ppm and stored frozen (-20 ^{o} C) for up to 30 months. At 30 months posttreatment, parent linuron comprised 86-90% of the applied (percent recovery normalized to recovery from fresh fortifications). During the study,

recovery of linuron from stored soil samples ranged from 82 to 115% of the applied (normalized). If samples are stored frozen for longer than 30 months prior to analysis, storage stability information for longer periods will be required. In addition, storage stability data are needed for individual degradates of linuron.

Actual recoveries of applied linuron from stored fortified soil decreased in the 24-, 26-, and 30-month samples; however, the decreased recoveries from stored soil samples coincided with poor recoveries from freshly fortified samples. Parent linuron comprised 76-114% of the applied in the soil samples stored for 0 to 18 months, then decreased to 56-66% of applied in the samples stored for 24 and 30 months. Similarly, linuron comprised 78-112% of the applied in freshly fortified soil samples extracted concurrently with the 0- to 18-month stored soil and decreased to 60-73% of applied in freshly fortified samples extracted concurrently with the 24- to 30-month stored samples.

The following data summary is derived from studies considered **supplemental** by EFGWB:

163-1: Leaching/Adsorption/Desorption

Abernathy, J.R. 1972. Linuron, chlorbromuron, nitrofen, and fluorodifen adsorption and movement in twelve selected Illinois soils. MRID# 05019500

Grover, R. 1975. Adsorption and desorption of urea herbicides on soils. MRID# 05016640

Hance, R.J. 1971. Complex formation as an adsorption mechanism for linuron and atrazine. MRID# 05019711

Several early investigations of the adsorption of linuron provide supplemental information which indicates sorption is probably related to the organic matter content of soils. In a study of the adsorption and desorption of urea herbicides, Grover (1975) reported adsorption of linuron was significantly correlated with soil organic matter but not clay content. Desorption of linuron was limited in a high organic matter (10.5%) loam soil when compared to four other soils ranging from 6.5-1.8% organic matter and 8-70% clay. Hance (1971) postulated that the formation of complexes with exchangeable cations could play a significant role in linuron adsorption in soil. Abernathy (1972) showed adsorption of [^{14}C] linuron for 12 selected Illinois soils was highly correlated to organic matter with no correlations between adsorption of linuron and temperature, pH, clay, silt, or sand.

164-1: Terrestrial Field Dissipation

Eble, J.E. 1990. Field soil dissipation of linuron herbicide in California soil. MRID# 41734202

Linuron dissipated with a registrant-calculated half-life of 75 days from the upper 15 cm of a plot (15 x 80 feet) of sandy clay loam soil planted to soybeans in California following a preemergence application of linuron [3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea; Lorox DF, 50% dry flowable] at 6 lb ai/A in June 1989. In the 0- to 15-cm soil depth, linuron decreased from an average of 1.14-2.07 ppm at 0-1 days posttreatment (maximum 3.31 ppm at 1 day) to 0.58 ppm at 7 days, increased to 1.21 ppm at 14 days, then decreased to 1.05 ppm at 29 days, 0.56 ppm at 90 days, 0.18 ppm at 181 days, and 0.05 ppm at 365 days (Table II). Linuron may have leached into lower soil depths (15- to 30- and 30- to 90-cm depths); however, analysis

of the pattern of leaching appeared to have been confounded by contamination of several of the subsurface soil samples during sampling. In the 15- to 30-cm depth, linuron was detected at an average of 0.02-0.03 ppm at 0-1 days posttreatment, 0.01 ppm at 7 days, 0.04 ppm (maximum 0.07 ppm) at 14 days, <0.01-0.03 ppm at 29-119 days, and <0.01 ppm (limit of quantitation) at 181, 270, and 365 days. In the 30- to 45-cm soil depth, linuron was detected at an average of 0.12 ppm (maximum 0.22 ppm) at 0 day posttreatment. In the 30- to 90-cm soil depth, linuron increased from an average of 0.02 ppm at 1-7 days posttreatment to 0.09 ppm (maximum 0.14 ppm) at 14 days, and was ≤0.01 ppm at 29-365 days.

SECTION 4. ASSESSMENT OF LINURON DETECTIONS IN GROUND WATER

To date, linuron has been detected in ground water in four states -- Georgia, Missouri, Virginia, and Wisconsin (Hoheisel et al., 1992). Review of the studies in which the ground water detections were reported gave the following results:

1. Georgia

Detections in ground water were solely from STORET which did not allow a detailed review. Concentrations of linuron ranged from 1 to 5 ?g/L (ppb).

2. Missouri

Rural private wells in agricultural areas of Missouri were monitored for pesticide residues. Linuron was detected at concentrations ranging from 0.5 to 1.9 ?g/L (Sievers and Fulhage, 1989a and 1991). In another study conducted in Missouri (Sievers and Fulhage, 1989b), linuron was also detected in ground water in rural agricultural wells at levels ranging from 0.48 to 0.9 ?g/L. The study examined ground-water quality in eight major agricultural areas in the state, without regard to the vulnerability of the soils to leaching, nor to areas of high linuron use.

Dennis Sievers (personal communication, 1994) related to the GWTS that there were some interference problems with the mass spectrometer detector due to sulfur and organic matter. Mr. Sievers was very confident regarding the linuron detections above 1 ?g/L, but less confident with the detections reported below 1 ?g/L. No information was provided about the wells, depth to ground water, or detection limits.

3. Virginia

Eight monitoring wells and four household wells were sampled for a suite of pesticides including linuron (Mostaghimi, 1992). There were no indications of point-source contamination or problems with the wells during the study. Linuron was detected in 50% of the monitoring wells (4 of 8 wells) at levels ranging from 0.35 to 1.31 ?g/L. The extensive QA/QC plan for the sampling program and GC analysis provided a high degree of confidence for these detections.

4. Wisconsin

In a Wisconsin study (Postle and Brey, 1991), monitoring wells were located in areas that were highly vulnerable to ground-water contamination. All detections were from areas with normal field use conditions. Linuron was detected at one site at concentrations that ranged from 1.3 to 2.7 ?g/L.

Using a Reference Dose (RfD) of 0.002 mg/kg/day in a dog feeding study, the lifetime Health Advisory for linuron in drinking water was estimated to be 1.4 ?g/L. Linuron has been placed in Cancer Group C (unquantified) indicating that it is a possible human carcinogen. Linuron has been detected in ground water in four states including Georgia, Missouri, Virginia, and Wisconsin at levels ranging up to 5.00 ?g/L (Hoheisel et al., 1992).

Linuron exhibits some of the properties and characteristics associated with chemicals that have been detected in ground water. Linuron is a persistent chemical with an aerobic soil metabolism half-life that ranges from 84 to 91 days (12 to 13 weeks). In addition, its field dissipation half-life has been reported to range from a minimum of 57 days to a maximum of 100 days (?8 to ?14 weeks, respectively). Based on its persistence, linuron use may have a significant impact on ground-water quality.

Because linuron is persistent and may be mobile under certain environmental conditions, it has the potential to significantly impact ground-water quality at levels that may affect human health. To date, linuron residues have been detected in ground water in three states above estimated lifetime Health Advisory levels. Potential concentrations of linuron in ground water are not likely to exceed the other risk-based Levels of Concern for ecological effects (see Figure 1).

Linuron Detections in Ground Water Exceed the Following Levels of Concern:

? **GROUND-WATER QUALITY**. Linuron has been detected in ground water in Georgia, Missouri, Virginia, and Wisconsin with detectable levels above the estimated toxicity threshold for humans. Considering the widespread use of linuron and its environmental fate characteristics, EFGWB is concerned about the degradation of water quality that might occur in linuron use areas.

? **HUMAN HEALTH**. Linuron residues have been detected in ground water at levels which exceed the estimated lifetime Health Advisory. To date, no information is available about the degradates in ground water, but additional information on the persistence and mobility of the degradates has been requested in this document. If the toxicity of the three degradates is similar to the parent, the combined concentrations of parent linuron and its degradates in ground water may greatly exceed the levels of concern for human health.

SECTION 5. RECOMMENDATIONS

Because linuron exceeds certain Levels of Concern for ground water, EFGWB recommends the following:

1. Linuron has been detected in ground water. Therefore, all product labels should carry the

following advisory:

> "This chemical is known to leach through soil into ground water under certain conditions as a result of agricultural use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination."

2. EFGWB recommends that prospective ground-water monitoring studies be conducted for linuron. In order to determine the potential of this chemical to leach to ground water, an adequate number of studies should be conducted to characterize linuron use. Study areas should include those with coarse-textured soils low in organic matter, and those more representative of typical linuron use areas.

3. Linuron meets the persistence and mobility triggers for classification as a restricted use chemical for ground-water concerns. EFGWB recommends that linuron be considered for classification as a restricted use chemical based on ground-water concerns.

4. Linuron has been detected in ground water as a result of normal agricultural use at levels that exceed its estimated lifetime Health Advisory. The registrant should determine the areas that are vulnerable to ground-water contamination by linuron, and recommend label restrictions.

5. The registrant and EPA will agree, as a condition of reregistration eligibility, to establish criteria for additional mitigation, suspension, and voluntary cancellation as a consequence of monitoring study results.

Environmental Fate Data Requirements

The current status of the environmental fate data requirements for the terrestrial food, terrestrial non-food, and forestry use patterns is briefly summarized below and outlined in detail in the attached Table A.

Data Requirement	Status	MRID No.
161-1: Hydrolysis	Fulfilled	40916201
161-2: Photolysis in Water	Fulfilled	40103601
161-3: Photolysis on Soil	Fulfilled	40171701
161-4: Photolysis in Air	Waived[1]	----
162-1: Aerobic Soil Metabolism	Fulfilled	00125244 41625401
162-2: Anaerobic Soil Metabolism	Fulfilled	40142501
162-3: Anaerobic Aquatic Metabolism	Fulfilled	40142501
163-1: Leaching/Sorption	Not fulfilled[2]	00148443 Acc.#255830
163-2: Volatility (Laboratory)	Waived[1]	----
163-3: Volatility (Field)	Waived[1]	----

164-1: Terrestrial Field Dissipation	Not fulfilled[3]		41734201 41734202 42422801
165-1: Confined Rotational Crop	Fulfilled		40730101
165-2: Field Rotational Crop	Waived[4]	----	
165-4: Bioaccumulation in Fish	Fulfilled		Acc.# 258300
166-1: Ground Water - Prospective	Not Fulfilled[5]		----

Notes:

[1] The Photodegradation in Air (161-4), Volatility (Laboratory; 163-2) and Volatility (Field; 163-3) data requirements were waived because the reported vapor pressure of linuron is 1.5×10^{-5} mm Hg at 24° C.

[2] The Leaching/Adsorption/Desorption (163-1) data requirement is not fulfilled because information on the K_ds for the major linuron degradates under anaerobic conditions (desmethoxy linuron, desmethoxy monolinuron, norlinuron) is not currently available. Adsorption coefficients (K_ds) may be determined using batch equilibrium test methodology.

[3] The Terrestrial Field Dissipation (164-1) data requirement is not fulfilled because the patterns of formation and decline of total linuron residues could not be assessed; and field test procedures and analytical methodology were not completely described. The California study may be upgradeable if additional information on study methods and early soil sample results can be provided; however, the Delaware study can not be upgraded because the consistent presence of linuron in the control plot confounds accurate assessment of the pattern of formation and decline of total linuron residues. A new study is needed to satisfy the data requirement.

[4] Information on the 165-2 data requirement waiver may be obtained from RCB/HED (Review Date 3/23/90).

[5] In order to determine the potential of this chemical to leach to ground water, an adequate number of studies should be conducted to characterize linuron use. Study areas should include those with coarse-textured soils low in organic matter, and those more representative of typical linuron use areas.

The following data requirements are fulfilled:

161-1: Hydrolysis - The study by Stevenson (1988; MRID# 40916201) was reviewed and found acceptable for fulfilling the Hydrolysis data requirement. Phenyl-labeled [^{14}C] linuron did not degrade via hydrolysis in sterile buffer solutions at pH 5, 7, or 9 and incubated in the dark at 25 ± 1 °C for 30 days.

161-2: Photodegradation in Water - A study by Buchta (1986; MRID# 40103601) was reviewed and found acceptable for fulfilling the Photodegradation in Water data requirement. Phenyl-labeled [^{14}C] linuron degraded slowly with a half-life of >30 days (registrant-calculated half-life of 49 days) in sterile aqueous pH 5 buffer solution irradiated with natural sunlight (May in Wilmington, DE) at 25° C.

161-3: Photodegradation on Soil - The study by Brown (1986; MRID# 40171711) was reviewed and found acceptable for fulfilling the Photodegradation on Soil data requirement. Phenyl-labeled [^{14}C] linuron degraded very slowly with a half-life >15 days on silt loam soil irradiated continuously with a Pyrex glass-filtered xenon arc light at 25° C.

162-1: Aerobic Soil Metabolism - The study by Schneiders (1990; MRID# 41625401) was reviewed and found acceptable for fulfilling the Aerobic Soil Metabolism data requirement. Linuron degraded with a half-life of 49 days in sandy loam soil that was incubated in the dark at 25° C and 75% of 0.33 bar moisture content. Several degradates were reported in small

concentrations (desmethoxy linuron, ?3%; desmethyl linuron, ?2%; norlinuron, ?2%). At 12 months posttreatment, CO_2 was the major degradate (?70% of the applied).

162-2: Anaerobic Soil Metabolism - No studies were reviewed. The Anaerobic Aquatic Metabolism study was used to fulfill this data requirement.

162-3: Anaerobic Aquatic Metabolism - The study by Monson (1986; MRID# 40142501) was reviewed and found acceptable for fulfilling the Anaerobic Soil Metabolism data requirement. Phenyl-labeled [^{14}C] linuron degraded with a half-life of <3 weeks in nonsterile anaerobic silt loam and sand soil: water (1:1) systems incubated in the dark at 24° C. Primary degradates were desmethoxy linuron (range of ?50-85% of the applied), desmethoxy monolinuron (?78% of the applied in the silt loam), and norlinuron (?33% of the applied in the sand soil). Minor (<5% of the applied) degradates were desmethyl linuron and dichloroaniline.

165-4: Bioaccumulation in Fish - The study by Butler (1985, Accession #258300) was reviewed and found acceptable for fulfilling the Bioaccumulation in Fish data requirement. Linuron residues accumulated in bluegill sunfish during 28 days of exposure to water treated at 0.1 and 1.0 ppm [^{14}C] linuron. Maximum bioconcentration factors were 49x for whole fish, 240x for viscera, 34x for muscle and 39x for carcass tissues. After 28 days of exposure, linuron residues in the viscera were identified as desmethyl linuron, norlinuron, and glucuronide conjugates. The edible tissues were not analyzed for linuron residues. Residues rapidly declined to ?10% of maximum levels after the 14-day depuration period.

The following data requirements are not fulfilled:

163-1: Leaching/Adsorption/Desorption - Two studies were reviewed (Preister, 1985; MRID# 00148443; Chrzanowski, 1984; Accession No. 255830) and provided partially acceptable information on the mobility of linuron. Based on the results of the two studies and supplemental information from three peer-reviewed journal publications on linuron mobility, linuron appears to be slightly mobile in coarse-textured soils (K_{ads} = 2.7-5.0 for sandy loams) and relatively immobile in fine-textured soils (K_{ads} = 7.2-7.7 for silt loams). Adsorption of linuron is probably related to the organic matter content with increased adsorption reported for soils with higher organic matter content ($K_{ads,om}$ <200 for two soils with >4% OM). The Leaching/Adsorption/Desorption (163-1) studies are partially acceptable because information on the K_ds for the primary linuron degradates formed under anaerobic conditions (desmethoxy linuron, desmethoxy monolinuron, norlinuron) is not currently available. Adsorption coefficients (K_ds) may be determined using batch equilibrium test methodology.

164-1: Terrestrial Field Dissipation - Two studies were reviewed (Eble, 1990a, 1990b; MRID# 41734201, 41734202) and provided partially acceptable or supplemental information on the field dissipation of linuron in California and Delaware. The Terrestrial Field Dissipation (164-1) data requirement is not fulfilled because the patterns of formation and decline of total linuron residues could not be assessed; and field test procedures and analytical methodology were not completely described. The California study may be upgradeable if additional information on study methods and early soil sample results can be provided; however, the Delaware study can not be upgraded because the consistent presence of linuron in the control plot confounds accurate assessment of

the pattern of formation and decline of total linuron residues. A new study is needed to satisfy the data requirement.

166-1: Ground Water - Prospective - EFGWB recommends that prospective ground-water monitoring studies be conducted for linuron. In order to determine the potential of this chemical to leach to ground water, an adequate number of studies should be conducted to characterize linuron use. Study areas should include those with coarse-textured soils low in organic matter, and those more representative of typical linuron use areas.

The following data requirements are deferred or are not required for presently registered uses:

161-4: Photodegradation in Air - No studies were reviewed. The Photodegradation in Air data requirement was waived because the vapor pressure for linuron was reportedly 1.5×10^{-5} mm Hg at 24° C (2.0 mPa); therefore, volatilization and subsequent photodegradation in air are not considered probable routes of dissipation.

163-2: Volatility - Laboratory - No studies were reviewed. The Laboratory Volatility data requirement was waived because the vapor pressure for linuron was reportedly 1.5×10^{-5} mm Hg at 24° C (2.0 mPa); therefore, volatilization is not considered a probable route of dissipation.

163-3: Volatility - Field - No studies were reviewed. The Field Volatility data requirement was waived because the vapor pressure for linuron was reportedly 1.5×10^{-5} mm Hg at 24° C (2.0 mPa); therefore, volatilization is not considered a probable route of dissipation.

165-1: Confined Rotational Crop - No studies were reviewed. The Confined Rotational Crop data requirement was transferred to RCB/HED (effective 2/22/93). Inquiries regarding this data requirements should be directed to RCB/HED.

165-2: Field Rotational Crop - No studies were reviewed. The Field Rotational Crop data requirement was transferred to RCB/HED (effective 2/22/93). Inquiries regarding this data requirements should be directed to RCB/HED.

201-1: Droplet Size Spectrum - No studies were reviewed. The registrant, Du Pont, is a participating member of the Spray Drift Task Force. Information regarding spray drift of linuron should be provided upon completion of the Spray Drift Task Force data base. This study may be required by EFGWB when toxicological considerations are indicated by either the Ecological Effects Branch and/or the Health Effects Division.

202-1: Drift Field Evaluation - No studies were reviewed. The registrant, Du Pont, is a participating member of the Spray Drift Task Force. Information regarding spray drift of linuron should be provided upon completion of the Spray Drift Task Force data base. This study may be required by EFGWB when toxicological considerations are indicated by either the Ecological Effects Branch and/or the Health Effects Division.

REFERENCES

Abernathy, J.R. 1972. Linuron, chlorbromuron, nitrofen, and fluorodifen adsorption and movement in twelve selected Illinois soils. Ph.D. Diss. Abstr. 73-9861, Urbana, IL. Univ. of Illinois at Urbana-Champaign. (MRID# 05019500)

Brown, A.M. 1986. Photodegradation of [phenyl-^{14}C(U)]linuron on soil. Laboratory Project ID AMR-644-86. Unpublished study prepared and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 40171711)

Buchta, R.C. 1986. Photodegradation of [phenyl-^{14}C(U)]linuron in water. Laboratory Project ID AMR-616-86. Unpublished study prepared and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 40103601)

Butler, L.D. 1985. Laboratory studies of phenyl-^{14}C linuron bioconcentration in bluegill sunfish. Unpublished study received June 14, 1985 under 352-326. Submitted by E.I. du pony de Nemours and Company, Inc., Wilmington, DE. (No MRID number; Accession #258300)

Chrzanowski, R.L. 1984. Soil column adsorption studies with Lorox linuron weed killer. In Linuron environmental fate. Unpublished study received Nov. 13, 1984 under 352-326. Submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (Accession No. 255830)

Eble, J.E. 1990a. Field soil dissipation of linuron herbicide. Du Pont Project ID AMR-1063-88. Unpublished study performed by Du Pont Stine Research Farm, Newark, DE; Du Pont Madera Field Station, Madera, CA; Enviro-Bio-Tech, Ltd., Bernville, PA; Minnesota Valley Testing Laboratories, Inc., New Ulm, MN; and Morse Laboratories, Inc., Sacramento, CA. Submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 41734201)

Eble, J.E. 1990b. Field soil dissipation of linuron herbicide in California soil. Du Pont Project ID AMR-1466-89. Unpublished study performed by Du Pont Madera Field Station, Madera, CA; Du Pont Experimental Station, Wilmington, DE; Minnesota Valley Testing Laboratories, Inc., New Ulm, MN; and Morse Laboratories, Inc., Sacramento, CA. Submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 41734202)

Grover, R. 1975. Adsorption and desorption of urea herbicides on soils. Can. Jour. of Soil Sci. 55(2):127-135. (MRID# 05016640)

Hance, R.J. 1971. Complex formation as an adsorption mechanism for linuron and atrazine. Weed Research 11(2/3):106-110. (MRID# 05019711)

Hoheisel, C., Karrie, J., Lees, S., Davies-Hilliard, L., Hannon, P., Bingham, R., Behl, E., Wells, D., and E. Waldman. 1992. Pesticides in Ground Water Database - A Compilation of Monitoring Studies: 1971-1991, EPA 734-12-92-001, September 1992.

Monson, K.D. 1986. Anaerobic aquatic metabolism of [phenyl-^{14}C(U)] linuron. Laboratory

Project ID AMR-622-86. Unpublished study prepared and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 40142501)

Mostaghimi, S. 1992. Watershed/Water Quality Monitoring for Evaluating BMP Effectiveness, Virginia Polytechnic Institute and State University.

Postle, J.K. and K.M. Brey. 1991. Results of the WDATCP Groundwater Monitoring for Pesticides, Wisconsin Department of Agriculture, Madison, WI.

Priester, T.M. 1985. Batch equilibrium (adsorption/desorption) and soil thin-layer chromatography studies with [phenyl-^{14}C(U)] linuron. Laboratory Project ID AMR-311-85. Unpublished study performed and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 00148443; Accession No. 257620)

Priester, T.M. 1988. Supplement #1: Batch equilibrium (adsorption/desorption) and soil thin-layer chromatography studies with [phenyl-^{14}C(U)] linuron. Laboratory Project ID AMR-311-85. Unpublished study performed and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 40559001)

Priester, T.M. 1992. Supplement #2: Batch equilibrium (adsorption/desorption) and soil thin-layer chromatography studies with [phenyl-^{14}C(U)] linuron. Laboratory Project ID AMR-311-85. Unpublished study performed and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 42264601)

Schneiders, G.E. 1990. Aerobic soil metabolism of [phenyl-^{14}C(U)]linuron in Hanford sandy loam. Laboratory Project ID AMR-1348-88. Unpublished study performed and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 41625401)

Sievers, D.M. and C.D. Fulhage. 1989a. Quality of Missouri's Agricultural Groundwater Region II Sampling, University of Missouri.

Sievers, D.M. and C.D. Fulhage. 1989b. Quality of Rural Well Water, North Missouri, Special Report 402, University of Missouri at Columbia, September 1989.

Sievers, D.M. and C.D. Fulhage. 1991. Quality of Missouri's Agricultural Groundwater Region II Sampling, Missouri Department of Natural Resources.

Sievers, Dennis. 1994. Personal communication.

Stevenson, I.E. 1988. Hydrolysis of [phenyl-^{14}C(U)]linuron in water buffered at pH 5, pH 7, and pH 9. Laboratory Project ID AMR-1223-88. Unpublished study prepared and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 40916201)

Tomic, D.M. 1992. Freezer storage stability of linuron in soil. MVTL Project ID 02- 8906. Du Pont Project ID AMR-1677-90. Unpublished study performed by Minnesota Valley Testing Laboratories, Inc., New Ulm, MN, and submitted by E.I. du Pont de Nemours and Company, Inc., Wilmington, DE. (MRID# 42422801)

Wisconsin Dept. of Agriculture, Trade, and Consumer Services. 1989. Grade A Dairy Farm Well Water Quality Survey, Wisconsin Agricultural Statistics Service.

APPENDIX: PARENT AND ITS DEGRADATES

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

OFFICE OF PREVENTION,
PESTICIDES AND TOXIC
SUBSTANCES
PC Code: 035506
DP Barcode: D275651
Date: 10/14/01

MEMORANDUM: Drinking Water Assessment for Linuron on Carrots in California.

TO: Carol Christensen
Reregistration actions Branch II
Health Effects Division (7509C)

FROM: Ibrahim Abdel-Saheb/Agronomist
Environmental Risk Branch II
Environmental Fate and Effects Division (7507C)

PEER REVIEW: Jim Carleton/Chemist
Environmental Risk Branch II
Environmental Fate and Effects Division (7507C)

THRU : Tom Bailey, Branch Chief
Environmental Risk Branch II
Environmental Fate and Effects Division (7507C)

Conclusions:

The 3-(3-,4-dichlorophenyl)-1-methoxy-1-methylurea (Linuron) use on carrots in Griffin Label (EPA Reg. No. 1812-320) is represented by this memorandum.

Linuron is a herbicide used to control germinating and newly emerging grasses and broad-leafed weeds. It is applied to agricultural crops, ornamental bulbs, and poplar trees for use in shelterbelts in the mid-west.

Formulations include water dispersable granules, wettable powders, flowable concentrates, and emulsifiable concentrates/liquid suspensions.

Linuron usually is applied after a crop has been planted but before weeds emerge, using ground or aerial equipment. In some crops, such as carrots and celery, linuron is applied to newly emerging plants as an over-top spray. In asparagus, linuron is applied between cuttings of newly emerging spears for weed control during harvest.

The Tier II screening models PRZM[1] and EXAMS[2] with the Index Reservoir and Percent Crop Area adjustment (IR-PCA PRZM/EXAMS) were used to determine estimated surface water concentrations of linuron. The Screening Concentration in Groundwater (SCI-GROW[3]) model was used to estimate groundwater concentrations for linuron. Modeling results are shown in Table 1.

Table 1. Estimated environmental concentrations in surface and groundwater for linuron use on carrots.

	model EECs (μg/L)	use(s) modeled	PCA
Surface water/ peak (90th percentile annual daily max.)	31.3	two applications on carrots @ 1.0 lb ai/acre, ground application	Default PCA (0.87)
Surface water/ 90th percentile annual mean)	12.5		
Surface water/ 36-year overall mean	7.31		
Groundwater/peak and long term average	0.54		

The IR-PCA PRZM/EXAMS modeling results indicate that linuron has the potential to contaminate surface waters by spray drift, and runoff in areas with large amounts of annual rainfall. Modeling results are higher than those from existing surface water monitoring data for linuron targeted to the pesticide use area.

The recommended groundwater drinking water EECs is 5.0 ppb

(from the USEPA Pesticide in Groundwater Database). The modeling result is lower than historical data from the USEPA (data > 10 years old). The maximum observed concentration was 5.0 ppb. Recent NAWQA data which includes drinking water wells show no concentration > 0.029 ppb. This recommendation is based on the fact that there are no obvious changes in the use pattern presented in the June 7, 2001 Linuron SMART meeting.

Usage map for linuron[4] is attached.

Environmental Fate and Transport Assessment

Although the environmental fate data base for parent linuron is essentially complete, two environmental fate data requirements (leaching/adsorption/desorption and terrestrial field dissipation studies) are not fulfilled. The environmental fate assessment for linuron is incomplete and tentative because information on the persistence, mobility and dissipation pathways of several degradates of linuron is not available.

Parent linuron appears to be moderately persistent and relatively immobile. Increased mobility may occur under specific environmental conditions such as in coarse textured soils and soils with low levels of organic matter. Linuron dissipates principally by biotic processes such as microbial degradation. In surface soils with adequate organic matter, the combined processes of adsorption and microbial degradation would limit linuron's potential to migrate to ground water. Linuron could runoff to surface water bodies. In that case, it would degrade fairly rapidly to three primary metabolites (desmethoxy linuron, desmethyl linuron, norlinuron, and 3,4-DCA, none of each is >10% of the applied radioactivity in the aerobic soil metabolism study). However, information on the persistence and mobility of these degradates is not currently available.

Linuron exhibits some of the properties and characteristics of chemicals that have been detected in ground water, and linuron itself has been detected in ground water in four states (Georgia, Missouri, Virginia and Wisconsin). Linuron is moderately persistent with an aerobic soil metabolism half-life ranging from 57 to 100 days. Because linuron is sufficiently persistent and may be mobile under certain environmental conditions, it has the potential to impact ground water quality.

Linuron can be applied aerially or by ground spray and therefore could contaminate surface waters through spray drift. It

has the potential to be somewhat persistent in surface waters, particularly those with low microbiological activity and long hydrological residence times. Linuron degraded with a half-life of less than 3 weeks in nonsterile anaerobic silt loam and sand soil:water (1:1) systems. It may be less persistent in water and sediment under anaerobic conditions than under aerobic conditions. Its bioconcentration potential is relatively low.

Linuron is not currently regulated under the Safe Drinking Water Act, and water supply systems are not required to sample and analyze for it. No Maximum Contaminant Level (MCL) or drinking water health advisories have been established for linuron. The primary treatment processes employed by most water systems may not always be completely effective in removing linuron. As a result, the Agency does have some moderate concerns regarding potential risks of linuron to surface water source supply systems.

Surface Water

Monitoring

The EFED has limited monitoring data on the concentrations of linuron in surface water at the present time.

The USGS-National Water Quality Assessment Program, San Joaquin - Tulare Basins analyzed surface water samples from a fixed site on the San Joaquin River near Vernalis, CA. Grab water samples were collected biweekly for one year (1993). Maximum linuron concentration was 0.29 ppb[5], even though the San Joaquin Valley is a major production region for carrots in California[6].

In another study, the US Geological Survey (USGS) National Water Quality Assessment Program (NAWQA) collected 5196 surface water samples from 40 agricultural stream sites through the nation during the period from 1992-1998. One to two samples were collected at each site each month during periods when pesticide transport in the streams was expected to be low. At most sites, the sampling frequency was increased to 1 to 3 samples per week during periods when elevated levels of pesticides were expected in the streams. Linuron was detected in 2.70% of the samples (detection limit = 0.01 ppb) with a linuron maximum concentration of 1.4 ppb[7].

The frequency of sampling and the length of sampling period of both of the USGS studies were not sufficient to represent the temporal and spatial requirements for use in making regulatory determinations concerning drinking water.

Modeling

Tier II surface water modeling was done using the Index Reservoir (IR) and Percent Crop Area (PCA) modifications to PRZM and EXAMS.

The index reservoir represents a potentially vulnerable drinking water source based on the geometry of an actual reservoir and its watershed in a specific area (Illinois), using regional screening specific cropping patterns, weather, soils, and other factors.

The PCA is a generic watershed-based adjustment factor which represent the portion of a watershed planted to a crop or crops and will be applied to pesticide concentrations estimated for the surface water component of the drinking water exposure assessment using PRZM/EXAMS with the index reservoir scenario.

The IR-PCA PRZM/EXAMS model use and fate input parameters for linuron in surface water are shown in Table 2. The IR-PCA PRZM/EXAMS model input and output files for linuron are shown in Appendix I.

Table 2: IR-PC PRZM/EXAMS input parameters for linuron use on carrots in California.

Input variable	Input value & calculations	Source/Quality of data
Crop name	carrots	label EPA Reg. No. 1812-320).
application rate (lb ai/acre)	2	label EPA Reg. No. 1812-320).
Interval between appl. (d)	14	label EPA Reg. No. 1812-320).
Application efficiency	0.99	IR-PCA Guidance[8]
Spray drift fraction	0.064	IR-PCA Guidance
Application method	ground	label (EPA Reg. No. 1812-362).
DWRATE (day^{-1})	0.005	MRID#41625401; Input parameters guidance[9]; single value X 3.
DSRATE (day^{-1})	0.005	MRID#41625401; Input parameters guidance; single value X 3
K_d (mL/g)	2.7 (sandy loam)	MRID#00148443; Input parameters guidance. Soil-K_d for best match of soil in model was used.
Henry (atm.m^3/mole)	$6.07X10^{-8}$ (calculated)	RED, 1994.
KBACW (h^{-1})	0.0003	No aerobic aquatic data is available, the aerobic soil met. degradation rate was multiplied by 0.5. MRID#41625401. Input parameters guidance.
KBACS (h^{-1})	0.0002	Anaerobic aquatic half-life (21 days) was multiplied by 3. MRID#40142501. Input parameters guidance
KDP (h^{-1})	0.0006	MRID#40103601; Input parameters guidance.
KBH, KNH, KAH (h^{-1})	(stable)	MRID#40916201; Input parameters guidance.
KPS (mL/g)	2.7	MRID#00148443; Input parameters guidance.
MWT (g/mole)	249.1	RED, 1994.
Solubility @ 25 °C (ppm)	81	RED, 1994.
Vapor pressure (torr)	$1.5X10^{-5}$	The MERCK Index[10].

Assumptions and Uncertainties[11,12]

Index Reservoir

The results from the index reservoir represent potential drinking water exposure from a specific area (Illinois) with

specific cropping patterns, weather, soils, and other factors. Use of the index reservoir for areas with different climates, crops, pesticides used, sources of water (e.g. rivers instead of reservoirs, etc), and hydrogeology creates uncertainties. In general, because the index reservoir represents a fairly vulnerable watershed, the exposure estimated with the index reservoir will likely be higher than the actual exposure for most drinking water sources. However, the index reservoir is not a worst case scenario, communities that derive their drinking water from smaller bodies of water with minimal outflow, or with more runoff prone soils would likely get higher drinking water exposure than estimated using the index reservoir. Areas with a more humid climate that use a similar reservoir and cropping patterns may also get more pesticides in their drinking water than predicted using this scenario.

A single steady flow has been used to represent the flow through the reservoir. Discharge from the reservoir also removes chemical so this assumption will underestimate removal from the reservoir during wet periods and overestimates removal during dry periods. This assumption can underestimate or overestimate the concentration in the pond depending upon the annual precipitation pattern at the site.

The index reservoir scenario uses the characteristics of a single soil to represent the soil in the basin. In fact, soils can vary substantially across even small areas, and this variation is not reflected in these simulations.

The index reservoir scenario does not consider tile drainage. Areas that are prone to substantial runoff are often tile drained. Tile drainage contributes additional water and in some cases, additional pesticide loading to the reservoir. This may cause either an increase or decrease in the pesticide concentration in the reservoir. Tile drainage also causes the surface soil to dry out faster. This will reduce runoff of the pesticide into the reservoir. The watershed used as the model for the index reservoir (Shipman City Lake) does not have tile drainage in the cropped areas.

EXAMS is unable to easily model spring and fall turnover. Turnover occurs when the temperature drops in the fall and the thermal stratification of the reservoir is removed. Turnover occurs again in the spring when the reservoir warms up. This results in complete mixing of the chemical through the water column at these times. Because of this inability, the Index Reservoir has been simulated without stratification. There is data to suggest that Shipman City Lake, upon which the Index Reservoir is based, does indeed stratify in the deepest parts of the lake at least in

some years. This may result in over or underestimation of the concentration in drinking water depending upon the time of the year and the depth the drinking water intake is drawing from.

Percent Crop Area Correction Factor

The PCA is a watershed-based modification. Implicit in its application is the assumption that currently-used field-scale models reflect basin-scale processes consistently for all pesticides and uses. In other words, we assume that the field scale processes simulated by the coupled PRZM and EXAMS models are a reasonable approximation of pesticide fate and transport within a watershed that contains a drinking water reservoir. If the models fail to capture pertinent basin-scale fate and transport processes consistently for all pesticides and all uses, the application of a factor that reduces the estimated concentrations predicted by modeling could, in some instances, result in inadvertently passing a chemical through the screen that may actually pose a risk. Some preliminary assessments made in the development of the PCA suggest that PRZM/EXAMS may not be realistically capturing basin-scale processes for all pesticides or for all uses. A preliminary survey of water assessments which compared screening model estimates to readily available monitoring data suggest uneven model results. In some instances, the screening model estimates are more than an order of magnitude greater than the highest concentrations reported in available monitoring data; in other instances, the model estimates are less than monitoring concentrations. Because of these concerns, the SAP recommended using the PCA only for "major" crops in the Midwest. For other crops, development of PCA's will depend on the availability of relevant monitoring data that could be used to evaluate the result of the PCA adjustment.

The spatial data used for the PCA came from readily-available sources and have a number of inherent limitations:

- The size of the 8-digit HUC [mean = 366,989 ha; range = 6.7-2,282,081 ha; n = 2,111] may not provide reasonable estimates of actual PCA's for smaller watersheds. The watersheds that drain into drinking water reservoirs are generally smaller than the 8-digit HUC and may be better represented by watersheds defined for drinking water intakes.
- The conversion of the county level data to watershed-based percent crop areas assumes the distribution of the crops within a county is uniform and homogeneous throughout the county area. Distance between the treated fields and the water body is not addressed.
- The PCA's were generated using data from the 1992 Census of

Agriculture. However, recent changes in the agriculture sector from farm bill legislation may significantly impact the distribution of crops throughout the country. The methods described in this report can rapidly be updated as more current agricultural crops data are obtained. The assumption that yearly changes in cropping patterns will cause minimal impact needs to be evaluated.

The PCA adjustment is only applicable to pesticides applied to agricultural crops. Contributions to surface waters from non-agricultural uses such as urban environments are not well-modeled. Currently, non-agricultural uses are not included in the screening model assessments for drinking water.

The PCA does not consider percent crop treated because detailed pesticide usage data are extremely limited at this time. Detailed pesticide usage data are currently available for only a few states.

Groundwater

Monitoring

EFED has limited monitoring data on the concentrations of Linuron in groundwater. Table 3 shows validated monitoring data for linuron that are available for the states of Georgia (GA), Missouri (MO), Virginia (VA), and Wisconsin (WI).

Table 3. Groundwater monitoring data for linuron. Number of wells sampled (number of wells with residues)[13].

State	well results	range of conc. (ppb)
GA	70 (67)	1.0 - 5.0
Mo	269 (38)	0.2 - 1.9
VA	12 (5)	0.042 - 3.79
WI	26 (1)	3.00

In addition, the US Geological Survey (USGS) National Water Quality Assessment Program (NAWQA) analyzed pesticide occurrence

and concentrations in shallow ground water in agricultural areas (detection limit = 0.01 ppb). Analysis of 924 samples showed linuron in 0.11% of the samples analyzed with a maximum concentration of 0.029 ppb[14].

A Major component of the sampling design in the NAWQA study was to target specific watersheds and shallow ground water areas that are influenced primarily by a single dominant land use(agricultural or urban) that is important in the particular area. The ground-water data were primarily collected from a combination of production and monitoring wells. Ground-water sites in the NAWQA study were sampled for pesticides once at each site.

Even though the groundwater monitoring data collected by USGS NAWQA are from sites considered to represent typical use areas, the frequency and duration of sampling were not sufficient to represent an adequate monitoring data set for exclusive use in drinking water exposure determination.

The SCI-GROW model was used to estimate potential groundwater concentrations of linuron.

Table 4 shows the input parameter values used in SCI-GROW modeling.

Table 4. Input parameters for linuron used in the SCI-GROW model.

Input variable	Input value & calculations	Source/Quality of data 1
Application rate (lb ai/acre)	1.0	(EPA Reg. No. 1812-320).
Maximum No. of Applications	2	(EPA Reg. No. 1812-320).
K_{oc} (mL/g)	208	MRID# 46007015 (median value); Input parameters guidance.
Aerobic Soil metabolism $t_{1/2}$. (day)	49	MRID# 41625401; Input parameters guidance.

Groundwater EECs predicted using the SCI-GROW screening model are substantially less than those estimated for surface water using PRZM and EXAMS. SCI-GROW estimated concentrations of linuron are also much less than those from monitoring data shown in Table 3.

Therefore, for drinking water concentrations from groundwater sources we recommend 5.0 ppb to be used in the drinking water assessment.

REFERENCES

4. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick and J.S. Donigian, Jr. 1997. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0; Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

2. Burns, L.A. March 1997. Exposure Analysis Modeling System (EXAMSII) Users Guide for Version 2.97.5, Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

3. Barrett, M., 1997, Proposal For a Method to Determine Screening Concentration Estimates for Drinking Water Derived from Groundwater Studies, EFED/OPP.

4. U.S GS. 1992. National Water Quality Assessment (NWQA), Pesticides National Synthesis Project, Annual Use: Linuron.

5. U.S GS. 1993. National Water Quality Assessment Program San Joaquin - Tulare Basins Study Unit, [Online]. Available at http://ca.water.usgs.gov/sanj_nawqa/data_sw/ifs.1993.herb2.

6. The United State Department of Agriculture, Office of Pesticide Management Policy & Pesticide Impact Assessment Program. Crop Profile for Carrots in California, [Online]. Available at http://pestdata.ncsu.edu/cropprofiles/Detail.CFM?FactSheets_RecordID=285.

7. USGS. 1998. Pesticides in Surface and Ground Water of the United States: Summary of Results of the National Water Quality Assessment Program, [Online]. Available at http://(NAWQA)=http://ca.water.usgs.gov/pnsp/allsum/#t1.

8. Effland, W., N. Thurman, I. Kennedy, R.D. Jones, J. Breithaupt, J. Lin, J. Carleton, L. Libel. R. Parker, and R. Matzner. 2000. " Guidance for use of the index Reservoir and Percent Crop Area Factor in drinking water exposure assessment s. Office of Pesticide Programs.

9. Guidance for Chemistry and Management Practice Input Parameters For Use in Modeling the Environmental Fate and Transport of Pesticides. Version 2. November 7, 2000. U.S. EPA Office of Pesticide Programs, Environmental Fate and Effects Division.

10. The Merck Index. 1989. An encyclopedia of chemicals, drugs, and biologicals. 11th ed. Rahway, N.J. p. 533.

11. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick and J.S. Donigian, Jr. 1997. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0; Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

12. U.S. Environmental Protection Agency. 1984. Chemical Information Fact Sheet Number 28: Linuron. Office of Pesticides and Toxic Substances, Washington, DC,9-13.

13. U.S.EPA. 1992. Pesticides in Ground Water Database- A compilation of Monitoring Studies: 1971 - 1991. Office of Prevention, Pesticides, and Toxic Substances, EPA 734-12-92-001.

14. U.S GS. 1998. National Water Quality Assessment (NWQA), Pesticides National Synthesis Project [Online] at http://ca.water.usgs.gov/pnsp/allsum/#over.

APPENDIX I

IR-PCA PRZM/EXAMS INPUT FILE FOR THE USE OF LINURON ON CARROTS IN CALIFORNIA

```
LINURON
Lerdo clay loam, MLRA C-17; Central Valley, CA, Carrots
   0.700    0.500        0    17.00        1        1
       4
    0.21     1.00    1.000    172.8                 3    1.00    600.00
       1
       1     0.20    60.00    80.00        3   91   85   88     0.00   100.00
       1        3
0101 21 9 2209
0.10 0.10 0.10
.023 .023 .023
      36
  100948   231248   311248        1
  100949   231249   311249        1
  100950   231250   311250        1
  100951   231251   311251        1
  100952   231252   311252        1
  100953   231253   311253        1
  100954   231254   311254        1
  100955   231255   311255        1
  100956   231256   311256        1
  100957   231257   311257        1
  100958   231258   311258        1
  100959   231259   311259        1
  100960   231260   311260        1
  100961   231261   311261        1
  100962   231262   311262        1
  100963   231263   311263        1
  100964   231264   311264        1
  100965   231265   311265        1
  100966   231266   311266        1
  100967   231267   311267        1
  100968   231268   311268        1
  100969   231269   311269        1
  100970   231270   311270        1
  100971   231271   311271        1
  100972   231272   311272        1
  100973   231273   311273        1
  100974   231274   311274        1
  100975   231275   311275        1
  100976   231276   311276        1
  100977   231277   311277        1
  100978   231278   311278        1
  100979   231279   311279        1
  100980   231280   311280        1
  100981   231281   311281        1
  100982   231282   311282        1
  100983   231283   311283        1
2 non-incorporated applications of 2.0 lbs A.I./acre (2.24 Kg/Ha), spry drift
0.99, APPEFF. 0.064
     72       1       0
```

Linuron

*** Kd:2.7 AeSM: T1/2=49 days AnAQ Met: T1/2=21 days ***

101248	0	2	0.00	2.24	0.99	0.064
241248	0	2	0.00	2.24	0.99	0.064
101249	0	2	0.00	2.24	0.99	0.064
241249	0	2	0.00	2.24	0.99	0.064
101250	0	2	0.00	2.24	0.99	0.064
241250	0	2	0.00	2.24	0.99	0.064
101251	0	2	0.00	2.24	0.99	0.064
241251	0	2	0.00	2.24	0.99	0.064
101252	0	2	0.00	2.24	0.99	0.064
241252	0	2	0.00	2.24	0.99	0.064
101253	0	2	0.00	2.24	0.99	0.064
241253	0	2	0.00	2.24	0.99	0.064
101254	0	2	0.00	2.24	0.99	0.064
241254	0	2	0.00	2.24	0.99	0.064
101255	0	2	0.00	2.24	0.99	0.064
241255	0	2	0.00	2.24	0.99	0.064
101256	0	2	0.00	2.24	0.99	0.064
241256	0	2	0.00	2.24	0.99	0.064
101257	0	2	0.00	2.24	0.99	0.064
241257	0	2	0.00	2.24	0.99	0.064
101258	0	2	0.00	2.24	0.99	0.064
241258	0	2	0.00	2.24	0.99	0.064
101259	0	2	0.00	2.24	0.99	0.064
241259	0	2	0.00	2.24	0.99	0.064
101260	0	2	0.00	2.24	0.99	0.064
241260	0	2	0.00	2.24	0.99	0.064
101261	0	2	0.00	2.24	0.99	0.064
241261	0	2	0.00	2.24	0.99	0.064
101262	0	2	0.00	2.24	0.99	0.064
241262	0	2	0.00	2.24	0.99	0.064
101263	0	2	0.00	2.24	0.99	0.064
241263	0	2	0.00	2.24	0.99	0.064
101264	0	2	0.00	2.24	0.99	0.064
241264	0	2	0.00	2.24	0.99	0.064
101265	0	2	0.00	2.24	0.99	0.064
241265	0	2	0.00	2.24	0.99	0.064
101266	0	2	0.00	2.24	0.99	0.064
241266	0	2	0.00	2.24	0.99	0.064
101267	0	2	0.00	2.24	0.99	0.064
241267	0	2	0.00	2.24	0.99	0.064
101268	0	2	0.00	2.24	0.99	0.064
241268	0	2	0.00	2.24	0.99	0.064
101269	0	2	0.00	2.24	0.99	0.064
241269	0	2	0.00	2.24	0.99	0.064
101270	0	2	0.00	2.24	0.99	0.064
241270	0	2	0.00	2.24	0.99	0.064
101271	0	2	0.00	2.24	0.99	0.064
241271	0	2	0.00	2.24	0.99	0.064
101272	0	2	0.00	2.24	0.99	0.064
241272	0	2	0.00	2.24	0.99	0.064
101273	0	2	0.00	2.24	0.99	0.064
241273	0	2	0.00	2.24	0.99	0.064
101274	0	2	0.00	2.24	0.99	0.064
241274	0	2	0.00	2.24	0.99	0.064
101275	0	2	0.00	2.24	0.99	0.064

```
  241275  0 2 0.00   2.24 0.99 0.064
  101276  0 2 0.00   2.24 0.99 0.064
  241276  0 2 0.00   2.24 0.99 0.064
  101277  0 2 0.00   2.24 0.99 0.064
  241277  0 2 0.00   2.24 0.99 0.064
  101278  0 2 0.00   2.24 0.99 0.064
  241278  0 2 0.00   2.24 0.99 0.064
  101279  0 2 0.00   2.24 0.99 0.064
  241279  0 2 0.00   2.24 0.99 0.064
  101280  0 2 0.00   2.24 0.99 0.064
  241280  0 2 0.00   2.24 0.99 0.064
  101281  0 2 0.00   2.24 0.99 0.064
  241281  0 2 0.00   2.24 0.99 0.064
  101282  0 2 0.00   2.24 0.99 0.064
  241282  0 2 0.00   2.24 0.99 0.064
  101283  0 2 0.00   2.24 0.99 0.064
  241283  0 2 0.00   2.24 0.99 0.064
     0.       1      0.0
    0.00   0.072     0.5
Lerdo clay loam; Hydrologic Group C
  100.00             0   0   0   0   0   0   0   0   0
     0.0   0.000     0.00
       2
       1   18.00    1.600    0.325    0.000    0.000    0.000
           0.005    0.005    0.000
           1.00     0.325    0.175    0.017    2.700
       2   82.00    1.500    0.249    0.000    0.000    0.000
           0.005    0.005    0.000
             1.0    0.249    0.129    0.002    2.700
       0
    WATR    YEAR      10     PEST     YEAR      10     CONC     YEAR      10    1
       6
      11   -----
       5    DAY
    RUNF    TSER   0    0    1.E0
    EFLX    TSER   0    0    1.E0
    ESLS    TSER   0    0    1.E0
    RUNF    TSER   0    0    1.E0
    PRCP    TSER   0    0    1.E0
```

IR-PCA PRZM/EXAMS OUTPUT FILE FOR THE USE OF LINURON ON CARROTS IN CALIFORNIA

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	9.435	9.325	6.422	2.329	1.553	0.404
1949	9.955	9.840	8.497	7.644	7.053	3.680
1950	11.890	11.760	11.330	10.280	9.819	5.169
1951	10.600	10.480	9.986	9.396	8.974	4.647

1952	21.000	20.770	19.830	18.430	17.710	9.137
1953	12.020	11.890	11.640	10.740	9.992	5.283
1954	27.190	26.890	25.790	23.460	21.690	10.420
1955	15.580	15.410	14.710	13.740	12.790	6.510
1956	11.290	11.160	9.362	8.490	7.831	4.669
1957	12.600	12.460	11.880	10.920	10.360	5.678
1958	13.920	13.710	13.000	11.700	10.870	6.840
1959	10.270	10.160	9.697	8.797	8.148	4.086
1960	16.510	16.330	15.640	14.390	13.280	6.984
1961	11.670	11.550	11.020	9.910	9.124	4.476
1962	37.470	37.030	35.920	32.460	29.850	14.070
1963	28.360	28.030	26.690	24.540	22.870	11.350
1964	11.050	10.930	10.430	9.383	8.641	4.259
1965	24.260	20.610	10.820	10.240	9.405	5.963
1966	29.150	28.820	27.450	24.760	23.860	11.930
1967	17.300	17.110	16.320	14.610	13.830	7.722
1968	10.360	10.240	9.774	8.791	8.478	4.829
1969	12.320	12.180	11.610	10.550	10.350	5.865
1970	14.000	13.840	13.180	11.760	10.730	5.920
1971	10.990	10.870	10.400	9.372	8.630	5.431
1972	11.240	11.110	9.625	8.657	7.971	5.639
1973	25.240	24.960	23.810	21.460	20.490	10.300
1974	17.600	17.380	16.470	14.490	13.000	7.568
1975	15.110	14.940	14.230	12.690	11.890	6.320
1976	12.340	12.200	11.650	10.480	10.000	5.397
1977	22.180	21.930	11.240	9.721	9.147	6.433
1978	73.250	72.400	68.960	61.770	56.310	26.430
1979	16.730	16.550	15.790	14.530	13.770	6.910
1980	15.100	14.940	14.580	14.130	13.460	7.027
1981	13.080	12.930	12.390	11.380	11.000	6.157
1982	11.170	11.000	10.320	9.676	9.229	5.630
1983	36.360	35.960	34.270	31.170	28.770	13.920

SORTED FOR PLOTTING

PROB	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
0.027	73.250	72.400	68.960	61.770	56.310	26.430
0.054	37.470	37.030	35.920	32.460	29.850	14.070
0.081	36.360	35.960	34.270	31.170	28.770	13.920
0.108	29.150	28.820	27.450	24.760	23.860	11.930
0.135	28.360	28.030	26.690	24.540	22.870	11.350
0.162	27.190	26.890	25.790	23.460	21.690	10.420
0.189	25.240	24.960	23.810	21.460	20.490	10.300
0.216	24.260	21.930	19.830	18.430	17.710	9.137
0.243	22.180	20.770	16.470	14.610	13.830	7.722

0.270	21.000	20.610	16.320	14.530	13.770	7.568
0.297	17.600	17.380	15.790	14.490	13.460	7.027
0.324	17.300	17.110	15.640	14.390	13.280	6.984
0.351	16.730	16.550	14.710	14.130	13.000	6.910
0.378	16.510	16.330	14.580	13.740	12.790	6.840
0.405	15.580	15.410	14.230	12.690	11.890	6.510
0.432	15.110	14.940	13.180	11.760	11.000	6.433
0.459	15.100	14.940	13.000	11.700	10.870	6.320
0.486	14.000	13.840	12.390	11.380	10.730	6.157
0.514	13.920	13.710	11.880	10.920	10.360	5.963
0.541	13.080	12.930	11.650	10.740	10.350	5.920
0.568	12.600	12.460	11.640	10.550	10.000	5.865
0.595	12.340	12.200	11.610	10.480	9.992	5.678
0.622	12.320	12.180	11.330	10.280	9.819	5.639
0.649	12.020	11.890	11.240	10.240	9.405	5.630
0.676	11.890	11.760	11.020	9.910	9.229	5.431
0.703	11.670	11.550	10.820	9.721	9.147	5.397
0.730	11.290	11.160	10.430	9.676	9.124	5.283
0.757	11.240	11.110	10.400	9.396	8.974	5.169
0.784	11.170	11.000	10.320	9.383	8.641	4.829
0.811	11.050	10.930	9.986	9.372	8.630	4.669
0.838	10.990	10.870	9.774	8.797	8.478	4.647
0.865	10.600	10.480	9.697	8.791	8.148	4.476
0.892	10.360	10.240	9.625	8.657	7.971	4.259
0.919	10.270	10.160	9.362	8.490	7.831	4.086
0.946	9.955	9.840	8.497	7.644	7.053	3.680
0.973	9.435	9.325	6.422	2.329	1.553	0.404
1/10	31.313	30.962	29.496	26.683	25.333	12.527

MEAN OF ANNUAL VALUES = 7.307
STANDARD DEVIATION OF ANNUAL VALUES = 4.336
UPPER 90% CONFIDENCE LIMIT ON MEAN = 8.377

SCI-GROW output file

RUN No. 1 FOR linuron INPUT VALUES

APPL (#/AC) RATE	APPL. URATE NO. (#/AC/YR)	SOIL KOC	SOIL AEROBIC METABOLISM (DAYS)

1.000 2 2.000 208.0 49.0

GROUND-WATER SCREENING CONCENTRATIONS IN PPB

.544

A= 44.000 B= 207.000 C= 1.643 D= 2.316 RILP= 2.768

F= -.553 G= .280 URATE= 2.000 GWSC= .560119

Avianandmammalianspecies

Avianandmammalianspeciesmaybeexposedtolinuronthrough multipleroutes,includingdietaryanddermal.Thecriterionforthe presumptionofhighriskfromexposureforacuteavianandmammalian speciesisavaluegreaterthanorequalto0.5forthequotientofthe estimatedenvironmentalconcentration(EEC)dividedbythelowestLC valueforbirdsandmammals--thisisknownastheriskquotient(RQ).

AcuteRQ=EEC/LC50 ≥0.5forbirdsandmammals

Calculationofestimatedenvironmentalresiduesarebasedonthe workbyHoergerandKenaga(1972).

AvianAcute/SubacuteRisk

HighRiskLOCsarenotexceededatanyapplicationrateforasingle application.RestrictedUseLevelsofConcern(LOC)areexceededonshort grassatthe3and4lbsa.i./Arates.EndangeredspeciesLOCareexceeded forallthereatesevaluated.Residuesoninsectswouldnotexceed LOCs(see Table1).

Table1.AvianAcuteRiskQuotientandLOCexceedanceforthemaximumapplicationratesoflinuronbyusesite. EECforshortgrass=applicationrate(alai/A)x240ppm/lbai.EECforinsects=applicationratex58ppm/lbai. LowestavianLC50=3083ppm(mallardduck)RiskQuotient=EEC/LC50.

UseSite	ApplicationRate	Substrate (EEC)	RiskQuotient (EEC/LC50)	LOC
Carrots,celery,sweet corn,cottonseed,parsley, parsnips,sorghum; ornamentalherbaceous plants	1.5lbsai	ShortGrass (360)	0.12	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
		Insects (87)	0.03	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Fieldcorn	1.54lbsai	shortgrass (370)	0.12	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
		Insects (89)	0.03	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Winterwheat(drill planted)	1.75lbsai	shortgrass (420)	0.14	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
		Insects (101.5)	0.03	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1

UseSite	ApplicationRate	Substrate (EEC)	RiskQuotient (EEC/LC50)	LOC
Potatoes;poplar(forest/ shelterbelt)	2.0lbsai	shortgrass (480)	0.16	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
		Insects (116)	0.04	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Soybeans;non-ag. ROW/fencerows/ hedgerows/uncultiv. areas/soils	3.0lbsai	shortgrass (720)	0.23	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
		Insects (174)	0.06	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Asparagus	4.0lbsai	shortgrass (960)	0.31	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
		Insects (232)	0.08	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1

RU=RestrictedUseES=EndangeredSpecies

AvianChronicandReproductiveRisk

TheavianreproductionNOELisconsidered100ppm,witheffects seenat300ppm.Bothoftheselevelsarebelowthoseresiduelevelsthat couldoccuronshortgrasswithinthetreatedareaateventhelowestofthe maximumapplicationratesbycrop,fromasingleapplication.Giventhis, aswellasthepersistenceoflinurondescribedbytheAgency,itappears thatchronicavianriskispresentforallusesites.

Table2.AvianChronicRiskQuotientandLOCexceedanceforthemaximumapplicationratesoflinuronbyuse site.(NOEL=100ppm).TableusessameEECsasTable1.RiskQuotient=EEC/NOEL.

UseSite	ApplicationRate	Substrate (EEC)	RiskQuotient (EEC/NOEL)	LOC
Carrots,celery,sweet corn,cottonseed,parsley, parsnips,sorghum; ornamentalherbaceous plants	1.5lbsai	ShortGrass (360)	3.60	ChronicRisk* ≥1
		Insects (87)	0.87	ChronicRisk* ≥1
Fieldcorn	1.54lbsai	shortgrass (370)	3.70	ChronicRisk* ≥1
		Insects (89)	0.89	ChronicRisk* ≥1

UseSite	ApplicationRate	Substrate (EEC)	RiskQuotient (EEC/NOEL)	LOC
Winterwheat(drill planted)	1.75lbsai	shortgrass (420)	4.20	ChronicRisk* ≥1
		Insects (101.5)	1.02	ChronicRisk* ≥1
Potatoes;poplar(forest/ shelterbelt)	2.0lbsai	shortgrass (480)	4.80	ChronicRisk* ≥1
		Insects (116)	1.16	ChronicRisk* ≥1
Soybeans;non-ag. ROW/fencerows/ hedgerows/uncultiv. areas/soils	3.0lbsai	shortgrass (720)	7.20	ChronicRisk* ≥1
		Insects (174)	1.74	ChronicRisk* ≥1
Asparagus	4.0lbsai	shortgrass (960)	9.60	ChronicRisk* ≥1
		Insects (232)	2.32	ChronicRisk* ≥1

*"Chronicrisk,endangeredbirdsmaybeaffected,restricteduserecommended"

Inadditiontoriskfromdirectapplication,therecanberisktobirds feedinginareasadjacenttotreatedfields,duetodrift,particularlywith aerialapplication.ThecurrentAgecncyestimateis5%.Thisaddedrisk, basedonthisassumption,doesnotbyitselfexceedtheLOC(seeTable3).

Table3.AvianChronicRiskQuotientandLOCexceedance--off-siteexposurewithsoybeans.Off-sitedrift estimate=5%ofEEC(fromTable1).

UseSite	ApplicationRate	Substrate	RiskQuotient (EEC/NOEL)	LOC
Soybeans	3.0lbsai	shortgrass(36)	0.36	ChronicRisk* ≥1
		Insects(8.7)	0.087	ChronicRisk* ≥1

*"Chronicrisk,endangeredbirdsmaybeaffected,restricteduserecommended"

RisktoMammals

Tables4and5showLD50s/sq.ft.fortheusesites,fortwosmall mammals.LD50s/sq.ft.willvarywiththeweightoftheanimal,since LD50sareexpressedinmg/kgbodyweight(i.e.,foragivenLD50,a smalleranimalwillrequirelesstoxicanttoreceivealethaldose).For linuron,allLOCsareexceededforthesmall,carnivorousleastshrew whereasnoneareforthemuchheavier,omnivorousrat.

Table4.MammalianRiskQuotientandLOCexceedanceforthemaximumapplicationratesoflinuronbyusesite. (lowestLD50=2100mg/kg;mammalbodyweight=0.005kg,leastshrew).Mgai/sq.ft=lbai/Ax10.4(conversion factor).RiskQuotient=LD50/sq.ft.=mgai/sq.ft./LD50xanimalweight).

UseSite	ApplicationRate	mgai/sq.ft.	RiskQuotient LD50/sq.ft.	LOC
Carrots,celery,sweet corn,cottonseed,parsley, parsnips,sorghum; ornamentalherbaceous plants	1.5lbsai	15.6	1.49	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Fieldcorn	1.54lbsai	16.0	1.52	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Winterwheat(drill planted)	1.75lbsai	18.2	1.7	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Potatoes;poplar(forest/ shelterbelt)	2.0lbsai	20.8	2.0	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Soybeans;non-ag. ROW/fencerows/ hedgerows/uncultiv. areas/soils	3.0lbsai	31.2	3.0	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Asparagus	4.0lbsai	41.6	4.0	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1

RU=RestrictedUseES=EndangeredSpecies

Table5.MammalianRiskQuotientandLOCexceedanceforthemaximumapplicationratesoflinuronbyusesite. (lowestLD50=2100mg/kg;mammalbodyweight=0.3kg,rat).

UseSite	ApplicationRate	mgai/sq.ft.	RiskQuotient LD50/sq.ft.	LOC
Carrots,celery,sweet corn,cottonseed,parsley, parsnips,sorghum; ornamentalherbaceous plants	1.5lbsai	15.6	0.02	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Fieldcorn	1.54lbsai	16.0	0.03	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Winterwheat(drill planted)	1.75lbsai	18.2	0.03	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Potatoes;poplar(forest/ shelterbelt)	2.0lbsai	20.8	0.03	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1

UseSite	ApplicationRate	mgai/sq.ft.	RiskQuotient LD50/sq.ft.	LOC
Soybeans:non-ag. ROW/fencerows/ hedgerows/uncultiv. areas/soils	3.0lbsai	31.2	0.05	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1
Asparagus	4.0lbsai	41.6	0.07	HighRisk≥ 0.5 RU ≥0.2 ES ≥0.1

RU=RestrictedUseES=EndangeredSpecies

MammalianChronicRisk

ThelowestNOELdietaryconcentrationreportedinsubmitteddata is25ppm,seenina1-yeardogfeedingstudyandina3-generation reproductionstudyinrats.Oncogeniceffectswerereportedinbothmice andratstudies.Formice,"hepatocellularadenomasweresignificantly increasedinthehighdosegroup[1500ppm]andreachedborderline significanceinthelowdosegroup[50ppm]".Forrats,"testicular interstitialcelladenomasincreasedin125and625ppmmales"(submitted data).Giventhepersistenceoflinuroninthefieldandtheeffectsseenin thelabatconcentrationswellbelowthoseexpectedafterinitialapplication, itappearsthatchroniceffectsinwildmammalsarelikely.

(2) AquaticRisk

Aquatic-AcuteRisk

Acuterisktoaquaticorganismshasbeenestimatedbycomparing EECstothelowestavailablelinurontechnicalLC $_{50}$orEC $_{50}$forfishand aquaticinvertebrates.EECsusedwerederivedfromtwomodels,one involvingrunofftoa6'waterbody(A)andthesecondinvolvingrunofftoa 6"waterbodyorwetland(B).Thelatteristobeusedforlinurononlyfor theROWuse.Table6showsthatfishrestricteduseLOCsareexceeded undermodelB(ROWs).FishendangeredspeciesLOCsareexceeded undermodelB(ROWs)andalsoundermodelAforthe4lbai/Arate.

Table7showsthattheaquaticinvertebratehighriskLOCis exceededwithmodelB(ROWs).Aquaticinvertebraterestricteduseand endangeredspeciesLOCsareexceededforallsiteswithbothmodels.

Directapplicationtoaquatichabitatcouldalsopotentiallyoccur withaROWuse.Directapplicationto6"ofwaterwouldresultin2202 ppbata3lbai/Arate.Thiswouldproduceariskquotientof2,474forfish and18,350foraquaticinvertebrates,vastlyexceedingallLOCs.

Table6.FishRiskQuotientandLOCexceedanceforthemaximumapplicationratesoflinuronbyusesite.(lowest LC50=0.89ppm).EECformodelA(runoffto6'pond)=[applicationrate(lbai/A)x%runoffx10acredrainage basin]x61ppb/lbai.where%runoff=2%(basedonlinuronwatersolubilityof81ppm).EECformodelB(runoff to6"wetland)=[applicationrate(lbai/Ax%runoffx10acredrainagebasin]x734ppb/lbai.with2%runoff. RiskQuotient=EEC/EC50wherefishLC50=0.89ppm(sheepsheadminnow).

UseSite	ApplicationRate	RQ (EEC/EC50) (model[1])	LOC
Carrots,celery,sweetcorn, cottonseed,parsley, parsnips,sorghum; ornamentalherbaceous plants	1.5lbsai	0.021(A)	HighRisk≥ 0.5 RU ≥0.1 ES ≥0.05
Fieldcorn	1.54lbsai	0.021(A)	HighRisk≥ 0.5 RU ≥0.1 ES ≥0.05
Winterwheat(drill planted)	1.75lbsai	0.024(A)	HighRisk≥ 0.5 RU ≥0.1 ES ≥0.05
Potatoes;poplar(forest/ shelterbelt)	2.0lbsai	0.027(A)	HighRisk≥ 0.5 RU ≥0.1 ES ≥0.05
Soybeans;non-ag. ROW/fencerows/ hedgerows/uncultiv.areas/ soils	3.0lbsai	0.041(A) 0.49(B)(ROW)	HighRisk≥ 0.5 RU ≥0.1(B) ES ≥0.05(B)
Asparagus	4.0lbsai	0.055(A)	HighRisk≥ 0.5 RU ≥0.1 ES ≥0.05(A)

RU=RestrictedUseES=EndangeredSpecies

1.model:A=runoffto6'pond;B=runoffto6"wetland

Table7.AquaticInvertebrateRiskQuotientandLOCexceedanceforthemaximumapplicationratesoflinuronby usesite.(lowestEC50=0.12ppm).EECformodelA(runoffto6'pond)=[applicationrate(lbai/A)x%runoffx10 acredrainagebasin]x61ppb/lbai.where%runoff=2%(basedonlinuronwatersolubilityof81ppm).EECfor modelB(runoffto6"wetland)=[applicationrate(lbai/Ax%runoffx10acredrainagebasin]x734ppb/lbai.with 2%runoff.RiskQuotient=EEC/LC50wherelowestaquaticinvertebrate=0.12ppm(*D.Magna*)

UseSite	ApplicationRate	RQ (EEC/EC50) (model[1])	LOC
Carrots,celery,sweet corn,cottonseed,parsley, parsnips,sorghum; ornamentalherbaceous plants	1.5lbsai	0.15(A)	HighRisk≥ 0.5 RU ≥0.1(A) ES ≥0.05(A)
Fieldcorn	1.54lbsai	0.157(A)	HighRisk≥ 0.5 RU ≥0.1(A) ES ≥0.05(A)

UseSite	ApplicationRate	RQ (EEC/EC50) (model[1])	LOC
Winterwheat(drill planted)	1.75lbsai	0.178(A)	HighRisk≥ 0.5 RU ≥0.1(A) ES ≥0.05(A)
Potatoes;poplar(forest/ shelterbelt)	2.0lbsai	0.203(A)	HighRisk≥ 0.5 RU ≥0.1(A) ES ≥0.05(A)
Soybeans;non-ag. ROW/fencerows/ hedgerows/uncultiv. areas/soils	3.0lbsai	0.305(A) 3.67(B) (ROW)	HighRisk≥ 0.5(B) RU ≥0.1(A,B) ES ≥0.05(A,B)
Asparagus	4.0lbsai	0.4(A)	HighRisk≥ 0.5 RU ≥0.1(A,B) ES ≥0.05(A,B)

RU=RestrictedUseES=EndangeredSpecies

1.model:A=runoffto6'pond;B=runoffto6"wetland

Aquatic-ChronicRisk

Chronicaquaticeffectscannotbefullyassessedatthistime.Effects onfishlengthwereseenatthelowestconcentration(0.042ppm)with rainbowtroutinanearlylifestagetest.The"rough-cut"EECsusedforthe abovetablesundermodelAexceedthiseffectlevelatthe4lbai/Arateand undermodelBatthe3lbairate(ROWs).SincetheNOELforthisstudy wassomeuntestedlevelbelow0.042ppm,therewouldlikelybefurther exceedancesoftheNOELandthusthechronicLOC(EEC/NOEL> _1).

Althoughtheabovecomparisonswerederivedfrom"preliminary qaulitative"EECs,availableenvironmentalfateinformationfromEFED (seeabove)indicatespotentialpersistenceinwater.Thereislittleorno effectofhydrolysisorphotolysis(bothhalf-livesgreaterthan30days). MicrobialdegradationisdescribedbyEFED;theanaerobicaquatichalf-life isreportedaslessthan21days.Threedegradatesofunknowntoxicity havebeenidentifiedbyEFED.Thus,thetoxicityofthecombined degradatesplusremainingparentlinuronisalsonotknown.

Thechroniceffectlevelfor*D.magna*isreportedly2xtheLC $_{50}$seen inapreviousacutestudy,amajorinconsistency.Also,invertebrateswere moresensitivethanfishinacutetests,butappearconsiderablylesssensitive inthechronictest.Furthertestingwiththeacutewouldbenecessaryto resolvethisproblem.

(3) Plants

Validdataonthetoxicityoflinurontonontargetplantsisavailable foronlyoneoffiveaquaticplants,andnotavailableatallfortheten requiredterrestrialspecies.Exposureofnontargetterrestrialandaquatic plantstolinuronisexpectedprimarilyduetorunofffromground applications(allusesites)andfromrunoffanddriftforaerialapplications (certainsoybeanproductlabels).

Noterrestrialplantriskassessmentcanbedoneduetothelackof adequatedata.

Onlyapreliminaryaquaticplantriskassessmentcanbedonesince adequatedataareavailableforjustoneoffivespecies.Highriskand endangeredplantLOCsareexceededforaquaticplantsiftheEEC/$EC_{50} \geq 1$. BasedontheEECspreviouslycalculatedtoevaluaterisktoaquatic animals,andtheoneavailableEC_{50}(0.067ppm),theseLOCsareexceeded undertherunofftowetlandmodel(6")forROWs,butnottherunoffto6' pondmodelforallotheruses.

(4) EndangeredSpecies

Asdescribedintheaboveriskassessmentsections,endangered speciesLOCsareexceededinsomeinstancesforacuteeffectstobirds,wild mammals,aquaticorganismsandnontargetplants.Endangeredspecies LOCsareexceededforchroniceffectstobirds,wildmammals,andaquatic organisms.

TheEndangeredSpeciesProtectionProgramisexpectedtobecome finalin1995.Limitationsontheuseoflinuronwillberequiredtoprotect endangeredandthreatenedspecies,buttheselimitationshavenotyetbeen defined(andmaybeformulationspecific).OPPanticipatesthat consultationwiththeFishandWildlifeServicewillbeconductedin accordancewiththespecies-basedpriorityapproachdescribedinthe Program.Aftercompletionofconsultation,registrantswillbeinformedif anyrequiredlabelmodificationsarenecessary.Suchmodificationswould mostlikelyconsistofthegenericlabelstatementreferringpesticideusersto uselimitationscontainedincountybulletins.

IV. RISKMANAGEMENTANDREREGISTRATIONDECISION

A. DeterminationofEligibility

Section4(g)(2)(A)ofFIFRAcallsfortheAgencytodetermine,aftersubmissionofrelevant data concerning an active ingredient, whether products containing the active ingredient are eligibleforreregistration.TheAgencyhaspreviouslyidentifiedandrequiredthesubmissionof the generic (i.e. active ingredient specific) data required to support reregistration of products

containinglinuronactiveingredient.TheAgencyhascompleteditsreviewofthesegenericdata, andhasdeterminedthatbasedontheinformationcurrentlyavailable,thereisdatatosupportthe reregistrationofallproductscontaininglinuron, withtheexceptionofuseoncotton,potato,non-cropland(rights-of-way),andsweetcorn.AppendixBidentifiesthegenericdatarequirements thattheAgencyreviewedaspartofitsdeterminationofreregistrationeligibilityoflinuron,and listsdthesubmittedstudiesthattheAgencyfoundacceptable.

ThedataidentifiedinAppendixBweresufficienttoallowtheAg encytoassesstheregistered usesoflinuronandtodeterminet hatexceptforthecotton,potato,non-cropland,andsweetcorn uses,li nuroncanbeusedwithoutresultinginunreasonableadverseeffectstohumansandthe environment.Toensurethatthepotentialrisksoflinuronarenot unreasonable,theAgencyis requiring the registrant to implement certain risk mitigation measures. Provided that these measures are implemented, as discussed below, the Agency therefore finds that all products containinglinuronasthesoleactiveingredientwiththeexceptionofcotton,potato,non-cropland (rights-of-way),andsweetcorn,areeligibleforreregistration.Thereregistrationofparticular productsisaddressedinSectionVofthisdocument.

TheAgencymadeitsr eregistrationeligibilitydeterminationbaseduponthetargetdatabase requiredforreregistration,thecurrentguidelines forconductingacceptablestudiestogenerate suchdataandthedataidentifiedinAppendixB.TheAgencyhasfoundthatallusesoflinuron, exceptforthecotton,potato,non-cropland(rights-of-way),andsweetcornuses,areeligiblefor reregistration. **Atthistime,theAgencyisunable tomakeareregistrationeligibilitydecision ontheuseoflinurononpotatoesbecauseundercurrentpoliciestolerancesunderSection 409oftheFederalFood,DrugandCosmeticAct(FFDCA)areneededforthisuse,butsuch a toleranc emaybebarredbytheDelaneyclauseinSection409.Refertothediscussion under"ToleranceReassessment."**

Asariskreductionmeasu reforlinuron,DuPonthasagreedtovoluntarilycanceltheHybrid poplar and non-cropland (rights-of-way) uses. In addition, DuPont has already voluntarily cancelledthecottonuseoflinuron.However,dataremainoutstandingforthecotton,rights-of-way,andsw eetcorn uses. Registrants must either amend their labels deleting these uses or submitthe requireddata.Therefore,theAgencyisunabletomakeareregistrationeligibility decisionfortheuseoflinurononcotton,rights-of-way,andsweetcorn.

It sh ould be understood that the Agency may take appropriate regulatory action, and/or require the submission of additional data to support the registration of products containing linuron, i f new information comes to the Agency's attention or if the data requirements for registration(ortheguidelinesforgeneratingsuchdata)change.

1. EligibilityDecision

Basedonthereviewsofthegenericdatafo rtheactiveingredientlinuron,theAgency hassufficientinformationonthehealtheffectsoflinuronandonitspotentialforcausing adverse effectsinfishandwildlifeandtheenvironment.Althoughlevelsofconcernare exceededforecologicalef fectsandgroundwaterquality,theAgencyconcludesthatmostof theusesofproductscontaininglinuron,withthe exceptionofcotton,potato,non-cropland (rights-of-way),and sweetcorn,amendedtoreflecttheriskmitigationmeasuresimposedin thisREDareeligibleforreregistration.

TheAgencyisunabletomakeareregistrationeligibiltydecisionfortheuseoflinuron oncotton,potato,non-cropla nd(rights-of-way),andsweetcornuntiladditionalgenericdata aresubmitted. TheAgencyisunabletomakeareregistrationeligibilitydecisionontheuse oflinuron onpotatoesbecauseundercurrentpoliciestolerancesunderSection409ofthe FederalFood,DrugandCosmeticAct(FFDCA) areneededforthisuse,butsuchatolerance maybebarredbytheDelaneyclauseinSection409.

The Agen cy has determined that eligible linuron products, labeled and used as specified in this Reregistration Eligibility Decision, will not pose unreasonable risks or adverseeffectstohumansortheenvironment.

2. EligibleandIneligibleUses

The Agency has determined that all uses of linuron, with the exception of cotton, potato,non-cropland(rights-of-way),andsweetcorn,areeligibleforreregistration.

B. RegulatoryPosition

The followin gisasummaryoftheregulatorypositionsandrationalesforlinuron. Where labelingrevisionsareimposed,specificlanguageissetforthinSectionVofthisdocument.

1. ToleranceReassessment

TolerancesListedUnder40CFR§180.184(a)

Thetoleranceslistedunder40CFR§180.184(a)forresiduesoflinur onin/onplantand animalcommo ditiesareexpressedintermsofresiduesoflinuron *perse* . Thetolerance expression under 40 CFR §180.184(a) should be revised as follows: "Tolerances are established for the combined residues of the herbicide linuron (3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea)anditsmetabolitesconvertibleto3,4-dichloroaniline,calculatedas linuron, in or on the following raw agricultural commodities:". A summary of the reassessmentoftoleranceslistedin40CFR§180.184(a)ispresentedinTableD.

Sufficientdataareavailabletosupporttheestablishedtolerancesforthefollowing crops:carrots;corn,field,grain ;corn,field,forageandfodder;celery;cottonseed;parsnips; potatoes;sorghum,grain;soybeans;andwheat,grainandstraw.

Additionalresiduedataarer equiredifallregisteredusesoflinuronaretobecovered underestabli shedtolerancesfor:asparagus;corn,sweet(K+CWHR);corn,sweet,forage; sorghum for age and fodder; soybeans, forage and hay; and wheat forage. In addition, aspiratedgrainfractiondataremainoutstandingforfieldcorn.

A proce ssing study remains outstanding for cottonseed, if registrants other than DuPontdecidetosupportuseoncotton.Thet oleranceforcottonseedmustberevoked,ifno registrantissupportingthecottonuse.

Foodadditivetoleranceproposalsarerequiredfor"potat oes,granules"at0.8ppmand "potatoes,chips"at0.6ppm,andafeeda dditivetoleranceproposalisrequiredfor"potatoes, wastefromprocessing"at10ppm.

However,undertheDelaneyclauseoftheFFDCA,afood/f eedadditiveregulationfor a proces sed food may not be established for a pesticide which induces cancer in man or animals. Linuron may meet this criterion (see discussion in Section III.B.1.c. of this document). The Ninth Circuit Court of Appeals has ruled that EPA must interpret this provisionstrictly.EPAisinthep rocessofrevokingfoodadditivetolerancesthatviolatethe Delaneyclause.

UndercurrentEPApolicy,ifafood/feedad ditivetolerancecannotbeestablisheddue tothe Del aneyclause,EPAwillneitherestablishnorcontinueineffectatoleranceforthe associatedrawagriculturalcommodity.

At this time, the Agency is unable to make a reregistration eligibility decision on potatoesbecauseEPAiscurrentlyevaluatinglegalchallengestoitspoliciesrelatedtothe coordinationofactionsunderSection409'sDelaneyclauseandFFDCASection408and FIFRA.ButintheeventthattheAgencywillallowthe useoflinurononpotatoes,additional datatoupgradetheexistingpotatoprocessingstudywillberequired.

The establishedtolerancesforcorn,grain(inc.pop);corn,pop,forage;corn,pop, fodder;barley,oa ts,andryeforage,grain,hay,andstrawwillberevokedsincethereareno registeredusesoflinurononthesecommodities.Inaddition,theestablishedtolerancesfor corn,sweet,fodder;p arsnips,tops;andwheat,haywillberevokedsincethesecommodities are not listed as raw agricultural commodities of sweet corn, parsnips, and wheat, respectively.

Toleranceshavebeenproposedfor lettuceat0.1ppm(PP#1E02486),andgingerand taroat1ppm(PP#3E2920).Tolerancerevisionshavebeenpropose dforpotatoesat0.2ppm; themeat,fat,andmeat-by-product(exceptkidneyandliver)ofcatt le,goats,hogs,horses,and sheepat0.1ppm;andtheliverandkidneyofcattle,goats,hogs ,horses,andsheepat1.0ppm (PP#0F3832).

A6(a)(2)datasubmissionindicateslinuronresiduesinoroncornfodderwillneedto beraisedtocoverresiduesupto5.5ppmincornfodder.Thecurrenttoleranceis1ppm.

TolerancesListedUnder40CFR§180.184(b)

The tole rancelistedunder40CFR§180.184(b)iswithregionalrestrictionandis expressedintermsofresiduesoflinuron *perse* .Thetoleranceexpressionunder40CFR §180.184(b)shouldberevisedasfollows:"Tolerancesareestablishedforthecombined residuesoftheherbicidelinuron(3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea)andits metabolitesconvertibleto3,4-dichloroaniline,calculatedaslinuron,inoronthefollowing rawag riculturalcommodities:".Asummaryofthereassessmentoftoleranceslistedin40 CFR§180.184(b)ispresentedinTableD.

Sufficientdataareavailabletosupporttheestablishedtoleranceforparsley.

TableD.ToleranceReassessmentSummary.

Commodity	CurrentTolerance (ppm)	Tolerance Reassessment(ppm)	Comment/*Correct CommodityDefinition*
Toleranceslistedunder40CFR180.184(a):			
Asparagus	3	Reserved	Dataarestillneededforthe FIC.Thecurrenttoleranceis inadequate.Basedon availabledata,thetolerance willneedtoberaisedto7 ppm.
Barley,forage	0.5	Revoke	Noregistereduses.
Barley,grain	0.25	Revoke	Noregistereduses.
Barley,hay	0.5	Revoke	Noregistereduses;not regulatedasaRAC.
Barley,straw	0.5	Revoke	Noregistereduses.
Carrots	1	1	A14-dayPHIisrequired.
Cattle,fat	1	0.1	Proposedtolerancerevision 0.1ppm.PP#0F3832
Cattle,mbyp	1	1 0.1	*Cattle,kidney* *Cattle,liver* *Cattle,mbyp(exc.liverand kidney)*/Proposedtolerance revision0.1ppm.PP#0F3832
Cattle,meat	1	0.1	Proposedtolerancerevision 0.1ppm.PP#0F3832
Celery	0.5	0.5	Theavailabledatasupportuse westoftheRockyMountains, alllabelsmustreflectthis restriction.
Corn,field,fodder	1	Increaseto6	6(a)(2)datahavebeen submittedbyDuPont indicatingahighertolerance6 ppmin/onfodderisrequired.
Corn,field,forage	1	1	
Corn,fresh(inc.sweet K+CWHR)	0.25	Reserved	*Corn,sweet(K+CWHR)* Additionaldataarerequired.
Corn,grain(inc.pop)	0.25	0.1	*Corn,field,grain* Popcorngraintolerance shouldbedeletedsincethere arenoregistereduses.
Corn,pop,fodder	1	Revoke	Noregistereduses.
Corn,pop,forage	1	Revoke	
Corn,sweet,fodder	1	Revoke	NotregulatedasaRAC.
Corn,sweet,forage	1	Reserved	Additionaldatarequired.

Commodity	CurrentTolerance (ppm)	Tolerance Reassessment(ppm)	Comment/*Correct CommodityDefinition*
Cottonseed	0.25	Revoke	*Cotton,seed* Useisnotsupportedby DuPont;Ifotherregistrants supportuse,aprocessing studyisrequired.Otherwise, useshouldbecancelledand tolerancerevoked.
Goats,fat	1	0.1	Proposedtolerancerevisionto 0.1ppm.
Goats,mbyp	1	1 0.1	*Goats,kidney* *Goats,liver* *Goats,mbyp(exc.liverand kidney)*/Proposedtolerance revisionto0.1ppm. PP#0F3832
Goats,meat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Hogs,fat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Hogs,mbyp	1	1 0.1	*Hogs,kidney* *Hogs,liver* *Hogs,mbyp(exc.liverand kidney*/Proposedtolerance revisionto0.1ppm. PP#0F3832
Hogs,meat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Horses,fat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Horses,mbyp	1	1 0.1	*Horses,kidney* *Horses,liver* *Horses,mbyp(exc.liverand kidney*/Proposedtolerance revisionto0.1ppm. PP#0F3832
Horses,meat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Oats,forage	0.5	Revoke	Noregistereduses.
Oats,grain	0.25	Revoke	Noregistereduses.
Oats,hay	0.5	Revoke	Noregistereduses;not regulatedasaRAC.
Oats,straw	0.5	Revoke	Noregistereduses.
Parsnips(withorwithout tops)	0.5	0.5	*Parsnips,roots*
Parsnips,tops	0.5	Revoke	NotregulatedasaRAC.

Commodity	CurrentTolerance (ppm)	Tolerance Reassessment(ppm)	Comment/*Correct CommodityDefinition*
Potatoes	1	0.2*[1]	Proposedrevisiontothe establishedtolerance. *-All registrantsmustsubmit revisedlabelsprohibitinguse westoftheRockyMountains.
Rye,forage	0.5	Revoke	Noregistereduses.
Rye,grain	0.25	Revoke	Noregistereduses.
Rye,hay	0.5	Revoke	Noregistereduses;not regulatedasaRAC.
Rye,straw	0.5	Revoke	Noregistereduses.
Sheep,fat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Sheep,mbyp	1	1 *Sheep,kidney* *Sheep,liver* 0.1	*Sheep,mbyp(exc.liverand kidney)*/Proposedtolerance revisionto0.1ppm. PP#0F3832
Sheep,meat	1	0.1	Proposedtolerancerevisionto 0.1ppm.PP#0F3832
Sorghum,fodder	1	Reserved	
Sorghum,forage	1	Reserved	
Sorghum,grain(milo)	0.25	0.2	*Sorghum,grain*
Soybeans,(dryorsucculent)	1	1	*Soybeans*
Soybeans,forage	1	Reserved	Feedingrestrictionsprohibited perJune1994document. Additionaldatarequired.
Soybeans,hay	1	Reserved	Feedingrestrictionsprohibited perJune94document. Additionaldatarequired.
Wheat,forage	0.5	Reserved	Additionaldatarequired.
Wheat,grain	0.25	0.1	
Wheat,hay	0.5	Revoke	NotregulatedasaRAC.
Wheat,straw	0.5	2.0	PP#4F4293
Toleranceslistedunder40CFR180.184(b):			
Lettuce	--	0.1	Proposedtolerance. PP#1E02486
Ginger	--	1	Proposedtolerance. PP#3E2920
Parsley	0.25	0.25	
Taro	--	1	Proposedtolerance. PP#3E2920
Tolerancestobeproposedunder40CFR185and186 [1]			
Potatoes,chips	--	0.6	Proposedtolerance.
Potatoes,granules	--	0.8	Proposedtolerance.
Potatoes,wastefromprocessing	--	10	Proposedtolerance.

[1]Delaneyissuesmaypreventtheestablishmentofthesetolerances.

CODEX HARMONIZATION

No Codex MRLs have been established for linuron; therefore, issues of compatibility between Codex MRLs and U.S. tolerances do not exist.

2. Restricted Use Classification

Linuron meets the proposed triggers for candidacy as a restricted use chemical for groundwater concerns. The Agency will consider linuron as a candidate for classification as a restricted use chemical after the groundwater restricted use rule is finalized.

3. Risk Mitigation

The Agency has determined that the current uses of linuron exceed levels of concern for many uses. Several risk mitigation measures proposed by the technical registrant, DuPont, and accepted by the Agency are being required. These risk mitigation measures include reducing application rates, cancellation of high application rate uses, prohibiting use in certain vulnerable soil types, prohibiting aerial uses, adding groundwater and surface water label advisories. These risk mitigation measures are required for all linuron registrants.

The technical registrant, DuPont, is reducing the application rates of linuron on soybeans to 1.0 lbai/A, corn field to 0.75 lbai/A, potatoes to 1.5 lbsai/A, and asparagus to 2.0 lbsai/A. DuPont is also limiting the use of linuron on soybeans, field corn, potatoes to 1 application per year (pre-emergent use only) and limiting the use of linuron on asparagus to 3 applications per year. Reduction of the application rates for soybeans and asparagus will also improve the MOEs for handlers.

DuPont has also agreed to prohibit the aerial uses of linuron, prohibit the use of linuron on sand or loamy sand, and on soils of <1% organic matter. Furthermore, DuPont has agreed to voluntarily cancel the high application rate uses including Hybrid poplar and Non-crop land uses (Rights-of-way).

Groundwater Concerns: Due to groundwater quality concerns, the following mitigation steps are required:

- Linuron has been detected in groundwater. Therefore **all product labels must carry a groundwater advisory.** The label language for this advisory can be found in Section V. of this document.

Surface Water Concerns:

Linuron can be applied by ground spray and therefore could contaminate surface waters by spray drift. The available data on the major degradates of linuron are insufficient to assess their runoff potential or persistence in surface water. Linuron is not currently regulated under the Safe Drinking Water Act (SDWA). Therefore, no MCL has been established for it and water supply systems are not required to sample and analyze for it. In addition, no drinking water health advisories have been established for linuron. However,

basedupontheReferenceDose,theAgenc yhas(forscreeningpurposesonly)alowlifetime healthadvisoryforlinuronof6.0ug/L.Althoughtheav ailabledatasuggeststhattheaverage annuallinuron concentrationwillgenerallybewellbelow6ug/L,theavailabledatadonot necessarilyincludethose fromwatershedsthatdrainhighlinuronuseareas.Inaddition,the relativelylowtointermediatesoiltowaterpartitioningoflinuronindicatesthattheprimary treatmentprocessesemployed bymostwatersupplysystemstoremovesuspendedsediment maynotalwaysbecompletelyeffectiveinremovinglinuron.Conse quently,theAgencydoes have somemoderateconcernsforpotentialrisksoflinurontosurfacewatersourcesupply systems.

SprayDriftAdvisory: Thepotential forspraydriftexistsbecauselinuroncanalso beappliedbygroundspray.However,aspraydriftlabelingstatementwillnotbeimposed untilspraydriftdataissubmittedandreviewedbytheAgency.

4. EndangeredSpeciesStatement

TheAgencyhasconcernsabouttheexposu reofthreatenedandendangeredplantand animalspeciesto linuron.Basedontheconclusionsdiscussedintheprecedingsectionsof this riskassessment,endangeredspecies LOCsareexceeded insomeinstancesforacute effectstobirds,wildmammals,aquaticorganisms,and nontargetplants.Endangeredspecies LOCsarealsoex ceededforchroniceffectstobirds,wildmammals,andaquaticorganisms.

Currently,theAgencyisdeveloping aprogram("TheEndangeredSpeciesProtection Program")toidentifyallpesticideswhoseusemayca useadverseimpactsonendangeredand threatened species and to implement mitigation measures that will eliminate the adverse impacts.Theprogramwouldrequireuse restrictionstoprotectendangeredandthreatened speciesinthecounty.Consulta tionswiththeFishandWildlifeServicemaybenecessaryto assessrisksto newlylistedspeciesorfromproposednewuses.Inthefuture,theAgency plans to publish in the Federal Register a description of the program and have available enforceable county-specific bulletins. Because the Agency is taking this approach for protectingendangeredandthreatenedspecies, itisnotimposinglabelmodificationsatthis timethroughtheRED.Rather,any requirementsforproductusemodificationswilloccurin thefutureundertheEndangeredSpeciesProtectionProgram.

5. LabelingRationale

WorkerProtectionStandard

Anyproduc twhoselabelingreasonablypermitsuseintheproductionofan agriculturalplantonanyfarm,forest, nursery,orgreenhousemustcomplywiththe labeling requirements of PR Notice 93-7, "Labeling Revisions Required by the WorkerProte ctionStandard(WPS),andPRNotice93-11,"SupplementalGuidance forPRNotice93-7,which reflecttherequirementsofEPA'slabelingregulationsfor workerprotectionsta tements(40CFRpart156,subpartK).Theselabelingrevisions arenecessarytoimplementtheWorkerProtectionStandardforAgriculturalPesticides (40 CFR part 170) and must be completed in accordance with, and within the deadlines specified in, PR Notices 93-7 and 93-11. Unless otherwise specifically

directedinthisRED,allstatementsrequiredbyPRNotices93-7and93-11aretobe ontheproductlabelexactlyasinstructedinthosenotices.

AfterApril21,1994,exceptasotherwiseprovidedinPRNotices93-7and 93-11,all productswithin the scope of those notices must bear WPS PR Notice complyinglabelingwhentheyared istributedorsoldbytheprimaryregistrantorany supplementallyregistereddistributor.

AfterOctober23,1995,exceptasotherwiseprovidedinPRNotices93-7and 93-11,all productswithin the scope of those notices must bear WPS PR Notice complyinglabelingwhentheyaredistributedorsoldbyanyperson.

UseswithinthescopeoftheWorkerProtectionStandard

The 1992 Worker Protection Standard for Agricultural Pesticides (WPS) establishedcertainworker-protectionrequirements(personalprotectiveequipment, restrictedentryinterval s,etc.)tobespecifiedonthelabelofallproductsthatcontain uses within the scope of the WPS. Uses within the scope of the WPS include all commercial (non-homeowner) and research uses on farms, forests, nurseries, and greenhouses to produce agricultural plants (including food, feed, and fiber plants, trees, turf grass, flowers, shrubs, ornamentals, and seedlings). Uses within scope includenotonlyusesonplants,butalsousesonthesoilorpl antingmediumtheplants are(orwillbe)grownin.

Someoftheregisteredusesoflinuronarewithinthescopeof the Worker ProtectionStandardfor Agricultural P esticides(WPS)andsome uses are outside the scope of the WPS. Those that are outsidethescopeoftheWPSincludeuse:

- on plants that are in ornamental gardens, parks, golf courses, and public or private lawns and grounds and that are intended only for decorativeorenvironmentalbenefit.
- inamannernotdirectlyrelatedtothepr oductionofagriculturalplants, including,forexample,controlofvegetationalongrights-of-wayand shelterbelts.

EntryRestrictions

EntryRestrictionsforOccupational-UseProducts(WPSUses)

Someregisteredusesoflinuronar ewithinthescopeoftheWorkerProtection Standard for Agricultural Pesticides (WPS) and some are outside the scope of the WPS.

RestrictedEntryInterval --Underthe Worker Protection Standard (WPS), interimrestrictedentryintervals(REI)foralluseswithinthescopeoftheWPSare based on the acutetoxicityoftheactiveingredient. Thetoxicitycategoriesofthe

activeingredien tforacutedermaltoxicity,eyeirritationpotential,andskinirritation potentialareusedtodeterminetheinterimWPSREI. Ifoneormoreofthethree acutetoxicityeffectsarei ntoxicitycategoryI,theinterimWPSREIisestablishedat 48hours.Ifnoneoftheacutetoxicity effectsareincategoryI,butoneormoreofthe threeisclassifiedascategoryII,theinterimWPSREIisestablishedat24hours.If noneofthethreeacutetoxicit yeffectsareincategoryIorII,theinterimWPSREIis established at 12 hours. A 48-hour REI is increased to 72 hours when an organophosphatepesticideisappliedoutdoorsinaridareas. Inaddition,theWPS specifically retains two types of REI's established by the Agency prior to the promulgation of the WPS: (1) product-specific REI's established on the basis of adequate da ta, and (2) interim REI's that are longer than those that would be establishedundertheWPS.

Foroccupationalend- useproductscontaininglinuronasanactiveingredient, theA gencyisestablishinga **24-hourrestricted-entryinterval** foreachuseofthe productthatiswithinthescopeoftheWorkerProtectionStandardforAgricultural Pesticides(WPS).Thebasisofth e24-hourREIisapost-applicationriskassessment using asparagus reentry data and the toxicological endpoint for developmental toxicity.

The WPS places very specific restrictions on entry during restricted-entry intervalswhenthatentryinvolvesco ntactwithtreatedsurfaces.TheAgencybelieves that these existing WPS protections are sufficient to mitigate post-application exposuresofworkerswhocontactsurfacestreatedwithlinuron.

EntryRestrictionsforOccupational-UseProducts(NonWPSUses)

Someregisteredusesoflinuronareoutsidethescop eoftheWorkerProtection StandardforAgriculturalPesticides(WPS). TheAgencyisestablishingthefollowing entryrestrictionsforallnonWPSoccupationalusesoflinuronend-useproducts:

Forliquidapplications:
"Donotenterorallowotherstoent erthetreatedareauntilsprayshave dried."

PersonalProtectiveEquipment(PPE)Requirements

PPEforHandlers(Mixer/Loader/Applicators)

Foreachend-useproduct,PPErequirementsforpesticidehandlerswillbeset duringreregistrationinoneoftwoways:

1. IfEPAha snospecialconcernsabouttheacuteorotheradverseeffectsofan activeing redient,thePPEforpesticidehandlerswillbebasedontheacute toxicityoftheend-useproduct.Foroccupational-useproducts,PPEwillbe establishedusingtheprocessdescribedinPRNotice93-7ormorerecentEPA guidelines.

2. IfEPAhasspecialconcer nsaboutanactiveingredientduetoveryhighacute toxicityortocertainotheradverseeffects,suchasallergiceffectsordelayed effects(cancer,developmentaltoxicity,reproductiveeffects,etc):

- IntheREDforth atactiveingredient,EPAmayestablishminimumor "baseline" handler PPE requirements that pertain to all or most occupationalend-useproductscontainingthatactiveingredient.

- Theseminimum PPErequirementsmustbecomparedwiththePPE thatwouldbedesignatedonthebasisof theacutetoxicityofeachend-useproduct.

- Themo restringentchoiceforeachtypeofPPE(i.e.,bodywear,hand protection,foot wear,eyewear,etc.)mustbeplacedonthelabelofthe end-useproduct.

There are special toxicological concerns about linuron that warrant the establishmentofactive-ingredi ent-basedPPErequirementsforhandlers.TheMOE's werecalculatedasbeingacceptableonl ywhen(1)aclosedsystemisusedformixing and l oading to support aerial application and (2) specified personal protective equipmentiswornbyothermixersandloaders.

HandlerPPEforOccupational-UseProducts

Some of theregistered usesoflinuron are within the scope oftheWorker ProtectionStandardforAgriculturalPesticides(WPS)andsomeareoutsidethescope ofth eWPS.However,theminimum(baseline)PPErequirementsforboththeWPS andnonWPSusesarethesame,sinceth epotentialexposuretohandlersissimilarfor WPSandnonWPSuses.

The minimum (baseline) PPE for mixers and loaders supporting ground equipmentapplicationsforallWPSandnonWPSusesoflinuronend-useproductsis: coverallsoverlong-sleeveshirtandlongpants,chemical-resistantfootwear,chemical-resistantgloves,andchemical-resistantapron.

No min imum(baseline)PPEforapplicatorsandotherhandlers(otherthan mixersandloaders)isbeingestablishedbytheAgencythroughthisRED.

Early-EntryPPE

TheWPSe stablishesveryspecificrestrictionsonentrybyworkerstoareas thatremainunder arestricted-entryintervaliftheentryinvolvescontactwithtreated surfaces.Amongthoserestrictions areaprohibitionofroutineentrytoperformhand labortasksandrequirementthatpersonalprotectiveequipmentbeworn. Personal protectiveequipmentrequirementsforpersonswhomustenterarea sthatremainunder a restr icted-entry interval are based on the toxicity concerns about the active ingredient.Therequirementsaresetinoneoftwoways.

1. IfEPAha snospecialconcernsabouttheacuteorotheradverseeffectsofan activeingredient,itestablish estheearly-entryPPErequirementsbasedonthe acutedermaltoxicity,skinirritationpotential,andeyeir ritationpotentialofthe activeingredient.

2. IfEPAhasspecialconcer nsaboutanactiveingredientduetoveryhighacute toxicity or to certain other adverse effects, such as allergic effects, cancer, developmental toxicity, or reproductive effects, it may establish early-entry PPErequirementsthataremorestringentthanwo uldbeestablishedotherwise.

Since linuron is classified as category III for eye irritation potential, skin irritation potential, and acute dermal toxicity, the PPE required for early entry is: coveralls,chemical-resistantgloves,shoes,andsocks. EPAbelievesthatthepotential adverse effects of linuron will be mitigated with this attire, provided the entry limitationsestablishedbytheWPSarecompliedwith.

V. ACTIONSREQUIREDBYREGISTRANTS

Thissectionspecifiesthedatarequirementsandresponsesnecessaryforthereregistrationofboth manufacturing-useandend-useproducts.

A. Manufacturing-UseProducts

1. AdditionalGenericDataRequirements

Insummary,allusesoflinuronareeligibleforreregistration,withtheexceptionofcotton,potato, non-cropland (rights-of-way), and sweet corn. The Agency is unable to make a reregistration eligibilitydecisionfortheuseoflinurononcotton,non-cropland(rights-of-way),andsweetcorn untiladditionaldataaresubmittedandevaluated. **Also,areregistr ationeligibilitydecisionwillnot bemadeonthepotatouseoflinuronuntiladecisiononEPA'sCoordinationPolicyhasbeen made.**Furthermore,theAgencyisrequiringthatadditi onalconfirmatorydatabesubmittedtofulfill thegenericdatarequirementsforreregistrationoflinuron.

StartingMaterialsandManufacturingProcess

FoliarDislodgeableResidues(Carrots/Celery)
SoilDislodgeableResidues(Carrots/Celery)
DermalExposure(Carrots/Celery)
InhalationExposure(Carrots/Celery)

Cropfield Trials - Asparagus; Corn Aspirated Fractions, Sorghum, Forage and Hay; and Wheat, Forage
CropfieldTrials-SoybeansForageandHay-requireddue tochangeinAgencypolicyon grazingrestrictions

AcuteAvianDietaryToxicityw/TGAI-QuailandDuck
AcuteAquaticInvertebrateToxicity
FishEarlyLifeStage-bothRainbowTroutandSheepsheadMinnow

AquaticInvertebrateLifeCycle-Mysidshrimp
Leaching/Adsorption/Desorption
TerrestrialFieldDissipation

Inorde rtosupporttheuseoflinurononcottonandsweetcorn,thefollowingresiduedataare required:

Cottonseedprocessingstudy
Cropfieldtrials-sweetcorn

Inordertosupporttheuseoflinurononandnon-cropland(rights-of-way)uses,thefollowingdata arerequired:

AcuteMarine/Estuarine(TEP)-SheepsheadMinnowusingDFFormulationfor Rights-of-Ways

Certaindataarenotpartofthetargetdatabaseforlinuron,butarealsorequired:

Seedgermination/seedlingemergence-10species
Vegetativevigor-10species
Aquaticplantgrowth-4additionalspecies

2. LabelingRequirementsforManufacturingUseProducts

ToremainincompliancewithFIFRA,manufacturing useproduct(MP)labelingmust berevisedtocomplywithall currentEPAregulations,PRNoticesandapplicablepolicies. TheMPlabelingmustbearthefollowingstatementunderDirectionsforUse:

"Onlyforformulationintoaherbicideforthefollowinguses(s): _____(fill blankonlywiththoseusesthatarebeingsupportedbyMPregistrant)."

AnMPregistrantmay,athis/herdiscretion,addoneofthefollowingstatements toanMPlabelunder" DirectionsforUse"topermitthereformulationoftheproductfor aspecificuseoralladditionalusessupportedbyaformulatororusergroup:

(a) "Thisproductmay beusedtoformulateproductsforspecificuse(s)notlistedon theMPlabeliftheformulator,usergroup,orgrowe rhascompliedwithU.S.EPA submissionrequirementsregardingthesupportofsuchuses(s)."

(b) "Thisproductmaybeusedtoformulateproductsforanyadditionaluse(s)not listedontheMPlabelif theformulator,usergroup,orgrowerhascompliedwith U.S.EPAsubmissionrequirementsregardingthesupportofsuchuses(s)."

B. End-Use Products

1. Additional Product-Specific Data Requirements

Section 4(g)(2)(B) of FIFRA calls for the Agency to obtain any needed product-specific data regarding the pesticide after a determination of eligibility has been made. The product specific data requirements are listed in Appendix G, the Product Specific Data Call-In Notice.

Registrants must review previous data submissions to ensure that they meet current EPA acceptance criteria (Appendix F; Attachment E) and if not, commit to conduct new studies. If a registrant believes that previously submitted data meet current testing standards, then study MRID numbers should be cited according to the instructions in the Requirement Status and Registrants Response Form provided for each product.

2. Labeling Requirements for End-Use Products

a. Worker Protection

(1) Entry Restrictions; Labeling

Entry Restrictions for Occupational-Use Products (WPS Uses)

In order to be in compliance with FIFRA, a 24 hour restricted entry interval (REI) is required for all uses within the scope of the Worker Protection Standard. This REI must be inserted into the standardized REI statement specified in the WPS as explained by the EPA guidance in PR Notice 93-7. The personal protective equipment for early entry must be the PPE required for handlers of linuron (see Section 2 below). This PPE must be inserted in to the standardized REI statement specified by the WPS as explained in the EPA guidance in PR Notice 93-7.

In order to be in compliance with FIFRA, labels of sole active ingredient end-use products that contain linuron must be revised to adopt the entry restrictions set forth in this section. Any conflicting entry restrictions on their current labeling must be removed.

In order to be in compliance with FIFRA, labels of multiple-active-ingredient end-use products that contain linuron must bear the more protective of either the entry restrictions set forth in this section or the entry restrictions on the current labeling.

Entry Restrictions for Occupational-Use Products (Non WPS Uses)

Some registered uses of linuron are outside the scop e of the Worker Protection Standard for Agricultural Pesticides (WPS). The Agency is establishing the following entry restrictions for all non WPS occupational uses of linuron end-use products:

Forliquidapplications:
"Donot enterorallowotherstoenterthetreatedarea untilsprayshavedried."

(2) **PersonalProtectiveEquipmentRequirements;Labeling**

*HandlerPPEforOccupationalUseProducts:*Forallusesoflinu ron,(includes usesbothwithinthescop eofWPSandnon-WPSuses)theminimum(baseline)PPE requirementsforpesticidehandlersonalllinuronend-useproductsare:

- coverallsoverlong-sleeveshirtandlongpants
- chemical-resistantfootwear
- chemical-resistantgloves
- chemical-resistantapron

Nomin imum(baseline)PPEforapplicatorsandotherhandlers(otherthan mixersandloaders)isbeingestablishedbytheAgencythroughthisRED.

EarlyE ntryPPE: Sincelinuronisclassifiedascategory IIIforeyeirritation potential,skinirritationpotential,andacutedermaltoxicity,t hePPErequiredforearly entryis: **coveralls,chemical-resistantgloves,shoes,andsocks.**EPAbelievesthat thepotentialadverseeffectsoflinuronwillbemitigatedwiththisattire,providedthe entrylimitationsestablishedbytheWPSarecompliedwith.

Productscontaininglinuronmaycontainmorestringent PPE, butinnocase maytheyrequirelessstringentPPEthantheaboverequirements.

Producersofend-useproductsthatcontainlinuronmustcomparethePPE requirements set forth in this section to the PPE requirements, if any, on current labelingandretainthemoreprotectiv e.Forguidanceinchoosingwhichrequirement ismoreprotective,seesupplement3ofPRNotice93-7.

b. OtherLabelingRequirements

TheAgencyisrequiringthefollowinglabelingstatementstobelocatedonall end-useproductscontaining linuronthatareintendedprimarilyforoccupationaluse:

(1) Thelabelsofalllinuronend-useproductsmustberevisedtobear thefollowing underthe**EnvironmentalHazardSection** :

GroundWaterAdvisory

"Thischemicalisknowntoleacht hroughsoilintogroundwaterunder certaincon ditionsasaresultofagriculturaluse.Useofthischemical inareaswheresoilsarepermeable,particularlywherethewatertable isshallow,mayresultinground-watercontamination."

SurfaceWaterAdvisory

"Linuronmaycontaminatesurfacewaterthroughspraydriftor,under certain conditions, from surface runoff into adjacent surface water bodies(pond,lakes,streams,etc.)Forseveralweekspost-application, linuronhasa highpotentialtorunoffwhenappliedtofieldswithany ofthefollowingconditions:slopi nglanddrainingintonearbysurface waters; very poorly to somewhat poorly drained soils; areas with extremelyshall owgroundwater;frequentlyfloodedareas;fieldswith surface water canals or ditches; and highly erodible land cultivated withpoormanagmentpractices."

Forterrestrialusesexceptrights-of-way

"Thispesticid eistoxictofishandaquaticinvertebrates.Donotapply towaterortoareaswheresurfacewaterispr esent,ortointertidalareas below the mean high water mark. Do not apply when weather conditionsfavordriftfromtreatedareas. Donotcontaminatewater whendisposingofequipmentwashwaterorrinsate."

Forrights-of-way

Ifaregistrantchoosestosupporttherights-of-wayuse,hemustsubmitthedata requiredinthisREDdocumentassociatedwiththerights-of-wayuseoflinuronand hislabelsmustalsobearthefollowinglabelingstatement:

"This pesticide is toxic to fish and aquatic invertebrates. Do not contaminate water when disposing of equipment washwaters or rinsate."

However,ifare gistrantdoesnotsupporttherights-of-wayuse,theregistrant mustamendhisproductlabelbydeletingtherights-of-wa yuseinaccordancewiththe proceduresinPRNotice91-1.

(2) Thelabelsofalllinuronend-useproductsmustberevisedtobear thefollowing applicationrestrictionsunderthe**DirectionsforUseSection** :

ApplicationRestrictions:

"Donotapplythisproductinawaythat willcontactworkersor otherpersons,eitherdirectlyorthroughdrift. Onlyprotected handlersmaybeintheareaduringapplication."

"Aerialapplicationisprohibited."

"Useonsandorloamysandisprohibited."

"Useonsoilsof<1%organicmatterisprohibited."

(3) Thelabelsofalllinuronend-useproductsmustberevisedtobear thefollowing applicationratesundertheCropUsesSection fortherespectivecrops:

ApplicationRates

Forlinuronuseonsoybeans:
Amaximumapplicationrateof1.0lbai/A,withuselimitedtosingle application(pre-emergentuseonly)peryear.

Forlinuronuseoncorn,field:
Amaximumapplicationrateof0.75lbai/A,withuselimitedtosingle application(pre-emergentuseonly)peryear.

Forlinuronuseonpotatoes:
Amaximumapplicatio nrateof1.5lbsai/A,withuselimitedtosingle application(pre-emergentuseonly)peryear.

Forlinuronuseonasparagus:
Amaximumap plicationrateof2.0lbsai/Aperyear,withuselimited to3applicationsperyear.

Donotexceed2.0lbstotalperacreperyear.

Thelabelsandlabelingofallproductsmustcomply withEPA'scurrentregulations andrequirementsasspecifiedin40CFR§156.10andotherapplicablenotices.

C. ExistingStocks

Registrants may generally distribute and sell products bearing old labels/labeling for 26 monthsfromthedateoftheissuanceofthisReregistrationEligibilityDecision(RED).Persons otherthantheregistrantmaygenerallydistributeorsellsuchproductsfor50monthsfromthe date of the issuance of this RED. However, existing stocks time frames will be established case-by-case, dependingonthenumberofproductsinvolved,thenumberoflabelchanges,and other factors. Refer to "Existing Stocks of Pesticide Products; Statement of Policy"; Federal Register, Volume56,No.123,June26,1991.

The Agency has determined that registrants may distribute and sell products bearing old labels/labeling,i.e.,labelsabsentthemodificationsspecifiedinthisREDdocument,exceptas noted below, for 26 months from the date of issuance of this RED. Persons other than the registrantmaydistributeorsellsuchpr oductsfor50monthsfromthedateoftheissuanceofthis RED. Registrants and persons other than registrants remain obligated to meet pre-existing Agencyimposedlabelchangesandexistingstocksrequirementsapplicabletoproductstheysell ordistribute.

VI.APPENDICES

APPENDIXA.TableofUsePatternsSubjecttoReregistration

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year(day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

Note:AllDuPontlabels,exceptforpackagemixeswithchlorimuronforsoybeansonly,andcertainothermanufacturers'labels,carrythefollowinglimitationsnotcapturedin the codes:otherlabelslackoneorbothlimitations:

- DonotuseonanycropinKernCounty,California,exceptasparagusandcarrotswhenapermithasbeenobtainedformtheAgricultureCommission.
- IntheColumbiaRiverBasin,useLinurononlyifthecropissprinklerirrigated.

ASPARAGUSUseGroup:TERRESTRIALFOODCROP

Broadcast.,Postemergence.,Boomsprayer.DFNA1lbA*4NS4lbNSNS1C40,C46,C92,CCA,
H01(1)

DFNA1lbA*4NS4lbNSNS1CAC40,C46,C87,CCA

DFNA1lbA*4NS4lbNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

DFNA1lbA*4NS4lbNSNS1CA,MI,MN,NC,C46,C87,CCA
OR,WA

DFNA1lbA*4NS4lbNSNS1CA,MI,MN,NC,C46,C92,CCA
OR,WA

FlCNA1lbA*4NS4lbNSNS1CAC40,C46,C92,CCA,
H01(1)

FlCNA1lbA*4NS4lbNSNS1CA,MI,MN,NC,C46,C93,CAG,CCA
OR,WA

FlCNA1lbA*4NS4lbNSNSNSCA,MI,MN,NC,C40,C46,CAD,CCA,
OR,WAH01(1)

FlCNA1lbA*NSNSNSNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

WPNA1lbA*4NS4lbNSNS1CA,MI,MN,NC,C46,CCA
OR,WA

Broadcast.,Preemergence.,Boomsprayer.DFNA2lbA*1NS2lbNSNS1C40,C46,C92,CCA,
H01(1)

DFNA2lbA*1NS2lbNSNS1CAC40,C46,C87,CCA

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Rffica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

ASPARAGUS(con't)UseGroup:TERRESTRIALFOODCROP(con't)

DFNA21bA*1NS21bNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

DFNA21bA*1NS21bNSNS1CA,MI,MN,NC,C46,C92,CCA
OR,WA

DFNA21bA*1NS41bNSNS1CA,MI,MN,NC,C46,C87,CCA
OR,WA

FlCNA21bA*1NS21bNSNS1CAC40,C46,C92,CCA,
H01(1)

FlCNA21bA*1NS21bNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

FlCNA21bA*1NS21bNSNS1CA,MI,MN,NC,C46,C93,CAG,CCA
OR,WA

FlCNA21bA*1NS21bNSNSNSCA,MI,MN,NC,C40,C46,CAD,CCA,
OR,WAH01(1)

WPNA21bA*1NS21bNSNS1CA,MI,MN,NC,C46,CCA
OR,WA

Directedspray.,Postemergence.,BoomDFNA41bA*1NS41bNSNS1C40,C46,C92,CCA,
sprayer.H01(1)

DFNA41bA*1NS41bNSNS1CAC40,C46,C87,CCA

DFNA41bA*1NS41bNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

DFNA41bA*1NS41bNSNS1CA,MI,MN,NC,C46,C87,CCA
OR,WA

DFNA41bA*1NS41bNSNS1CA,MI,MN,NC,C46,C92,CCA
OR,WA

FlCNA41bA*1NS41bNSNS1CAC40,C46,C92,CCA,
H01(1)

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

ASPARAGUS(con't)UseGroup:TERRESTRIALFOODCROP(con't)

F1CNA41bA*1NS41bNSNS1CA,MI,MN,NC,C46,C93,CAG,CCA
OR,WA

F1CNA41bA*1NS41bNSNSNSCA,MI,MN,NC,C40,C46,CAD,CCA,
OR,WAH01(1)

F1CNA41bA*NSNSNSNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

WPNA41bA*1NS41bNSNS1CA,MI,MN,NC,C46,CCA
OR,WA

Spray.,Postemergence.,Boomsprayer.F1CNA11bA*NSNSNSNSNS1CA,MI,MN,NC,C40,C46,C92,CCA,
OR,WAH01(1)

Spray.,Preemergence.,Boomsprayer.DFNA21bA*1NS21bNSNS1CAC40,C46,C87,CCA

F1CNA21bA*NSNSNSNSNS1CAC40,C46,C92,CCA,
H01(1)

WPNA21bA*1NS21bNSNS1CA,MI,MN,NC,C46,CCA
OR,WA

CARROT(INCLUDINGTOPS)UseGroup:TERRESTRIALFOODCROP

Spray.,Postemergence.,Boomsprayer.DFNA1.51bA*NSNS21bNSNS1C40,C46,C87,
H01(14)

DFNA1.51bA*NSNS21bNSNS1C40,C46,C92,
H01(14)

DFNA1.51bA*NSNS21bNSNS1C46,C92,H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C87,H01(14)

F1CNA1.51bA*2NS21bNSNS1C40,C46,C92,
H01(14)
F1CNA1.51bA*NSNS21bNSNS0.5C40,C87

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.%Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CARROT(INCLUDINGTOPS)(con't)UseGroup:TERRESTRIALFOODCROP(con't)

FlCNA1.51bA*NSNS21bNSNS1C40,C46,C92,
H01(14)

FlCNA1.51bA*NSNS21bNSNS1C46,C93,CAG,
H01(14)

FlCNA1.51bA*NSNS21bNSNSNSC40,C46,CAD,

H01(14)ReportRun
WPNA1.51bA*NSNS21bNSNS1C46

Spray.,Postplant.,Boomsprayer.FlCNA1.51bA*NSNS21bNSNS0.5C40,C87

Spray.,Preemergence.,Boomsprayer.DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC40,C46,C92,
H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C87,H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C92,H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,WIC40,C46,C87,
H01(14)

FlCNA1.51bA*2NS21bNSNS1FL,MI,OH,WI013C40,C46,C92

Geo.013: InFloridaapply2pintsofproductperacre;inMichigan,Ohio,andWisconsin,apply3pintsof productperacre.

FlCNA1.51bA*NSNS21bNSNS0.5C40,C87

FlCNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC40,C46,C92,
H01(14)

FlCNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C93,CAG

FlCNA1.51bA*NSNS21bNSNSNSFL,MI,OH,WIC40,C46,CAD,
H01(14)

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CARROT(INCLUDINGTOPS)(con't)UseGroup:TERRESTRIALFOODCROP(con't)

FlCNA1.51bA*NSNS21bNSNS1C40,C46,C92,
H01(14)

FlCNA1.51bA*NSNS21bNSNS1C46,C93,CAG,
H01(14)

FlCNA1.51bA*NSNS21bNSNSNSC40,C46,CAD,

H01(14)ReportRun
WPNA1.51bA*NSNS21bNSNS1C46

Spray.,Postplant.,Boomsprayer.FlCNA1.51bA*NSNS21bNSNS0.5C40,C87

Spray.,Preemergence.,Boomsprayer.DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC40,C46,C92,
H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C87,H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C92,H01(14)

DFNA1.51bA*NSNS21bNSNS1FL,MI,WIC40,C46,C87,
H01(14)

FlCNA1.51bA*2NS21bNSNS1FL,MI,OH,WI013C40,C46,C92

Geo.013: InFloridaapply2pintsofproductperacre;inMichigan,Ohio,andWisconsin,apply3pintsof productperacre.

FlCNA1.51bA*NSNS21bNSNS0.5C40,C87

FlCNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC40,C46,C92,
H01(14)

FlCNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46,C93,CAG

FlCNA1.51bA*NSNS21bNSNSNSFL,MI,OH,WIC40,C46,CAD,
H01(14)

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CARROT(INCLUDINGTOPS)(con't)UseGroup:TERRESTRIALFOODCROP(con't)

WFNA1.51bA*NSNS21bNSNS1FL,MI,OH,WIC46

Spray.,Preemergence.,Ground.DFNA11bA*NS1/1yrNS11bNS1CAC46,H01(14)

CELERYUseGroup:TERRESTRIALFOODCROP

Spray.,Posttransplant.,Boomsprayer.DFNA1.51bA*1NS1.51bNSNS1013C40,C46,C92
Geo.013:ApplyEastoftheRockyMountainsonly.IntheNortheast,useonlyoncelery
grownonmucksoils.

DFNA1.51bA*1NSNSNSNS1013C46,C92
Geo.013:IntheNortheast,usetheproductoncelerygrownonlyonmucksoils.Applyonly
EastoftheRockyMountains.

DFNA1.51bA*NSNSNSNSNS1013C40,C46,C87
Geo.013:ApplyEastoftheRockyMountainsonly.IntheNortheast,useonlyoncelery
grownonmucksoils.

DFNA1.51bA*NSNSNSNSNS1013C46,C87
Geo.013:Seeabove

FlCNA1.51bA*1NS1.51bNSNS0.5013C40,C87

IntheNortheast,useonlyoncelerygrownonmucksoils.

FlCNA1.51bA*1NS1.51bNSNS1013C40,C46,C92
Geo.013:ApplyEastoftheRockyMountainsonly.IntheNortheast,useonlyoncelery
grownonmucksoils.

FlCNA1.51bA*1NS1.51bNSNS1013013C40,C46,C92

grownonmucksoils.

Geo.013: Apply East of the Rocky Mountains only. In the Northeast, use only on celery

FlCNA1.51bA*1NS1.51bNSNSNS013C40,C46,CAD
Geo.013:ApplyEastoftheRockyMountainsonly.IntheNortheast,useonlyoncelery
grownonmucksoils.

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year(day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CELERY(con't)UseGroup:TERRESTRIALFOODCROP(con't)

FlCNA1.51bA*NSNSNSNSNS1013C46,C93,CAG
Geo.013:ApplyEastoftheRockyMountainsonly.InNortheast,useonlyoncelerygrownon
mucksoils.

WPNA1.51bA*NSNSNSNSNS1013C46
Geo.013:ApplyEastoftheRockyMountains.IntheNortheast,useonlyoncelerygrownon
mucksoils.

CORN,FIELDUseGroup:TERRESTRIALFOOD+FEEDCROP

Bandtreatment.,Postemergence.,BoomWPNA.5241bA*NS1/1yrNS.771bNS1C40,C46,CAD
sprayer..5241bAF
.4001bAM
.1541bAC

Bandtreatment.,Postemergence.,WPNA.5241bA*NS1/1yrNS.771bNS1C40,C46,CAD
Tractor-mountedsprayer..5241bAF
.4001bAM
.1541bAC

Bandtreatment.,Preemergence.,BoomWPNA.5241bA*NS1/1yrNS.771bNS1C40,C46,CAD
sprayer..5241bAF
.4001bAM
.1541bAC

Bandtreatment.,Preemergence.,WPNA.5241bA*NS1/1yrNS.771bNS1C40,C46,CAD
Tractor-mountedsprayer..5241bAF
.4001bAM
.1541bAC

Directedspray.,Postemergence.,BoomDFNA1.51bA*1NS1.51bNSNS1C40,C46,C92
sprayer.

DFNA1.51bA*1NSNSNSNS1013C46,C92
Geo.013:Foruse'EastoftheRockyMountainsonly.'

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.Rateunlessnoted IntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CORN,FIELD(con't)UseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFNA1.51bA*NSNSNSNSNS1C40,C46,C87

DFNA1.51bA*NSNSNSNSNS1C46,C87

FlCNA1.51bA*1NS1.51bNSNS0.5C40,C87

FlCNA1.51bA*1NS1.51bNSNS1C40,C46,C92

FlCNA1.51bA*1NS1.51bNSNSNSC40,C46,CAD

FlCNA1.51bA*NSNSNSNSNS1C46,C93,CAG

FlCNA1.51bA*NSNSNSNSNS1C40,C46,C92

WPNA1.51bA*NSNSNSNSNS1C46

Spray.,Postemergence.,Boomsprayer.WPNA1.541bA*NS1/1yrNS.771bNS1C40,C46,CAD
1.541bAF
1.2321bAM
.4931bAC

Spray.,Postemergence.,Tractor-mountedWPNA*NS1/1yrNS.771bNS1C40,C46,CAD
sprayer.

Spray.,Preemergence.,Boomsprayer.DFNA1.51bA*1NS1.51bNSNS1013C40,C46,C92
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

DFNA1.51bA*1NSNSNSNS1013C46,C92
1.51bAFGeo.013:Foruse'EastoftheRockyMountainsonly.'
1.251bAM
11bAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CORN,FIELD(con't)UseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFNA*NSNSNSNSNS1013C40,C46,C87
Geo.013:ApplyEastoftheRockyMountainsonly.

DFNA1.51bA*NSNSNSNSNS1013C46,C87
1.51bAFGeo.013:Seeabove
1.251bAM
11bAC

FlCNA1.51bA*1NS1.51bNSNS0.5013C40,C87
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

FlCNA1.51bA*1NS1.51bNSNS1013C40,C46,C92
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

FlCNA1.51bA*1NS1.51bNSNSNS013C40,C46,CAD
1.51bAFGeo.013:Seeabove
1.251bAM
11bAC

FlCNA*NSNSNSNSNS1013C46,C93,CAG
Geo.013:ApplyEastoftheRockymountainsonly.

FlCNA1.51bA*NSNSNSNSNS1013013C40,C46,C92
1.51bAFGeo.013:ApplyEastoftheRockyMountains.
1.251bAM
11bAC

WPNA1.541bA*NS1/1yrNS.771bNS1C40,C46,CAD
1.541bAF
1.2321bAM
.4931bAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)IntervCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CORN,FIELD(con't)UseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

WPNA1.51bA*NSNSNSNSNS1013C46
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

Spray.,Preemergence.,Tractor-mountedWPNA1.541bA*NS1/1yrNS.771bNS1C40,C46,CAD
sprayer.1.541bAF
1.2321bAM
.4931bAC

PARSLEYUseGroup:TERRESTRIALFOODCROP

Broadcast.,Preemergence.,Boomsprayer.DFNAUC*NS1/1yrNSUCNS1TXC46

PARSNIPUseGroup:TERRESTRIALFOODCROP

Spray.,Preemergence.,Boomsprayer.DFNA1.51bA*1NS1.51bNSNS1C40,C46,C92

DFNA1.51bA*1NS1.51bNSNS1C46,C92

Spray.,Postplant.,Boomsprayer.FlCNA1.51bA*1NS1.51bNSNS0.5C40,C87

Spray.,Preemergence.,Boomsprayer.DFNA1.51bA*1NS1.51bNSNS1C40,C46,C92

DFNA1.51bA*1NS1.51bNSNS1C46,C92

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CORN,FIELD(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFNA1.51bA*NSNSNSNSNS540,C46,C87

DFNA1.51bA*NSNSNSNSNS546,C87

FlCNA1.51bA*1NS1.51bNSNS0.C540,C87

FlCNA1.51bA*1NS1.51bNSNS540,C46,C92

FlCNA1.51bA*1NS1.51bNSNSNS40,C46,CAD

FlCNA1.51bA*NSNSNSNSNS546,C93,CAG

FlCNA1.51bA*NSNSNSNSNS540,C46,C92

WPNA1.51bA*NSNSNSNSNS546

Spray.,Postemergence.,Boomsprayer.WPNA1.541bA*NS1/1yrNS.771bNS540,C46,CAD
1.541bAF
1.2321bAM
.4931bAC

Spray.,Postemergence.,Tractor-mountedWPNANS1/1yrNS.771bNS540,C46,CAD
sprayer.

Spray.,Preemergence.,Boomsprayer.DFNA1.51bA*1NS1.51bNSNS101G40,C46,C92
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

DFNA1.51bA*1NSNSNSNS101G46,C92
1.51bAFGeo.013:Foruse'EastoftheRockyMountainsonly.'
1.251bAM
11bAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CORN,FIELD(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFNANSNSNSNSNS101G40,C46,C87
Geo.013:ApplyEastoftheRockyMountainsonly.

DFNA1.51bA*NSNSNSNSNS101G46,C87
1.51bAFGeo.013:Seeabove
1.251bAM
11bAC

FlCNA1.51bA*1NS1.51bNSNS0.501G40,C87
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

FlCNA1.51bA*1NS1.51bNSNS101G40,C46,C92
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

FlCNA1.51bA*1NS1.51bNSNSNS01G40,C46,CAD
1.51bAFGeo.013:Seeabove
1.251bAM
11bAC

FlCNANSNSNSNSNS101G46,C93,CAG
Geo.013:ApplyEastoftheRockymountainsonly.

FlCNA1.51bA*NSNSNSNSNS101D13C40,C46,C92
1.51bAFGeo.013:ApplyEastoftheRockyMountains.
1.251bAM
11bAC

WPNA1.541bA*NS1/1yrNS.771bNS40,C46,CAD
1.541bAF
1.2321bAM
.4931bAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

CORN,FIELD(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

WPNA1.51bA*NSNSNSNS101046
1.51bAFGeo.013:ApplyEastoftheRockyMountainsonly.
1.251bAM
11bAC

Spray.,Preemergence.,Tractor-mountedWPNA1.541bA*NS1/1yrNS.771bNSM40,C46,CAD
spraydr.541bAF
1.2321bAM
.4931bAC

PARSLEYUseGroup:TERRESTRIALFOODCROP

Broadcast.,Preemergence.,BoomsprayerDFNA1C*NS1/1yrNSUCNS1TOM46

PARSNIPUseGroup:TERRESTRIALFOODCROP

Spray.,Preemergence.,BoomsprayerDFNA1.51bA*1NS1.51bNSNSM40,C46,C92

DFNA1.51bA*1NS1.51bNSNSM46,C92

Spray.,Postplant.,BoomsprayerFlCNA1.51bA*1NS1.51bNSNS0.CM40,C87

Spray.,Preemergence.,BoomsprayerDFNA1.51bA*1NS1.51bNSNSM40,C46,C92

DFNA1.51bA*1NS1.51bNSNSM46,C92

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

PARSNIP(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFNA .5lbA*NSNSNSNSNS40,C46,C87

DFNA .5lbA*NSNSNSNSNS46,C87

FlCNA .5lbA*1NS1 .5lbNSNS0 .C40,C87

FlCNA .5lbA*1NS1 .5lbNSNS40,C46,C92

FlCNA .5lbA*1NS1 .5lbNSNS40,C46,C92

FlCNA .5lbA*1NS1 .5lbNSNSNS40,C46,CAD

FlCNA .5lbA*NSNSNSNSNS46,C93,CAG

WPNA .5lbA*NSNSNSNSNS46

SORGHUMGroup:TERRESTRIALFOOD+FEEDCROP

Directedspray.,Postemergence.,BoomDFNA lbA*1NSNSNSNS46,C92,G74
sprayer.
DFNA lbA*NSNSNSNSNS40,C46,C87

DFNA lbA*NSNSNSNSNS40,C46,C92,
G01(90)

DFNA lbA*NSNSNSNSNS46,C87,G03,GC9

FlCNA lbA*1NS1 lbNSNS0 .C40,C87,G74

FlCNAC*NSNSNSNSNS40,C46,C92,
G01(90)

FlCNA lbA*NSNSNSNSNS46,C93,CAG

FlCNA lbA*NSNSNSNSNS40,C46,C92,
G01(90)

FlCNA lbA*NSNSNSNSNS40,C46,CAD,
G01(90)

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

SORGHUM(con UseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

WPNA1bA*NSNSNSNSNS46

Spray.,Postplant.,Boomsprayer.FlCNANSNSNSNSNS0.C40,C87,G74,GI8

Spray.,Preemergence.,Boomsprayer.DFNA1bA*1NS1bNSNSNS40,C46,C92,
1bAM(90)
.75lbAC

DFNA1bA*1NSNSNSNSNS46,C92,G74
1lbAM
.75lbAC

DFNA.5lbA*NSNSNSNSNS40,C46,C87

DFNA1bA*NSNSNSNSNS46,C87,G03,GC9,
1bAM
.75lbAC

FlCNA1bA*1NS1bNSNSNS40,C46,C92,
1bAM(90)
.75lbAC

FlCNA1bA*1NS1bNSNSNS40,C46,CAD,
1bAM(90)
.75lbAC

FlCNA.5lbA*1NS1.5lbNSNS0.C40,C87,G74,GI8
1lbAM
.75lbAC

FlCNANSNSNSNSNS46,C93,CAG,G03,
GI8

FlCNA.5lbA*NSNSNSNSNS40,C46,C92,
1.5bAF(90)
1lbAM
.75lbAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year(day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

SORGHUM(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

WPNAlbA*NSNSNSNSNS46
1lbAM
.75lbAC

SOYBEANS(UNSPECIFIEDUseGroup:TERRESTRIALFOOD+FEEDCROP

Broadcast.,Postemergence.,Boomsprayer.FlCNAlbA*NSNSNSNSNS40,C46,C92,
H01(60)

Directedspray.,Postemergence.,BoomDFNAlbA*1NS1lbNSNS46,C92,GH9,
sH01(60)

DFNAlbA*NSNS1lbNSNS40,C46,C87,
H01(60)

DFNAlbA*NSNS1lbNSNS46,C87,H01(60)

DFNA6401lbA*NSNSNSNSNS0.C540,C46,C92,GE8

DFNAlbA*NSNSNSNSNS40,C46,C92,G74

DFNAlbA*NSNSNSNSNS40,C46,C92,G74,
G94,H01(60)

FlCNAlbA*NSNS1lbNSNS40,C46,C92,G74,
G94,H01(60)

FlCNA75lbA*NSNS1lbNSNS46,C93,CAG,
.75lbAF(60)
.375lbAM
.25lbAC

FlCNAlbA*NSNS1lbNSNS40,C46,C92

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

SOYBEANS(UNSPECIFIED)(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

FlCNAlbA*NSNSNSNSNS0.501G40,C87,H01(60)

Geo.013:InMidsouthandSoutheastapplywhensoybeansareatleast12inchestallandwhenweedsdo notexceed4inchesinheight.InMidsouth,applicationmaybemadewhensoybeansareatleast8 inchestallandweedsdonotexceed2inchesinheight.Makeasingleapplicationof1to2pints peracre(0.5to1pintperacreon8inchsoybeans).Alternatively,ifapplicationismadeto12 inchsoybeans,makeasplitapplicationof1pintperacrefollowedbyasecondapplicationatsame rateafteraweekorlater.Overalldosagenottoexceed2pintsperacreperseason,for postemergencetreatment.

FlCNAlbA*NSNSNSNSNSNS40,C46,CAD,G74,
H01(60)

WFNAlbA*NSNSlbNSNS46,G94

Soilincorporatedtreatment.,EarlyDFNA64011bA*NSNSNSNSNS0.540,C46,C92,GE8
preplant.,Boomsprayer64011bAF
.5691bAM
.49791bAC

Soilincorporatedtreatment.,Preplant.,DFNA64011bA*NSNSNSNSNS0.540,C46,C92,GE8
Boomsprayer.

DFNA64011bA*NSNSNSNSNS0.5AA,GE8
.64011bAF
.5691bAM
.49791bAC

DFNA8311bA*NSNSNSNSNS0.5VA,WV,DE,MD,C46,GE8
.8311bAE,PA
.6931bAM
.5541bAC

Spray.,Earlypreplant.,Boomsprayer.DFNA64011bA*NSNSNSNSNS0.5AA,GE8
.64011bAF
.5691bAM
.49791bAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

SOYBEANS(UNSPECIFIED)(con'tTreeGroup:TERRESTRIALFOOD+FEEDCROP(con't)

Spray.,Preemergence.,Aircraft DFNAC*1NSNSNSNS46,C92,GH9

DFNAC*NSNSNSNSNS46,C87

FlCNA2.51bA*NSNSNSNSNS0.540,C87
2.51bAF
21bAM
1.51bAC

FlCNA1bA*NSNSNSNSNS46,C93,CAG
2.51bAF
21bAM
1.51bAC

Spray.,Preemergence.,Boomsprayer.DFNA1bA*1NSNSNSNS46,C92,GH9
2.51bAF
21bAM
1.51bAC

DFNA 64011bA*NSNSNSNSNS0.540,C46,C92,GE8
.64011bAF
.5691bAM
.49791bAC

DFNA 64011bA*NSNSNSNSNS0.5AA,GE8
.64011bAF
.5691bAM
.49791bAC

DFNA 8311bA*NSNSNSNSNS0.5VA,WV,DE,MD,C46,GE8
.8311bNE,PA
.6931bAM
.5541bAC

DFNA.51bA*NSNSNSNSNS40,C46,C87

DFNA2.51bA*NSNSNSNSNS40,C46,C92,G74
31bAF
21bAM
1.51bAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

SOYBEANS(UNSPECIFIED)(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFNA .75lbA*NSNSNSNSNS46,C87,G63
2.5lbAF
2lbAM
1.5lbAC

FlCNA lbA*1NS3lbNSNS40,C46,C92,G99
3lbAF
2lbAM
1.5lbAC

FlCNA2.5lbA*NSNSNSNSNS0.C40,C87,GI7,GK3
2.5lbAF
2lbAM
1.5lbAC

FlCNA2.5lbA*NSNSNSNSNS40,C46,C92,G74
3lbAF
2lbAM
1.5lbAC

FlCNA lbA*NSNSNSNSNS46,C93,CAG
3lbAF
2lbAM
1.5lbAC

FlCNA1.5lbA*NSNSNSNSNS40,C46,CAD,G74
3lbAF
2lbAM
1.5lbAC

WPNA lbA*NSNSNSNSNS46,GA3
3lbAF
2lbAM
1.5lbAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.Soil Max.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

WHEATGroup:TERRESTRIALFOOD+FEEDCROP

Spray.,Fall.,Boomsprayer FlCNA 751bA*NSNSNSNSNS0.501G40,C87
Geo.013:Extractedinformationappliestoareas EastofCascadeRange.

FlCNA 751bA*NSNSNSNSNS1ID,OR,WAE46,C93,CAG

FlCNA 751bA*NSNSNSNSNS1ID,OR,WA013C40,C46,C92
Geo.013:Extractedinformationappliestoareas EastofCascadeRange.

Spray.,Postemergence.,Boomsprayer.FlCNA.751bA*NSNSNSNSNS0.G40,C87

FlCNA.751bA*NSNSNSNSNS1ID,OR,WAE40,C46,C92

Spray.,Preemergence.,Boomsprayer.FlCNA.751bA*NSNSNSNSNS0.501G40,C87
Geo.013:Theextracteddata(max.doseperapplication)appliestoareaswestofCascade
Range.

FlCNA.751bA*NSNSNSNSNS1ID,OR,WAE46,C93,CAG

FlCNA.751bA*NSNSNSNSNS1ID,OR,WA013C40,C46,C92
Geo.013:Theextracteddata(max.doseperapplication)appliestoareaswestofCascade
Range.

Spray.,Spring.,Boomsprayer FlCNA 6251bA*NSNSNSNSNS0.501G40,C87

Geo.013:Extracteddatareferstoareaeast ofCascadeRangeandwhereAverageAnnualrainfall
exceeds16inches;howeverinareaseastofCascadeRange,withanaveragerainfallof10to20
inchesthedosageisreducedto0.5pintandasatankmixturewithanotherherbicide.

FlCNA 6251bA*NSNSNSNSNS1ID,OR,WAE46,C93,CAG

FlCNA 6251bA*NSNSNSNSNS1ID,OR,WA013C40,C46,C92
Geo.013:Extracteddatareferstoareaeast ofCascadeRangeandwhere
AverageAnnualrainfallexceeds16inches;howeverinareaseastofCascadeRange,withan
averagerainfallof10to20inchesthedosageisreducedto0.5pintandasatankmixture
withanotherherbicide.

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

FOOD/FEED

WHEAT(conUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

Spray.,Winter.,BoomsprayerFlCNA75lbA*NSNSNSNSNS0.501040,C87

Geo.013:ExtracteddatareferstoEastofCascadeRangeandwhereaverageannualrainfallis10to16 inches.

FlCNA75lbA*NSNSNSNSNS1ID,OR,WE46,C93,CAG

FlCNA75lbA*NSNSNSNSNS1ID,OR,WA013C40,C46,C92

Geo.013:ExtracteddatareferstoEastofCascadeRangeandwhereaverageannualrainfallis10to16 inches.

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

NONAGRICULTURALUNCULTIVATEDAREAS/SOILUseGroup:TERRESTRIALNON-FOODCROP

Spray.,Whenneeded.,Boomsprayer DFNAlbA*NSNSNSNSNS40,C46,C87

DFNAlbA*NSNSNSNSNS40,C46,C92

DFNAlbA*NSNSNSNSNS46,C87

DFNAlbA*NSNSNSNSNS46,C92

FlCNAlC*NSNSNSNSNS0.C40,C87

FlCNAlbA*NSNSNSNSNS40,C46,C92

FlCNAlbA*NSNSNSNSNS46,C93,CAG

FlCNAlbA*NSNSNSNSNS40,C46,C92

FlCNAlbA*NSNSNSNSNS40,C46,CAD

WPNAlbA*NSNSNSNSNS46

ORNAMENTALHERBACEOUSPLANTUseGroup:TERRESTRIALNON-FOODCROP

Spray.,Preemergence.,Boomsprayer DFNAlbA*1NS1lbNSNS1CA46,C92

DFNAlbA*1NSNSNSNS1CA46,C87

FlCNAlbA*1NS1lbNSNS1CA40,C46,C47,CAD

FlCNAlbA*1NS1lbNSNS1CA46,C93,CAG

WPNAlbA*1NSNSNSNS1CA46

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)Intervodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

POPLAR(FOREST/SHELTERBELUseGroup:FORESTRY

Spray.,Spring.,BoomsprayerDFNAlbA*NSNSNS41bNS101G40,C46,C92
BeforebudbreakGeo.013:ApplyintheMidwestonly.
(UseDirectedSprayafter
budbreak.DFNAlbA*NSNSNS41bNS101G46,C87

DFNAlbA*NSNSNS41bNS101G46,C92
Geo.013:ApplyintheMidwestonly.

FlCNAlbA*NSNSNS41bNS101G40,C46,C92
Geo.013:ApplyintheMidwestonly.

FlCNAlbA*NSNSNS41bNS101G46,C93,CAG
Geo.013:Seeabove

FlCNAlbA*NSNSNS41bNSNS01G40,C46,CAD
Geo.013:Seeabove

WPNAlbA*NSNSNS41bNS101G46
Geo.013:Seeabove

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose|(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.Rateunlessnotedinterventryallowedisallowedlimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

POPLAR(FOREST/SHELTERBELUseGroup:FORESTRY

Spray.,Spring.,Boomsprayer DFN&lbA*NSNSNS4lbNS101G40,C46,C92
Beforebudbr@ko.013:ApplyintheMidwestonly.
(UseDirectedSprayafter
budbreak.DFN&lbA*NSNSNS4lbNS101G46,C87

DFN&lbA*NSNSNS4lbNS101G46,C92
Geo.013:ApplyintheMidwestonly.

FlCN&lbA*NSNSNS4lbNS101G40,C46,C92
Geo.013:ApplyintheMidwestonly.

FlCN&lbA*NSNSNS4lbNS101G46,C93,CAG
Geo.013:Seeabove

FlCN&lbA*NSNSNS4lbNSNS01G40,C46,CAD
Geo.013:Seeabove

WPN&lbA*NSNSNS4lbNS101G46
Geo.013:Seeabove

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.Rateunlessnoted IntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

CORN,SWEETGroup:TERRESTRIALFOOD+FEEDCROP

Directedspray.,Postemergence.,BoomDFNA.5lbA*1NS1.5lbNSNS40,C46,C92
sprayer.
DFNA.5lbA*1NSNSNSNS46,C92

DFNA625lbA*NSNSNSNSNS40,C46,C87

DFNA.5lbA*NSNSNSNSNS46,C87

FlCNA.5lbA*1NS1.5lbNSNS0.540,C87

FlCNA.5lbA*1NS1.5lbNSNS40,C46,C92

FlCNA.5lbA*1NS1.5lbNSNSNS40,C46,CAD

FlCNA.5lbA*NSNSNSNSNS46,C93,CAG

FlCNA.5lbA*NSNSNSNSNS40,C46,C92

WPNA.5lbA*NSNSNSNSNS46

COTTONGroup:TERRESTRIALFOOD+FEEDCROP

Directedspray.,Postemergence.,BoomDFNA.5lbA*NSNSNSNSNS101G40,C46,C87,G03,
sprayGeo.013:ApplyEastoftheRockyMountainsonlyG14,GA4

DFNA.5lbA*NSNSNSNSNS101G46,C87,G03,G14,
Geo.013:SeeabGA4

DFNA.5lbA*NSNSNSNSNS101G46,C92,G03,G14

Geo.013:ApplyeastoftheRockyMountainsonly.

FlCNA.5lbA*NSNSNSNSNS0.501G40,C87,G03,G14,
GA4
Geo.013:ApplyEastoftheRockyMountainsonly.

FlCNA.5lbA*NSNSNSNSNS101G40,C46,C47,CAD,
G14,G74
Geo.013:UseeastofRockyMountains.

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

COTTON(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

FlCNA.5lbA*NSNSNSNSNS101G46,C93,CAG,G03,
G14,GA4
Geo.013:ApplyEastoftheRockyMountainsonly.

FlCNA.5lbA*NSNSNSNSNS101D1C40,C46,C92,G03,
G14,GA4
Geo.013:ApplyEastoftheRockyMountainsonly.

Spray.,Postemergence.,Boomsprayer.FlCNA.75lbA*NSNSNSNSNS0.501G40,C87,G03,G28
Geo.013:ApplyEastofRockyMountains.

POTATO,WHITE/IRISHUseGroup:TERRESTRIALFOOD+FEEDCROP

Spray.,Postplant.,Boomsprayer.FlCNANSNSNSNSNS0.501G40,C87
Geo.013:ApplyextracteddosagesEastofRockymountains.

Spray.,Preemergence.,Aircraft.DFNAC*NSNSNSNSNS46,C87

DFNAlbA*NSNSNSNSNS101D1C46,C92
Geo.013:UseEastofRockyMountains,NortheastandinCentralSandsAreaofWisconsin.

FlCNANSNSNSNSNS46,C93,CAG

Spray.,Preemergence.,Boomsprayer.DFNAlbA*1NS2lbNSNS101G40,C46,C92
2lbAFGeo.013:ApplyextracteddosagesEastoftheRockyMountains.InWisconsin-CentralSands
2lbAMArea,apply1poundproductperacreonsandsand2poundsperacreonloamysands.In
1.25lbACNortheast,apply2poundsperacreoncoarsesoilswith3to5percentorganicmatter.
Apply2.5poundsofproductonmediumsoilswith3to5percentorganicmatter.

DFNAlbA*1NSNSNSNS101D1C46,C92
2lbAFGeo.013:UseEastofRockyMountains,Northeast
2lbAMApplyextracteddosagesEastoftheRockyMountainsandinCentralSandsAreaofWisconsin.
1.25lbAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

POTATO,WHITE/IRISH(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

DFN&lbA*NSNSNSNSNS101G40,C46,C87
2lbAFGeo.013:ApplyextracteddosagesEastoftheRockymountains.InWisconsin-CentralSands
2lbAMArea,apply1poundproductperacreonsandsand2poundsperacreonloamysands.Inthe
1.25lbACNortheast,apply2poundsperacreoncoarsesoilswith3percentto5percentorganic
matter.Apply2.5poundsofproductperacreonmediumsoilswith3percentto5percent
organicmatter.

DFN&NSNSNSNSNS101G46,C87
Geo.013:ApplyextracteddosagesEastoftheRockymountains.InWisconsin-CentralSands
Area,apply1poundproductperacreonsandsand2poundsperacreonloamysands.

FlCN&lbA*1NS2lbNSNSNS101G40,C46,C92
2lbAFGeo.013:ApplyextracteddosagesEastoftheRockyMountains.InWisconsin-CentralSands
2lbAMArea,apply1pintofproductperacreonsandsand2pintsperacreonloamysands.In
1.25lbACNortheast,apply2pintsperacreoncoarsesoilswith3to5percentorganicmatter.
Apply2.5pintsofproductonmediumsoilswith3to5percentorganicmatter.

FlCN&lbA*1NS2lbNSNSNS01G40,C46,CAD
2lbAFGeo.013:Seeabove
2lbAM
1.25lbAC

FlCN&lbA*NSNSNSNSNS0.501G40,C87
2lbAFGeo.013:ApplyextracteddosagesEastofRockymountain,whereas,inWisconsinapplydosages
2lbAMaccordingtosoiltypespecified.
1.25lbAC

FlCN&NSNSNSNSNS101G46,C93,CAG
Geo.013:ApplyextracteddosagesEastoftheRockyMountains.InWisconsin-CentralSands
Area,apply1pintproductperacreonsandsand2pintsperacreonloamysands.Inthe
Northeast,apply2pintsperacreoncoarsesoilswith3percentrto5percentorganic
matter.Apply2.5pintsofproductperacreonmediumsoilswith3percentto5percent
organicmatter.

FlCN&lbA*NSNSNSNSNS101D13C40,C46,C92
2lbAFGeo.013:"DonotuseonanycropinKernCounty,California.ApplyextracteddosagesEast
2lbAMoftheRockymountains.DonotapplyinKernCounty,CA.
1.25lbAC

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment -Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)Interkodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

POTATO,WHITE/IRISH(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

WPNA1.25lbA*NSNSNSNSNS101G46
21bAFGeo.013:ApplyEastoftheRockyMountains.InWisconsin-CentralSandsArea,apply1
21bAMpoundproductperacreonsandsand2poundsperacreonloamysands.IntheNortheast,
1.25lbACapply2poundsperacreoncoarsesoilswith3percentto5percentorganicmatter.Apply

2.5poundsofproductonmediumsoilswith3percentto5percentorganicmatter.
NON-FOOD/NON-FEEDUSES
NONAGRICULTURALRIGHTS-OF-WAY/FENCEROWS/HEDGEROWSUseGroup:TERRESTRIALNON-FOODCROP

Spray.,Whenneeded.,BoomsprayerDFNA1lbA*NSNSNSNSNS40,C46,C87

DFNA1lbA*NSNSNSNSNS40,C46,C92

DFNA1lbA*NSNSNSNSNS46,C87

DFNA1lbA*NSNSNSNSNS46,C92

FlCNAC*NSNSNSNSNS0.540,C87

FlCNA1lbA*NSNSNSNSNS40,C46,C92

FlCNA1lbA*NSNSNSNSNS46,C93,CAG

FlCNA1lbA*NSNSNSNSNS40,C46,C92

FlCNA1lbA*NSNSNSNSNS40,C46,CAD

WPNA1lbA*NSNSNSNSNS46

SITEApplicationType,ApplicationForm(s)Min.Appl.Max.Appl.SoilMax.#AppsMax.Dose[(AIMin.Restr.GeographicLimitationsUse
Timing,ApplicationEquipment Rate(AIun-Rate(AITex.@Max.RateunlessnotedIntervEntryAllowedDisallowedLimitations
SurfaceType(Antimicrobialonly)&Effica-lessnotedunlessnotedMax./crop/yearotherwise)/A](days)InterCodes
cyInfluencingFactor(Antimicrobialonly)otherwise)otherwise)Dosecycle/crop/year[day(s)]
cycle

USESELIGIBLEFORREREGISTRATION

NON-FOOD/NON-FEED

POTATO,WHITE/IRISH(con'tUseGroup:TERRESTRIALFOOD+FEEDCROP(con't)

WPNA.25lbA*NSNSNSNSNS101046
2lbAFGeo.013:ApplyEastoftheRockyMountains.InWisconsin-CentralSandsArea,apply1
2lbAMpoundproductperacreonsandsand2poundsperacreonloamysands.IntheNortheast,
1.25lbACapply2poundsperacreoncoarsesoilswith3percentto5percentorganicmatter.Apply

2.5poundsofproductonmediumsoilswith3percentto5percentorganicmatter.
NON-FOOD/NON-FEEDUSES
NONAGRICULTURALRIGHTS-OF-WAY/FENCEROWS/HEDGEROWUseGroup:TERRESTRIALNON-FOODCROP

Spray.,Whenneeded.,BoomsprayerDFNA1lbA*NSNSNSNSNS40,C46,C87

DFNA1lbA*NSNSNSNSNS40,C46,C92

DFNA1lbA*NSNSNSNSNS46,C87

DFNA1lbA*NSNSNSNSNS46,C92

FlCNBC*NSNSNSNSNS0.540,C87

FlCNA1lbA*NSNSNSNSNS40,C46,C92

FlCNA1lbA*NSNSNSNSNS46,C93,CAG

FlCNA1lbA*NSNSNSNSNS40,C46,C92

FlCNA1lbA*NSNSNSNSNS40,C46,CAD

WPNA1lbA*NSNSNSNSNS46

LEGEND
======
HEADERABBREVIATIONS
Min.Appl.Rate(AIunless:Minimumdoseforasingleapplicationtoasinglesite.Systemcalculated.Microbialclaimsonly.
notedotherwise)
Max.Appl.Rate(AIunless:Maximumdoseforasingleapplicationtoasinglesite.Systemcalculated.
notedotherwise)
SoilTex.Max.Dose:Maximumdoseforasingleapplicationtoasinglesiteasrelatedtosoiltexture(Herbicideclaimsonly).
Max.#Apps@Max.Rate:MaximumnumberofApplicationsatMaximumDosageRate.Example:"4applicationsperyear"isexpressedas"4/1yr";"4applicationsper3
years"isexpressedas"4/3yr"
Max.Dose[(AIunless:Maximumdoseappliedtoasiteoverasinglecropcycleoryear.Systemcalculated.
notedotherwise)/A]
Min.Interv(days):MinimumIntervalbetweenApplications(days)
Restr.EntryInterv(days):RestrictedEntryInterval(days)
PRDReportDate:LUIScontainsallproductsthatwereactiveorsuspended(andthatwereavailablefromOPPDocumentCenter)asofthisdate.Someproducts
registeredafterthisdatemayhavedataincludedinthisreport,butLUISdoesnotguaranteethatallproductsregisteredafterthisdatehave
datathathasbeencaptured.
SOILTEXTUREFORMAXAPP.RATE
*:Non-specific
C:Coarse
M:Medium
F:Fine
O:Others

FORMULATIONCODES
DF:WATERDISPERSIBLEGRANULES(DRYFLOWABLE)
FlC:FLOWABLECONCENTRATE
WP:WETTABLEPOWDER

ABBREVIATIONS
AN:AsNeeded
NA:NotApplicable
NS:NotSpecified(onlabel)
UC:Unconvertedduetolackofdata(onlabel),orwithoneoffollowingunits:bag,bait,baitblock,baitpack,baitstation,baitstation(s),block,briquet,
briquets,bursts,cake,can,canister,capsule,cartridges,coil,collar,container,dispenser,drop,eartag,grains,lure,pack,packet,packets,pad,part,
parts,pellets,piece,pieces,pill,pumps,sec,secburst,sheet,spike,stake,stick,strip,tab,tablet,tablets,tag,tape,towelette,tray,unit,--

APPLICATIONRATE
DCNC:DosageCanNotbeCalculated
NoCalc:NoCalculationcanbemade
W:PPMcalculatedbyweight
V:PPMCalculatedbyvolume
U:UnknownwhetherPPMisgivenbyweightorbyvolume
cwt:HundredWeight
nnE-xx:nntimes(10power-xx);forinstance,"1.234E-04"isequivalentto".0001234"

USEuSELIMITATIONSCODES
C14:Grownforseedonly.
C40:Donotapplybyaircraft.
C46:Donotapplythroughanytypeofirrigationsystem.
C47:Donotentertreatedareaswithoutprotectiveclothinguntil24hoursafterapplication.
C87:Donotapplydirectlytowaterorwetlands,orwhererunoffislikelytooccur.
C92:Forterrestrialuses,donotapplydirectlytowaterortoareaswheresurfacewaterispresentortointertidalareasbelowthemeanhighwatermark.
C93:Donotapplydirectlytowater.
CAA:Donotapplytoanybodyofwater.
CAD:Donotapplydirectlytowaterorwetlands.
CAG:Donotapplywhererunoffislikelytooccur.
CCA:Applicationratesareforcropsestablishedlyearormore.Fornewlyseededortransplantedcrop,maximumdoseperapplicationis2lbai/Apreemergenceand1lb
posetemregence;andpercropcycleis2lbai/A.
G01:__day(s)pregrazinginterval.
G03:Donotgrazelivestockintreatedareas.
G14:Donotfeedgintrashortreatedfoliagetolivestock.
G28:Donotfeedgintrashortreatedfoliagetodairyanimals.
G63:Nopartsoftreatedplantsmaybeusedasfoodorfeed.
G74:Donotfeedtreatedfoliagetolivestockorgrazetreatedareas.

G94:Donotfeedtreatedforageorhaytolivestock.
G99:Donotfeedorgrazeanimalsontreatedareas.
GA3:Donotgrazelivestockintreatedareasorharvestforforage.
GA4:Donotfeedtreatedforagetolivestock.
GC9:Donotgrazeorforagecropgrownintreatedsoilorcutforhayorsilage.
GE8:Donotgrazeorharvestforforageorhay.
GH9:Donotfeedlivestockontreatedplantparts.
GI7:Donotuseseedforfood,feedoroilpurposes.
GI8:Donotgrazeorfeedforage,silageorfodder(stubble)fromtreatedfieldstodairyanimals.
GK3:Donotfeedforagetolivestockorallowlivestocktograzeintreatedareas.
H01:_day(s)preharvestinterval.
*NUMBERINPARENTHESESREPRESENTSTHENUMBEROFTIMEUNITS(HOURS,DAYS,ETC.)DESCRIBEDINTHELIMITATION.

GEOGRAPHICCODES

013:Other
CA:California
DE:Delaware
FL:Florida
ID:Idaho
MD:Maryland
MI:Michigan
MN:Minnesota
NC:NorthCarolina
OH:Ohio
OR:Oregon
PA:Pennsylvania
TX:Texas
VA:Virginia
WA:Washington
WI:Wisconsin
WV:WestVirginia

APPENDIX B. Table of the Generic Data Requirements and Studies Used to Make the Reregistration Decision

GUIDETOAPPENDIXB

AppendixBcontainslistingsofdatarequirementswhichsupportthereregistrationforactive ingredientswithinthecaseLinuroncoveredbythisReregistrationEligibilityDecision Document.Itcontainsgenericdatarequirementsthatapplytolinuroninallproducts, includingdatarequirementsforwhicha"typicalformulation"isthetestsubstance.

Thedatatableisorganizedinthefollowingformat:

1. DataRequirement (Column1).Thedatarequirementsarelistedintheorderin whichtheyappearin40CFRPart158.thereferencenumbersaccompanyingeachtestrefer tothetestprotocolssetinthePesticideAssessmentGuidelines,whichareavailablefromthe NationalTechnicalInformationService,5285PortRoyalRoad,Springfield,VA22161(703) 487-4650.

2. UsePattern (Column2).Thiscolumnindicatestheusepatternsforwhichthedata requirementsapply.Thefollowingletterdesignationsareusedforthegivenusepatterns:

A	Terrestrialfood
B	Terrestrialfeed
C	Terrestrialnon-food
D	Aquaticfood
E	Aquaticnon-foodoutdoor
F	Aquaticnon-foodindustrial
G	Aquaticnon-foodresidential
H	Greenhousefood
I	Greenhousenon-food
J	Forestry
K	Residential
L	Indoorfood
M	Indoornon-food
N	Indoormedical
O	Indoorresidential

3. Bibliographiccitation (Column3).IftheAgencyhasacceptabledatainitsfiles, thiscolumnliststheidentifyingnumberofeachstudy.ThisnormallyistheMasterRecord Identification(MRID)number,butmaybea"GS"numberifnoMRIDnumberhasbeen assigned.RefertotheBibliographyappendixforacompletecitationofthestudy.