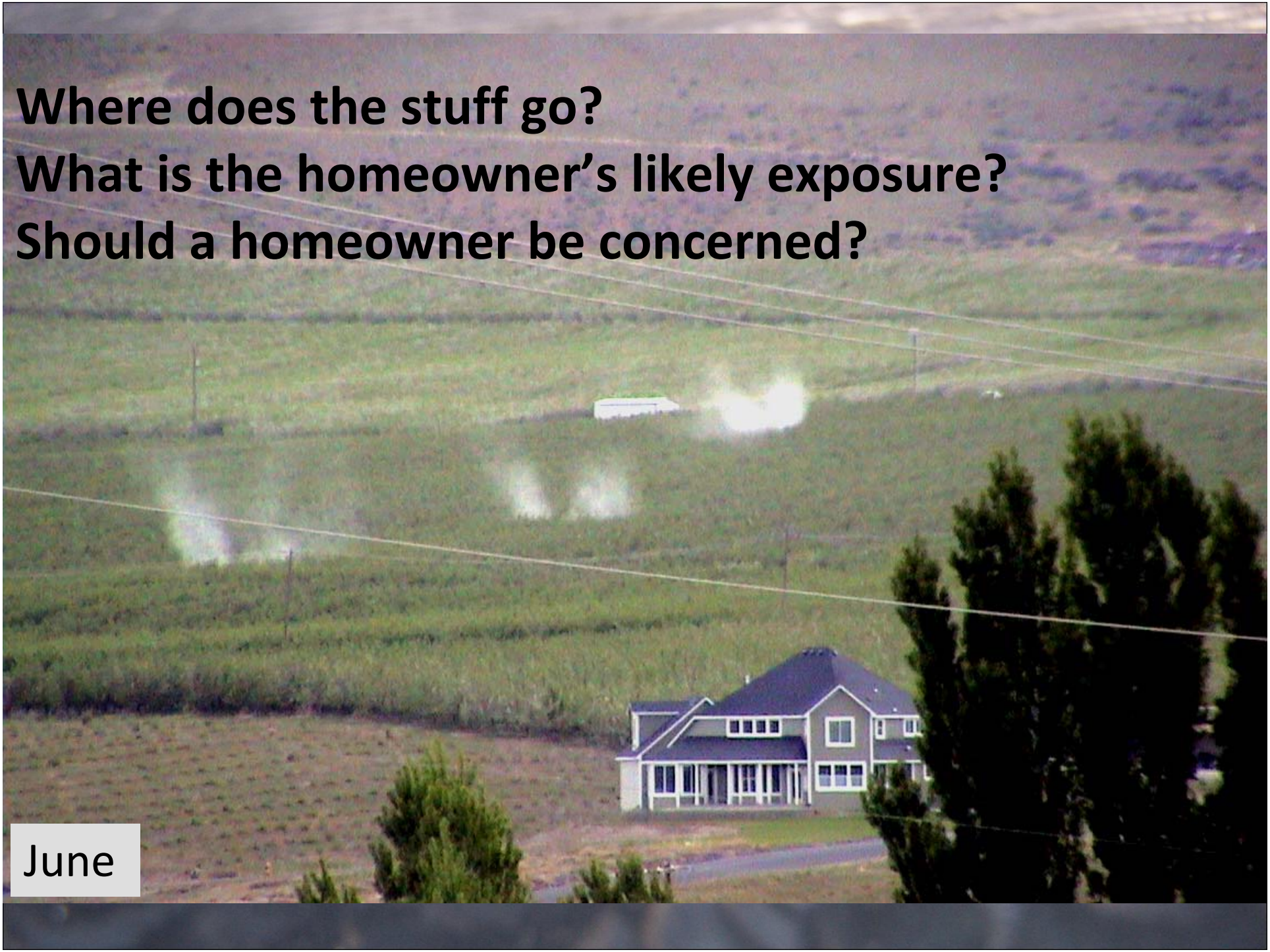
Gail Amos
TPSA Session 6A
2010/23/February
Savanna, Georgia USA

Buffer Zones
No Spray Zones

EPA's No Spray Zone

- "A no-spray zone is an area in which direct application of the pesticide is prohibited;
  - This area is specified in distance between the closest point of direct pesticide application and the nearest boundary of a site to be protected, unless otherwise specified on a product label."

“Farming at the Edge”


Where does the stuff go?
What is the homeowner's likely exposure?
Should a homeowner be concerned?
June


2002


2004

June 2003

March 2005


03/11/05 (A.M.)


Dormant Spraying (oil+)
03/11/05 (P.M.)

Hard, Cold Reality

- All sprays drift
- All chemicals are toxic at some dose
- Thus, the best we can do is minimize drift to a potential exposure level that is estimated to have a “reasonable certainty of no harm”

Drift Continues to Be the Top Cause of Bad PR, Lawsuits, and Regulatory Concern

Pesticide spray concerns rural residents

Homeowners near Ice Harbor Dam fear health problems

By MIKE LEE
Herald staff writer

Jeff and Ann Smith are taking off their shoes before going inside.

And not because they ju
a new house.

The Smiths, both Kenne
firefighters, are worried t
their three children were
to a common but toxic pes
Thursday evening during
spraying
nearby c
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off Ice H
Drive.

They're
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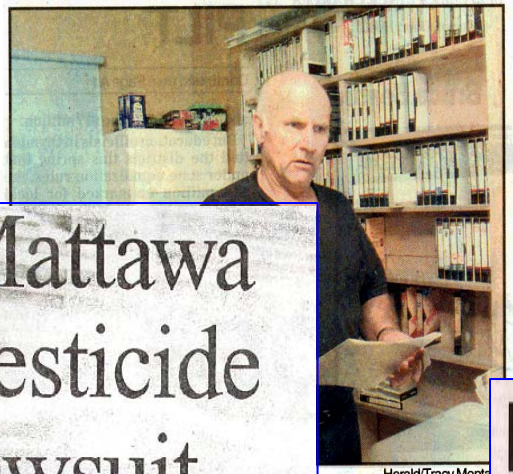
shoes. A
say they
complai
the Department of Agricu
state agency responsible f
cide management.

"This is dangerous stuff. We've got little kids."
—Jeff Smith, homeowner



Herald/Tracy Monta

overnment correspondenc
icide damage to his prope

has videotaped spray
flying over his house drip
sticides and spraying in
onditions.

He rushed the kids into the house and kept them inside that evening. "If we crack our windows it gets really strong," he said Friday morning. "I think we might have to find other lodging if it doesn't get better."

A spokesman for the chemical's manufacturer said Friday that Lorsban includes an inactive ingredient that emits a strong odor, similar to the smelly additive in gasoline. "Just because you smell it does not mean you are being exposed to any high concentrations," said James Zahand at DowElanco's Spokane office.

DowElanco bills Lorsban as "one of the great success stories in pest control efforts," and says it is one of the nation's best researched and most common pesticides.

Mattawa pesticide lawsuit settled

By The Associated Press

SPOKANE — A California chemical company and its insurance carrier will pay about $750,000 to three agricultural workers sprayed with a toxic pesticide near Mattawa, a Spokane newspaper reports.

High levels of pesticides found in state streams

By The Associated Press

SEATTLE — A new study tying pesticide and herbicide sales with stream pollution has waste management officials and environmentalists urging homeowners to think

EPA pushed to protect fish from pesticides

By The Associated Press and Herald staff

PORTLAND — Conservation groups are trying to push the Environmental Protection Agency toward stricter controls on pesticides

The Northwest Coalition for Alternatives to Pesticides, or NCAP, and the Washington Toxics Coalition served the EPA

It's Your Call:

Should there be stricter

mental groups are that the EPA hasn't canceled pesticide registrations that cause environmental harm. And they fault the EPA for not consulting with the National Marine Fisheries Service to

Aimee Code of NCAP said while pesticid labels warn against allowing them to get int fish-bearing streams, they don't tell consumer how to accomplish that.

38 pesticides barred near salmon waters

■ *Federal judge's ruling affects nearly all tributaries in Mid-Columbia region*

By John Stang
Herald staff writer

A federal judge ruled Thursday that 38 pesticides cannot be used within specific distances of rivers and creeks used by salmon runs that are endangered or threatened.

threatened and endangered salmonids," Coughenour wrote in his order.

These buffer zones are to remain until the Environmental Protection Agency and the National Marine Fisheries Service review and establish permanent restrictions on pesticide uses near streams containing salmon runs listed by the federal government as threatened or endangered.

Consequently, the ruling affects rivers and creeks branching off the Columbia River in Washington and Oregon — including the Mid-Columbia.

Coughenour also ordered that home

baryl, diazinon, diuron, malathion, triclopyr BEE and trifluralin.

Coughenour's order is not a surprise because he earlier indicated he would rule that way, said Patti Goldman, a Seattle-based attorney for Earthjustice.

Earthjustice represents the Washington Toxics Coalition, the Northwest Coalition for Alternatives to Pesticides, the Pacific Coast Federation of Fishermen's Associations and the Institute for Fisheries Resources in a lawsuit filed against the EPA to seek the restrictions noted in Thursday's order.

and NMFS) to talk to each other, and farmers are going to pay for it," said Heather Hansen, executive director of Washington Friends of Farms and Forests, based in Olympia.

She later added, "Some people will likely be put out of business because of (the ruling)."

Hansen pointed to small tree fruit farms in the Wenatchee area and in Skagit County as potential ventures that could go out of business.

She also contended that EPA can already restrict specific pesticides if they

Tri-City Herald 11/30/02

Signs of ailment needn't be present to get money, court says

By The Associated Press

SALEM — Indications of injury or disease don't have to be present during a physical exam in order for an employee to qualify for workers' compensation coverage, the Oregon Supreme Court ruled Friday.

With the decision, the Supreme Court unanimously reversed the Oregon Court of Appeals in refining a key part of the state's workers' compensation law.

The case involves an appeal of a state Workers' Compensation Board ruling in the case of Geoffrey Lewis, an Oregon State University bioscience technician who suffered from chemical exposure.

Lewis in 1997 developed symptoms during and after cleaning a building containing insecticides, herbicides and fungicides. He wore a mask, which leaked, and goggles that he took off when they became fogged.

He experienced fatigue, eye irritation, coughing and wheezing and later developed a sore throat, dizziness, headache, sinus congestion, bright yellow phlegm and vision problems.

Lewis continued to work and was about 70 percent recovered when he first went to a doctor, who concluded the chemical exposure caused his symptoms. He later was examined by two other doctors, when he was 95 percent recovered.

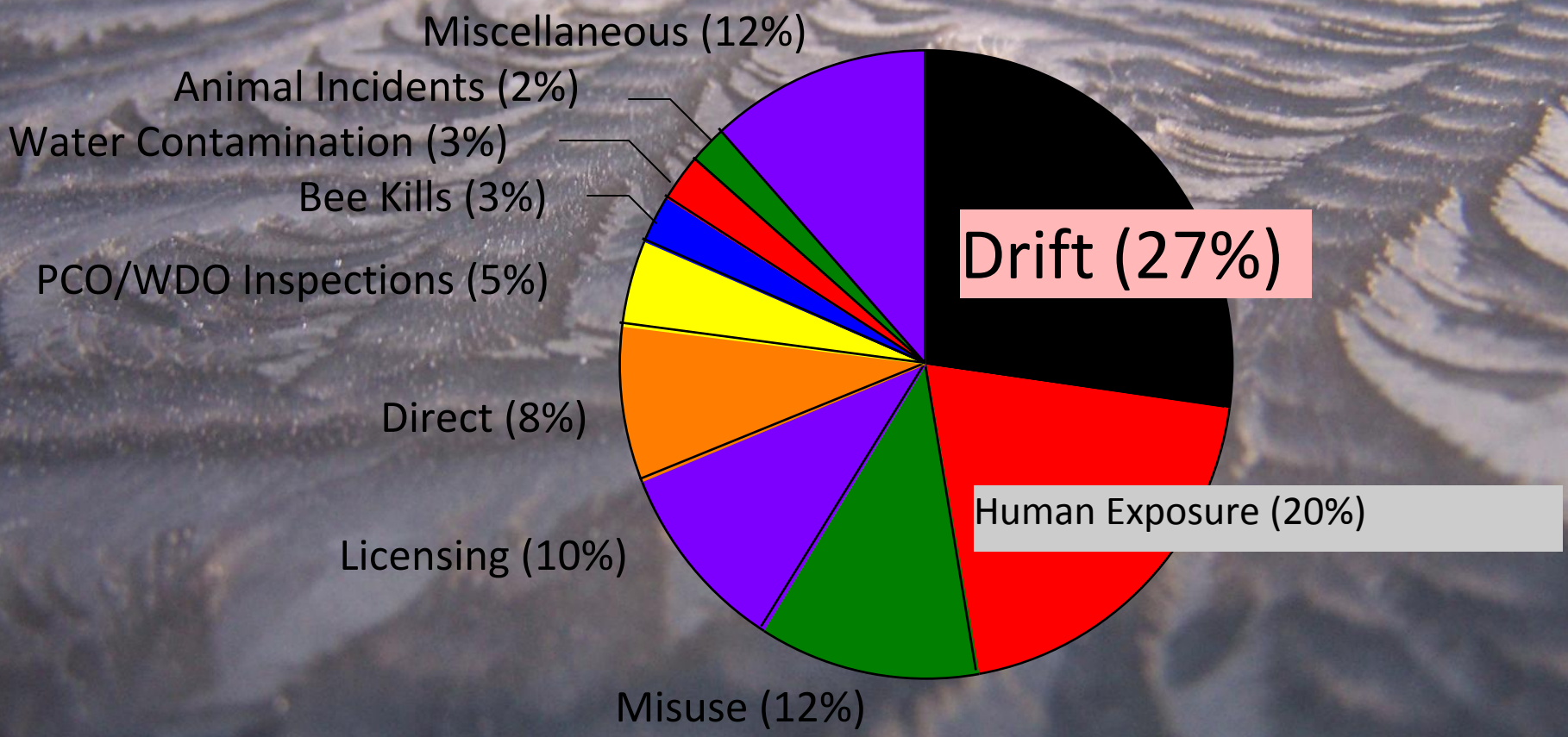
The school's workers' compensation insurer, SAIF Corp., denied Lewis' claim for exposure to pesticide-contaminated dust on grounds there was insufficient evidence he had a diagnosable condition relating to the exposure.

The Court of Appeals ruled for the insurer, saying "indications of an injury or disease must, at the time of the examination, be presently verifiable."

The Supreme Court said it found nothing in the law requiring that.

WSDA PIRT Analysis 2000
(Pesticide Incident Reporting & Tracking)

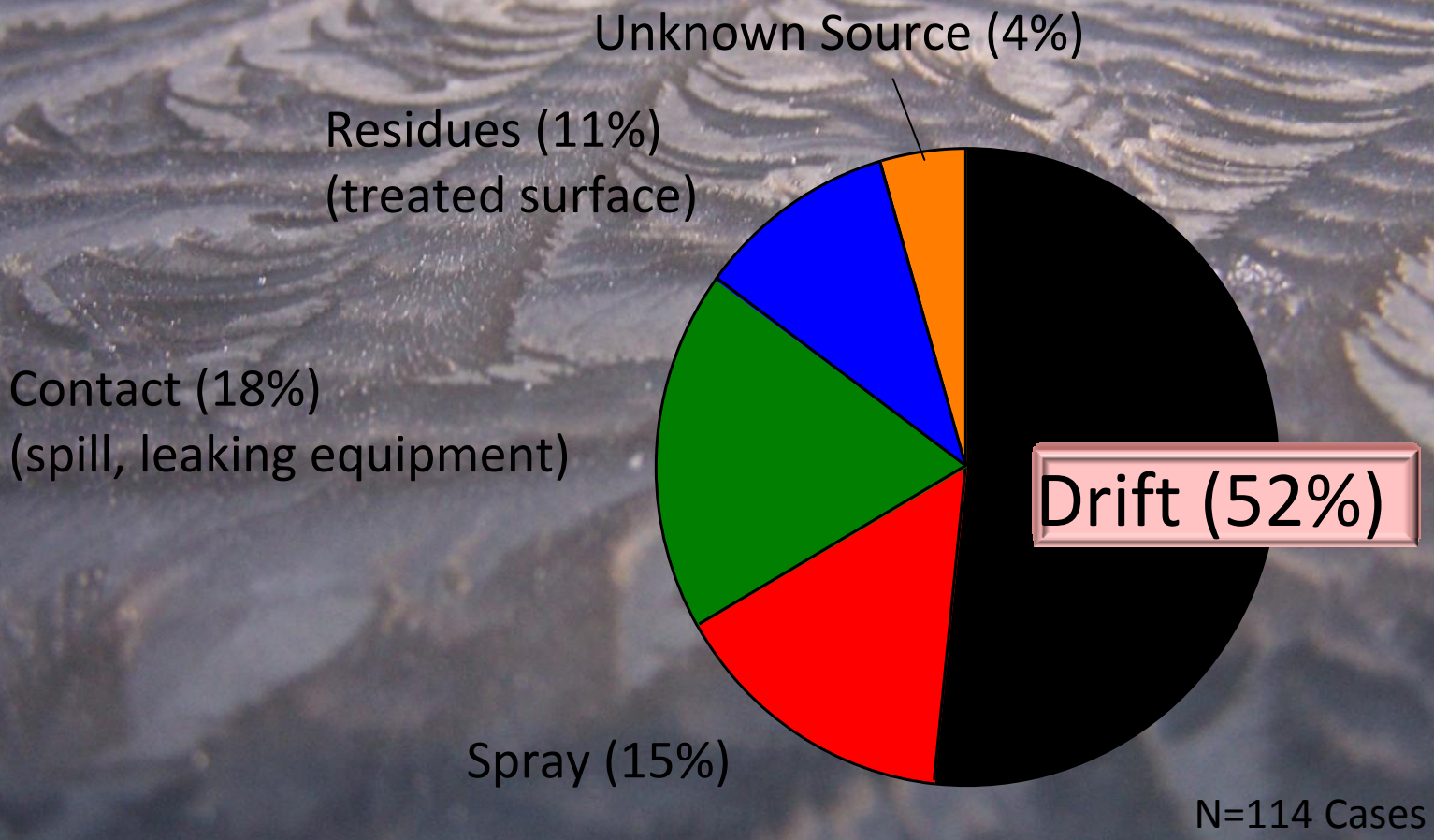
Complaints Associated with Cases



N=199 Complaints

WA Department of Health PIRT Analysis 2000
(Pesticide Incident Reporting & Tracking)

Exposure Sources Associated with Cases



Wenatchee - Brender Creek

	3/24	4/14	5/13	5/21	5/27	8/13	8/19	8/26
Imidacloprid		0.060						
DDT & metabolites	0.027	0.040	0.368	0.058	0.079	0.033	0.030	0.046
Chlorpyrifos		0.28	0.019					
Total Endosulfan	0.118	0.046	0.045	0.040	0.036			

Detection of pesticide residue, concentration below regulatory or toxicology endpoint
Magnitude of detection above WAC or NRWQC regulatory endpoint.
Magnitude of detection above ES level of concern for fish, which is 1/20th of the acute toxicity endpoint.


Wind 3-8 MPH Pesticide Application Record

Lower Yakima - Marion Drain

	4/7	4/28	5/26	6/10	6/18	6/23	8/20	8/25	9/2
2, 4 D			0.057	0.091	0.085	0.028	0.05	0.03	
Dicamba 1		0.01	0.011	0.007			0.02	0.02	
Chlorpyrifos	0.009			0.005					0
Malathion			0.015						
Terbacil		0.09	0.043	0.041	0.054		0.04	0.02	0.03
Trifluralin		0.012	0.04	0.02	0.018				

Pesticide residue detected. Assessment criteria not available.

Detection of pesticide residue, concentration below regulatory or toxicology endpoint

How Do Pesticides Move to Water?

- In drier climates, spray drift is likely a major source of pesticide residues in water
- In wetter climates, runoff is likely to be the source of pesticide residues in water
  - However, minimizing off-target movement from spray drift into riparian zones will mitigate runoff concentrations
  - Must avoid direct entry into water
- Thus, minimizing spray drift makes sense for any climatic region

Achieving a Reasonable Certainty of No Harm

- Minimize the amount of drift by employing BMPs (Best Management Practices)
  - Minimize transport out of targeted area
  - Maintain efficacy
- Need to understand the mechanics of drift, the factors affecting drift, and how we can manage those factors

RESTRICTED USE PESTICIDE

DUE TO AVIAN AND AQUATIC TOXICITY

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

Diazinon AG500

INSECTICIDE

For control of certain insects on fruits, nuts, vegetables, and ornamentals grown outdoors in nurseries.

ACTIVE INGREDIENT:	% BY WT.
Diazinon: O,O-diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate	48.0%

FIRST AID *(continued)*

- Dormant applications on orchard crops are restricted to ground application equipment only.
- Do not apply within 100 feet upslope of "sensitive aquatic sites" such as any irrigation ditch, drainage canal, or body of water that may drain into a river or tributary unless a suitable method is used to contain or divert runoff waters. Waters that are contained or diverted must be held for a minimum of 72 hours before release into a sensitive aquatic site.
- Maintain a vegetative buffer strip a minimum of 10 feet wide from the edge of a field that is adjacent to and within 100 feet of sensitive aquatic sites.
- Do not apply this product to orchards when soil moisture is at field capacity and/or when a storm event likely to produce runoff from the treated orchard is forecasted by NOAA/NWS (National Weather Service) to occur within 48 hours following application.

- When sensitive aquatic sites are downwind from orchards, spray the first three rows nearest the sensitive aquatic sites only when the wind is blowing away from the sites. The row at the edge of the field next to sensitive aquatic sites must be sprayed with the outside nozzles turned off. Spray must not be directed higher than the tree canopy, and spray must be directed away from sensitive aquatic sites.

MUSTANG MAX
Insecticide

Mustang MAX

BUFFER ZONES

Vegetative Buffer Zones

Construct and maintain a minimum 10-foot-wide vegetative filter strip of grass or other permanent vegetation between the field edge and down gradient aquatic habitat (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or natural ponds; estuaries; and commercial fish ponds.)

RESTRICTED USE PESTICIDE
Toxic to fish and aquatic organisms
For retail sale to and use only by certified applicators, or persons under their direct supervision and only for those uses covered by the certified applicator's certification.

MUSTANG MAX
Insecticide

Mustang MAX

Only apply products containing zeta-cypermethrin onto fields where a maintained vegetative buffer strip of at least 10 feet exists between the field and down gradient aquatic habitat.

For guidance, refer to the following publication for information On constructing and maintaining effective buffers: Conservation Buffers to Reduce Pesticide Losses, Natural Resources Conservation Services, USDA, NRCS. 2000. Fort Worth, Texas. 21pp. http://www.in.nrcs.usda.gov/technical/agronomy/newconbuf.pdf.

RESTRICTED USE PESTICIDE
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MUSTANG MAX™

Insecticide

Mustang MAX

Buffer Zone for Ground Application (groundboom, overhead chemigation, or airblast)- Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes, reservoirs, rivers, permanent streams, marshes, natural ponds, estuaries, and commercial fish ponds.)

Buffer Zone for ULV Aerial Application- Do not apply within 450 feet of aquatic habitats, (such as, but not limited to, lakes, reservoirs, rivers, permanent streams, marshes, natural ponds, estuaries, and commercial fish ponds.)

RESTRICTED USE PESTICIDE

Toxic to fish and aquatic organisms

For retail sale to and use only by certified applicators, or persons under their direct supervision and only for those uses covered by the certified applicator's certification.

MUSTANG MAX
Insecticide

Mustang MAX

Buffer Zone for Non-ULV Aerial Application- Do not apply within 150 feet of aquatic habitats, (such as, but not limited to, lakes, reservoirs, rivers, permanent streams, marshes, natural ponds, estuaries, and commercial fish ponds.)

RESTRICTED USE PESTICIDE
Toxic to fish and aquatic organisms
For retail sale to and use only by certified applicators, or persons under their direct supervision and only for those uses covered by the certified applicator's certification.

RESTRICTED USE PESTICIDE

Due to acute toxicity to humans, aquatic organisms, and avian species. For retail sale to and use only by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator's certification.

Drexel

Endosulfan 3EC

Insecticide

For Agricultural or Commercial Use Only. Not for use or storage in or around residential sites - see DIRECTIONS FOR USE / GENERAL INFORMATION for prohibited areas.

ACTIVE INGREDIENT:

Endosulfan	34.0%
OTHER INGREDIENTS:*	66.0%
TOTAL:	100.0%

This product contains 3 pounds of Endosulfan per gallon.
*Contains xylene range aromatic solvent.

KEEP OUT OF REACH OF CHILDREN

DANGER **PELIGRO**

POISON **VENENO**

PRECAUTIONARY STATEMENTS

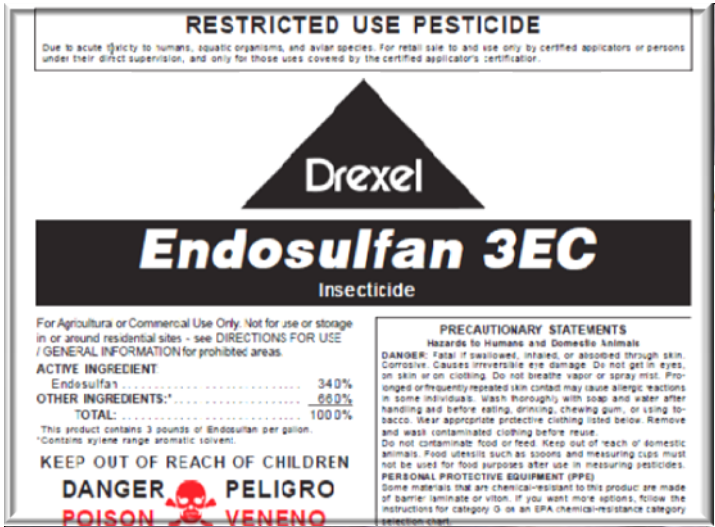
Hazards to Humans and Domestic Animals

DANGER: Fatal if swallowed, inhaled, or absorbed through skin. Corrosive. Causes irreversible eye damage. Do not get in eyes, on skin or on clothing. Do not breathe vapor or spray mist. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Wear appropriate protective clothing listed below. Remove and wash contaminated clothing before reuse.

Do not contaminate food or feed. Keep out of reach of domestic animals. Food utensils such as spoons and measuring cups must not be used for food purposes after use in measuring pesticides.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are made of barrier laminate or viton. If you want more options, follow the instructions for category G on an EPA chemical-resistance category selection chart.



RESTRICTED USE PESTICIDE

Due to acute toxicity to humans, aquatic organisms, and avian species. For retail sale to and use only by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator's certification.

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KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

POISON VENENO

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

DANGER: Fatal if swallowed, inhaled, or absorbed through skin. Corrosive. Causes irreversible eye damage. Do not get in eyes, on skin or on clothing. Do not breathe vapor or spray mist. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Wear appropriate protective clothing listed below. Remove and wash contaminated clothing before reuse.

Do not contaminate food or feed. Keep out of reach of domestic animals. Food utensils such as spoons and measuring cups must not be used for food purposes after use in measuring pesticides.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are made of barrier laminate or viton. If you want more options, follow the instructions for category D on an EPA chemical-resistance category selection chart.

30' Vegetation buffer strip

SPRAY DRIFT MANAGEMENT:

1. Do not allow spray to drift from the application site and contact people, structures people occupy at any time and the associated property, parks and recreation areas, non-target crops, aquatic and wetland areas, woodlands, pastures, rangelands, or animals.
2. A 30 ft. vegetative buffer strip must be maintained between all areas treated with this product and rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries and commercial fish ponds.
3. For ground boom applications, do not apply within 100 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries and commercial fish ponds. Apply with nozzle height no more than 4 feet above the ground or crop canopy and when wind speed is 10 mph or less at the application site as measured by an anemometer. Use fine, medium or coarser spray according to ASAE 572 definition for standard nozzles or VMD for spinning atomizer nozzles.
4. For orchard/vineyard airblast applications, do not apply within 100 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries and commercial fish ponds. Direct spray above trees/ vines and turn off outward pointing nozzles at row ends and outer rows. Apply only when wind speed is 3 to 10 mph as measured by an anemometer outside of the orchard/vineyard on the upwind side.
5. For aerial applications, do not apply within 300 feet of rivers, natural ponds, lakes, streams, reservoirs, marshes, estuaries and commercial fish ponds. The boom width must not exceed 75% of the wingspan or 90% of the rotary blade. Use upwind swath displacement and apply

No spray zone: Ground 100' Air 300'

Airblast direct spray above trees turn off outward pointing nozzles at row ends and outer rows

RESTRICTED USE PESTICIDE

DUE TO TOXICITY TO FISH AND AQUATIC ORGANISMS

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS, OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

GROUP 3 INSECTICIDE

Warrior II
with Zeon Technology®

Insecticide

Active Ingredient:
Lambda-cyhalothrin[1,2]

SPRAY DRIFT PRECAUTIONS

BUFFER ZONES

Vegetative Buffer Strip

Construct and maintain a minimum 10-foot-wide vegetative filter strip of grass or other permanent vegetation between the field edge and down gradient aquatic habitat (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or natural ponds; estuaries; and commercial fish farm ponds).

Only apply products containing Warrior II with Zeon Technology onto fields where a maintained vegetative buffer strip of at least 10 feet exists between the field and down gradient aquatic habitat.

For guidance, refer to the following publication for information on constructing and maintaining effective buffers:
Conservation Buffers to Reduce Pesticide Losses. Natural Resources Conservation Services. USDA, NRCS. 2000. Fort Worth, Texas. 21 pp.
www.in.nrcs.usda.gov/technical/agronomy/newconbuf.pdf

In the State of New York, a 25 ft. vegetated, non-cropped buffer strip untraversed by drainage tiles must be maintained between a treated field and a coastal salt marsh or stream that drains into a coastal salt marsh, for both aerial or ground application. For aerial applications, the 25 ft. vegetated non-cropped buffer strip for runoff protection would be part of the larger 150 ft. buffer strip (or 450 ft. buffer strip for ULV application) required for spray drift.

Buffer Zone for Ground Application (groundboom, overhead chemigation, or airblast)

Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes; natural ponds; estuaries; and commercial fish ponds).

Buffer Zone for ULV Aerial Application

Do not apply within 450 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes; natural ponds; estuaries; and commercial fish ponds).

Buffer Zone for Non-ULV Aerial Application

Do not apply within 150 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes; natural ponds; estuaries; and commercial fish ponds).

Dow AgroSciences

Starane*

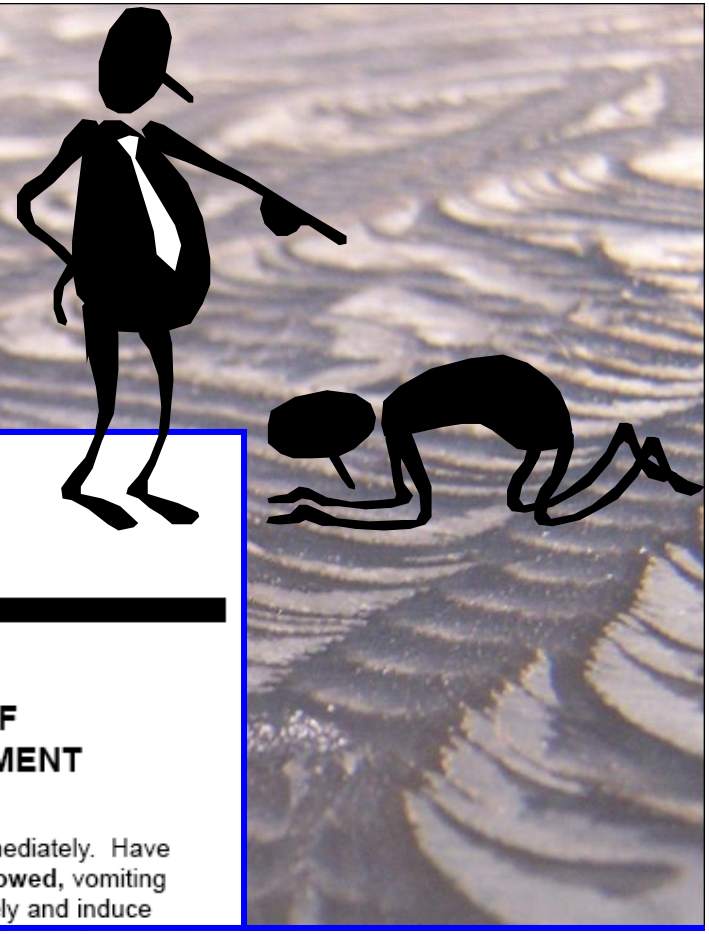
+Sword®

Herbicide

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

The Pesticide Label

Prime Mechanism of Controlling Pesticide Use



Guthion® Solupak

50% WETTABLE POWDER CROP INSECTICIDE

IN WATER SOLUBLE PACKETS

For effective economical insect control.

ACTIVE INGREDIENT:

O,O-Dimethyl *S*-[(4-oxo-1,2,3-benzotriazin-3(4*H*)-yl)methyl]phosphorodithioate 50%

IN

STATEMENTS OF PRACTICAL TREATMENT

Organophosphate

In case of poisoning, call a physician immediately. Have patient lie down and keep quiet. **If swallowed,** vomiting should be induced. Administer water freely and induce

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may

REQUIREMENTS FOR REDUCING SPRAY DRIFT

Do not apply under conditions where possible drift to unprotected persons or to food, forage, or other plantings that might be damaged or the crops thereof rendered unfit for sale, use or consumption can occur.

1. Use the largest droplet size consistent with acceptable efficacy. Formation of very small droplets may be minimized by appropriate nozzle selection, by orienting nozzles away from the air stream as much as possible and by avoiding excessive spray boom pressure. For ground-boom and aerial applications, use medium or coarser spray nozzles according to ASAE 572 definition for standard nozzles or a volume mean diameter (VMD) of 300 microns or greater for spinning atomizer nozzles.
2. Make aerial or ground applications when the wind velocity favors on-target product deposition. Apply only when the wind speed is less than 10 mph. For all non-aerial applications, wind speed must be measured adjacent to the application site on the upwind side, immediately prior to application.
3. Do not make aerial or ground applications into areas of temperature inversions. Inversions are characterized by stable air and increasing temperatures with increasing distance above the ground. Mist or fog may indicate the presence of an inversion in humid areas. Where permissible by local regulations, the applicator may detect the presence of an inversion by producing smoke and observing a smoke layer near the ground surface.
4. Low humidity and high temperatures increase the evaporation rate of spray droplets and therefore the likelihood of increased spray drift. Avoid spraying during conditions of low humidity and/or high temperatures.

Low humidity high temp

5. All aerial and ground application equipment must be properly maintained and calibrated using appropriate carriers.
6. For ground boom applications, apply with nozzle height no more than 4 feet above the ground or crop canopy.
7. For airblast applications, turn off outward pointing nozzles at row ends and when spraying the outer two rows.
8. For aerial applications, release spray at the lowest height consistent with efficacy and flight safety. If the application includes an aquatic buffer zone, do not release spray at a height greater than 10 feet above the ground or crop canopy.
9. For aerial applications, the spray boom should be mounted on the aircraft so as to minimize drift caused by wing tip vortices. The minimum practical boom length should be used and must not exceed 75% of the wingspan or 90% of rotor blade diameter. Use upwind swath displacement.
10. Do not apply this product within 60 feet of (1) buildings occupied by humans for residential, commercial, or business purposes, including, but not limited to, homes, farmworker housing, or other residential buildings, schools, daycare centers, nursing homes, hospitals, and (2) outdoor recreational areas such as school grounds, athletic fields, and parks. Non-residential agricultural buildings, including barns, livestock facilities, sheds, and outhouses are not included in this prohibition.


Turn off at row ends

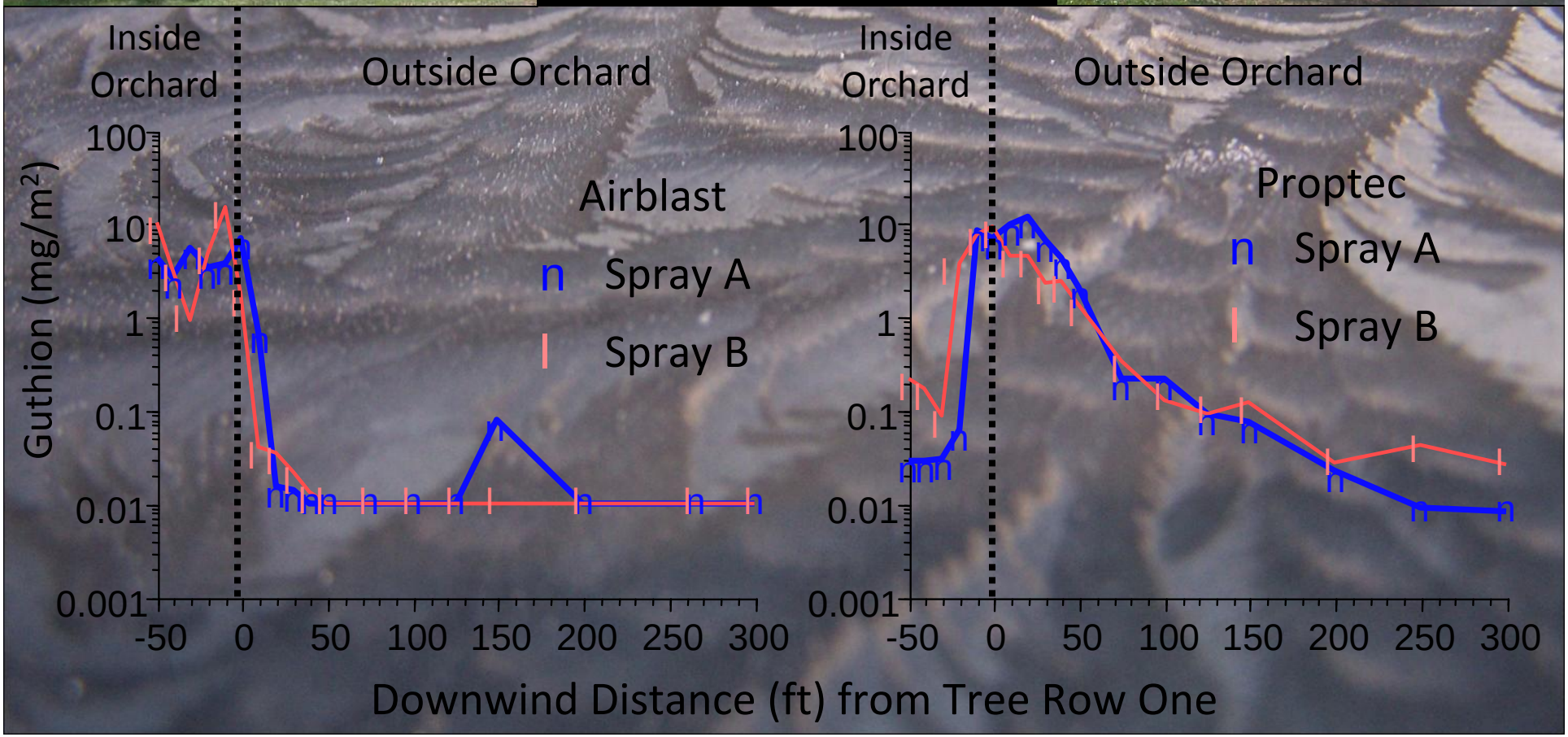

Is it the sprayer or the operator?

Application Control on Amended Guthion Label

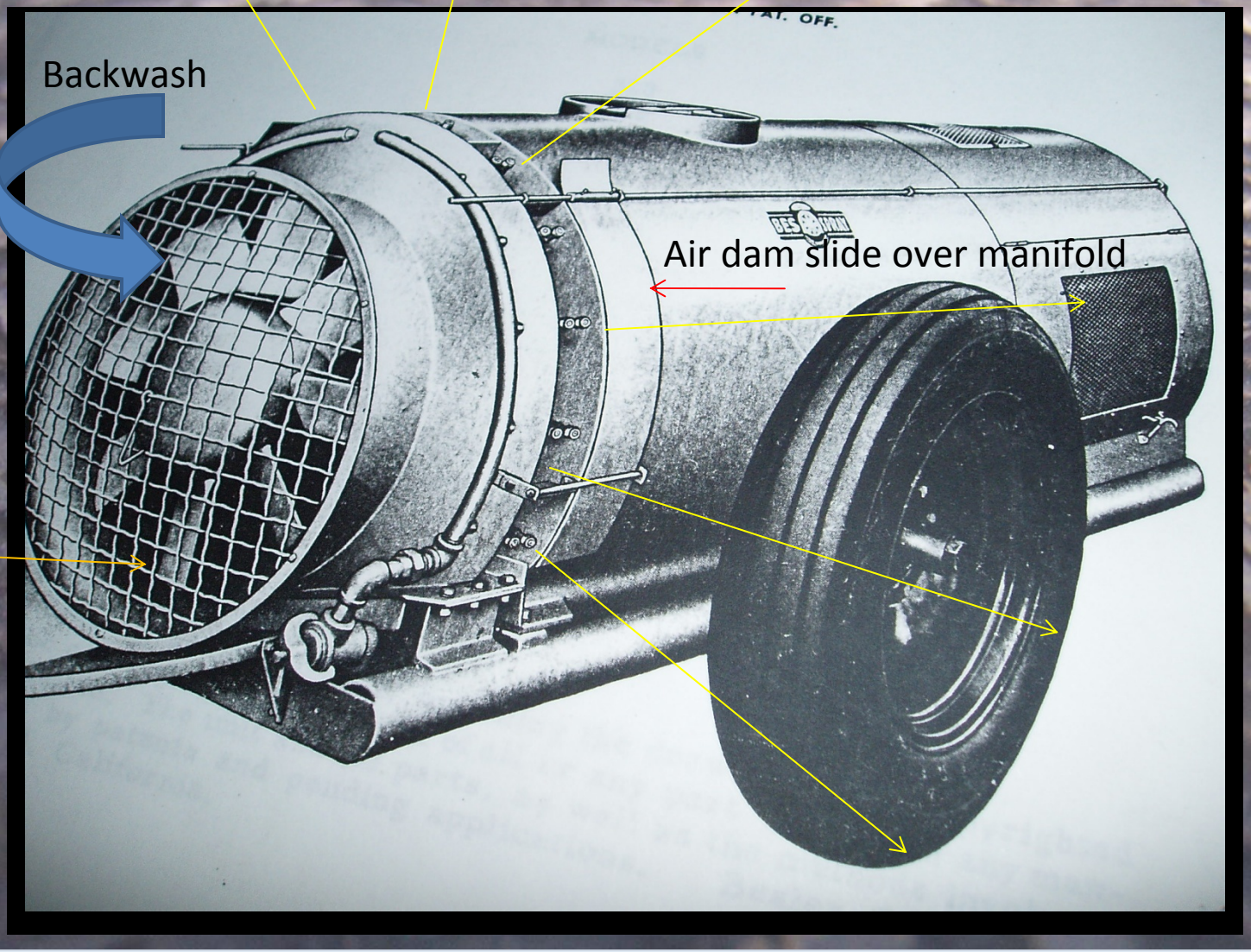
- "For airblast applications, turn off outward pointing nozzles at row ends and when spraying the outer two rows"


KUBOTA

Evidence for Sprayer Backwash When Nozzles Off on One Side



Old style sprayer air dam has merit to eliminate backwash



Turning off nozzles on one side of manifold will not eliminate spray

Manifold Shields: An Easy Solution to An Avoidable Problem


Gail Amos

No-Spray Buffer Zones

A Solution for Minimizing Impact of Drift

- Downwind distance between the outer edge of the last swath and the point beyond which exposure to a nontarget receptor is **reasonably certain to pose no harm**
  - May be required on the pesticide product label
  - Can be estimated using relevant toxicological endpoints
  - Can be estimated so that
    - Regulatory water quality standards are not likely to be violated
    - Acceptable daily intakes (ADIs) or reference doses (RfDs) are not likely to be reached

Toxicological Criteria

- Of all the herbicides likely to be used in turf management, 2,4-D is probably considered the most hazardous
  - Set a no-spray zone to protect against 2,4-D and you'll protect against all others
- 2,4-D acute Reference Dose (RfD) is 0.025 mg/kg/day
  - The acute RfD is the "safe" dose ("reasonable certainty of no harm") following exposure during a 24 hour period
  - A human body dose <0.025 mg/kg/day is 1000 times less than the dose observed to cause no effects of in toxicological studies
  - Thus, any spray drift should be below the RfD

Conclusions

- All sprays drift
- Minimize drift with BMPs
  - Goal: Exposure potential meets the test of "reasonable certainty of no harm" or residues do not exceed State water quality standards
- No-spray buffer zones are one of many BMPs
- Size of the buffer zone can be tailored to the non-target (human or ecological) and the specific pesticide
  - Labels or lawsuit decision may dictate the size!

Conclusions

- Other Options
  - Nozzle, pressure, boom height, alternative sprayers/nozzles, drift control agents, shields, optimal weather
  - Vegetation wind breaks “hide” activities & filter sprays
    - Be aware that “solid” hedge rows can increase deposition on the leeward side
  - Choose reduced risk pesticides
    - Tend to have higher NOAECs & LC50s
    - Will significantly reduce buffer zone size
    - May eliminate need for no-spray buffer

Establishing Buffer Zones

- Compile toxicological data
  - Endpoints for Aquatic Nontarget Organisms
    - NOAEC--dose at which no adverse effect is observed on development and reproduction
  - Endpoints for Sensitive Plant Species
    - EC25--application rate equivalent that affects plant vigor by 25% compared to control
      - Adjust with safety factor
  - Endpoints for Humans
    - RfD--EPA's Reference Dose (exposure dose with reasonable certainty of no harm; applies at least a 100X safety factor to the NOAEL

Establishing Buffer Zones

- Information Sources
  - Registration Eligibility Decision Documents
  - EPA Acquire Database
    - **Information is now linked to Pesticide Action Network Database!!**
  - State regulatory agencies (Agriculture, Environment/Ecology)
  - GOOGLE it!!!