

US EPA ARCHIVE DOCUMENT

EEB

111601
SHAUGHNESSEY NO.

23
REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 7-6-84 OUT 9-6-84

FILE OR REG. NO. 707-145/707-174

PETITION OR EXP. PERMIT NO. _____

DATE OF SUBMISSION 7-3-84

DATE RECIEVED BY HED 7-6-84

RD REQUESTED COMPLETION DATE 9-20-84

EEB ESTIMATED COMPLETION DATE 9-13-84

RD ACTION CODE/TYPE OF REVIEW 315/Amended Registration

TYPE PRODUCT(S): I, D, H, F, N, R, S Herbicide

DATA ACCESSION NO(S). Mountfort (23)

PRODUCT MANAGER NO. Goal 1.6E Herbicide/Goal 2E Herbicide

PRODUCT NAME(S) _____

COMPANY NAME Rohm and Haas

SUBMISSION PURPOSE Use on Non-Bearing Citrus

| SHAUGHNESSEY NO. | CHEMICAL, & FORMULATION | % A.I. |
|------------------|---|-------------|
| <u>111601</u> | <u>oxyflourfen (Goal 1.6E - (707-174)</u> | <u>19.4</u> |
| <u>111601</u> | <u>" - (707-145) (Goal 2E</u> | <u>22.6</u> |

①

Pesticide name: Goal (oxyflourfen) 1.6E Herbicide
Goal (oxyflourfen) 2E Herbicide

100 Submission Purpose and Pesticide Use

100.1 Submission Purpose and Pesticide Use

This submission is an application to amend the labels for Goal (oxyfloufen) 1.6E and Goal (oxyfloufen) 2E herbicides to add use on non-bearing citrus trees to include: calamandin, chironja, citrus citron, grapefruit, kumquat, lemon, lime, mandarin, pummelo, satsuma mandarin, sour orange, sweet orange, tangelo, tangerine, tangor. The products are contact herbicides used for both preemergence and/or postemergence control of a variety of broadleaf weeds.

100.2 Formulation Information

Goal 1.6E

Oxyflurfen
2-chloro-1-(3 ethoxy-4-nitrophenoxy)-
4-(trifluoromethyl) benzene.....19.4%
Inerts.....80.6%

Goal 2E

oxyfloufen.....22.6%
Inerts.....77.4%

100.3 Application Methods, Directions, Rates

Specific label directions for individual states and/or crops are listed in the attached supplemental labeling (attachment 1). Generally the following directions are pertinent for this review.

Postemergence control recommended at 2.5-10 pints/A = 0.5 tp 2.0 lb. active ingredient/A. For newly planted trees or young trees which will not bear fruit for at least one (1) year. Preemergence control - most effective when spray applied to clean, weed-free soil. Treated soil or berms should not be disked or disturbed so as to avoid reduction in efficacy. Preemergence control should be applied at 2.0 lb ai/A, broadcast in a minimum of 40 gallons of water per acre.

See specific directions for Tank mixes (attached labeling).

Goal herbicide should be directed to the soil surface. Avoid direct contact with citrus foliage. Use a low-pressure sprayer equipped with a break-away broom and flat fan nozzles.

For best preemergence control, at least one-quarter (1/4) inch of water should be applied within 3 to 4 weeks after application if no rainfall occurs.

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Cultural practices, such as cutting water furrows or cultivations that mix untreated soil into treated areas, or any practice which results in redistribution or disturbance of the soil surface, will decrease the efficacy of the treatment.

Use restriction statements limit applications to 2 lb ai/A in a single application and no more than 4 lb ai/A in a 12-month period "as a result of multiple applications". There is no minimum interim period stated for reapplications.

100.4 Target Organisms

Weeds controlled in various states are listed in the attached supplemental labeling. Specific target weeds may require tank mixes with other herbicides - see attached supplemental labeling.

100.5 Precautionary Labeling

Goal 1.6 E -

"Environmental hazards

Do not apply directly to water. Do not contaminate water by cleaning of equipment or disposal of wastes.

This product is highly toxic to aquatic invertebrates, aquatic plants, wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water or wetland area. Do not apply when weather conditions favor drift or erosion from target areas."

Supplemental Specific Use Restrictions - Goal 1.6E

- " . Apply Goal 1.6E herbicide only to nonbearing citrus trees
- . Do not apply more than 10 pints of Goal 1.6E (2.0 lb active) per broadcast acre herbicide in a single application or more than 20 pints (4.0 lb. active/per broadcast acre during any 12 month period as a result of multiple applications.
- . Goal 1.6E herbicide or any of the combinations recommended on this label should only be applied to healthy growing trees.
- . Do not apply during periods of new foliage growth. Applications should be made only after foliage has fully expanded and hardened off.
- . Direct spray toward the base of trees. Avoid direct spray contact on the citrus foliage."

Goal 2E -

"Environmental hazards

Keep out of lakes, ponds or streams. Do not contaminate water by cleaning of equipment or disposal of wastes.

This pesticide is toxic to wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water. Do not apply when weather conditions favor drift from target areas."

This product is highly toxic to freshwater clams, oysters, aquatic invertebrates and aquatic plants. Do not apply Goal where visible erosion to aquatic habitats and/or wetlands occurs."

Supplemental Specific Use Restrictions - Goal 2E

- " . Read and observe all label directions before using. When tank mixing, always read all individual manufacturer's labels. In interpreting all labels for the tank mixture, the most restrictive situations must apply.
- . Apply Goal 2E herbicide only to nonbearing citrus trees.
- . Do not apply more than 4 quarts of Goal 2E herbicide (2.0 lb active) per broadcast herbicide in a single application or more than 8 quarts (4.0 lb active) per broadcast acre during any 12 month period as a result of multiple applications.
- . Goal 2E herbicide or any of the combinations recommended on this label should only be applied to healthy growing trees.
- . Do not apply during periods of new foliage growth. Applications should be made only after foliage has fully expanded and hardened off.
- . Direct spray toward the base of trees. Avoid direct spray contact on the citrus foliage.
- . Do not contaminate irrigation water or water used for domestic purposes.
- . Do not use any plants treated with Goal 2E herbicide for feed or forage.
- . Do not feed or allow animals to graze on any areas treated with Goal 2E herbicides.
- . Goal 2E herbicide should be applied only by ground application equipment except as specifically directed on this label or another Rohm and Haas Company supplemental labeling.
- . Do not apply when weather conditions favor drift. Avoid drift to all non-target areas. Goal 2E herbicide is phytotoxic to plant foliage.
- . Thoroughly flush spray equipment (tank, pump, hoses and boom) with clean water before and after each use. Residual Goal 2E herbicide remaining in spray equipment may damage other crops. To assist removal of Goal residues in spray equipment, Triton AG-98 or Triton CS-7 may be added at the rate of 1 quart per 100 gallons of water during flushing.

- . Do not rotate any crops other than corn, cotton, soybeans, or spearmint/peppermint within a 10-month period after treatment.
- . Use Goal 2E herbicide only for recommended purposes and at recommended rates.
- . Do not treat ditch banks or waterways with Goal 2E herbicide.

101 Hazard Assessment

101.1 Discussion

Oxyflourfen herbicide as Goal 1.6E and Goal 2E, is following uses at the rates indicated:

1. Fruit and nut trees - almond, apricot, cherry, fig, nectarine, peach, pear, pistachio, plum, prune, walnut, and grapes at 0.5 to 2.0 lb ai/A.
2. Conifer seed beds transplants and container stock-at 0.25 to 1.0 lb. ai/A for conifer seedbeds, 1.0 to 2.0 lb. ai/A for conifer transplants,
3. Corn - at 0.5 to 0.75 lb. ai/A with repeat treatments at rates of .25 to .5 lb ai/A
4. Cotton - at 0.25 to 0.5 lb ai/A; (Western cotton at 2 x 0.5 lb/A)
5. Fallow Bed - at 0.25 to 0.5 lb ai/A
6. Spearmint and peppermint - at 0.75 to 1.5 lb ai/A
7. Soybeans - at 0.75 lb. ai/A

The pertinent "worst-case" application rate is 2.0 lb ai/A, but this rate is only applicable to the fruit and nut tree uses. The pertinent "worst-case" view on exposure basis is the total acreage of the large acreage row crops such as cotton, corn and soybeans. These crops are treated at from 0.5-0.75 lb. a.i./A, except for western cotton in Arizona and California, which recently have obtained a 0.5 lb ai/A rate with two(2) treatments allowed per season for a total of 1.0 lb ai/A per season.

The current amendment request is to allow use on citrus at 0.5 - 2 lb. ai/A. with repeat applications to allow a maximum of 4 lb a.i./A in a 12-month period.

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Citrus - Extent of use Pattern

The following data is taken from the 1978 U.S.D.A. Census of Agriculture.

Florida - all citrus

Harvested Acres - 910, 924
 " Trees - 67, 991, 357
 Trees/acre - 74.6

Bearing Trees - 62, 526, 535
 Non-Bearing Trees - 5, 464, 822
 % non-bearing - 8%

Approx. Acres non-bearing - 73,255

California - all citrus

Harvested acres - 248, 632
 " Trees - 27,000,000
 Trees/Acre - 108.5

Bearing Trees - 25,600,000
 Non-Bearing Trees - 1,325,696
 % non-bearing - 5%

Approx. Acres non-bearing - 12,218

Arizona - all citrus

Harvested Acres - 53,873
 " Trees - 4,680,000
 Trees/Acre - 86.8

Bearing Trees - 4,530,000
 Non-Bearing Trees - 150,000
 % Non-Bearing - 3%

Approx. Acres Non-Bearing - 1,728

Texas - all citrus

Harvested acres - 87,654
 " Trees - 8,946,651
 Trees/Acre - 102

Bearing Trees - 7,995, 102
 Non - Bearing Trees - 951, 549
 % non-bearing - 10.6%

Approx. Acres Non-Bearing - 9,329

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Incremental Exposure - Non Bearing Citrus only.
Total non-bearing acres (Approx.)
(Florida, California, Arizona, Texas) = 96,530 acres

Citrus - Aquatic Resources

Florida

Maximum citrus acreage is located in Florida. Over 70% of the U.S. orange and grapefruit acreage (700,000 A) are located there.

For this assessment citrus groves are divided into two scenarios: Central county (a greater production of citrus per county); and Coastal County. Central counties have numerous lakes, thought to have formed from ancient sinkholes. Florida Dept. of Environmental Regulations (DER) characterizes the groves there as having fine sandy soil on hilly terrain, with good drainage (some groundwater drainage into lakes is expected). Grooves may be planted to lake's edge; some have rim ditches or marsh buffers. Buffers of less than 30 yards are common.

The central Florida waters do not support a particularly good sport fishery since, particularly in the rivers, the water has a high tannic acid content (pH as low as 3.8). However, the aquatic invertebrate fauna is highly diverse. Fish include large-mouth bass and chain pickerel, among others.

Florida DER expects little or no surface runoff from the hilly groves of the central area, but movement through the sand could contaminate lakes and connecting rivers. Soils and hydrosols are of low OM content, thus organically bound chemicals may be moving through with little impediment. DER doubts any extensive use of tile and/or ditch drainage systems in the central state groves because they are expensive and unnecessary there.

The coastal groves are more subject to rainy and dry seasons, which determine whether groves may have to be pumped-drained or irrigated. The rainy season, coincides with most pesticidal applications, and pump drainage of groves could be expected. Most groves have ditch-drainage. Ditches empty directly into canals and ultimately into the Intercoastal Waterway.

Ditches and canals of the coastal groves may be characterized by heavy "muck" (organic) soils and hydrosols, thus favoring retention of organically bound chemicals. They support amphibians, reptiles and fish including largemouth bass, bluegill, killifish and mosquitofish, among others. Aquatic invertebrates there are of course basic to these food chains.

Both of the citrus grove scenarios discussed represent significant opportunity for aquatic contamination through spray drift, direct application, surface runoff, and groundwater drainage, on leaching.

Since the total of bearing and non-bearing Florida citrus acreage is very extensive and, in some localities, exclusive, any potential hazards to lakes, marshes, streams, and ditch canals may represent a significant incremental risk of adverse effects.

California -

This represents the second largest use of pesticides on citrus.

Aquatic communities are many and varied. Many man-made bodies of water such as irrigation ditches and canals, large and small reservoirs, and the California Aquaduct, are important aquatic resources. Natural and man-made ecosystems range in size from small vernal ponds to large impoundments, and from small streams to large rivers. The fish habitat in the San Joaquin Valley alone exceeds 6,000 miles of streams, canals, rivers lakes, and reservoirs that support both cold-and warm-water species.

Commercial citrus is concentrated in Southern Calif. in Fresno, Kern, Orange, Riverside, San Bernadino, San Diego, Tulare and Ventura counties.

Texas

(soils, surface and groundwater information taken from EFB files).

The majority of the orange and grapefruit acreage in Texas occurs in a tri-county areas bordering the Rio Grande River and Gulf of Mexico (Cameron, Hidalgo, Willacy Cos. - about 50,000 acres of citrus).

The following characterizes the soils, water tables and pH;

| <u>SCS Land Capability</u> | <u>Soil Series</u> | <u>Characteristics</u> |
|----------------------------|-------------------------|--|
| A | Delfina fine sandy loam | pH 6.6-7.8 seasonal high water table percolation rate of 2-6.3 in./hr. Texture 60% sand (of which 30% fine, 30% coarse) 30% silt, 10% clay. |
| B | Willacy fine sandy loam | same as Delfina |
| C | Camergo silty loam | pH 7.9 - 8.4 perched water table common after rain or irrigation. percolation 0.6 - 2.0 in./hr Texture 60% silt, 30% sand, 10% clay. |

It is noted that some of these fields are tile-drained which can serve to discharge irrigation water applied to the orchards. The tile drain can be either deep tilled or shallow tilled and drain into discharge ditches. The composition of these ditches is generally soil and they flow into a common discharge basin.

Precipitation in the area ranges from 16 - 32 inches per year, with the pan evapotranspiration ranging from 80 - 112 inches per year, which results in a negative natural water balance. Supplemental irrigation rates are 2.5 acre feet per acre pre annum.

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Water Resources (Surface)

The Rio Grande is both the major watercourse within and the major water supply source for the Lower Rio Grande Valley. The flow of the Rio Grande is utilized by two major water impoundments along the Rio Grande. Falcon Reservoir, the first, located between Laredo and Brownsville, Texas, provides water for many uses. The second, Amistad Reservoir, located a short distance upstream from Del Rio, Texas, serves as the second source of water for the area.

Almost all the water used for consumptive purposes in the Lower Rio Grande Valley is supplied from the Rio Grande. Small reservoirs, such as Delta Lake, in east Hidalgo County, and Valley Acres Reservoir, north of Mercedes, are used for temporary storage.

Other surface waters of the Lower Rio Grande Valley include Laguna Madre, South Bay, Laguna Atascosa, Bathia Grande, Brownsville Ship Channel, Arroyo Colorado, North Floodway, and San Martin Lake. These hydrologic features are not used for water supply although they are utilized for non-consumptive purposes.

(Ground Water)

The ground water resources of the Lower Rio Grand Valley area consists of three ground water reservoirs:

1. Linn-Faysville ground water reservoir
2. Lower Rio Grande
3. Mercedes-Sebastian

Water that is used for irrigation purposes is collected by ditch tile-drain systems, which carries the excess eastward to Rio Hondo and to a communal drainage basin near Harling (26°15' by 97°40;), with eventual discharge into the Gulf of Mexico. The drainage water is not used again for irrigation.

Surface runoff from Texas groves are not expected to be significant due to the hydrology of the area. Spray drift, however, may contaminate small ponds or streams near groves, so that caution needs to be exercised there. Drainage ditches and canals are not likely to have soils favoring the retention of organically bound chemicals.

101.2 Likelihood of Adverse Effects to Non-target Organisms

In a March, 1981 oxyfluorfen position document the Agency made a preliminary evaluation of potential environmental risks of Goal 2E (EPA, OPTS, Wash, D.C. 20460 - pre-RPAR PD-1-2-3). Several areas of concern were listed. These included

1. Persistence and Bioaccumulation in Aquatic habitats
2. Toxicity to Molluscs, particularly endangered freshwater mussel species
3. Possible wetlands hazards
4. Avian Reproduction

Avian reproduction studies reviewed and accepted by EEB in Dec., 1982 indicate that the reproductive NOEL for both a wild waterfowl (mallard duck) and upland game species (Bobwhite quail) is greater than 100 ppm. Sub-acute dietary toxicity of technical oxyfluorfen varies with species; "slightly toxic" to mallards (LC₅₀ = 4000 ppm) but "highly toxic" to Bobwhite quail (LC₅₀ = 390 ppm). Acute toxicity to Bobwhite appears to be "practically non-toxic" (LD₅₀ >2000 mg/kg). Terrestrial residues resulting from maximum 2 lb ai/A applications are expected to be no greater than:

| | |
|---------------------------|-----------|
| Short rangegrass | - 500 ppm |
| Long grass | - 225 ppm |
| Leaves, Leafy crop | - 250 ppm |
| Forage, (alfalfa, clover) | - 110 ppm |
| Pods with seeds (legumes) | - 21 ppm |
| fruit (cherries, peaches) | - 14 ppm |
| Small insect | - 110 ppm |
| Large insect | - 21 ppm |

With most preemergence applications applied to clean soil, terrestrial residues are not expected to pose a dietary hazard for the more sensitive upland game birds. Postemergence control however, at 2.0 lb ai/A, could present a subacute toxicity risk to these birds if extensive contamination of food items occurs. Young bobwhite quail are, however, mainly insectivorous and would be at a substantially lower risk than adults since their prey items are not expected to accumulate significant residues. Gussey and Maturgo (1972), reports no observations of feeding in citrus grooves by any bird species, however nesting, brood-rearing, loafing and use for cover are reported for upland species, as well as typical passerine. Mammals such as deer and raccoons were reported to use citrus groves for feeding, except in summer months. Acute mammalian tox. data shows LD₅₀ for tech. a.i. >5000 mg/kg. Rabbit acute dermal tox. was >3000 mg/kg. (25% a.i.) and >10,000 mg/kg (tech.). Use in newly planted citrus grooves as proposed, is expected to result in even less avian and mammalian exposure than that described for mature citrus, since new groves will present less attraction for birds seeking cover, or for foraging mammals.

Currently available laboratory and field monitoring studies have demonstrated that Goal can reach aquatic habitats in some circumstances. Persistence and bioaccumulation in aquatic habitats and wetlands therefore remain concerns for this use pattern. In Florida, marsh and wetland habitats are frequently adjacent to citrus groves and could be exposed to oxyfluorfen residues. However, significant runoff is not expected from the sandy soils of citrus groves, especially for the limited use on newly planted groves. Preliminary studies conducted by Agency personnel and a registrant runoff monitoring study, conducted under conditional registration, have both indicated that fields prone to soil erosion contribute to hydrosol accumulation of oxyfluorfen in adjacent ponds. EPA hydrosol samples contained residues as high as 70 ppb and 20 ppb in benthic organisms was found. Although soil erosion is also not expected to be a significant factor for citrus groves, marsh and other wetland habitats could still be exposed to some

oxyflourfen residues in runoff water carried off tile-drained fields or pumped off of coastal groves that lack tile drains. Tile-drains can receive residues through leaching from fine sand. Laboratory studies using C¹⁴ labeled oxyflourfen indicate that it will leach through fine sandy soil but that will not leach in soils with more organic matter content (reference p. 25-31 of review of environmental chemistry by Exposure Assessment Branch attached to EEB review No. 6B). Residues transported off of groves would be expected to bind to organic soils of wetlands, particularly in the coastal counties. Some groundwater drainage into lakes and connecting streams (and associated wetlands) is expected in the "hilly" central Florida groves, thus providing potential for hydrosol contamination in central counties as well.

The drainage canals, ditches and wetlands of the coastal grove areas support a rich and diverse fish, invertebrate, amphibian, and reptilian fauna. The relevant questions for this incremental risk review is how much of the non-target flora and fauna could be exposed to chemicals leaching from non-bearing citrus acreage. These areas represent a new incremental exposure, although minimal. Citrus areas, especially in Florida, may be planted exclusively to citrus, indicating no previous exposure to Goal via currently registered uses.

Invertebrates such as shrimp, snails, or clams could be the most exposed non-target animals because of their benthic nature and the expected accumulation of oxyflourfen in hydrosols. It is highly acutely toxic to these organisms with an LC₅₀ approx. = 30 ppb. Benthics such as snails, clams or the larval stages of mayflies, caddiceflies, stoneflies, and dragonflies would be examples of animals expected to be exposed in hydrosols.

Fish species utilizing shallow waters of wetlands or marshes for breeding would be highly sensitive to water column residues (LC₅₀ >50 <100 ppb; MATC >38 <74 ppb - both for fathead minnow). In addition to dependence on the aquatic vegetation in wetlands for food, shelter and breeding, fish, amphibians, birds and reptiles extensively use the invertebrate resources most directly exposed to accumulated hydrosol residue. Since oxyflourfen has been shown to bioaccumulate (in Bluegill sunfish up to 3900 X (viscera); in channel catfish up to 5000X) there is some potential for wetland ecosystem food chain contamination.

Considering the extensive citrus acreage in Florida and its importance to wildlife, especially in the wetland ecosystems directly adjacent to many citrus groves, a residue monitoring program would be appropriate to support a registration for bearing citrus. However, the limited exposure provided by the proposed use on newly planted, non-bearing citrus does not in itself justify extensive monitoring at this time. Available residues from the limited use on new (non-bearing) citrus may have adverse impact on isolated areas immediately adjacent to the treated groves, but only proposed use on all citrus should be considered a significant increment. Use on bearing and non-bearing-citrus could prove to be an unreasonable risk of adverse effects compared to existing citrus impact on wetland ecosystems.

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101.3 Endangered Species Considerations

None of the endangered freshwater clam species listed in the GOAL RPAR PD-1-2-3 (p. 45) are expected to be at risk in the proposed citrus use pattern due to lack of exposure. No endangered plant species have been identified as being directly threatened by any potential accumulation of Goal residue in hydrosols resulting from the use on citrus (bearing and non-bearing) nor from direct application by spray drift from citrus.

One potential threat from use in southern Florida would be to the Apple Snail (Pomacea paludosa) which is virtually the sole food source of the endangered Florida Everglades Kite (Rostrhamus sociabilis plumbeus). The Pomacea snails have experienced population declines due to dropping water levels in recent droughts. These conditions force kites into less desirable wetland Areas in search of snails. These areas are documented to include agricultural drainage ditches and canals and seasonal marshes in citrus growing areas. It is therefore conceivable that if a full citrus registration (non-bearing and bearing trees) were granted, and if this resulted in an accumulation of oxyflourfen residue in wetland hydrosols, that these residues could have some deleterious effects on the apple snail, and thus on the kite populations. It would be essential under a full citrus registration to answer the questions of potential oxyflourfen transport from citrus and of significance of sediment bound residues to the snails (since oxyflourfen is known to be a molluscicide) - see discussion of "Adequacy of Data" for details on these issues. At this time we do not have sufficient cause to make a "may affect" determination due to "non-bearing" citrus registration.

101.5 Adequacy of Data

Field monitoring residue data obtained from several studies are presented in attachments to this review. Some of these data were collected by Agency personnel in preparation for designing monitoring to be done by the registrant pursuant to the 1981 RPAR. Agency monitoring data on three North Carolina corn fields was carried out in cooperation with U.S.D.A. witchweed control program personnel. Fields studied were considered to have a low gradient and consisted of sandy soils.

Each farm had corn acreage within the watershed of a swamp or pond-like body of water. Witchweed is treated at about 0.75 lb a.i./A, but fields received multiple treatments in the same year, and were treated for 4 years in one case (Quinn) and 2 years in the other (Hilburn). Results indicated that oxyflourfen was present in the hydrosol samples at $\bar{X} = 50$ ppb (n=6) (range = 10-70 ppb) and in benthic samples at $\bar{X} = 20$ ppb (n=2). Field samples of this farm (treated 4 years) had $\bar{X} = 72$ ppb (n=2) (range = 42-102 ppb). The farm treated for only 2 years had no detectable residues (detection limit < 10 ppb). Benthic organism collections consisted of adult crayfish (Astacidae), tadpoles (Ranidae) and freshwater clams (class Pelecypoda). Pre-monitoring EXAMS simulation model predicted 30 ppb residue after 1 year of loading at 0.046 kg/year oxyflourfen.

Although no field soil residues were found at the 10 ppb detection level at the Hilburn site, oxyflourfen was still providing control of the witchweed there. The Agency questioned whether or not the observed

hydro-soil concentrations of 50 ppb may not be having some effect (possibly lethal) on aquatic plants residing in the wetlands of the corn and other use patterns. Since the citrus use pattern provides greater exposure to wetlands in Florida, this question must be answered if residues of Goal are detected in wetland hydrosols adjacent to citrus groves.

Since the Agency's field monitoring results tended to support the EXAMS simulation a definitive program of field monitoring was recommended for soybean and bearing fruit use patterns with steeper gradients and higher content organic matter soils (finer texture).

The results of the "definitive" monitoring study submitted by the registrant in response to the RPAR agreements of PD-1-2-3 are shown in Attachments 3 and 4. In the first year's results detectable residues were found in hydrosols site D-213 and two early samples of "edge of pond": one at site P-18; one at site H79-289. In the second year of this study no residues were found in pond hydrosols but site D-213, which had late sample hydrosol residues of as high as 40 ppb in mid-pond samples, was not studied! EEB objected to the deletion of this site. The registrant indicated that they did not consider this site representative because of erosion there. EEB's position is that the study not only failed to support deletion of label cautions protecting aquatic life, but rather it vividly supports the restricting statement, which includes protection of aquatic plants (see EEB review No. 20A).

EEB expects that in the absence of erosion, leaching through sandy soils (not studied in the registrant's "definitive" monitoring program but confirmed by their laboratory data) could contribute residues of oxyflourfen to groundwater or citrus tile - drainage systems. Groundwater residues in Florida could enter surface water (lakes) in the citrus counties. Tile-drainage from citrus grove soils could directly contribute residues to surface waters. Leaching from fields not utilizing tile-drains could also result in surface water residues. Any water column residues however would be expected to lodge in hydrosols of these bodies and to accumulate there over repeated treatments, hence a question and concern for benthic life and aquatic plants. At this point in time there is no significant sandy soil or eroded acreage crop which also exposes so much wetland area as would the registration of bearing citrus in Florida, California and Texas. In addition to conducting a field monitoring program in citrus, the questions of toxicological significance and bioavailability of sediment-bound oxyflourfen residues would have to be addressed if an application is made to register bearing citrus acreage. Toxicological testing should also include tests on representative aquatic vegetation of basic importance to relevant wetland ecosystems.

101.5 Adequacy of Labeling

Due to the proximity of citrus to Marshes, ponds, lakes and other wetlands, and due to potential of GOAL for leaching through sandy soils characteristic of citrus orchards, the current label statement may not be adequate to protect aquatic vegetation and/or certain aquatic animal life in adjacent wetlands. We will be unable to assess actual hazard potential without field monitoring data on residue transport, and further toxicological information on aquatic plants and invertebrates.

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Conclusions

EEB has completed an incremental risk assessment (3(c)(7) finding) of the proposed conditional registration of oxyflourfen (Goal 1.6E and Goal 2E) for use on non-bearing citrus. Based upon the available data EEB concludes that the proposed uses provide for a minimal increase in exposure, but there is no significant increase in risks to nontarget organisms. This finding is based on the limited acreage expected to be treated with oxyflourfen on non-bearing citrus. This conclusion could be significantly different, however, if bearing citrus orchards are to be proposed for the same treatments.

John Bascietto 9-12-84
John Bascietto
Wildlife Biologist
Ecological Effects Branch/HED

Dave Coppage 9/12/84
Dave Coppage
Head, Sec. 3
Ecological Effects Branch/HED

Clayton Blushong 9/12/84
Clayton Blushong
Branch Chief
Ecological Effects Branch/HED



July 3, 1984

*ATTACHMENT 1. - GOAL Review
Supplemental Labeling
FOR NON-BEARING CITRUS*

Mr. Richard F. Mountfort
Product Manager (23)
Fungicide-Herbicide Branch
Registration Division (TS-767)
U.S. Environmental Protection Agency
Crystal Mall 2, 1921 Jefferson Davis Highway
Arlington, VA 22202

Dear Mr. Mountfort:

Subject: GOAL^R 1.6E Herbicide (707-174)
GOAL^R 2E Herbicide (707-145)
Application for Amended Registration
Use on Non-bearing Citrus

This application for an amended registration for GOAL 1.6E and 2E herbicide is to allow use of the products for weed control in non-bearing citrus plantings. Use will be limited to newly planted or young trees which will not bear fruit within one year of application. Since the proposed use is classified as a non-food application, a tolerance is not needed.

GOAL herbicide is currently registered for use on certain treefruits and nuts, grapes, conifers, soybeans, corn, cotton, mint, and fallow land. It was first registered for use on non-bearing fruit trees in California on May 17, 1979.

The following items are attached to support this application:

- a. Application for Pesticide Amendment - EPA Form 8570-1 for each product.
- b. Five copies of proposed labeling for each product.

The product chemistry, toxicology, environmental fate, and fish and wildlife toxicity for GOAL herbicide have already been reviewed by the Agency for existing registrations. We do not believe that any additional data are required to support the proposed use.

The provisions of PR Notices 83-4 and 4a for this application are covered by our Data Reference List submitted on May 17, 1984.

Sincerely,

Thomas D. Rogerson

Thomas D. Rogerson, Ph.D.
Product Registration Manager - Herbicides
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TDR: ew
Attachment
(5801E/218Z)

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ROHM AND HAAS COMPANY

INDEPENDENCE MALL WEST
PHILADELPHIA, PENNSYLVANIA 19105

EPA Reg. No. 707-174-AA
EPA Est. No. 707-PA-1



GOAL^R 1.6E HERBICIDE

DIRECTIONS FOR USE

NONBEARING CITRUS - CALAMONDIN, CHIRONJA, CITRUS CITRON, GRAPEFRUIT, KUMQUAT, LEMON, LIME, MANDARIN, PUMPELO, SATSUMA MANDARIN, SOUR ORANGE, SWEET ORANGE, TANGELO, TANGERINE, TANGOR

GENERAL INFORMATION

GOAL 1.6E is effective as a preemergence and/or postemergence herbicide when used alone or in recommended tank mix combinations, for the control of certain annual broadleaf weeds in non-bearing citrus plantings. GOAL 1.6E herbicide may be applied to newly planted trees or to young trees which will not bear fruit within one year.

The most effective postemergence weed control is achieved when GOAL 1.6E herbicide is applied to seedling weeds at the recommended growth stage. For postemergence control of certain grassy and broadleaf weeds, a tank mix of GOAL 1.6E herbicide with paraquat (Gramoxone^R or Ortho^R paraquat) or Roundup^R can be used.

Preemergence control is most effective when spray is applied to clean, weed-free soil surfaces. Treated soil surfaces or berms should not be disked or disturbed in any manner as the herbicidal effectiveness of GOAL 1.6E may be decreased. Seedling weeds are controlled as they come in contact with the soil-applied herbicide during emergence. For residual grass control in citrus, a tank mixture of GOAL 1.6E herbicide with Devrinol^R, simazine, Solicam^R or Surflan can be used. Contact herbicides such as paraquat or Roundup may also be added to the tank mixture.

Check individual product labels to determine suitability and use rates for various crops.

GOAL 1.6E HERBICIDE USED ALONE

GEOGRAPHIC USE DIRECTIONS

ARIZONA AND CALIFORNIA

DOSAGE

GOAL 1.6E herbicide is recommended for postemergence control at 2.5 to 10 pints (0.5 to 2.0 lb. active) per broadcast acre. The lower rate is recommended for the control of susceptible seedling weeds, less than 4 inches in height. See weed stage rate and weeds controlled for susceptible weeds up to 8 inches in height. The higher rate (2.0 lb. active) should be used for weeds less than 12 inches in height. For preemergence control of susceptible weeds, use 10 pints (2.0 lb. active) per broadcast acre.

WEEDS CONTROLLED POSTEMERGENCE

CHEESEWEED (MALVA)
FIDDLENECK, COAST
FILAREE, BROADLEAF
FILAREE, REDSTEM
FILAREE, WHITESTEM
GROUNDSEL, COMMON

Malva parviflora
Amsinckia intermedia
Erodium botrys
Erodium cicutarium
Erodium moschatum
Senecio vulgaris

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HENBIT
 LETTUCE, MINERS
 NETTLE, BURNING
 PIGWEED, REDROOT
 REDMAIDS
 SHEPHERDSPURSE
 SOWTHISTLE, ANNUAL

Lamium amplexicaule
 Montia perfoliata
 Urtica urens
 Amaranthus retroflexus
 Calandrinia caulescens
 Capsella bursa-pastoris
 Sonchus oleraceus

WEEDS CONTROLLED PREEMERGENCE

BURCLOVER
 CHEESEWEED (MALVA)
 FIDDLENECK, COAST
 FILAREE, BROADLEAF
 FILAREE, REDSTEM
 FILAREE, WHITESTEM
 GROUNDSEL, COMMON
 HENBIT
 KNOTWEED, PROSTRATE
 LAMBSQUARTERS, COMMON
 LETTUCE, PRICKLY
 PIGWEED, REDROOT
 PURSLANE, COMMON
 REDMAIDS
 ROCKET, LONDON
 SHEPHERDSPURSE
 SOWTHISTLE, ANNUAL
 SPURGE, PROSTRATE
 SPURGE, SPOTTED

Medicago hipida
 Malva parviflora
 Amsinckia intermedia
 Erodium botrys
 Erodium cicutarium
 Erodium moschatum
 Senecio vulgaris
 Lamium amplexicaule
 Polygonum aviculare
 Chenopodium album
 Lactuca serriola
 Amaranthus retroflexus
 Portulaca oleracea
 Calandrinia caulescens
 Sisymbrium irio
 Capsella bursa-pastoris
 Sonchus oleraceus
 Euphorbia supina
 Euphorbia maculata

| <u>Weed Stage</u> | <u>GOAL 1.6E Herbicide Rate (Per Broadcast Acre)*</u> | <u>Weeds Controlled</u> |
|---|---|---|
| Early Postemergence (weeds up to 4 inches high) | 2.5 pints (0.5 lb. active) | CHEESEWEED (MALVA) FIDDLENECK, COAST FILAREE, REDSTEM HENBIT REDMAIDS SHEPHERDSPURSE |
| Postemergence (weeds up to 8 inches high) | 5 pints (1.0 lb. active) | CHEESEWEED (MALVA) FIDDLENECK, COAST FILAREE, REDSTEM HENBIT LETTUCE, MINERS NETTLE, BURNING REDMAIDS SHEPHERDSPURSE SOWTHISTLE, ANNUAL |

Late Postemergence
(weeds up to
12 inches high)

10 pints
(2.0 lb. active)

CHEESEWEED (MALVA)
FIDDLENECK, COAST
FILAREE, BROADLEAF
FILAREE, REDSTEM
FILAREE, WHITESTEM
GROUNDSEL, COMMON
HENBIT
LETTUCE, MINERS
NETTLE, BURNING
PIGWEED, REDROOT
REDMAIDS
SHEPHERDSPURSE
SOWTHISTLE, ANNUAL

Weed
Stage

GOAL 1.6E
Herbicide Rate
(Per Broadcast Acre)*

Weeds
Controlled

Preemergence

10 pints
(2.0 lb. active)

BURCLOVER
CHEESEWEED, (MALVA)
FIDDLENECK, COAST
FILAREE, BROADLEAF
FILAREE, REDSTEM
FILAREE, WHITESTEM
GROUNDSEL, COMMON
HENBIT
KNOTWEED, PROSTRATE
LAMBSQUARTERS, COMMON
LETTUCE, PRICKLY
PIGWEED, REDROOT
PURSLANE, COMMON
REDMAIDS
ROCKET, LONDON
SHEPHERDSPURSE
SOWTHISTLE, ANNUAL
SPURGE, PROSTRATE
SPURGE, SPOTTED

*Dosages listed are for broadcast application. For banded application, the amount of GOAL 1.6E herbicide used per acre should be reduced according to the following formula:

$$\frac{\text{Band Width (in.)}}{\text{Row Width (in.)}} \times \text{Rate per Acre Broadcast} = \text{Amount Needed per Acre for Banded Application}$$

TIMING AND METHOD OF APPLICATION

As a preemergence treatment, apply in a minimum of 40 gallons of water per acre depending upon density of emerged weeds. Best preemergence results are achieved when spray is applied to a relatively weed-free berm or soil surface. GOAL 1.6E herbicide should be directed to the soil and the base of trees. Avoid direct spray contact on the citrus foliage. Use a low-pressure sprayer equipped with a break-away boom and flat fan nozzles. An off-center (OC) nozzle positioned at the end of the boom may be desired. Spray equipment should be calibrated carefully before each use.

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SPRAY VOLUME:

| <u>Weed Stage</u> | <u>Gallons of Water Per Acre</u> |
|--|--------------------------------------|
| Early Postemergence (weeds up to 4 inches high) | 40 or more |
| Postemergence (weeds up to 8 inches high) | 100 or more |
| Late Postemergence (weeds up to 12 inches high) | 100 or more |
| Preemergence | 40 or more |

FLORIDA, LOUISIANA AND TEXAS
DOSAGE

GOAL 1.6E herbicide is recommended for postemergence control at 2.5 to 10 pints* (0.5 to 2.0 lb. active) per broadcast acre. The lower rate is recommended for the control of susceptible seedling weeds in the early postemergence stage up to the 4 leaf stage. The higher rate (2.0 lb. active) should be used for weeds up to the 6 leaf stage. For preemergence control of susceptible weeds, GOAL 1.6E herbicide is recommended at 10.0 pints (2.0 lb. active) per broadcast acre.

*Dosages listed are for broadcast application. For banded application, the amount of GOAL 1.6E herbicide used per acre should be reduced according to the following formula:

$$\frac{\text{Band Width (in.)}}{\text{Row Width (in.)}} \times \text{Rate per Acre Broadcast} = \text{Amount Needed per Acre for Banded Application}$$

WEEDS CONTROLLED POSTEMERGENCE

| | |
|----------------------------|-------------------------|
| BALSAMAPPLE | Momordica charantia |
| *CUDWEED, NARROWLEAF | Gnaphalium falcatum |
| **EVENINGPRIMROSE, CUTLEAF | Oenothera laciniata |
| GROUNDCHERRY, CUTLEAF | Physalis angulata |
| GROUNDCHERRY, WRIGHT | Physalis wrightii |
| LAMBSQUARTERS, COMMON | Chenopodium album |
| MORNINGGLORY, ANNUAL | Ipomoea species |
| NIGHTSHADE, AMERICAN BLACK | Solanum nodiflorum |
| NIGHTSHADE, BLACK | Solanum nigrum |
| PEPPERWEED, VIRGINIA | Lepidium virginicum |
| PIGWEEED, REDROOT | Amaranthus retroflexus |
| POINSETTIA, WILD | Euphorbia heterophylla |
| PURSLANE, COMMON | Portulaca oleracea |
| PUSLEY, FLORIDA | Richardia scabra |
| SIDA, PRICKLY (TEAWEED) | Sida spinosa |
| SMARTWEED, PENNSYLVANIA | Polygonum pensylvanicum |
| SOWTHISTLE, ANNUAL | Sonchus oleraceus |

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WEEDS CONTROLLED PREEMERGENCE

CUDWEED, NARROWLEAF
 **EVENINGPRIMROSE, CUTLEAF
 GROUNDCHERRY, CUTLEAF
 LAMBSQUARTERS, COMMON
 NIGHTSHADE, AMERICAN BLACK
 NIGHTSHADE, BLACK
 PEPPERWEED, VIRGINIA
 PIGWEED, REDROOT
 POINSETTIA, WILD
 PUSLEY, FLORIDA
 SIDA, PRICKLY
 SMARTWEED, PENNSYLVANIA
 SOWTHISTLE, ANNUAL
 SPURGE, PROSTRATE
 SPURGE, SPOTTED

Gnaphalium falcatum
 Oenothera laciniata
 Physalis angulata
 Chenopodium album
 Solanum nodiflorum
 Solanum nigrum
 Lepidium virginicum
 Amaranthus retroflexus
 Euphorbia heterophylla
 Richardia scabra
 Sida spinosa
 Polygonum pennsylvanicum
 Sonchus oleraceus
 Euphorbia supina
 Euphorbia maculata

*Maximum 0.5 inch diameter.

**Highest rate and/or multiple applications may be required for acceptable control. Do not apply more than 20 pints (4.0 lb. active) per broadcast acre during any 12 month period as a result of multiple applications.

TIMING AND METHOD OF APPLICATION

As a preemergence treatment, apply in a minimum of 40 gallons of water per acre depending upon density of emerged weeds. Best preemergence results are achieved when spray is applied to a relatively weed-free soil surface. GOAL 1.6E herbicide should be directed to the soil and the base of trees. Avoid direct spray contact on the citrus foliage. Use a low-pressure sprayer equipped with a break-away boom and flat fan nozzles. An off-center (OC) nozzle positioned at the end of the boom may be desired. Spray equipment should be calibrated carefully before each use.

SPRAY VOLUME:

| <u>Weed Stage</u> | <u>Gallons of Water Per Acre</u> |
|---|----------------------------------|
| Early Postemergence (weeds up to 4 leaf stage) | 40 or more |
| Postemergence (weeds up to 6 leaf stage) | 100 or more |
| Preemergence | 40 or more |

ALL STATES (ARIZONA, CALIFORNIA, FLORIDA, LOUISIANA, TEXAS)

MIXING DIRECTIONS: Fill the spray tank at least one-third full of clean water and add the recommended amount of GOAL 1.6E herbicide while the pump and agitator are running. Complete filling of the spray tank with water and then add 1 quart of a nonionic surfactant such as TRITON^R AG-98, or comparable 80% active nonionic surfactant cleared for application to growing crops, per each 100 gallons of spray. Maintain agitation until spraying is completed.

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CULTURAL CONSIDERATIONS: In order to provide maximum effectiveness of preemergence activity of GOAL 1.6E herbicide, the berm or soil surface should be smooth and free of crop or weed trash (decaying leaves, clippings, dead weeds, etc.) Leaves and trash may be removed by blowing the area to be treated or by thoroughly mixing the trash into the soil through cultivation prior to herbicide application.

For best preemergence activity, at least one-quarter inch ($\frac{1}{4}$ inch) of water should be applied within 3 to 4 weeks after application if no rainfall occurs.

Cultural practices which result in redistribution or disturbance of the soil surface after treatment will decrease the herbicidal effectiveness of GOAL 1.6E. Cutting water furrows or cultivations that mix untreated soil into treated areas will also reduce the effectiveness of the treatment. The best results are from applications to soil surfaces or berms which are left undisturbed during the time period for which weed control is desired.

GOAL 1.6E HERBICIDE - SPECIFIC USE RESTRICTIONS

The following use restrictions should be observed when GOAL 1.6E herbicide is used alone or in any spray combination recommended on this label. Follow General Use Restrictions listed on the GOAL 1.6E herbicide label.

- . Apply GOAL 1.6E herbicide only to nonbearing citrus trees.
- . Do not apply more than 10 pints of GOAL 1.6E herbicide (2.0 lb. active) per broadcast acre herbicide in a single application or more than 20 pints (4.0 lb. active) per broadcast acre during any 12 month period as a result of multiple applications.
- . GOAL 1.6E herbicide or any of the combinations recommended on this label should only be applied to healthy growing trees.
- . Do not apply during periods of new foliage growth. Applications should be made only after foliage has fully expanded and hardened off.
- . Direct spray toward the base of trees. Avoid direct spray contact on the citrus foliage.

TANK MIXES WITH GOAL 1.6E HERBICIDE

IMPORTANT: Read and observe all label directions before using. When tank mixing, always read all individual manufacturers' labels. In interpreting all labels for the tank mix, the most restrictive situations must apply.

DOSAGE

For postemergence control of certain grassy and broadleaf weeds, in certain citrus plantings, a tank mixture of GOAL 1.6E herbicide with either paraquat or Roundup can be used. Apply at the recommended rates and growth stages to susceptible weed species in a manner described on the respective labels.

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For preemergence control of certain grassy and broadleaf weeds, in certain citrus plantings, a tank mixture of GOAL 1.6E herbicide with either Devrinol, simazine, Solicam or Surflan can be applied. Contact herbicides such as paraquat or Roundup may be added to the tank mixture. Apply at the recommended rates and growth stages to susceptible weed species in a manner described on the respective labels.

For preemergence control of susceptible weeds, use 10 pints (2.0 lb. active) of GOAL 1.6E herbicide per broadcast acre.

WEEDS CONTROLLED PREEMERGENCE

When GOAL 1.6E herbicide is tank mixed with Devrinol 50-WP and applied preemergence, in addition to the weeds controlled preemergence by GOAL 1.6E alone, control of the following weeds is also obtained.

| | |
|----------------------------|----------------------------------|
| BARNYARDGRASS (WATERGRASS) | <i>Echinochloa crus-galli</i> |
| BLUEGRASS, ANNUAL | <i>Poa annua</i> |
| BROME, RIPGUT | <i>Bromus rigidus</i> |
| CHICKWEED, COMMON | <i>Stellaria media</i> |
| CRABGRASS, LARGE (HAIRY) | <i>Digitaria sanguinalis</i> |
| PINEAPPLEWEED | <i>Matricaria matricarioides</i> |

When GOAL 1.6E herbicide is tank mixed with simazine and applied preemergence, in addition to the weeds controlled preemergence by GOAL 1.6E alone, control of the following weeds is also obtained.

| | |
|----------------------------|-------------------------------|
| BARNYARDGRASS (WATERGRASS) | <i>Echinochloa crus-galli</i> |
| BLUEGRASS, ANNUAL | <i>Poa annua</i> |
| CHICKWEED, COMMON | <i>Stellaria media</i> |
| CRABGRASS, LARGE (HAIRY) | <i>Digitaria sanguinalis</i> |
| CRABGRASS, SMOOTH | <i>Digitaria ischaemum</i> |
| HORSEWEED (MARESTAIL) | <i>Conyza canadensis</i> |

When GOAL 1.6E herbicide is tank mixed with Solicam and applied preemergence, in addition to the weeds controlled preemergence by GOAL 1.6E alone, control of the following weeds is also obtained.

| | |
|----------------------------|----------------------------------|
| BARNYARDGRASS (WATERGRASS) | <i>Echinochloa crus-galli</i> |
| BLUEGRASS, ANNUAL | <i>Poa annua</i> |
| BROME, RIPGUT | <i>Bromus rigidus</i> |
| CUPGRASS, SOUTHWESTERN | <i>Eriochloa gracilis</i> |
| PINEAPPLEWEED | <i>Matricaria matricarioides</i> |

When GOAL 1.6E herbicide is tank mixed with Surflan and applied preemergence, in addition to the weeds controlled preemergence by GOAL 1.6E alone, control of the following weeds is also obtained.

| | |
|----------------------------|-------------------------------|
| BARNYARDGRASS (WATERGRASS) | <i>Echinochloa crus-galli</i> |
| BLUEGRASS, ANNUAL | <i>Poa annua</i> |
| CHICKWEED, COMMON | <i>Stellaria media</i> |
| CRABGRASS, LARGE (HAIRY) | <i>Digitaria sanguinalis</i> |
| CRABGRASS, SMOOTH | <i>Digitaria ischaemum</i> |
| CUPGRASS, SOUTHWESTERN | <i>Eriochloa gracilis</i> |

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WEEDS CONTROLLED POSTEMERGENCE:

When GOAL 1.6E herbicide is tank mixed with paraquat or Roundup and applied postemergence, in addition to the broadleaf weeds controlled postemergence by GOAL 1.6E herbicide alone, control of the following weeds is also obtained.

| | |
|-----------------------|------------------------|
| BARNYARDGRASS | Echinochloa crus-galli |
| BLUEGRASS, ANNUAL | Poa annua |
| BROME, RIPGUT | Bromus rigidus |
| CHICKWEED, COMMON | Stellaria media |
| HORSEWEED (MARESTAIL) | Conyza canadensis |
| ROCKET, LONDON | Sisymbrium irio |
| SPURGE, PROSTRATE | Euphorbia supina |

METHOD OF APPLICATION

As a preemergence and/or postemergence treatment, apply in a minimum of 40 gallons of water per acre depending upon density of emerged weeds. Spray coverage is essential for good postemergence results. Best preemergence results are achieved when the tank mix is applied to a relatively weed-free soil surface or berm. Spray should be directed to the soil and the base of trees. Use a low-pressure sprayer equipped with a break-away boom with flat fan nozzles. An off-center (OC) nozzle positioned at the end of the boom may be desired. Spray equipment should be calibrated carefully before each use.

MIXING DIRECTIONS: Fill the spray tank at least one-third full of clean water. With the pump and agitator running, add the recommended amounts of Devrinol, simazine, Solicam or Surflan to the spray tank, then add the recommended amounts of GOAL 1.6E herbicide and paraquat or Roundup while the pump and agitator are running. Complete filling of the spray tank with water and then add 1 quart of a nonionic surfactant such as TRITON[®] AG-98 or comparable 80% active nonionic surfactant cleared for application to growing crops, per each 100 gallons of spray. Maintain agitation until spraying is completed.

CULTURAL CONSIDERATIONS: In addition to details previously listed under "GOAL 1.6E Herbicide Used Alone," read all individual manufacturers' labels. In interpreting all labels for the tank mixture, the most restrictive label specifications must apply.

SPECIFIC USE RESTRICTIONS - GOAL 1.6E HERBICIDE/TANK MIXES

In addition to the following, also observe all specific use restrictions previously listed under GOAL 1.6E Herbicide Used Alone. Follow General Use Restrictions listed on the GOAL 1.6E herbicide label.

- When tank mixing, always read all individual manufacturers' labels. In interpreting all labels for the tank mixture, the most restrictive situations must apply.

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GOAL^R, and TRITON^R AG-98 are registered trademarks of Rohm and Haas Company
DEVIRINOL^R is a registered trademark of Stauffer Chemical Company
GRAMOXONER^R is a registered trademark of ICI Americas, Inc.
ORTHO^R is a registered trademark of the Chevron Chemical Company
ROUNDUP^R is a registered trademark of Monsanto Company
SURFLAN^R is a registered trademark of the Elanco Products Company
SOLICAM^R is a registered trademark of Sandoz, Inc.

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(Doc. #7841E/263Z)
3/29/84

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ROHM AND HAAS COMPANY

INDEPENDENCE MALL WEST
PHILADELPHIA, PENNSYLVANIA 19105

EPA Reg. No. 707-145-AA
EPA Est. No. 707-PA-1



GOAL^R 2E HERBICIDE

DIRECTIONS FOR USE

NONBEARING CITRUS - CALAMONDIN, CHIRONJA, CITRUS CITRON, GRAPEFRUIT, KUMQUAT, LEMON, LIME, MANDARIN, PUMMELO, SATSUMA MANDARIN, SOUR ORANGE, SWEET ORANGE, TANGELO, TANGERINE, TANGOR

GENERAL INFORMATION

GOAL 2E is effective as a preemergence and/or postemergence herbicide when used alone or in recommended tank mix combinations, for the control of certain annual broadleaf weeds in non-bearing citrus plantings. GOAL 2E herbicide may be applied to newly planted trees or to young trees which will not bear fruit within one year.

The most effective postemergence weed control is achieved when GOAL 2E herbicide is applied to seedling weeds at the recommended growth stage. For postemergence control of certain grassy and broadleaf weeds, a tank mix of GOAL 2E herbicide with paraquat (Gramoxone^R or Ortho^R paraquat) or Roundup^R can be used.

Preemergence control is most effective when spray is applied to clean, weed-free soil surfaces. Treated soil surfaces or berms should not be disked or disturbed in any manner as the herbicidal effectiveness of GOAL 2E may be decreased. Seedling weeds are controlled as they come in contact with the soil-applied herbicide during emergence. For residual grass control in citrus, a tank mixture of GOAL 2E herbicide with Devrinol^R, simazine, Solicam^R or Surflan can be used. Contact herbicides such as paraquat or Roundup may also be added to the tank mixture.

Check individual product labels to determine suitability and use rates for various crops.

GOAL 2E HERBICIDE USED ALONE

GEOGRAPHIC USE DIRECTIONS

ARIZONA AND CALIFORNIA DOSAGE

GOAL 2E herbicide is recommended for postemergence control at 1 to 4 quarts (0.5 to 2.0 lb. active) per broadcast acre. The lower rate is recommended for the control of susceptible seedling weeds, less than 4 inches in height. See weed stage rate and weeds controlled for susceptible weeds up to 8 inches in height. The higher rate (2.0 lb. active) should be used for weeds less than 12 inches in height. For preemergence control of susceptible weeds, use 4 quarts (2.0 lb. active) per broadcast acre.

WEEDS CONTROLLED POSTEMERGENCE

CHEESEWEED (MALVA)
FIDDLENECK, COAST
FILAREE, BROADLEAF
FILAREE, REDSTEM
FILAREE, WHITESTEM
GROUNDSEL, COMMON

Malva parviflora
Amsinckia intermedia
Erodium botrys
Erodium cicutarium
Erodium moschatum
Senecio vulgaris

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HENBIT
 LETTUCE, MINERS
 NETTLE, BURNING
 PIGWEED, REDROOT
 REDMAIDS
 SHEPHERDSPURSE
 SOWTHISTLE, ANNUAL

Lamium amplexicaule
 Montia perfoliata
 Urtica urens
 Amaranthus retroflexus
 Calandrinia caulescens
 Capsella bursa-pastoris
 Sonchus oleraceus

WEEDS CONTROLLED PREEMERGENCE

BURCLOVER
 CHEESEWEED (MALVA)
 FIDDLENECK, COAST
 FILAREE, BROADLEAF
 FILAREE, REDSTEM
 FILAREE, WHITESTEM
 GROUNDSEL, COMMON
 HENBIT
 KNOTWEED, PROSTRATE
 LAMBSQUARTERS, COMMON
 LETTUCE, PRICKLY
 PIGWEED, REDROOT
 PURSLANE, COMMON
 REDMAIDS
 ROCKET, LONDON
 SHEPHERDSPURSE
 SOWTHISTLE, ANNUAL
 SPURGE, PROSTRATE
 SPURGE, SPOTTED

Medicago hipida
 Malva parviflora
 Amsinckia intermedia
 Erodium botrys
 Erodium cicutarium
 Erodium moschatum
 Senecio vulgaris
 Lamium amplexicaule
 Polygonum aviculare
 Chenopodium album
 Lactuca serriola
 Amaranthus retroflexus
 Portulaca oleracea
 Calandrinia caulescens
 Sisymbrium irio
 Capsella bursa-pastoris
 Sonchus oleraceus
 Euphorbia supina
 Euphorbia maculata

| <u>Weed Stage</u> | <u>GOAL 2E Herbicide Rate (Per Broadcast Acre)*</u> | <u>Weeds Controlled</u> |
|---|---|---|
| Early Postemergence (weeds up to 4 inches high) | 1 quart (0.5 lb. active) | CHEESEWEED (MALVA) FIDDLENECK, COAST FILAREE, REDSTEM HENBIT REDMAIDS SHEPHERDSPURSE |
| Postemergence (weeds up to 8 inches high) | 2 quarts (1.0 lb. active) | CHEESEWEED (MALVA) FIDDLENECK, COAST FILAREE, REDSTEM HENBIT LETTUCE, MINERS NETTLE, BURNING REDMAIDS SHEPHERDSPURSE SOWTHISTLE, ANNUAL |

Late Postemergence
(weeds up to
12 inches high)

4 quarts
(2.0 lb. active)

CHEESEWEED (MALVA)
FIDDLENECK, COAST
FILAREE, BROADLEAF
FILAREE, REDSTEM
FILAREE, WHITESTEM
GROUNDSEL, COMMON
HENBIT
LETTUCE, MINERS
NETTLE, BURNING
PIGWEEED, REDROOT
REDMAIDS
SHEPHERDSPURSE
SOWTHISTLE, ANNUAL

Weed
Stage

GOAL 2E
Herbicide Rate
(Per Broadcast Acre)*

Weeds
Controlled

Preemergence

4 quarts
(2.0 lb. active)

BURCLOVER
CHEESEWEED, (MALVA)
FIDDLENECK, COAST
FILAREE, BROADLEAF
FILAREE, REDSTEM
FILAREE, WHITESTEM
GROUNDSEL, COMMON
HENBIT
KNOTWEED, PROSTRATE
LAMBSQUARTERS, COMMON
LETTUCE, PRICKLY
PIGWEEED, REDROOT
PURSLANE, COMMON
REDMAIDS
ROCKET, LONDON
SHEPHERDSPURSE
SOWTHISTLE, ANNUAL
SPURGE, PROSTRATE
SPURGE, SPOTTED

*Dosages listed are for broadcast application. For banded application, the amount of GOAL 2E herbicide used per acre should be reduced according to the following formula:

$$\frac{\text{Band Width (in.)}}{\text{Row Width (in.)}} \times \text{Rate per Acre Broadcast} = \text{Amount Needed per Acre for Banded Application}$$

TIMING AND METHOD OF APPLICATION

As a preemergence treatment, apply in a minimum of 40 gallons of water per acre depending upon density of emerged weeds. Best preemergence results are achieved when spray is applied to a relatively weed-free berm or soil surface. GOAL 2E herbicide should be directed to the soil and the base of trees. Avoid direct spray contact on the citrus foliage. Use a low-pressure sprayer equipped with a break-away boom and flat fan nozzles. An off-center (OC) nozzle positioned at the end of the boom may be desired. Spray equipment should be calibrated carefully before each use.

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SPRAY VOLUME:

| <u>Weed Stage</u> | <u>Gallons of Water Per Acre</u> |
|--|----------------------------------|
| Early Postemergence (weeds up to 4 inches high) | 40 or more |
| Postemergence (weeds up to 8 inches high) | 100 or more |
| Late Postemergence (weeds up to 12 inches high) | 100 or more |
| Preemergence | 40 or more |

FLORIDA, LOUISIANA AND TEXAS
DOSAGE

GOAL 2E herbicide is recommended for postemergence control at 1 to 4 quarts (0.5 to 2.0 lb. active) per broadcast acre. The lower rate is recommended for the control of susceptible seedling weeds in the early postemergence stage up to the 4 leaf stage. The higher rate (2.0 lb. active) should be used for weeds up to the 6 leaf stage. For preemergence control of susceptible weeds, GOAL 2E herbicide is recommended at 4 quarts (2.0 lb. active) per broadcast acre.

*Dosages listed are for broadcast application. For banded application, the amount of GOAL 2E herbicide used per acre should be reduced according to the following formula:

$$\frac{\text{Band Width (in.)}}{\text{Row Width (in.)}} \times \text{Rate per Acre Broadcast} = \text{Amount Needed per Acre for Banded Application}$$

WEEDS CONTROLLED POSTEMERGENCE

- BALSAMAPPLE
- *CUDWEED, NARROWLEAF
- **EVENINGPRIMROSE, CUTLEAF
- GROUNDCHERRY, CUTLEAF
- GROUNDCHERRY, WRIGHT
- LAMBSQUARTERS, COMMON
- MORNINGGLORY, ANNUAL
- NIGHTSHADE, AMERICAN BLACK
- NIGHTSHADE, BLACK
- PEPPERWEED, VIRGINIA
- PIGWEEED, REDROOT
- POINSETTIA, WILD
- PURSLANE, COMMON
- PUSLEY, FLORIDA
- SIDA, PRICKLY (TEAWEED)
- SMARTWEED, PENNSYLVANIA
- SOWTHISTLE, ANNUAL

- Momordica charantia
- Gnaphalium falcatum
- Oenothera laciniata
- Physalis angulata
- Physalis wrightii
- Chenopodium album
- Ipomoea species
- Solanum nodiflorum
- Solanum nigrum
- Lepidium virginicum
- Amaranthus retroflexus
- Euphorbia heterophylla
- Portulaca oleracea
- Richardia scabra
- Sida spinosa
- Polygonum pennsylvanicum
- Sonchus oleraceus

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WEEDS CONTROLLED PREEMERGENCE

CUDWEED, NARROWLEAF
 **EVENINGPRIMROSE, CUTLEAF
 GROUNDCHERRY, CUTLEAF
 LAMBSQUARTERS, COMMON
 NIGHTSHADE, AMERICAN BLACK
 NIGHTSHADE, BLACK
 PEPPERWEED, VIRGINIA
 PIGWEED, REDROOT
 POINSETTIA, WILD
 PUSLEY, FLORIDA
 SIDA, PRICKLY
 SMARTWEED, PENNSYLVANIA
 SOWTHISTLE, ANNUAL
 SPURGE, PROSTRATE
 SPURGE, SPOTTED

Gnaphalium falcatum
 Oenothera laciniata
 Physalis angulata
 Chenopodium album
 Solanum nodiflorum
 Solanum nigrum
 Lepidium virginicum
 Amaranthus retroflexus
 Euphorbia heterophylla
 Richardia scabra
 Sida spinosa
 Polygonum pennsylvanicum
 Sonchus oleraceus
 Euphorbia supina
 Euphorbia maculata

*Maximum 0.5 inch diameter.

**Highest rate and/or multiple applications may be required for acceptable control. Do not apply more than 8 quarts (4.0 lb. active) per broadcast acre during any 12 month period as a result of multiple applications.

TIMING AND METHOD OF APPLICATION

As a preemergence treatment, apply in a minimum of 40 gallons of water per acre depending upon density of emerged weeds. Best preemergence results are achieved when spray is applied to a relatively weed-free soil surface. GOAL 2E herbicide should be directed to the soil and the base of trees. Avoid direct spray contact on the citrus foliage. Use a low-pressure sprayer equipped with a break-away boom and flat fan nozzles. An off-center (OC) nozzle positioned at the end of the boom may be desired. Spray equipment should be calibrated carefully before each use.

SPRAY VOLUME:

| <u>Weed Stage</u> | <u>Gallons of Water Per Acre</u> |
|---|--------------------------------------|
| Early Postemergence (weeds up to 4 leaf stage) | 40 or more |
| Postemergence (weeds up to 6 leaf stage) | 100 or more |
| Preemergence | 40 or more |

ALL STATES (ARIZONA, CALIFORNIA, FLORIDA, LOUISIANA, TEXAS)

MIXING DIRECTIONS: Fill the spray tank at least one-third full of clear water and add the recommended amount of GOAL 2E herbicide while the pump and agitator are running. Complete filling of the spray tank with water and then add 1 quart of a nonionic surfactant such as TRITON[®] AG-98, or comparable 80% active nonionic surfactant cleared for application to growing crops, per each 100 gallons of spray. Maintain agitation until spraying is completed.

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CULTURAL CONSIDERATIONS: In order to provide maximum effectiveness of preemergence activity of GOAL 2E herbicide, the berm or soil surface should be smooth and free of crop or weed trash (decaying leaves, clippings, dead weeds, etc.) Leaves and trash may be removed by blowing the area to be treated or by thoroughly mixing the trash into the soil through cultivation prior to herbicide application.

For best preemergence activity, at least one-quarter inch ($\frac{1}{4}$ inch) of water should be applied within 3 to 4 weeks after application if no rainfall occurs.

Cultural practices which result in redistribution or disturbance of the soil surface after treatment will decrease the herbicidal effectiveness of GOAL 2E. Cutting water furrows or cultivations that mix untreated soil into treated areas will also reduce the effectiveness of the treatment. The best results are from applications to soil surfaces or berms which are left undisturbed during the time period for which weed control is desired.

GOAL 2E HERBICIDE - SPECIFIC USE RESTRICTIONS

The following use restrictions should be observed when GOAL 2E herbicide is used alone or in any spray combination recommended on this label.

- . Read and observe all label directions before using. When tank mixing, always read all individual manufacturers' labels. In interpreting all labels for the tank mixture, the most restrictive situations must apply.
- . Apply GOAL 2E herbicide only to nonbearing citrus trees.
- . Do not apply more than 4 quarts of GOAL 2E herbicide (2.0 lb. active) per broadcast acre herbicide in a single application or more than 8 quarts (4.0 lb. active) per broadcast acre during any 12 month period as a result of multiple applications.
- . GOAL 2E herbicide or any of the combinations recommended on this label should only be applied to healthy growing trees.
- . Do not apply during periods of new foliage growth. Applications should be made only after foliage has fully expanded and hardened off.
- . Direct spray toward the base of trees. Avoid direct spray contact on the citrus foliage.
- . Do not contaminate irrigation water or water used for domestic purposes.
- . Do not use any plants treated with GOAL 2E herbicide for feed or forage.
- . Do not feed or allow animals to graze on any areas treated with GOAL 2E herbicide.

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- GOAL 2E herbicide should be applied only by ground application equipment except as specifically directed on this label or on other approved Rohm and Haas Company supplemental labeling.
- Do not apply when weather conditions favor drift. Avoid drift to all non-target areas. GOAL 2E herbicide is phytotoxic to plant foliage.
- Thoroughly flush spray equipment (tank, pump, hoses and boom) with clean water before and after each use. Residual GOAL 2E herbicide remaining in spray equipment may damage other crops. To assist removal of GOAL herbicide residues in spray equipment, TRITON AG-98 or TRITON CS-7 may be added at the rate of 1 quart per 100 gallons of water during flushing.
- Do not rotate any crops other than corn, cotton, soybeans, or spearmint/peppermint within a 10-month period after treatment.
- Use GOAL 2E herbicide only for recommended purposes and at recommended rates.
- Do not treat ditch banks or waterways with GOAL 2E herbicide.

TANK MIXES WITH GOAL 2E HERBICIDE

IMPORTANT: Read and observe all label directions before using. When tank mixing, always read all individual manufacturers' labels. In interpreting all labels for the tank mix, the most restrictive situations must apply.

DOSAGE

For postemergence control of certain grassy and broadleaf weeds, in certain citrus plantings, a tank mixture of GOAL 2E herbicide with either paraquat or Roundup can be used. Apply at the recommended rates and growth stages to susceptible weed species in a manner described on the respective labels.

For preemergence control of certain grassy and broadleaf weeds, in certain citrus plantings, a tank mixture of GOAL 2E herbicide with either Devrinol, simazine, Solicam or Surflan can be applied. Contact herbicides such as paraquat or Roundup may be added to the tank mixture. Apply at the recommended rates and growth stages to susceptible weed species in a manner described on the respective labels.

For preemergence control of susceptible weeds, use 4 quarts (2.0 lb. active) of GOAL 2E herbicide per broadcast acre.

WEEDS CONTROLLED PREEMERGENCE

When GOAL 2E herbicide is tank mixed with Devrinol 50-WP and applied preemergence, in addition to the weeds controlled preemergence by GOAL 2E alone, control of the following weeds is also obtained.

BARNYARDGRASS (WATERGRASS)
BLUEGRASS, ANNUAL
BROME, RIPGUT
CHICKWEED, COMMON
CRABGRASS, LARGE (HAIRY)
PINEAPPLEWEED

Echinochloa crus-galli
Poa annua
Bromus rigidus
Stellaria media
Digitaria sanguinalis
Matricaria matricarioides

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When GOAL 2E herbicide is tank mixed with simazine and applied preemergence, in addition to the weeds controlled preemergence by GOAL 2E alone, control of the following weeds is also obtained.

| | |
|----------------------------|------------------------|
| BARNYARDGRASS (WATERGRASS) | Echinochloa crus-galli |
| BLUEGRASS, ANNUAL | Poa annua |
| CHICKWEED, COMMON | Stellaria media |
| CRABGRASS, LARGE (HAIRY) | Digitaria sanguinalis |
| CRABGRASS, SMOOTH | Digitaria ischaemum |
| HORSEWEED (MARESTAIL) | Conyza canadensis |

When GOAL 2E herbicide is tank mixed with Solicam and applied preemergence, in addition to the weeds controlled preemergence by GOAL 2E alone, control of the following weeds is also obtained.

| | |
|----------------------------|---------------------------|
| BARNYARDGRASS (WATERGRASS) | Echinochloa crus-galli |
| BLUEGRASS, ANNUAL | Poa annua |
| BROME, RIPGUT | Bromus rigidus |
| CUPGRASS, SOUTHWESTERN | Eriochloa gracilis |
| PINEAPPLEWEED | Matricaria matricarioides |

When GOAL 2E herbicide is tank mixed with Surflan and applied preemergence, in addition to the weeds controlled preemergence by GOAL 2E alone, control of the following weeds is also obtained.

| | |
|----------------------------|------------------------|
| BARNYARDGRASS (WATERGRASS) | Echinochloa crus-galli |
| BLUEGRASS, ANNUAL | Poa annua |
| CHICKWEED, COMMON | Stellaria media |
| CRABGRASS, LARGE (HAIRY) | Digitaria sanguinalis |
| CRABGRASS, SMOOTH | Digitaria ischaemum |
| CUPGRASS, SOUTHWESTERN | Eriochloa gracilis |

WEEDS CONTROLLED POSTEMERGENCE:

When GOAL 2E herbicide is tank mixed with paraquat or Roundup and applied postemergence, in addition to the broadleaf weeds controlled postemergence by GOAL 2E herbicide alone, control of the following weeds is also obtained.

| | |
|-----------------------|------------------------|
| BARNYARDGRASS | Echinochloa crus-galli |
| BLUEGRASS, ANNUAL | Poa annua |
| BROME, RIPGUT | Bromus rigidus |
| CHICKWEED, COMMON | Stellaria media |
| HORSEWEED (MARESTAIL) | Conyza canadensis |
| ROCKET, LONDON | Sisymbrium irio |
| SPURGE, PROSTRATE | Euphorbia supina |

METHOD OF APPLICATION

As a preemergence and/or postemergence treatment, apply in a minimum of 40 gallons of water per acre depending upon density of emerged weeds. Spray coverage is essential for good postemergence results. Best preemergence results are achieved when the tank mix is applied to a relatively weed-free soil surface or berm. Spray should be directed to the soil and the base of trees. Use a low-pressure sprayer equipped with a break-away boom with flat fan nozzles. An off-center (OC) nozzle positioned at the end of the boom may be desired. Spray equipment should be calibrated carefully before each use.

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MIXING DIRECTIONS: Fill the spray tank at least one-third full of clean water. With the pump and agitator running, add the recommended amounts of Devrinol, simazine, Solicam or Surflan to the spray tank, then add the recommended amounts of GOAL 2E herbicide and paraquat or Roundup while the pump and agitator are running. Complete filling of the spray tank with water and then add 1 quart of a nonionic surfactant such as TRITON[®] AG-98 or comparable 80% active nonionic surfactant cleared for application to growing crops, per each 100 gallons of spray. Maintain agitation until spraying is completed.

CULTURAL CONSIDERATIONS: In addition to details previously listed under "GOAL 2E Herbicide Used Alone," read all individual manufacturers' labels. In interpreting all labels for the tank mixture, the most restrictive label specifications must apply.

SPECIFIC USE RESTRICTIONS - GOAL 2E HERBICIDE/TANK MIXES

In addition to the following, also observe all specific use restrictions previously listed under GOAL 2E Herbicide Used Alone.

- When tank mixing, always read all individual manufacturers' labels. In interpreting all labels for the tank mixture, the most restrictive situations must apply.

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Goal Residue Analyses from Samples Taken in the Witchweed
Quarantine Area (August 13-15, 1980) **

| Farm | Sample Type | Number of Samples | Mean (ppb) | Range (ppb) |
|----------------------|------------------|-------------------|------------|-------------|
| Quinn (Treated) | Hydrosoil | 6 | 50 | 10-70 |
| | Field Soil | 2 | 72 | 42-102 |
| | Benthic Organism | 2 | 20 | 20 |
| Hilburn (Treated) | Hydrosoil | 2 | * | * |
| | Field Soil | 2 | * | * |
| | Benthic Organism | 2 | * | * |
| Fensel (Control) | Hydrosoil | 2 | * | * |
| | Field Soil | 2 | * | * |
| | Benthic Organism | 2 | * | * |

* Below 10 ppb detection limit.

** EPA. preliminary monitoring data from corn fields treated at 0.75 lb. a.i. /A with repeat applications

RIN 0637-00

EFED Review - Oxycodone

Page _____ is not included in this copy.

Pages 35 through 41 are not included.

The material not included contains the following type of information:

- Identity of product inert ingredients.
- Identity of product impurities.
- Description of the product manufacturing process.
- Description of quality control procedures.
- Identity of the source of product ingredients.
- Sales or other commercial/financial information.
- A draft product label.
- The product confidential statement of formula.
- Information about a pending registration action.
- FIFRA registration data.
- The document is a duplicate of page(s) _____.
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