Tracking Down Off-Target Movement of Herbicides: Tips and Tricks

Eric Webster

My Experience Investigating Drift

- Rice
- Cotton
- Soybean
- Sweet potato
- Corn
- Sugarcane
- Trees

- Newpath
- Beyond
- Roundup
- Ignite/Liberty
- 2,4-D
- Dicamba
- Permit
- Londax
- Metolachlor
- Grandstand
- Atrazine
- Paraquat

Identifying Herbicide Drift

- Recognizing drift, an art rather than science
  - Usually no one symptom can say it is one herbicide over the other
  - It may show nutrient deficiency, may be disease symptomology
  - Drift rates can be so low visual symptoms to not occur
- Try to identify herbicide
  - One plant cannot be used to determine injury
  - When was symptomology first noticed?
  - When did application in question occur?
  - Ground vs aerial?
  - What time of day?
  - Weather conditions – nearest weather station can help?
  - Ask as many questions as possible?

Direction of Herbicide Drift

- Stand back and look at the entire area
  - More often than not, the best evidence in not in the field
  - Vegetation around field
  - Roadsides
  - Crops/Weeds in surrounding fields
  - Levees/Field roads
  - I really like to look at trees

The Easy Ones

Identifying Herbicide Drift

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  - More often than not the best evidence in not in the field
  - Roadsides
  - Vegetation around field
  - Crops in surrounding fields
  - Levees
  - I really like to look at trees
  - Most calls from aerial application vs. ground
  - Worst drift was from ground application
  - Most wide spread aerial application during inversion
  - Don’t make it harder than it is

Three types of Off-Target Movement of Pesticides

1. Physical Drift

   A. Near Drift – less than 0.3 miles
      - more wind blown drift
      - more pattern of distribution
      - more severe injury in a smaller defined area
      - I refer to this as misapplication

   B. Far Drift – greater than 0.3 miles
      - Movement in stable air – inversion
      - Tend to be less pattern
      - Generally more wide spread, large acreage sprayed

- Bird et al. 1996 – Spray Drift Task Force

  Atmospheric stability and wind speed, the only meteorological parameters correlated with physical drift

Inversion Layers and Spray Drift

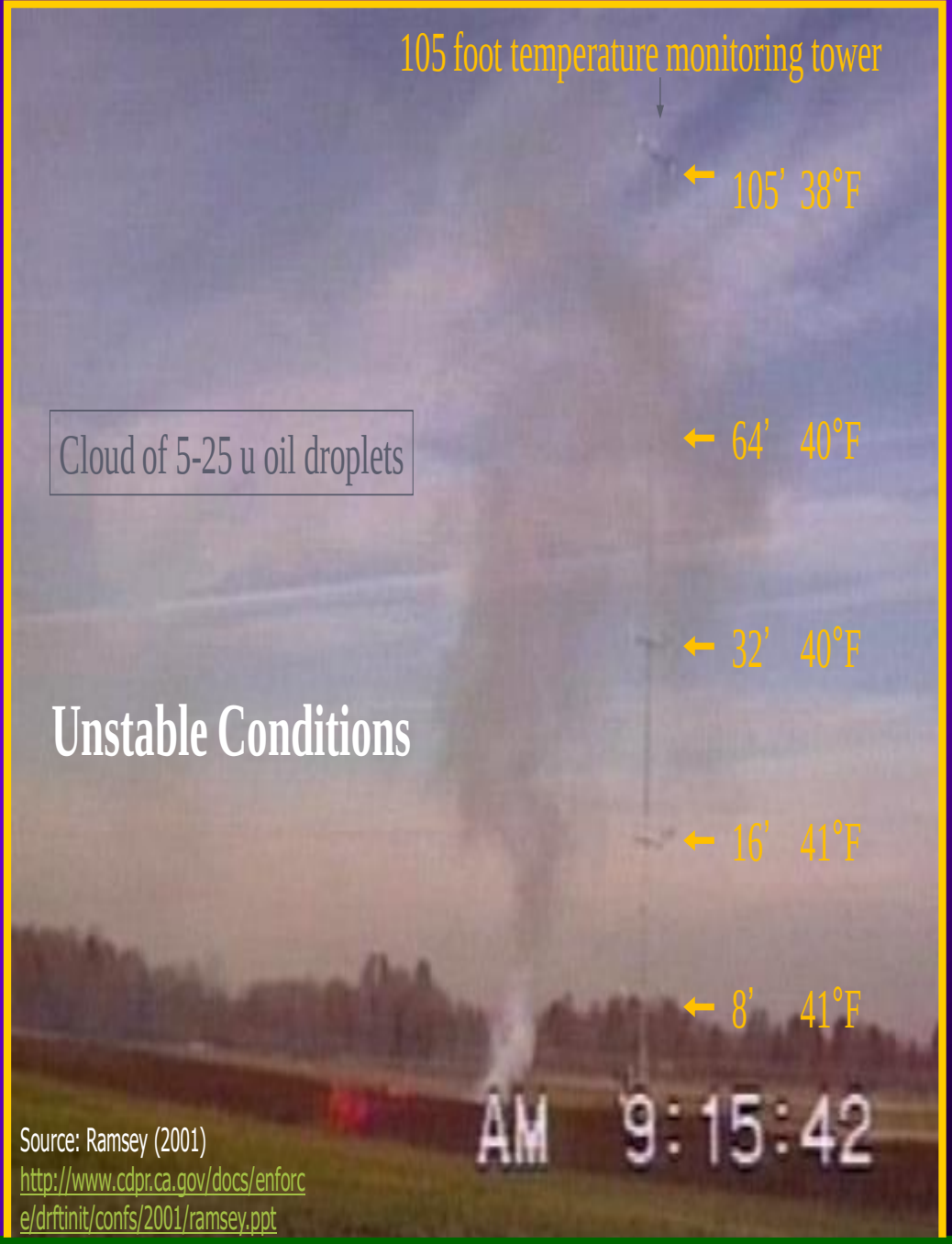
Atmospheric Conditions

- Neutral atmosphere – normal temperature lapse of - 5.4 F/1000’
- Stable atmosphere – temperature increases with altitude
  - Often referred to as an inversion
- Applications should be made during Neutral atmosphere
  - This is due to mixing of the atmosphere from wind
- “Common sense” says spray with no wind
- In reality, 2 to 5 MPH winds are best
- I hope to explain inversions to you, to help you better understand what is going on

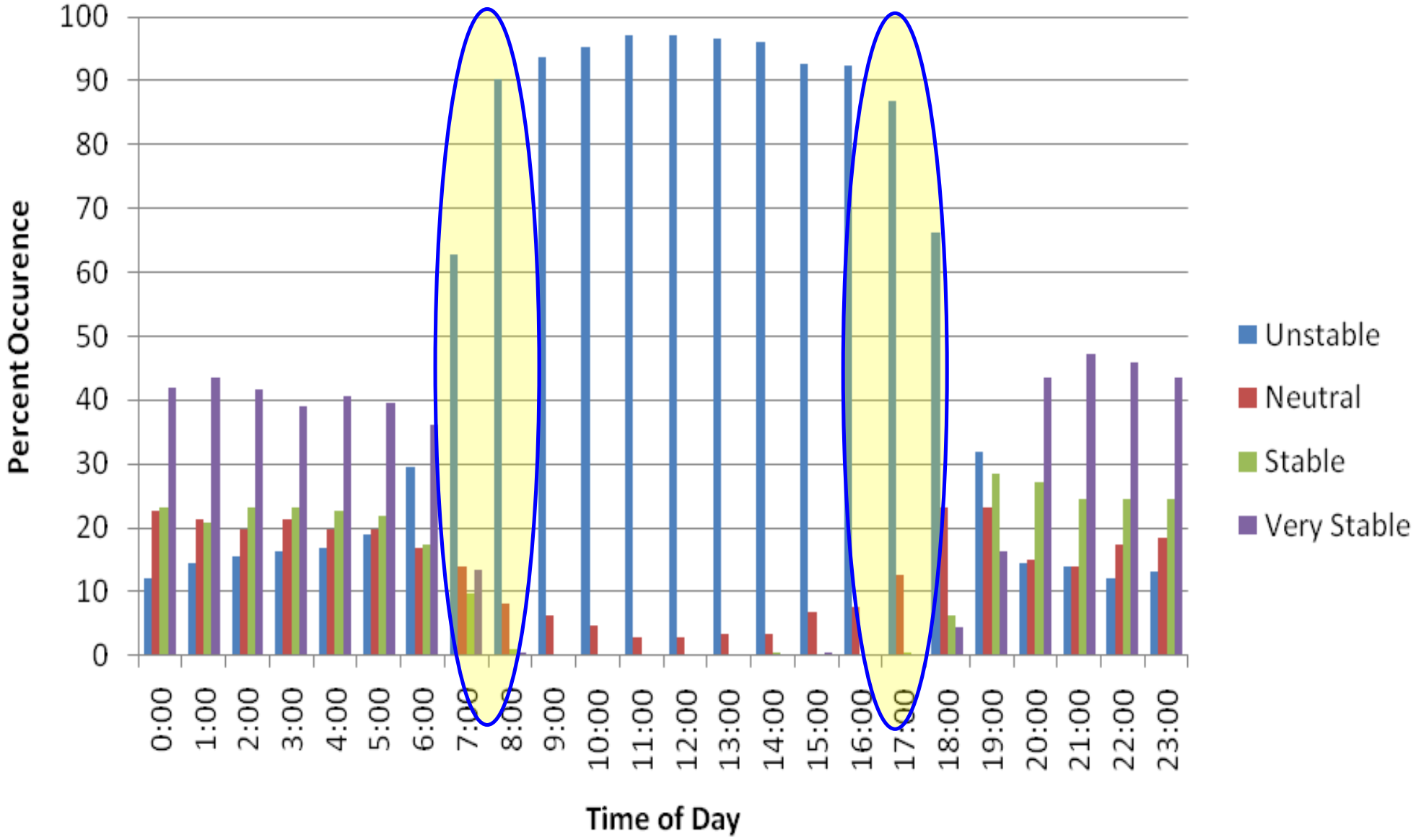
What Happens During and After Application


32'
75°F
AM 6:35

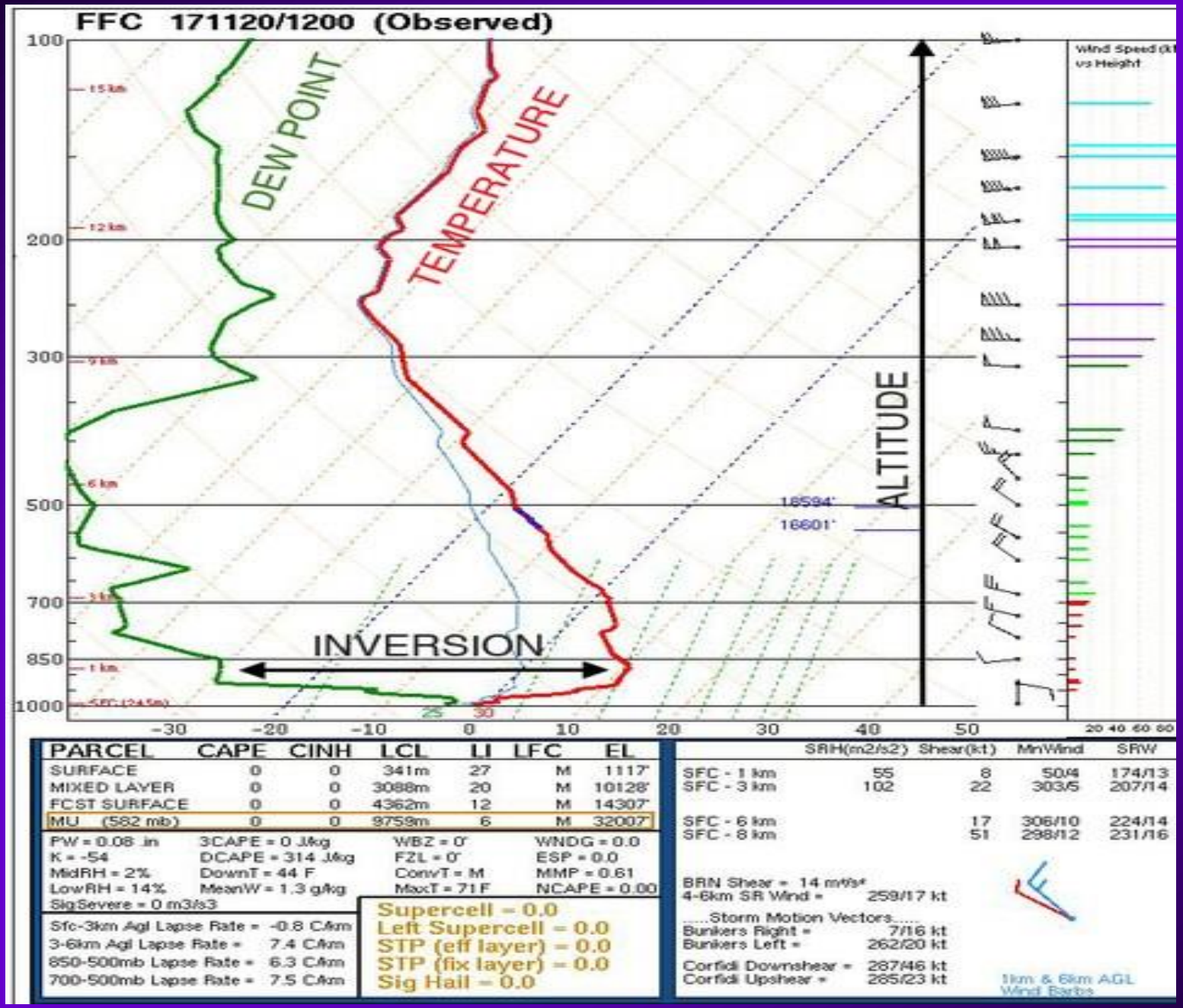
- Sinking parcel of air moving downward is less dense and rise to original position
- Rising parcel of air is denser than surrounding air and sink to original position
- Stable conditions winds become laminar; controlled airflow in a defined space, at a uniform speed, in a single direction



Source: Ramsey (2001)
http://www.cdpr.ca.gov/docs/enforce/drftinit/confs/2001/ramsey.ppt


Percent Occurence
100
90
80
70
60
50
40
30
20
10
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time of Day
Unstable
Neutral
Stable
Very Stable

Georgia Dome Implosion
November 20, 2017


FFC 171120/1200 (Observed)
DEW POINT
TEMPERATURE
ALTITUDE
INVERSION
16594'
16601'
100
200
300
500
700
850
1000
-30 -20 -10 0 10 20 30 40 50
Wind Speed (kt) vs Height
20 40 60 80
PARCEL CAPE CINH LCL LI LFC EL
SURFACE 0 0 341m 27 M 1117'
MIXED LAYER 0 0 3088m 20 M 10128'
FCST SURFACE 0 0 4362m 12 M 14307'
MU (582 mb) 0 0 9759m 6 M 32007'
PW = 0.08 in
K = -54
MidRH = 2%
LowRH = 14%
SigSevere = 0 m3/s3
3CAPE = 0 J/kg
DCAPE = 314 J/kg
DownT = 44 F
MeanW = 1.3 g/kg
WBZ = 0'
FZL = 0'
ConvT = M
MaxT = 71F
WNDG = 0.0
ESP = 0.0
MMP = 0.61
NCAPE = 0.00
Sfc-3km Agl Lapse Rate = -0.8 C/km
3-6km Agl Lapse Rate = 7.4 C/km
850-500mb Lapse Rate = 6.3 C/km
700-500mb Lapse Rate = 7.5 C/km
Supercell = 0.0
Left Supercell = 0.0
STP (eff layer) = 0.0
STP (fix layer) = 0.0
Sig Hail = 0.0
SRH(m2/s2) Shear(kt) MnWind SRW
SFC - 1 km 55 8 50/4 174/13
SFC - 3 km 102 22 303/5 207/14
SFC - 6 km 17 306/10 224/14
SFC - 8 km 51 298/12 231/16
BRN Shear = 14 m²/s²
4-6km SR Wind = 259/17 kt
.....Storm Motion Vectors.....
Bunkers Right = 7/16 kt
Bunkers Left = 262/20 kt
Corfidi Downshear = 287/46 kt
Corfidi Upshear = 285/23 kt
1km & 6km AGL Wind Barbs


Mercedes-Benz
STADIUM

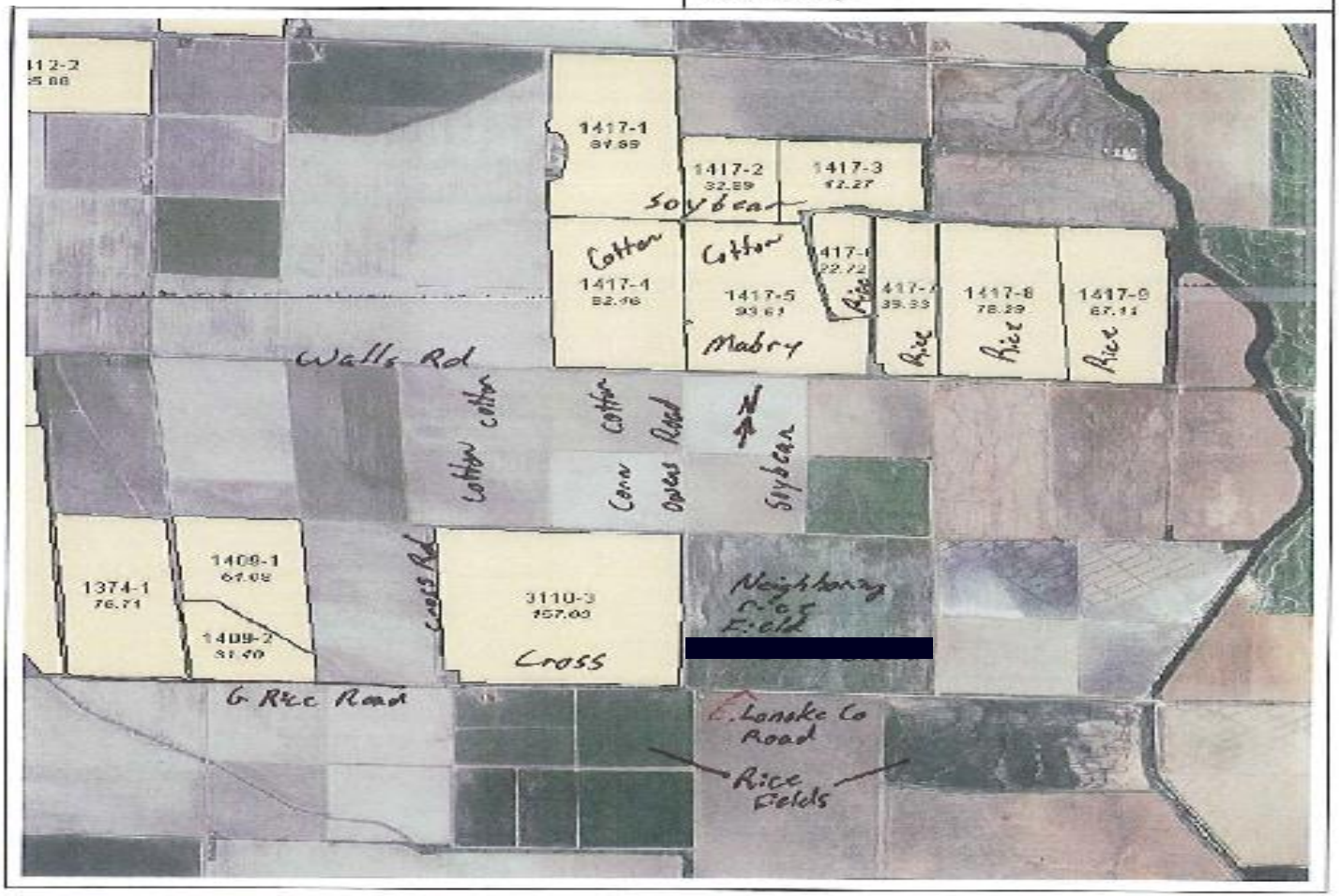

CNN

Wind Blown Drift

Misapplication

Crop Zone:
Crop Year:

Prepared By:



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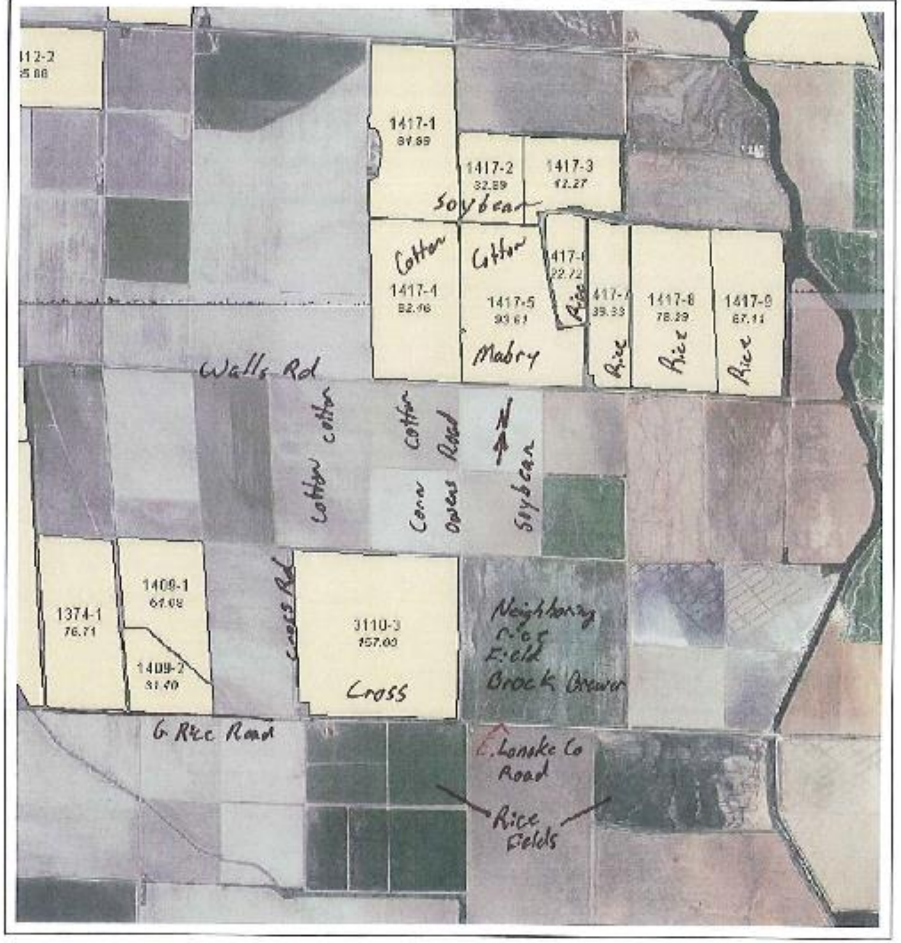
Crop Zone:
Crop Year:

Prepared By:



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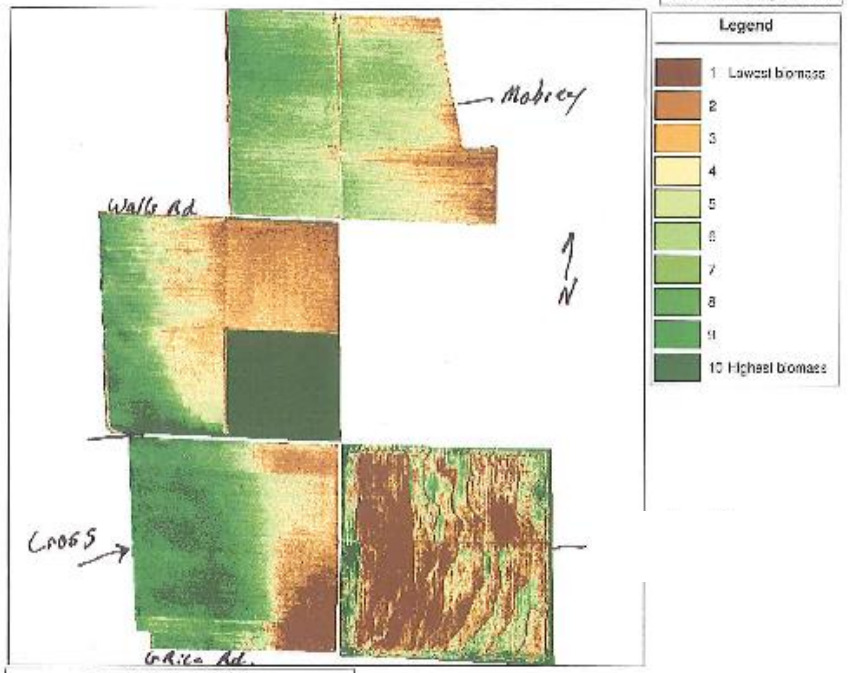
Scout Report

Scout Map for New Path Drift

Product Information

Request: # 69134
Data Acquired: Jun 13, 2012
Product Model:Vari-Scout
Number of Classes: 10
Classification Source: Global



Map Total Area By Class

Class	Acres	Percent	Class	Acres	Percent
1	84.34	12.47%	6	65.16	9.63%
2	68.87	10.18%	7	68.78	10.17%
3	65.84	9.73%	8	66.34	9.81%
4	57.13	8.45%	9	66.06	9.80%
5	58.90	8.71%	10	74.04	10.95%

Total Area: 676.33 Acres

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2. Volatility – movement after application pesticide turns to gas

- high temperatures, low humidity
- Move over wide spread area

3. Blowing soil

- Not as common

Three types of Off-Target Movement of Pesticides

2. Volatility – movement after application pesticide turns to gas
   - Severity depends on conditions during volatility
   - Turbulent conditions – the volatilized pesticide is usually be dispersed
   - Under stable atmosphere – can move long distance
   - Much harder to track
   - History repeats itself
   - Auxin herbicides historically are volatile
   - Oops – Auxin Herbicides
   - Mimic Hormones
   - Don’t take much – 0.0000001 active, 0.0001 mls

How to Minimize Drift

1. Read the label
2. Know you immediate environment
   - Adjacent crops
   - Weather conditions – wind speed and direction
3. Reduce pressure
   - nozzle selection
4. Increase spray volume
   - Slowdown – this will also help with droplet shear
5. Boom height
6. If you think you shouldn't spray – Don’t, it can wait
7. Common sense goes a long way

Impacts of Drift

1. Environmental impact
2. Yield impact
3. Financial impact
4. Psychological impact, loss of sleep, stress
5. Relationship impact
6. Drift is no accident, it can be avoided
7. No one wins!