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

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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Qualitative Assessment Of Sulfonylurea Herbicides And Other ALS Inhibitors

FROM: for Anthony F. Maciorowski, Chief
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Environmental Fate and Effects Division (7507C)
Douglas J. Urban 3/24/94

TO: Evert Byington, Chief
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Environmental Fate and Effects Division (7507C)

Attached please find a chronology of Ecological Effects Branch (EEB) involvement with sulfonylurea herbicides, a qualitative assessment of sulfonylurea herbicides, and a summary of outstanding EEB studies for the ALS inhibiting herbicides (sulfonylureas, imidazolinones, triazolopyrimidines). This report was prepared at the request of Jean Holmes and is to be used in the preparation of an EFED report for Special Review and Reregistration Division (Ms. Amy Farrell).

If you have any questions regarding the information contained in this report, please contact Richard Petrie or Michael Davy.

SULFONYLUREA HERBICIDES

History:

1981 - Based on the review of environmental fate data, EFED recommends to Registration Division that the sulfonylurea (SU's) not be registered (EFGWB file). This decision was based on the determination that SU's are excessively persistent in the environment and that they cannot be detected at low levels in environmental samples. (P. Mastradone)

1982 - SU's first come on the market.

- EPA Subdivision J nontarget plant phytotoxicity guidelines published (Submission of nontarget plant and drift data waived by OPP).

1984 - Widespread use of SU's on wheat to control Russian thistle. SU compounds were used to control weeds that had developed resistance to other herbicides.

1986 - The EFED begins the review of Subdivision J nontarget plant phytotoxicity data after numerous reports of widespread plant injury are reported to the EPA following the registered use of clomazone (Command) herbicide on soybeans.

1988 - The Agency begins a review of environmental fate studies in our files. Reregistration 3(c)(2)(b) data-call-in notices are issued for most herbicides to obtain Subdivision J and drift studies. The EFED begins routine risk assessments to assess hazard to nontarget and endangered/threatened plants. All SU new chemical registrations up to this point (1981-1988) approved with no nontarget plant or drift exposure assessment. In most cases, aerial application was granted as long as drift warnings were present on the labels. SU drift warnings were not generic as were the 2,4-D herbicide warnings.

Most SU nontarget plant phytotoxicity data reviews for low dosage herbicides and volatile herbicides since 1988 have resulted in the recommendation to the Registration Division that aerial applications **not** be allowed. In some cases (such as Amber SU herbicide), the EFED has recommended that registration not be approved based on the chemicals persistence, the inability to detect it in the environment, and it's potential to get into groundwater. A 550 foot within-the-field buffer zone for aerial applications was proposed, but rejected by higher management.

1989 - Reports to the Agency of suspected SU drift were first received from Region 10 (Horse Heaven Hills area of WA). Little was done because there was no analytical confirmation that a SU was

at fault, nor were bioassay methods available. The off-target injury to nontarget plants in the Horse Heaven Hills area was correlated with the introduction and use of the SU's for weed control in wheat. Injury to woody perennial trees such as cherry and apricot was extensive (death often occurred) and up to 2 to 3 miles distant from the wheat growing areas. When soil and plant samples were analyzed chemically for herbicide residues, no SU's were detected.

DuPont briefs OPP on the status of methods development for SU herbicides, a summary of incidents, plus their view of the Horse Heaven Hills incidents. DuPont informs the Agency that approximately 90 incidents per year occur in the Red River Valley area of ND. No adverse effects reports for these incidents have been filed with the EPA to date.

1990 - Washington State University plant experts developed a lentil bioassay sensitive to sulfonylurea herbicides. In 1990, J. Fletcher and T. Pfleeger (EPA Corvallis Laboratory) visited the Horse Heaven Hills area. They reported their findings to OPP. Beginning 1990, as many as 30 SU type "hits" on the sensitive lentils were recorded each year. In May, acting EPA Administrator for Region 10 requests help from headquarters (Memorandum to L. Fisher, AA, OPTS) regarding continuing herbicide drift problems in the Horse Heaven Hills area. 1/

OPP personnel are briefed regarding extensive OUST SU herbicide injury to 1,000's of acres of potatoes in Colorado under center pivot irrigation. Movement of OUST from a treated railroad rights-of-way is suspected as the cause. From replicated/controlled field studies at Colorado State University the authors determined that any spray drift resulting from Assert, Harmony Extra, or Oust applications would cause totally unacceptable adverse effects to potatoes. Small amounts of Ally, Glean, or Amber drifting onto growing potatoes are not expected to cause significant adverse effects. 2/ In personal communication with Dr. Westra, he stated that Oust caused significant phytotoxicity to potatoes at the lowest dosage tested, 10 ppt. 3/

1991 - The OPP funds a SU research project in which our Corvallis Laboratory sprays cherry trees with SU's. Cherry trees were chosen for this research project because of the unexplained death of cherry and apricot orchards 2 or more miles down-wind from the SU treated wheat fields at the Horse Heaven Hills.

In 2/91 Glean SU is voluntarily withdrawn from seven Midwestern states due to ineffectiveness in controlling target weed species that have become resistant to ALS inhibiting herbicides. The wheat states involved were: CO, MT, ND, SD, MN, WY, and NB. The resistant weeds were: kochia, Russian thistle, prickly lettuce, and chickweed. 4/

1992 - Progress report received in January from Corvallis, OR regarding the effects of SU's on cherry trees. When foliage was treated at the early fruit stage, at 1/10th or 1/100th the maximum registered label application rate, viable fruit were completely eliminated. 5/
On February 28, 1992, Amber (triasulfuron) SU herbicide is registered for aerial application on wheat and barley with no buffer zones. The registered label contains statements regarding potential for groundwater contamination and potential ineffectiveness due to weed resistance that may already exist in the field. Once SU weed resistance occurs, all SU's will be ineffective for control of those weeds. Amber was given a registration for use in the same 7 wheat producing states where weed resistance to Glean occurred. Glean was voluntarily withdrawn by the registrant because of poor control due to resistant weed biotypes. 6/

On March, 18, 1992, Karl H. Arne (Region 10), T. Pfleeger (Corvallis, OR - EPA Laboratory), brief Registration Division regarding "Concerns Over Sulfonylurea Herbicides". A follow-up report was transmitted to A. Lindsay, Director of Registration Division on 5/08/1992. The report recommends that serious consideration be given to further SU aerial applications plus specific suggestions to reduce drift from ground applications. 7/

In July/Sept. a comparison of plant injury to roses from SU's compared to 2,4-D, glyphosate, and bromoxynil is published. At 1/100th the maximum label application rates, the SU's were significantly **more** phytotoxic to roses that the other herbicides tested. This was a 2 year replicated field study. 8/

1993 - January, 1993, the EEB receives a large package of 6(a)(2) information for OUST SU herbicide. The package contains a large number of incidents that resulted in economic damage to crops such as potatoes, rice, vineyards, corn, sugarbeets, sorghum, almonds; and plant damage from drifting soil particles. 9/

On 3/30/1993, Margaret Hue, a farmer and spokesperson for "Tri-Citians Against Chemical Trespass" presented a summation of crop damage and health related impacts of pesticide use in the Horse Heaven Hills area of Washington. Mrs. Hue believes that the SU herbicides are responsible for extensive damages to her down-wind crops. She has observed subtle but devastating injury to alfalfa and asparagus since the introduction of SU's on wheat. The injury symptoms have no resemblance to typical 2,4-D, glyphosate, or paraquat drift that she has grown accustomed to. She is upset because she cannot detect the SU's analytically on soil or plant samples. 10/

In October, 1993, the EPA research report "Potential Environmental Risks Associated With The New Sulfonylurea Herbicides" is published. This paper describes cherry tree research results. The

authors determined that the low-dose herbicides are approximately 100 times more toxic than herbicides used prior to 1982. Significant adverse effects on yields (up to 85% yield loss) was measured following treatment at, during, or shortly after bloom. These effects on the full grown, woody perennial cherry tree occurred from use of 1/500th the maximum label rate for chlorsulfuron herbicide (1/500th of 1/3 oz. ai/Acre). 11/

Field Operations Division prepares a report regarding the status of SU's, in response to concerns presented by EPA - Region 10.

1994 - DuPont briefs the EPA (3/07/94). At the request of SRRD, DuPont briefs OPP scientists regarding SU sales, incidents, and status of plant phytotoxicity research. DuPont raised the following points: "SU risks to nontarget plants are no different than those from other herbicides", "Spray drift is a function of application technology, not the active ingredient or product chemistry", Drift is a pesticide issue, not a SU issue", "Spray drift is a generic phenomenon", "Improved label statements have resulted in a reduced number of SU spray drift incidents", "Adverse SU nontarget plant effects are subtle and only occur in the field margins, the adversely affected plants outgrow the injury, and in some cases, even experience increased yields over non-drift impacted plants", "Off-target spray drift incidents have occurred on less than 0.003% of total SU treated acres across the U.S.", "Most currently registered herbicides do not have analytical methods to detect residues in environmental samples to the level that causes plant damage (ex. 2,4-D on grapes, need 1-2 ppb level of detection but current methods only go down to ppm level)".

QUALITATIVE ASSESSMENT OF SULFONYLUREA HERBICIDES:

INTRODUCTION

At this point in time, there is a rather large amount of field testing in the literature (Tier III type studies) from which to draw generic conclusions regarding sulfonylurea herbicides and other ALS* inhibiting herbicides. 2/8/11/ The focus in OPP has been on sulfonylurea herbicides as opposed to the other ALS inhibiting herbicides primarily because we are aware of more incidents involving the SU's. Historically, the SU's are used at extremely low rates per acre but have soil and water persistence values greater than older high rate herbicides. The imidazolinone herbicides have a different fate profile than the SU's because they are quickly inactivated by sunlight (photoactive). The triazolopyrimidines are the latest class of low-dose herbicide, example being "Broadstrike" herbicide with a fate profile similar to the SU's.

* ALS refers to amino lactace synthase enzyme inhibiting herbicides. These herbicides have the same mode-of-action, or method of killing/adversely affecting plants.

PLANT TOXICITY DATA

The Ecological Effects Branch has conducted a review of Guideline studies in our files for the SU's, imidazolinones, and the newest class of ALS inhibitors the triazolopyrimidines. A summary list is attached. The EEB cannot conduct a complete assessment of these chemicals until all required studies are submitted and reviewed, however, in-house data to date indicates that the low-dosage herbicides are of little risk to nontarget and endangered animal species.

Subdivision J plant phytotoxicity studies are outstanding for tribensulfuron methyl (Express), triasulfuron (Amber), triametsulfuron methyl (Harmony, Pinnacle), sulfometuron methyl (Oust), ethasulfuron (Muster), chlorsulfuron (Glean), metsulfuron methyl (Ally, Escort), nicosulfuron (Accent), and in review for rimsulfuron (Exceed) [Refer to attachment]. In their recent briefing (3/07/94), DuPont presented a much larger comparative data base for herbicides than we currently have in our files. All Subdivision J studies (and non-guideline studies) referenced in this briefing should be submitted for EEB review. The growth endpoint used by DuPont in their herbicide comparison (SU's vs other herbicides), shoot height, is just one endpoint commonly reported in Subdivision J studies. Quite often, plant dry weight and/or visual phytotoxic effects are more sensitive endpoints. The methods used by DuPont to select test data and the statistical validity of the information (plus copies of all slides) should be submitted with the test data.

The Subdivision J nontarget terrestrial plant studies are early growth stage screening tests that are used to determine if the phytotoxicant inhibits seed germination, seedling growth and emergence, vegetative growth of the young plant; or any combination of these. Some herbicides are designed to kill weed seeds (methyl bromide), some are incorporated into the soil or applied to the surface of the soil to kill plants as they sprout and emerge from the soil (triazines, acetanilides, dinitroanilides), and some herbicides are applied to the foliage to kill plant tissue on contact (paraquat, dinoseb) or to be absorbed/translocated into the plant tissue (SU's, 2,4-D). The Subdivision J studies are designed to differentiate among the 3 types of inhibition. They are **not** designed to measure adverse effects of phytotoxicants on the plants ability to flower, set seed/fruit, and ultimately reproduce because the studies are ended after 2 to 3 weeks.

When adverse reproductive effects to cherry and apricot orchards were first observed and correlated with the introduction of SU's in the Horse Heaven Hills area, an EPA - Corvallis research project was initiated to determine if the SU's caused adverse effects on plant reproduction as low doses. 11/ At the same time, the USDA initiated a comparative herbicide field study to also observe low dose effects of herbicides on cherries, roses, grapes, and other plants considered sensitive to phenoxies, the SU's and glyphosate. 8/ Another field study initiated at or about the same time was conducted at Colorado State University. This study evaluated the phytotoxic effects of 6 SU's on potatoes. 2/ Also, the USDA initiated a greenhouse study in which herbicide treated dust was applied to plants in an effort to simulate wind-blown soil particles. (This reference to be added when received from DuPont).

Irrespective of the incompleteness of our Subdivision J data base for the SU's, independent field studies plus incident reports weigh heavily in our "weight-of-evidence" eco-risk assessments. On a molecule per molecule basis, the SU's are more toxic to plants than phenoxy herbicides or glyphosate. The USDA studies used fractions of the maximum registered label rates of chlorsulfuron, thifensulfuron, bromoxynil, 2,4-D, and glyphosate. The increments used were 1/100th, 1/33rd, 1/10th, and 1/3rd. At 1/100th rates, chlorsulfuron resulted in 37% visual phytotoxicity, thifensulfuron 20%, bromoxynil 0%, 2,4-D 8%, and glyphosate 3%. At the 5% level of significance, both sulfonylureas were significantly different from the other 3 compounds (1990 test year). 8/ In the EPA - Corvallis research on cherry trees, no visual phytotoxicity was observed at 1/500th the chlorsulfuron label rate, however, cherry yield was reduced significantly by 85%. In another unpublished greenhouse study at the Corvallis - EPA Laboratory,

adverse effects on white mustard seed production were observed at 1/10,000 the maximum label application rate of chlorsulfuron.

This research clearly shows that the SU herbicides are unique from other standard herbicides such as 2,4-D, glyphosate, and bromoxynil with regard to potential for significant adverse effects at very low amounts. Any rate differentials were accounted for in these studies.

The Dupont statement in the 3/07/94 meeting with EPA that all herbicides affect seed production because they kill the plant, thus making them unable to produce seed is partially correct. In a 1992 publication "Sulfonylurea Herbicides Reduce Survival and Seed Production of Green and Yellow Foxtail (Setaria spp.)", the authors stated that "Little is known about either the degree to which herbicides reduce weed seed production or the demographic mechanism for reduced weed seed production, particularly for weed species that are only partially controlled by herbicides." In this publication, the SU's tested did kill plants, but of those plants that survived treatment, seed production was reduced. 12/

SPRAY DRIFT DATA

The NACA Spray Drift Task Force (SDTF) has recently submitted spray drift data that indicates spray drift is a function of physical parameters and minimally, but occasionally, a function of the chemical itself. However, the SDTF research results also confirm that a certain number of droplets smaller than 150 microns are produced from the majority of nozzles tested, both aerial and ground application equipment. When aerial applications are made, it is inevitable that a predictable percentage of spray will transport potentially as far as 2 or more miles from the treatment site. A percentage of the amount of spray applied per given acre is lost (unaccounted for) into the atmosphere during spraying (efficiency loss). The EEB currently uses a 40% efficiency loss value when we calculate combined surface transport and drift estimates. The SDTF has had difficulty estimating this value in their spray drift studies. In addition, the EEB currently estimates that 5% of the per acreage amount applied (so-called visible drift) will drift off-target to adjacent areas during any aerial spraying. The potency or toxicity of these drifting particles to plants down-wind of the treatment site is the issue here. The EFED has always held the position that if a pesticide is expected to cause adverse biological effects beyond a reasonable and practical buffer distance (a distance that a grower would be willing to sacrifice or take out of production, or set back within the field) that aerial application should not be granted. Growers are usually unwilling to sacrifice more than 200

feet. A reasonable buffer distance will vary with the use site and the proximity of sensitive species. Due to the lack of geographic data for endangered/threatened species and their proximity to pesticide use sites, any plant phytotoxicant application using aerial, sprinkler, or mist/air blast technology is expected to adversely affect off-target endangered/threatened plant species. Sandra Byrd, EPA - Athens, has recently reported depositions of 1/100th% to 2.0% of the amount applied 1/4 mile downwind. Most spray drift studies are truncated at 1/4 mile downwind mostly for economic reasons. The shape of the drift curves suggest that 0.5% of the application rate could potentially be observed as far as a mile from the downwind edge of a very large field.

Large scale field applications would be expected to generate a greater amount of aerosol phytotoxicant than is generated in these 4 to 20 swath studies. It takes 1/3 ounce of an SU herbicide to kill plants and 1/500th of this rate to cause adverse reproductive effects on woody plants (cherry trees). Most wheat in a given area would mature and require herbicide treatment at the same time (within a 1 week window). The amount of phytotoxicant airborne on a given day or during a given week could be substantial. The potential for adverse effects increases if the nontarget plants are at a sensitive stage of growth at the time the wheat is treated (cherry trees are blooming or setting fruit).

Ground application equipment also produces driftable fines below 150 microns. The EFGWB currently uses a 1% calculation for ground equipment (1% of amount of chemical used per acre).

On 3/30/93, Margaret Hue, spokesperson for Tri-Citians Against Chemical Trespass, briefed the OPP regarding SU aerial and ground drift. The Tri-citians have recommended that the EPA 1.) delete aerial application from herbicide labels, 2.) restrict ground application nozzles to nozzle orifices > or = 0.072 inches to increase the median droplet size, 3.) increase the spray volume applied per acre, 4.) require air monitoring to detect drifting herbicides, 5.) conduct plant studies on crop reproductive cycles and nontarget plants, 6.) require registrants to develop analytical methods to detect pesticides on plant tissue at levels that cause adverse effects prior to pesticide registration.

POTENTIAL FOR LONG-TERM ECOLOGICAL IMPACTS

Based on the preliminary review of SU incidents reported to the Agency to date, the following conclusions can be drawn:

- Most SU's are involved in incidents, and some are involved to a greater extent than others. It should be noted that all SU related incidents to date are alleged due to the fact that analytical methodology is not currently available to detect SU's in environmental samples at the levels that cause adverse effects on

plant growth. Three states have commented that soil and plant samples believed to be contaminated with SU herbicides are not even sent to the laboratory for analysis knowing that the labs are not capable of detecting the SU's using current analytical methods.

The total number of SU incidents reported to date may be a function of one or more of the following:

1.) reporting procedures (most incidents reported to the registrant are settled by the registrant and are not reported to the state or EPA regional office,

2.) inability to determine the cause of plant damage (many symptoms on plants are similar to disease and nutrient deficiencies),

3.) inability to verify chemical or chemicals present,

The scope of a given incident may be a function of one or more of the following:

1.) total acreage treated,

2.) the site treated and it's proximity to sensitive vegetation,

3.) the SU's ability to move off-target via drift, runoff, or on drifting soil particles,

4.) the fate of the SU(s) in soil, water, and plant tissue,

5.) the method of application and application equipment used,

6.) the potency of the SU to plants. Oust tends to adversely affect <u>all</u> plants (nonselective), is soluble, and is persistent in the environment.

- The potential for adverse effects due to long-range transport of SU"s exists:

1.) wind-blown soil particles (2 confirmed Oust incidents, theoretical possibility at Horse Heaven Hills),

2.) aerosol transport of spray particles following aerial and possibly ground applications (Horse Heaven Hills area - aerial and ground applications suspected, temperature inversion conditions in ND, SDTF report and EPA modeling support potential for adverse biological effects from aerosols at the time of aerial applications).

- As SU usage expands in the major agricultural crops (corn, soybeans, sorghum, peanuts, sugar crops) the potential for adverse

ecological impacts on nontarget plants increases. If the ALS inhibitors were to replace the triazines, we predict similar or possibly greater presence of SU's in water bodies, rainfall, fog, soil, air, and plant samples. We expect off-target SU residues to have a 100X or greater adverse impact on nontarget vegetation than other registered herbicides due to a much higher level of foliar activity. SU's with extremely long half-lives in soil and/or water (Amber - 3 year 1/2 life in water) may accumulate in the environment over time. The ability to detect minute levels of SU's in air, soil, water, and plant samples will become increasingly important.

- The Office of Compliance Monitoring is currently surveying each state to obtain SU incident reports. This report does not contain an analysis of the OCM or other reported incidents. One recent incident (TX) is attached. It is important to note that SU incidents are **not** confined to the Horse Heaven Hills area of the U.S. S. Turner, Ag. Consultant, has reported involvement in 13 Oust related court cases. Two of the larger ones were: "Middleton, et al. vs. DuPont, et al." and "Rose, et al. vs DuPont, et al."

RECOMMENDATIONS:

The EFGWB and our EPA Athens Laboratory are currently evaluating the usefulness of completed SDTF studies for modeling purposes. The SDTF effort only evaluates primary spray drift. Virtually no effort has been given to drift beyond 1/4 mile or to long-range transport that could occur days or weeks following the initial pesticide application. The SDTF efforts have focused strictly on physical parameters associated with spray drift. Biological effects resulting from small amounts of spray drift have not been evaluated.

The "weight of evidence" for the SU herbicides (field studies plus incidents) indicate potential for serious adverse effects to nontarget plants following aerial application, and potentially from ground application equipment and/or drifting/wind-blown soil particles. This coupled with the current inability to detect the SU's and other ALS inhibiting herbicides leads the EEB to offer the following recommendations:

1.) delete aerial applications from all ALS inhibiting herbicide labels,

2.) review and revise ground application equipment use directions on all ALS inhibiting herbicide labels,

3.) require the conduct of field studies to monitor airborne residues (drifting/wind-blown soil, rainfall) in association with bio-assay studies to determine the levels at which the residues are phytotoxic to nontarget plants,

4.) issue a moratorium on the further registration of ALS inhibiting herbicides until residue detection methods are commonly available that can detect residues at levels in soil, water, air, and plant samples that are phytotoxic to plants,

5.) initiate research (non-guideline studies) that will compare the relative toxicity of the ALS inhibitors to each other and to other registered herbicides; using plant life-cycle studies,

6.) limit total usage of SU's within a given watershed to reduce the total ecosystem impacts,

7.) initiate Jeopardy Opinions with the Fish and Wildlife Service for the ALS inhibiting herbicides.

8.) initiate in-depth review of ALS inhibiting herbicides associated with drift, runoff, and wind-blown soil incidents. These include sulfometuron methyl (Oust), chlorsulfuron (Glean), metsulfuron methyl (Ally), tribenuron methyl (Express), nicosulfuron (Accent), thifensulfuron methyl (Pinnacle), chlorimuron ethyl (Classic). Improve incident reporting and tracking systems.

9.) require the conduct of plant resistance studies to determine the significance of ALS plant resistance in target weeds. Determine the extent of resistance (number of species and acreage affected). Assess feasibility of current and future ALS inhibiting herbicide registrations on the basis of product efficacy.

REFERENCES

1/ Dunne, T. May, 31, 1990 Memorandum from T. Dunne, Acting Regional Administrator for Region 10 to Linda Fisher, Assistant Administrator, Office of Pesticides and Toxic Substances. The continuing problem of undetectable residues of drifted herbicides causing non-target crop damage.

2/ Westra, P, G. Franc, B. Cranmer and T. D'Amato. Research Report on 1988 Potato-Herbicide Injury Research. Colorado State University, Ft. Collins, CO. Published in EPA/600/9-91/041. "Plant Tier Testing: A Workshop to Evaluate Nontarget Plant Testing in Subdivision J Pesticide Guidelines", Nov.-Dec., 1990, Corvallis, OR.

3/ Personal communication. Petrie, R. and P. Westra. 12/1990.

4/ _____. 1991. DuPont Withdraws Glean From Seven States. Agrichemical Age Magazine. Feb. 1991. p.47.

5/ Memorandum. January 30, 1992. Research Report: "The Effects of Glean, a Sulfonylurea Herbicide, on the Reproductive Biology and Fruit Set in Cherry Trees". From: Jim McCormick, Director, EPA Region 10, to Anne Barton, Director, Environmental Fate and Effects Division, EPA.

6/ triasulfuron (Amber) label. Registration Number:100-701. Accepted by OPP on 2/28/92.

7/ Memorandum. May 08, 1992. "Concerns Over Sulfonylurea Herbicides". From: Karl H. Arne, Region 10, EPA To: Anne Lindsay, Director, Registration Division, EPA.

8/ Al-Khatib, K., R. Parker, and E. P. Fuerst. 1992. Rose (Rosa dilecta) Response to Simulated Herbicide Drift. HortTechnology. July/Sept., 2(3): 394-398.

9/ Review of 6(a)(2) incident reports. Note to 6(a)(2) Swat Team, Jan. 11, 1993.

10/ Note TO: Frank Sanders, Registration Division, EPA, FROM: J. Holmes, EFED, EPA, 4/02/93.

11/ Fletcher, J.S., T. G. Pfleeger, and H.C. Ratsch. 1992. Potential Environmental Risks Associated With The New Sulfonylurea Herbicides. Environ. Sci. Technol., Vol. 27 (10): 2250-2252.

12/ Khan, M. and W.W. Donald. 1992. Sulfonylurea Herbicides Reduce Survival and Seed Production of Green and Yellow Foxtails (Setaria spp.). Weed Technology. Vol. 6 (2): 284-290.

OUTSTANDING ECOLOGICAL EFFECTS BRANCH STUDIES FOR ALS INHIBITING HERBICIDES

Sulfonylurea Herbicides:

1.) tribenuron methyl - 128887 - (Express, Harmony Extra) -

Tier II, 123-1 - Seed Germination: IN REVIEW
Seedling Emergence: IN REVIEW
Vegetative Vigor: IN REVIEW,

Tier II, 123-2 - Aquatic Plant Growth Studies (12/14/92 MEMO)
Additional plant tests requested: OUTSTANDING,

201-1, 202-1 - Spray Drift Studies requested 10/01/92: OUTSTANDING,

71-4 - Avian Reproduction using Mallard and Bobwhite: OUTSTANDING.

OTHER TESTS - Using salt formulation, conduct bridging studies:
71-1 (b) - Avian acute oral LD50: OUTSTANDING,

72-1 (b)or(d) - Fish acute LC50: OUTSTANDING,

72-2 (b) - Invertebrate acute LC50: OUTSTANDING.

2.) triasulfuron - 128969 - (Amber) -

201-1, 202-1 - Spray Drift Studies requested 12/20/91: OUTSTANDING.

3.) thifensulfuron methyl - 128845 - (Harmony, Pinnacle, Concert, Classic) -

Tier II, 123-1 - Seed Germination: OUTSTANDING
Seedling Emergence: OUTSTANDING
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth Using 5 Species: OUTSTANDING,

71-4 - Possible need for Avian Reproduction: OUTSTANDING,
72-4 - Possible need for Chronic Fish study: OUTSTANDING.

4.) sulfometuron methyl - 122001 - (Oust, Knockout) -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth Using:
Skeletonema costatum: OUTSTANDING,
Lemna gibba: OUTSTANDING,
Anabaena flos-aquae: OUTSTANDING,
A freshwater diatom such as Navicula sp.: OUTSTANDING,

72-1 (a) - Fish Acute LC50 Using Bluegill sunfish: OUTSTANDING,

72-1 (c) - Fish Acute LC50 Using Rainbow trout: OUTSTANDING,

72-2 (a) - Invertebrate Acute LC50 Using Daphnia magna: OUTSTANDING.

5.) bensulfuron methyl - 128820 - (Londax, Rifle) -

201-1, 202-1 - Spray Drift Studies: OUTSTANDING.

6.) chlorsulfuron - 118601 - (Glean, Finess) -

Tier II, 123-1 - Seed Germination: IN EEB REVIEW (3/21/94),
Seedling Emergence: IN EEB REVIEW (3/21/94),
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth:
Selenastrum capricornutum: IN EEB REVIEW (3/21/94),
Lemna gibba: OUTSTANDING,
Anabaena flos-aquae: OUTSTANDING,
Skeletonema costatum: OUTSTANDING,

71-4 - Avian Reproduction Using Mallard and Bobwhite: OUTSTANDING,

72-3 (a) - Estuarine/Marine Fish Acute LC50: IN EEB REVIEW (3/21/94),

72-3 (b) - Estuarine/Marine Mollusk Acute LC50: IN EEB REVIEW (3/21/94),

72-3 (c) - Estuarine/Marine Shrimp Acute LC50: IN EEB REVIEW (3/21/94),

72-4 (b) - Aquatic Invertebrate Life Cycle, Chronic: OUTSTANDING.

7.) ethametsulfuron - 129091 - (Muster) -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth:
Lemna gibba: OUTSTANDING,
Skeletonema costatum: OUTSTANDING,
Anabaena flos-aquae: OUTSTANDING,
A freshwater diatom such as Navicula sp.: OUTSTANDING,

71-4 (a) - Avian Reproduction Using Quail: OUTSTANDING,

71-4 (b) - Avian Reproduction Using Mallard: OUTSTANDING,

72-4 (a) - Fish Early Life Stage, Chronic: OUTSTANDING.

8.) metsulfuron methyl - 122010 - (Ally, Escort) -

Tier II, 123-1 - Vegetative Vigor (2 species): OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth:
Skeletonema costatum: OUTSTANDING,
Anabaena flos-aquae: OUTSTANDING,
A freshwater diatom such as Navicula sp.: OUTSTANDING,

71-4 (a) - Avian Reproduction Using Quail: OUTSTANDING,

71-4 (b) - Avian Reproduction Using Mallard: OUTSTANDING,

72-3 (a) - Estuarine/Marine Fish Acute LC50: OUTSTANDING,

72-3 (b) - Estuarine/Marine Mollusc Acute LC50: OUTSTANDING,

72-3 (c) - Estuarine/Marine Shrimp Acute LC50: OUTSTANDING,

201-1, 202-1 - Spray Drift Studies: OUTSTANDING.

9.) nicosulfuron - 129008 - (Accent) -

Tier II, 123-1 - Seed Germination: IN EEB REVIEW (3/21/94),

- Seedling Emergence: IN EEB REVIEW (3/21/94),

- Vegetative Vigor (Upgrade Studies): OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth (5 studies): OUTSTANDING.

10.) primisulfuron methyl - 128973 - (Beacon) -

NO DATA OUTSTANDING AS OF 1/07/92.

11.) rimsulfuron - 129009 -

Tier II, 123-1 - Seed Germination: IN EEB REVIEW (3/21/94), Seedling Emergence: IN EEB REVIEW (3/21/94), Vegetative Vigor: IN EEB REVIEW (3/21/94),

Tier II, 123-2 - Aquatic Plant Growth (5 studies): IN EEB REVIEW (3/21/94),

OTHER PLANT - 123-1 and 123-2 Specific Bridging Studies Using degradates,

12.) CGA-152005 - 129031 - (Exceed) -

71-4 (a) - Avian Reproduction Using Quail: IN EEB REVIEW (3/21/94),

71-4 (b) - Avian Reproduction Using Mallard: IN EEB REVIEW (3/21/94),

72-3 (a) - Estuarine/Marine Fish Acute LC50: OUTSTANDING,

72-3 (b) - Estuarine/Marine Mollusc Acute LC50: OUTSTANDING,

72-3 (c) - Estuarine/Marine Shrimp Acute LC50: OUTSTANDING,

201-1, 202-1 - Spray Drift Studies: OUTSTANDING.

13.) chlorimuron ethyl - 128901 - (Classic) -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II,123-2 - Aquatic Plant Growth (5 studies): OUTSTANDING.

14.) DPX-66037 - 129002 -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth (5 studies): OUTSTANDING.

71-4 (a) - Avian Reproduction Using Quail: OUTSTANDING,

71-4 (b) - Avian Reproduction Using Mallard: OUTSTANDING,

72-4 (a) - Fish Early Life Stage, Chronic: OUTSTANDING,

72-4 (b) - Aquatic Invertebrate Life Cycle, Chronic: OUTSTANDING.

Imidazolinone Herbicides

1.) imazapyr - 128821 - (Arsenal) -

Tier II, 123-1 - Seed Germination: OUTSTANDING, (ISO salt)
Seedling Emergence: OUTSTANDING, (ISO salt)
Vegetative Vigor: OUTSTANDING, (ISO salt)

Tier II, 123-2 - Aquatic Plant Growth (5 studies): OUTSTANDING, (ISO salt)

71-4 (a) - Avian Reproduction Using Quail: OUTSTANDING,

71-4 (b) - Avian Reproduction Using Mallard: OUTSTANDING,

72-3 (b) - Estuarine/Marine Mollusc Acute LC50: OUTSTANDING,

72-4 (a) - Fish Early Life Stage, Chronic: OUTSTANDING.

2.) imazaquin - 128848 - (Scepter) -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth (5 studies): OUTSTANDING.

3.) imazethapyr - 128922 - (Pursuit) -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth Using:

Anabaena flos-aquae: OUTSTANDING,
Lemna gibba: OUTSTANDING,
Skeletonema costatum: OUTSTANDING,
A freshwater diatom such as *Navicula sp.*: OUTSTANDING.

4.) imazethabenz - 128842 - (Assert) -

Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth (5 studies): OUTSTANDING.

5.) AC-263, 222 - 129041 -

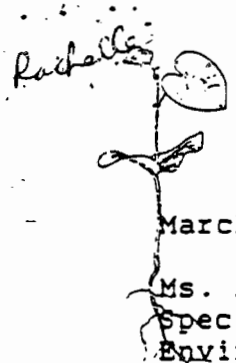
Tier II, 123-1 - Seed Germination: OUTSTANDING,
Seedling Emergence: OUTSTANDING,
Vegetative Vigor: OUTSTANDING,

Tier II, 123-2 - Aquatic Plant Growth (5 Studies): OUTSTANDING.

Triazolopyrimidine Herbicides

1.) flumetsulam - 129016 - (Broadstrike)

Non-guideline Seedling Emergence Study: OUTSTANDING.
(Conducted as part of Conditional Registration)



Rennerwood

Grower of liners

duplicate of I000903

March 9. 1994

Ms. Amy Farrell, 7508 W
Special Review and Re-registration Division
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Ms. Farrell:

I000903
001

Following up on our conversation of March 3, 1994, I have enclosed copies of materials pertaining to problems at my nursery.

I have been growing tree seedlings for thirteen years and in 1991-92 began having problems with a few crops which I had never seen before. Like most growers even today, I figured there was something I had done (sprayed) or there was some new insect causing the distortion I was observing. Three soil and plant samples were sent to three different laboratories (North Carolina, Florida, Oklahoma) and no known pathogens were found. They could not account for any of the symptoms.

In August 1992, Dr. Carl Whitcomb identified the problem as sulfonylurea herbicide damage. In 1993, Drs. Brent and Deb McGown confirmed the diagnosis. Since then I have observed the same symptoms in Florida, Alabama, Georgia, Tennessee, Arkansas and Louisiana. Plants shipped into Texas from Oregon, California, Washington, Montana and Virginia have also shown the same injury.

I grow 60 to 70 varieties of shade and ornamental trees. The most susceptible species are: river birch, white dogwood, Chinese dogwood, magnolias, red maple, live oak, willow oak, pecan, water oak, blackgum, Chinese pistachio, Chinese evergreen oak, tulip poplar and Chinese elm. All species show similar injury to roots: normal large white roots at the base of the trunk tapering to black, dead mushy roots with a large bulbous white end. Leaves of all species show similar patterns; tiny, miniscule and deformed or unformed. They often form in clusters or rosettes, curling and puckering. One half of a leaf may form and curl while the other side from the mid-vein fails to form at all. All species fail to grow, they are stunted and fail to develop roots in the container. We now have tree seeds sprouting

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TENNESSEE COLONY, TEXAS 75861
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deformed. We do not know if the seeds were contaminated on trees (DuPont labels and memos seem to imply seed crops can be contaminated by SU's even in storage) or here at the nursery from water or drift.

It has not been difficult to trace the sources of my contamination:

1. The Texas Highway Department sprays "Oust" March thru October every year at the rate of 2 oz. per 25 gallons of water on roadsides to my east and north (3/4 to 1 1/2 miles from my nursery). They spray over culverts and creeks that run into my 30 acre lake - the water source for my nursery. They spray over "paved surfaces", "highly compacted surfaces", and "impervious substrates". All are references to the Oust label where it should not be used. Of course, if you read further in the label it says "Oust is recommended for use...on roadsides" (pp. 3 and 4). Oust should not be used on roadsides because of pH: lime, limestone or calcium carbonate are used to stabilize roadbeds. As pH increases water solubility increases - 6.4 ppm at pH 5 and 12,600 ppm at pH 8.6.

2. The Texas Department of Corrections (5 prison units) is on my west spraying "Ally" on their coastal bermuda fields to kill Johnson and Bahia grasses. Their fields are 1/2 mile from me and sit on hills where runoff flows directly into my lake. Incidentally, they grow the vegetable crops for the state prison system and had serious crop failure last year that they couldn't account for (no tomatos, stunted and deformed potato tubers).

3. The Texas Forest Service recommends to all forestry consultant services the use of Oust on pine tree plantings. Bird Forestry Services (Houston) acts on their recommendation and last year alone sprayed 500 ounces of Oust on 3,000 acres of pine plantings in East Texas - some of which is 1 mile to my north. The Texas Forest Service, as well as the Texas Department of Agriculture, said they go on the basis of EPA registration and these products were certified for such use and therefore must be safe! It is interesting to note that the U.S. Forest Service killed their long-leaf pine tree plantings a couple of years ago after spraying with a contaminated "fungicide".

4. Hay farmers on my east and south spray "Ally" on their coastal bermuda fields to kill Bahia and Johnson grasses.

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Rennerwood

Grower of liners

Certainly, my water source has been contaminated. But that cannot account for distorted and dying shrubs and trees around my house which are watered by a community water system. It also cannot account for 30' tall post oaks and hickory trees in my woods showing distortion and dying.

In thirteen years I have built a reputation for quality. I am still regarded as growing the finest container grown liners in the industry. Some of the largest and oldest nurseries in the country have asked my help and advice with propagation. I am a member of the International Plant Propagators Society, a guest speaker of the society, past president of the Northeast Texas Nursery Growers Association, and current officer of the Texas Association of Nurserymen Region III. But now my business is suffering. I have entire greenhouses of stunted, deformed and dying trees. I have dumped thousands of tree liners over the past two years and it is getting worse. I am currently inquiring into the use of activated carbon to tie up the SU's but no one is knowledgeable enough about it. Even DuPont's tests in Florida to decontaminate fields did not work.

There is no place in this world for such an insidious and lethal class of herbicides as sulfonylureas. Is there anyplace where water doesn't run, wind doesn't blow, rain doesn't fall, crops aren't grown or won't be grown, or vegetation doesn't exist? If there is such a place, that is where SU's should be used.

Please pay attention to our concerns and our damages. I know EPA has been aware of the problems since at least 1987 but new SU's are still being registered. What will it take to pull these registrations? We already have declines in food crops from direct spraying (wheat in Oklahoma and Washington; rice in Japan; ginseng in Canada; kiwis in New Zealand; sugarcane and mangos in Puerto Rico); from the inability to rotate crops; from drift (apples, cherries, peaches, pecans - Washington, Texas, Oregon, South Carolina). What else is going on that we aren't aware of?

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Rennerwood

Grower of liners

I would greatly appreciate you keeping me informed on re-registration issues or efforts being made toward the removal of registrations of SU's. It should be a concern far beyond the nursery industry.

Sincerely,

Helen Matthews

Helen A. Matthews
owner

HAM:ss

enclosures
cc: Karl Arne, EPA Region 10
Teddi Brown, EPA region 7
Senator Charles Haley, Texas
Senator Bill Gustafson, Oklahoma
Rick Perry, Texas Department of Agriculture
Norma Grier, Northwest Coalition for Alternatives to Pesticides
Ann Hardison, EPA, Office of Administrator
Ed Edmondson, Texas Association of Nurserymen
Dr. Carl Whitcomb, Oklahoma
Stuart Turner, Washington

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Addendum: My investigation and research into SU's

1. Journal articles - U.S., Canada, Australia, England, France, Italy, Sweden.

a. ppt injure and kill plants: Brewster & Appleby; Atkins, et.al.; Blair & Martin; DuPont Doc. #25; Strek, et. al., DuPont; Beyer, et.al., DuPont; Levitt, DuPont; Horseley & Groninger; Obrigawitch, et.al., DuPont; Ray, DuPont; Kelley, et.al., DuPont; Moyer, et.al.; LaRossa, et.al., DuPont; Hay, DuPont; Maass; all SU labels.

b. symptoms on plants: Blair & Martin; La Rossa & Van Dyk; DuPont Doc. #25; Beyer, et.al., DuPont; Levitt, DuPont.

c. persistence & mobility in soil: DuPont Report No. AMR-1841-90; Blair & Martin; Gunther, et.al.; Beyer, et.al., DuPont; Bergstrom; Moyer, et.al.; Smith; Shea; Mahnken, et.al.

d. movement in air & water: DuPont Doc. #25; all SU labels; Mahnken, et.al.; Felsot, et.al.

e. no-effect level or non-detectable limits: Obrigawitch, et.al., DuPont; Strek, et.al., DuPont; Beyer, et.al., DuPont; Bergstrom.

f. volatility & vapor phase: Strek, et.al., DuPont; Kelley, et.al., DuPont; Felsot, et.al.

g. metabolism & sensitivity of plants to SU's: Beyer, et.al., DuPont; Levitt, DuPont; Sweetser, et.al.; Hageman & Behrens.

h. absence of antidote or prevention: Giardina, et.al.; Burnet & Hodgson.

2. Court documents

a. Washington (Middleton, et.al. v. DuPont) - "drift" of 3 miles after application of "Oust" through dust and wind.

b. Colorado (Rose, et.al. v. DuPont) - potato crops

damaged by "Oust"; carry over effect on primordial bud tissue of seed potatoes in the progeny grown from the contaminated seed; testimony revealed thousands of acres of crops had been destroyed in previous years from "Oust"; DuPont was liable until such time as crops could be grown in the contaminated soils.

c. Georgia (Lawson, et.al. v. DuPont) - chemists from Ohio, Michigan, Louisiana, Florida found SU's contaminated fungicide; DuPont admits symptoms are identical to those caused by SU's.

d. Arkansas, Florida, Texas - all symptoms identical to SU s.

e. 1993 recall by DuPont of "Preview", a soybean herbicide, because of contamination by "Ally", a DuPont SU.

3. Horticultural consultants - Carl Whitcomb, Stuart Turner, John Brown, Paul Nelson, John Chambers. Documentation on SU damage; how extensive it is worldwide yet the information is not getting out to us unless we track it down ourselves; impossible to detect in low levels; "unavailability" of laboratories; letters to EPA and USDA have gone unanswered.

4. Attorneys - Bruce McMath, Lonnie McGuire, Bob Parrott, Sherman Wilheim, Stewart Henry, Rick Lowerre. EPA has failed to pull the registration on SU's even though they know how uncontrollable they are and the specific problems they have caused; individual growers or groups must go through litigation in order to file "motions of discovery" to get the information and facts they need; it has become a political and legal endeavor for growers because no environmental action has been taken.

5. Researchers, toxicologists, plant pathologists, pesticide specialists - Carl Whitcomb, Stuart Turner, George Algard, Timothy D'Amato, Allan Felsot, Thomas Pfleeger. The proof and documentation is available on how destructive and uncontrollable SU's are in non-detectable amounts; it is known they remain in the soil at least seven years, leach out, travel in air and water; affect seed crops; how "insensitive" crops are showing reductions in yield from years of build up.

6. Laboratories - over two dozen contacted. Alta Analytical (California) won't accept my soil and water samples for testing for "Oust" and "Ally" because there is a "conflict of interest" with their manufacturer (DuPont); A & L (Texas) refused to test for SU's because they have been "harassed" and "discredited" in court cases by the manufacturer (DuPont); A & S (Pennsylvania) will be able to test for SU's shortly, as soon as they are "validated" by DuPont chemists.

7. Freedom of Information Office, Washington, D.C. - I have requested names of labs that can test for SU's but are not owned, controlled or validated by DuPont.

8. State and federal agencies - Texas Department of Agriculture, Texas Highway Department, Texas Department of Corrections, Texas Forestry Service, Louisiana Forestry Service, Texas Vegetable Growers Association, Texas Citrus Growers Association, Montana Department of Agriculture, Texas Farm Bureau, Texas Association of Nurserymen, EPA (Washington, Oregon, Texas, Washington, D.C.), Texas Natural Resource Commission (TNRCC). TNRCC is fighting TDA re: Ciba-Geigy's attempt to certify their new SU "Amber" for use in the state. Ciba-Geigy cannot give a half-life for the compound and leaching is a problem. The Organic and Compost Division of TNRCC is very concerned over non-detectable residues of SU's and the no-effect levels of SU's.

9. Private associations - Northwest Coalition for Alternatives to Pesticides (Norma Grier), Tri-Citians Against Chemical Trespass (Margaret Hue). Informed of extent of problems in the northwest and how long EPA has known about them and, as yet, has taken no action nor responded to letters, although some research was funded.

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10. Growers - ornamental shrubs, trees, ferns, bedding plants (2 dozen cases reported in January, 1994 in New Summerfield, Texas), vegetables, grains, flowers, peaches, pecans. Symptomology is identical per variety but in the worst cases (peaches and pecans) the trees have been killed outright. Each year, more and more of the fruit trees are dying as SU's build up in the soils and can't be metabolized. The death of peach trees in Texas had been credited to "peach tree decline" until law suits were filed and settled (v. DuPont). More cases are in the legal system now. The death of pecan trees was labelled "pecan tree decline" but now they are in

court. We also have "watermelon vine decline", "purple hull pea decline", "live oak decline", and "post oak decline". The word "decline" is used whenever no known pathogens can account for the damage. The Texas Fish and Wildlife Department is concerned over the decrease in fish populations due to a decrease in plankton in rivers and streams. Wildlife forage in East Texas has "unaccountably" diminished because of the death of hardwoods and berries (East Texas has a major lumber industry where Oust is continuously sprayed). The deer population in Texas has decreased, not from over hunting.

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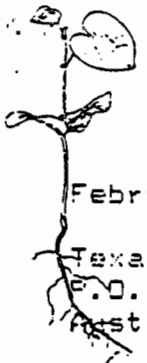

Rennerwood

Grower of liners

February 7, 1994

Texas Department of Agriculture
P.O. Box 12847
Austin, Texas 78711

RE: Complaint filed with David Inman, TDA Inspector
dated February 7, 1994

Dear Sirs:

On February 7, 1994 I filed a complaint with Texas Department of Agriculture, Inspector David Inman, for herbicide damage suffered at my nursery.

I specifically named:

1. Texas Highway Department - spraying Oust herbicide along highways and streams (around culverts) in my immediate area.
2. Texas Department of Corrections (4 units in Tennessee Colony) for spraying Ally herbicide.
3. Texas Forestry Service - recommending the use of Oust herbicide to forestry consultant services over pine plantings.

Both Oust and Ally belong to a class of herbicides called "sulfonylureas".

I currently have dwarfed, stunted and deformed plants at my nursery. Specific symptoms are: deformed leaves, cupping of leaves, half-formed and curled leaves, rosettes or clusters of miniscule leaves, dark green leathery foliage, red to maroon coloration in spring and summer, plants won't grow, brittle root tips, white phloem layer surrounding a black dead xylem layer, mushy roots, root tips enlarged in bulbous form.

First noticed symptoms in Fall '91. Had Dr. Carl Whitcomb, horticultural consultant from Oklahoma, look at my problems in 1992. He identified sulfonylurea damage. In August of '93 two more horticulturists from Wisconsin identified herbicide damage. Where did it come from? I have never used sulfonylurea herbicides. Who was using them nearby?

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I phoned Anderson County Commissioner Ron Howard, Texas Roadway Maintenance Supervisor Billy Bennett, which led me to Jim Grigsby the herbicide manager for the district. Mr. Grigsby came to the nursery and I told him of my concerns. I was given the name and number of the licensed state applicator who sprayed in my area - Jimmy Dingler, out of Athens. He informed me that Oust was used from March through October in conjunction with Roundup and Rodeo at the rates of 2 oz. Oust per 25 gallons of water or 2 oz. Oust per 33 gallons of water. He had been spraying Oust 3 or 4 years. Jim Grigsby promised they would not spray Oust anywhere around my area after February 2, 1993. We continued having problems.

On August 25, 1993, we phoned the prison units in Tennessee Colony. Spoke with Mr. Caraker, Mr. Reed and Ed Thomas in Huntsville who directed us to Steve Ball their herbicide specialist. Our prisons were using Ally herbicide and as a matter of information had considerable vegetable crop failure and damage that they couldn't account for. I000903 004

In 1993 we noticed pine plantings along State Highway 287 where the hardwoods were dying. We phoned Mike Glenn, Texas Forest Service, on January 19, 1994. The Texas Forest Service recommends Oust and Bird Forestry Service (Mike Bird) of Houston follows this recommendation and has sprayed 500 oz. of Oust over 3000 acres. Phoned Bruce Miles, Director of the Texas Forest Service and was told to talk with Dr. Brad Barber, Forest Service at Texas A & M. He was only aware of two sulfonylurea herbicides (there are 230) and "Oust didn't hurt anything, just killed weeds". When asked why then were hardwoods dying in these fields he replied that "pine seedlings must have full sun and cannot be shaded by other trees". Oust was used to kill other trees in addition to the weeds. I000903 005

At the west of my nursery are the prison units spraying Ally. Between the units and my nursery is Lake Creek #1 - my water source for the nursery. On the east and north are FM 645 and 3 other roads which are sprayed by the Highway Department. Not only were roadsides sprayed but areas around culverts and over creeks were sprayed. Two of these creeks feed my lake. In the Spring of 1993 we were behind the spray truck (about 2 car lengths) and had to turn our windshield wipers on when the sprayer was activated. part of I00090 004

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Rennerwood

Grower of liners

The manufacturers labels of these products (Oust and Ally) warn: "do not apply to impervious substrates such as paved or highly compacted surfaces...as off-target movement will occur." Also, "do not apply where it will physically drift...where it will be washed, where it will be blown or otherwise moved into crop land." "Do not apply to open water...nor while water is present, nor where it is likely to move into water, nor to areas near desirable plants."

"Keep out of lakes, streams, ponds, reservoirs or any body of water...extreme care must be taken to prevent drift or runoff to desirable plantings, agricultural land or any body of water."

"Do not allow to drift onto adjacent crops or desirable plants or trees as injury may occur...it can kill or severely injure most crops."

"Do not allow spray to drift onto crop land where crops are being grown or will be grown."

This entire class of herbicides is wrecking havoc in and out of the country: cases in Washington, Colorado, Arkansas, Georgia, Hawaii, Missouri, Oklahoma, Mississippi, Alabama, Oregon, Kentucky, North Dakota, Michigan, Florida, South Carolina, Puerto Rico, England, France, Belgium, Japan, Canada, Australia, New Zealand, and the Philippines.

I have a stack of research reports and court documents which identify and confirm the damages caused by sulfonylureas (these are available if you want to see them). But, by the manufacturing companies own admission, it is nearly impossible to detect ppb levels and totally impossible to detect ppt levels of sulfonylureas, yet ppt can and will stunt and kill sensitive species of plants.

The half-life of these products cannot even be proven. TDA is considering registering a new sulfonylurea herbicide "Amber" by CIBA-GEIGY - the company cannot tell how long it will remain in the soil. One Canadian study found sulfonylureas remained in soil 7 years after application!

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Rennerwood

Grower of liners

page 4

I have talked with growers all over the state of Texas - ornamental shrubs, trees, vegetables, peaches, pecans, ferns- with similar problems. Sulfonylureas are unprecedented in their ability to injure and kill plants. If nothing else, read the labels!

Sincerely,

Helen Matthews

Helen Matthews,
Owner

encl: Bibliography on sulfonylureas
Manufacturers label for Oust

cc: Ann Richards, Governor
Annie Tyrone, Texas Natural Resources Commission
Rick Perry, Texas Department of Agriculture
Ed Edmonson, Texas Association of Nurserymen
Gary Mauro, Texas Land Commissioner
Elton Bomer, Representative
Charles Haley, Representative
Carl Whitcomb, Ph.D.

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31

Document #9

DUPONT

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

BIOCHEMICALS DEPARTMENT

August 15, 1983

(1) ~~H. Stone~~ Needs info Sue gotten this story to date

(2) C. W. HITZEMANN

"OUST" WASHING/WIND DRIFT PROBLEMS
(Re: M. B. Burton's Note of 7/18/83)

We cannot be 100% sure of containing "Oust" on a treated ROW but are confident of minimizing the potential. I see no unusual liability potential to Du Pont in the future despite a hot, mobile herbicide. *

Our plans are to:

1. Conduct seminars with major customers and prospects. They are not too numerous because the market is custom applicators (who serve the plant site, utility, and railroad markets) and the roadside market.

2. In our literature, list necessary precautions. Pictures of what happened in 1983 will be in our literature and the instructions on how to prevent these liabilities. Make up slides for seminars.

3. We have already made them up with the necessary precautions and they are in the process of being distributed to sales personnel.

4. Modify our label. A copy is now in Judy Thomas's hands.

Do not apply
• saturated soil
• high rainfall periods
• windy conditions

In short, we will sell the product's weaknesses as well as its strengths. We are putting the liabilities up front in our presentations.

"Oust" is a "hot product." It works. Customers like it! They now know there are liabilities but what herbicide doesn't?

In 1983, "Oust" was applied to 250M miles of ROW. Considering the unusual year weatherwise, we have had a minimum of problems, and we have learned considerably. Custom applicators have insurance and so do most roadside customers. With our "honest" sales approach and the insurance factor, I am confident "Oust" will be an excellent money maker for Du Pont and with no more than the usual liability exposure.

Turney Isf
T. J. HERNANDEZ

103580

TJH/slf