

# OISC WEATHER DATA

CARRIE A. LEACH

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# OSIC WEATHER DATA

- THE PAST AND PRESENT
- EVIDENCE GATHERING OF RELIABLE WEATHER DATA
- OSIC PROCEDURAL GUIDANCE
- REAL WORLD EXAMPLES

**THE TROUBLE WITH WEATHER FORECASTING IS THAT IT'S RIGHT TOO OFTEN FOR US TO IGNORE IT  
AND WRONG TOO OFTEN FOR US TO RELY ON IT.**

**-PATRICK YOUNG**

# OISC WEATHER DATA

- 2011 OISC “PESTICIDE DRIFT INVESTIGATION” PROCEDURE RECOMMENDED:
  - COLLECT WEATHER INFORMATION FROM THE NEAREST RELIABLE AND REASONABLY ACCESSIBLE WEATHER RECORDING STATION(S) OR OTHER RELIABLE WEATHER INFORMATION SERVICE(S).
- WEATHER DATA WAS COLLECTED MOSTLY VIA WUNDERGROUND.COM
- THE CLOSEST WEATHER STATION TO INCIDENT WAS CHECKED WHICH COULD BE AIRPORT WEATHER STATIONS OR A PERSONAL WEATHER STATION (PWS)

# OISC WEATHER DATA

- A CLOSER LOOK AT OUR PROCEDURES FOR GATHERING WEATHER DATA WAS NEEDED
  - HOW DEFENSIBLE IS IT?
  - WHAT GOES IN TO THE DATA COLLECTION OF THE WEATHER STATIONS?
  - WHERE CAN OISC GET THE MOST RELIABLE HISTORICAL DATA?
- HISTORICAL BEING THE KEY POINT

# OISC WEATHER DATA

SOME WEATHER RECORD KEEPING REQUIREMENTS AND “DO NOTS” FOR ENGENIA, XTENDIMAX, FEXAPAN

- AIR TEMPERATURE (AT BOOM HEIGHT)
- WIND SPEED AT BOOM HEIGHT
- WIND DIRECTION AT BOOM HEIGHT
- DOWNWIND BUFFER
- DO NOT APPLY WHEN WIND IS BLOWING IN THE DIRECTION OF NEIGHBORING SENSITIVE CROPS
- APPLY ONLY BETWEEN SUNRISE AND SUNSET
- DO NOT APPLY IF A TEMPERATURE INVERSION EXISTS
- DO NOT APPLY IF RAIN IS PREDICTED WITHIN 24 HOURS
- APPLY ONLY WHEN WIND SPEEDS ARE 3-10 MPH, INCLUDING GUSTS
- OISC INVESTIGATORS WILL NEED TO PROVE OR DISPROVE THE LABEL WAS FOLLOWED

# OISC WEATHER DATA HOW DEFENSIBLE IS IT?

- ASOS/AWOS VS. PWS
  - AUTOMATED SURFACE OBSERVING SYSTEM
    - AUTOMATED SENSOR SUITES THAT ARE DESIGNED TO SERVE METEOROLOGICAL AND AVIATION OBSERVING NEEDS. THESE SYSTEMS GENERALLY REPORT AT HOURLY INTERVALS, BUT ALSO REPORT SPECIAL OBSERVATIONS IF WEATHER CONDITIONS CHANGE RAPIDLY AND CROSS AVIATION OPERATION THRESHOLDS. (SOURCE NOAA WEBSITE)
  - AUTOMATED WEATHER OBSERVING SYSTEM
    - OPERATED AND CONTROLLED BY THE FEDERAL AVIATION ADMINISTRATION. THESE SYSTEMS ARE AMONG THE OLDEST AUTOMATED WEATHER STATIONS AND PREDATE ASOS. THEY GENERALLY REPORT AT 20-MINUTE INTERVALS AND DO NOT REPORT SPECIAL OBSERVATIONS FOR RAPIDLY CHANGING WEATHER CONDITIONS. (SOURCE NOAA WEBSITE)
  - PERSONAL WEATHER STATION

# OISC WEATHER DATA ASOS

- INDIANA ASOS WEATHER STATIONS ARE CALIBRATED QUARTERLY BY A TECHNICIAN AT THE NATIONAL WEATHER SERVICE FORECAST OFFICE IN INDIANAPOLIS
- CALIBRATION CONSISTS OF CLEANING OPTICAL SENSORS, TUNING TO A KNOWN VALUE, REPLACING THE TEMPERATURE SENSOR IF VALUES ARE OFF, DEW POINT IS REPLACED EVERY 18 MONTHS WITH A LAB CALIBRATED SENSOR, VISIBILITY CALIBRATED WITH A BEAM OF LIGHT, FREEZING RAIN IS SELF-CALIBRATED, PRESSURE SENSORS ARE CALIBRATED BY A CALIBRATED LAB STANDARD, RAIN COLLECTION IS CALIBRATED BY BOTH A TIPPING BUCKED AND A KNOWN MEASURED AMOUNT. IF THE WEIGHT IS OFF, THE BUCKET IS REPLACED. LAB HEADQUARTERS, WHERE STANDARDS ARE OBTAINED, ARE IN SILVER CITY, MD.
- VAISALA (OISC VENDOR FOR SUPPLYING LABORATORY DATA-LOGGERS) PROVIDE THE WIND SENSOR (CALIBRATED WITH AN ECHO CHAMBER) DEW POINT, AND CEILOMETER (CLOUD HEIGHT INDICATOR) FOR WEATHER STATIONS.
- NO CERTIFICATE OF CALIBRATION IS ISSUED, BUT A CALIBRATION STICKER WITH DUE DATE IS AFFIXED TO THE WEATHER STATION.
- NWS DOES KEEP AN ELECTRONIC OFFICIAL RECORDS OF MAINTENANCE PERFORMED THAT COULD BE SHARED IF REQUESTED, IF NOT DIRECTLY, THEN THROUGH FOIA.
- FOR ITEMS THAT CANNOT BE FIELD CALIBRATED - THEY ARE SENT OFF TO VARIOUS PLACES. FOR EXAMPLE, THE DEW POINT SENSOR IS SENT TO OUR REPAIR FACILITY IN KANSAS CITY. THE PRESSURE STANDARD IS SENT TO THE PRESSURE STANDARDS LAB AT NWS HQ.

# OISC WEATHER DATA AWOS

- AWOS STATIONS ARE MAINTAINED BY THE FAA
- GUIDANCE ON AWOS MAINTENANCE AC150/5220-16E CHAPTER 4 “AWOS SYSTEM MAINTENANCE AND OPERATING REQUIREMENTS” PROVIDED BY THOMAS CARNEY PURDUE SCHOOL OF AVIATION & TRANSPORTATION TECH

“THE AWOS MANUFACTURER SHOULD PROVIDE AN ACCURATE, RELIABLE SYSTEM THROUGH TYPE CERTIFICATION ACCEPTANCE PROCEDURES AND, THEN, THE SYSTEM OWNER SHOULD MAINTAIN THE SYSTEMS BY ACCOMPLISHING VALID PERFORMANCE VERIFICATION CHECKS AT SUFFICIENT INTERVALS TO MAINTAIN USER CONFIDENCE IN THE SYSTEM’S PERFORMANCE.”



# OISC WEATHER DATA PWS

- WEATHER UNDERGROUND RESPONSES TO PERSONAL WEATHER STATIONS BY WILLIAM IN WUNDERGROUND SUPPORT
- ARE PWS CERTIFIED?
  - “NO”
- HOW ACCURATE IS DATA FROM PWS?
  - “IT DEPENDS. SOME ARE SEVERAL THOUSAND DOLLARS, HIGH PRECISION, OTHERS ARE BUDGET \$100 STATIONS”.
- ARE PWS CALIBRATED FOR ACCURACY?
  - “DEPENDS ON THE PWS OWNER”.
- IS DATA FROM PWS LEGALLY DEFENSIBLE? WILL IT STAND UP IN A COURT OF LAW?
  - “I CAN’T GIVE LEGAL ADVICE, BUT WE CERTAINLY WOULDN’T TESTIFY TO THEIR ACCURACY. STATIONS ARE OWNED AND OPERATED BY INDIVIDUAL CITIZENS AND THERE IS A HUGE RANGE OF QUALITY. SOME ARE CALIBRATED AND WELL-MAINTAINED, SOME AREN’T. I JUST FOUND ONE REPORTING 35° IN FLORIDA WHERE THE AVERAGE WAS AROUND 80°”.

# OISC WEATHER DATA ASOS/AWOS

- THE LIMITATIONS

- 52 ASOS/AWOS STATIONS IN INDIANA ONLY 12 OF THOSE ARE ASOS
- COULD BE MILES FROM A FOR-CAUSE INVESTIGATION SITE
- DOES NOT HAVE ARCHIVED FORECASTS, BUT NO WEATHER STATIONS DO THIS

# OISC WEATHER DATA ASOS/AWOS

- THE GOOD
  - CALIBRATED AND/OR MAINTAINED WEATHER STATIONS
  - WEATHER STATIONS PROVIDE HISTORICAL DATA ON TIME OF SUNRISE, SUNSET, TEMPERATURE, WIND SPEED AND WIND DIRECTION
  - CAN RETRIEVE ARCHIVED DATA FROM ASOS/AWOS STATIONS THROUGH WEATHER UNDERGROUND OR NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION (NOAA) AMONG OTHER WEBSITES
  - ATTORNEY GENERAL APPROVED- SENT A CASE WHERE AN AWOS STATION WAS USED TO GATHER HISTORICAL WIND DATA (SPEED AND DIRECTION)

# OISC WEATHER DATA ASOS/AWOS

- MEMORANDUM FROM AG SUBJECT “THE SCIENTIFIC RELIABILITY AND ADMISSIBILITY OF WIND DATA”
  - IN ORDER FOR EXPERT TESTIMONY TO BE RELIABLE, IT MUST BE BASED ON THE METHODS AND PROCEDURES OF SCIENCE RATHER THAN SUBJECTIVE BELIEF OR SPECULATION.
  - THERE ARE FIVE STANDARD CONSIDERATIONS:
    - (1) THE THEORY OR TECHNIQUE AT ISSUE CAN BE AND HAS BEEN TESTED;
    - (2) THE THEORY OR TECHNIQUE HAS BEEN SUBJECTED TO PEER REVIEW AND PUBLICATION;
    - (3) THERE ARE KNOWN OR POTENTIAL RATE OF ERROR;
    - (4) THERE ARE EXISTENCE AND MAINTENANCE OF STANDARDS CONTROLLING THE TECHNIQUE’S OPERATION;  
AND
    - (5) THE TECHNIQUE IS GENERALLY ACCEPTED WITHIN THE RELEVANT SCIENTIFIC COMMUNITY

# OISC WEATHER DATA ASOS/AWOS

- “BECAUSE THE COLLECTION OF WEATHER DATA BY UNDERGROUND WEATHER IS THE SAME SYSTEM USED BY NATIONAL WEATHER CHANNELS, THE FEDERAL GOVERNMENT, AND METEOROLOGISTS WORLDWIDE, IT CAN BE INFERRED THAT WEATHER DATA HAVE BEEN TESTED, THAT IT, THE COLLECTION AND UTILIZATION OF SUCH DATA HAVE BEEN SUBJECTED TO PEER REVIEW, THAT THERE ARE KNOWN RATES OF ERROR IN THE DATA, THAT THERE ARE STANDARDS TO CONTROL THE COLLECTION OF THE DATA, AND THAT THIS KIND OF COLLECTION OF WEATHER DATA IS GENERALLY ACCEPTED WITHIN THE RELEVANT SCIENTIFIC COMMUNITY”. *SEE MCGREW, 682 N.E.2D AT 1292.*

# OISC WEATHER DATA FOR CAUSE INVESTIGATIONS

- **WEATHER DATA COLLECTION**

- IF APPLICABLE, COLLECT WEATHER DATA TO MOST CLOSELY REPRESENT THE TIME(S) AND LOCATION(S) OF THE INCIDENT(S) BEING INVESTIGATED. THIS IS MOST OFTEN AT THE TIME THE INCIDENT OCCURRED, BUT MAY ALSO INCLUDE WEATHER THAT OCCURRED BEFORE AND/OR AFTER THE INCIDENT.
- IF AVAILABLE, COLLECT RECORDED OR REPORTED WEATHER DATA FROM COMPLAINANT, RESPONDENT, OR OTHER WITNESSES. IDENTIFY THE SOURCE AND/OR METHOD OF COLLECTION OF THIS DATA TO ASSIST WITH EVALUATING THE RELIABILITY.
- TO CONFIRM OR REFUTE WITNESS WEATHER DATA, OBTAIN RECORDED WEATHER DATA FROM A RELIABLE SOURCE, AS CLOSE TO THE SITE OF THE INCIDENT AS POSSIBLE. A RELIABLE SOURCE WILL MOST OFTEN MEAN DATA COLLECTED FROM AUTOMATED SURFACE OBSERVING SYSTEMS (ASOS)/AUTOMATED WEATHER OBSERVING SYSTEMS (AWOS) WEATHER STATIONS. DATA FROM THESE WEATHER STATIONS CAN BE FOUND ON THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) SITE  
[HTTPS://WWW.NCDC.NOAA.GOV/DATA-ACCESS/LAND-BASED-STATION-DATA](https://www.ncdc.noaa.gov/data-access/land-based-station-data).

# OISC WEATHER DATA NOT-FOR CAUSE INVESTIGATIONS

- **WEATHER DATA COLLECTION CONTINUED**

- COLLECT WEATHER DATA FROM AN ASOS/AWOS STATION CLOSEST TO THE SITE OF APPLICATION. IF WEATHER DATA FROM A SINGLE ASOS/AWOS STATION DOES NOT CORROBORATE WEATHER DATA SUBMITTED BY THE APPLICATOR, THEN GEOGRAPHICALLY TRIANGULATE WEATHER DATA BY COLLECTING DATA FROM TWO ADDITIONAL, REGIONALLY SIGNIFICANT ASOS/AWOS WEATHER STATIONS.
- IF ANY WEATHER DATA OBTAINED FROM A RELIABLE SOURCE IS SIGNIFICANTLY DIFFERENT FROM, AND WILL BE USED TO REFUTE DATA PROVIDED BY ANY WITNESSES, COLLECT COMPARATIVE TRIANGULATED DATA FROM THE NEAREST WEATHER UNDERGROUND ([WWW.WUNDERGROUND.COM](http://WWW.WUNDERGROUND.COM)) PRIVATE WEATHER STATIONS (PWS) SURROUNDING THE INCIDENT SITE.
- SIGNIFICANTLY DIFFERENT WEATHER DATA COULD MEAN, A DISCREPANCY IN WIND DIRECTION OR WIND SPEED DATA SIGNIFICANT ENOUGH TO CHANGE THE COMPLIANCE DETERMINATION OF THE INVESTIGATION.
- THE LAND BEAUFORT SCALE FROM THE NOAA SITE WILL BE USED FOR DETERMINING “CALM” AS <1 KNOT OR <1MPH.
- SUNRISE AND SUNSET APPLICATION TIMES ARE DEFINED AS TIME OF SUNRISE TO 30 MINUTES AFTER TIME OF SUNSET.

# OISC WEATHER DATA REAL WORLD EXAMPLE INVESTIGATION

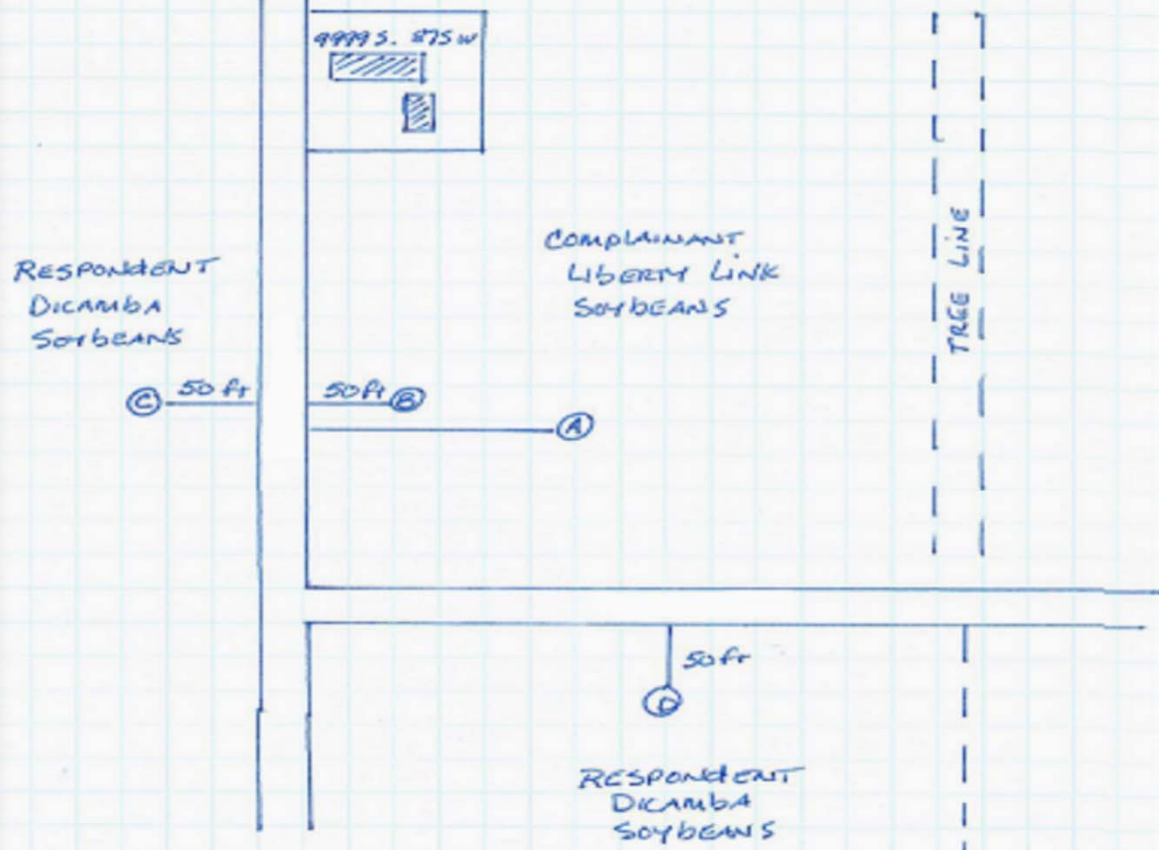
- ON JULY 13, 2017, THE COMPLAINANT STATED LIBERTY SOYBEANS WERE SPRAYED WITH DICAMBA WITH ABOUT  $\frac{3}{4}$  OF A 34-ACRE SOYBEAN FIELD HAVING DICAMBA INJURY.
- ON JULY 19, 2017, FIELD SURVEYED BY OISC INVESTIGATOR.
  - IT APPEARED MORE THAN  $\frac{1}{2}$  OF THE COMPLAINANT'S SOYBEAN FIELD HAD BEEN IMPACTED WITH GROWTH REGULATOR-TYPE SYMPTOMS OF LEAF CUPPING AND PUCKERING.
  - THERE WERE TWO OTHER SOYBEAN FIELDS ADJACENT TO THE COMPLAINANT'S SOYBEAN FIELD. THE COMPLAINANT BELIEVED A FIELD WEST AND A FIELD SOUTH OF THE LIBERTY SOYBEANS HAD DICAMBA APPLIED TO THEM.
  - NO GROWTH REGULATOR-TYPE SYMPTOMS WERE OBSERVED BY THE INVESTIGATOR TO THE ADJACENT FIELDS WEST AND SOUTH OF THE LIBERTY SOYBEANS.
  - SAMPLES WERE COLLECTED FOR PPDL AND THE OISC LABORATORY



# OISC WEATHER DATA REAL WORLD EXAMPLE INFORMATION FROM APPLICATOR

- PESTICIDE APPLICATION WAS MADE ON **JUNE 27, 2017 BETWEEN 10:12AM AND 2:17PM**
- BOOM HEIGHT WAS SET AT **20 INCHES** AT TIME OF APPLICATION
- EQUIPMENT GROUND SPEED WAS RECORDED AT **14.1 MPH**
- CHECKED ENGENIA WEB-SITE: **YES**
- CHECKED FIELDWATCH/DRIFTWATCH PRIOR TO APPLICATION: **NO**
- SURVEYED APPLICATION SITE PRIOR TO APPLICATION: **YES**
- BUFFER USED: **45 FEET TO THE WEST AND 48 FEET TO THE SOUTH**
- WIND SPEED AT TIME OF APPLICATION WAS RECORDED AT **3 MPH FROM THE SOUTHEAST**

W N  
S E      \*\* NOT TO SCALE



RESPONDENT  
Dicamba  
Soybeans

COMPLAINANT  
Liberty Link  
Soybeans

TREE LINE

50 ft C

50 ft B

A

50 ft D

RESPONDENT  
Dicamba  
Soybeans

- 2017561114 (A) Soybeans Complainant - 200 ft
- 2017561115 (B) Soybeans Complainant - 50 ft
- 2017561116 (C) Soybeans Respondent - 50 ft
- 2017561117 (D) Soybeans Respondent - 50 ft

# OISC WEATHER DATA REAL WORLD EXAMPLE

- TRIANGULATED FROM THE CLOSEST AWOS STATIONS
- ACCORDING TO THE WEATHER INFORMATION FROM THE AWOS STATION 35 MILES NORTHEAST OF APPLICATION SITE, THE WIND WAS BLOWING 3-5 MPH FROM THE NORTHWEST IN A SOUTHEASTERLY DIRECTION TOWARD THE SOUTHWEST CORNER OF THE COMPLAINANT'S FIELD
- ACCORDING TO THE WEATHER INFORMATION FOR THE AWOS STATION 36 MILES WEST OF APPLICATION SITE, THE WIND WAS BLOWING 0-5 MPH FROM SOUTHEAST AND NORTHWEST DIRECTIONS (NO CONSISTENT DIRECTION)
- ACCORDING TO THE WEATHER INFORMATION FOR THE AWOS STATION 48 MILES SOUTH OF APPLICATION SITE THE WIND WAS BLOWING 0-8 MPH FROM THE NORTHEAST IN A SOUTHWESTERLY DIRECTION AWAY FROM THE COMPLAINANT'S FIELD.

# OISC WEATHER DATA REAL WORLD EXAMPLE

- ONE WEATHER STATION CORROBORATES WITH THE APPLICATOR THAT THE WIND WAS BLOWING SOUTHEAST TOWARDS COMPLAINANT'S FIELD, HOWEVER; TWO DO NOT
- TWO WEATHER STATIONS INDICATE WIND SPEED <3MPH FOR AT LEAST PART OF THE APPLICATION, HOWEVER; ONE DOES NOT
- NOT KNOWN HOW THE APPLICATOR RECORDED WEATHER DATA
- TO DATE, NO ENFORCEMENT HAS BEEN TAKEN UNLESS THREE RELIABLE WEATHER REPORTING STATIONS REFUTE APPLICATOR DATA

OISC WEATHER DATA  
REAL WORLD EXAMPLE ENFORCEMENT?



# OISC WEATHER DATA ANOTHER REAL WORLD EXAMPLE

- APPLICATOR STATES WIND SPEED WAS 3MPH DURING APPLICATION, BUT THE INVESTIGATOR TRIANGULATED AND ALL THREE STATIONS SAY CALM TO 5.8 MPH DURING APPLICATION
  - AWOS STATION 30 MILES SOUTHWEST OF APPLICATION SITE
  - AWOS STATION 31 MILES NORTH-NORTHWEST OF THE APPLICATION SITE
  - AWOS STATION 36 MILES WEST OF THE APPLICATION SITE

IS THERE A LABEL VIOLATION?

# THE TEAM

- GEORGE SAXTON
- MELISSA ROSCH
- JAY KELLY
- GARRET CREASON
- BETH CARTER
- BOB BREWER
- AUSTIN PEARSON (TIPTON COUNTY EXTENSION DIRECTOR)
- HANZ SCHMITZ (POSY COUNTY EXTENSION DIRECTOR)
- KEN SCHEERINGA (ASSOCIATE STATE CLIMATOLOGIST)



THANK YOU

WEATHER FORECAST FOR TONIGHT: DARK.

-GEORGE CARLIN