Pesticide Drift
A Public Health Perspective

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Defining Spray Drift for Health Studies

- **Primary spray drift**
  - Off-target movement of pesticides during or soon after application
  - Affected by meteorology, mode of application, particle size, terrain, and crop
- **Secondary spray drift**
  - Post-application movement of pesticides
  - Volatilization -- affected by meteorology, temperature, vapor pressure
  - Re-suspension on dust -- affected by wind, human activity, weather, particle size

Exposure Pathways: Source-to-Receptor

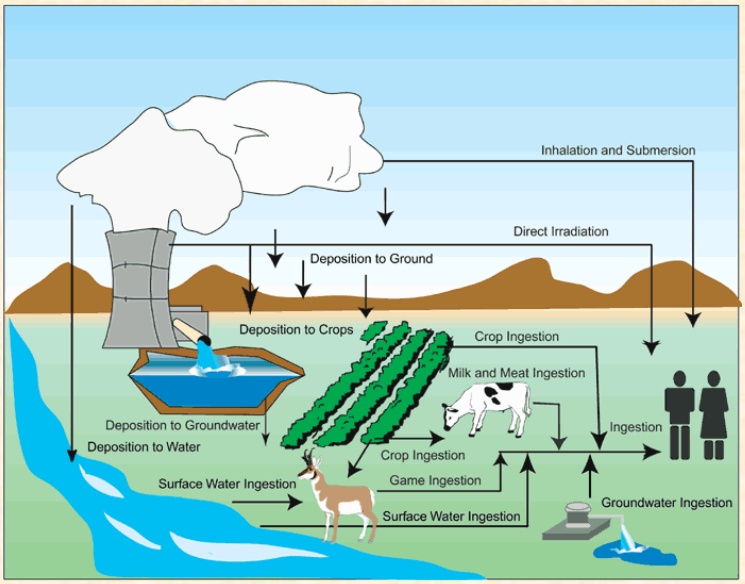
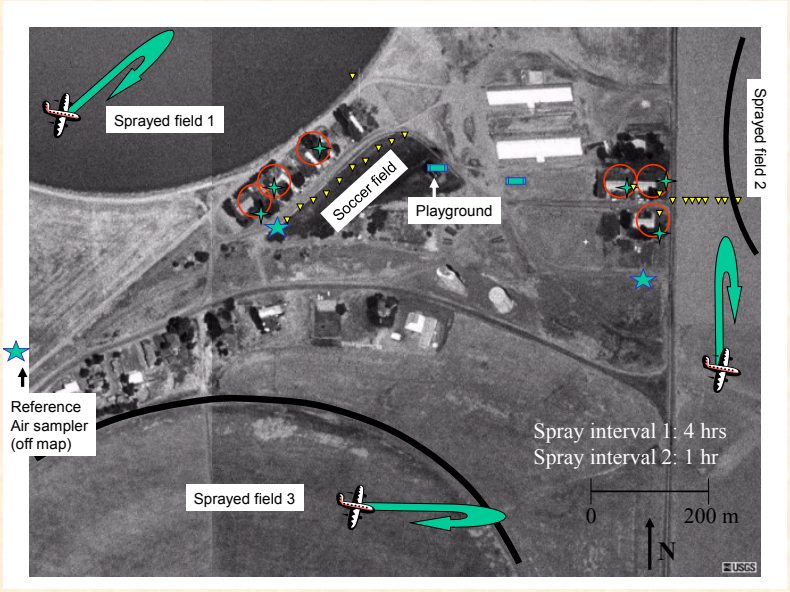


Figure 3-1. Potential exposure pathways to humans from the INEEL.

The Washington Aerial Spray Drift Study

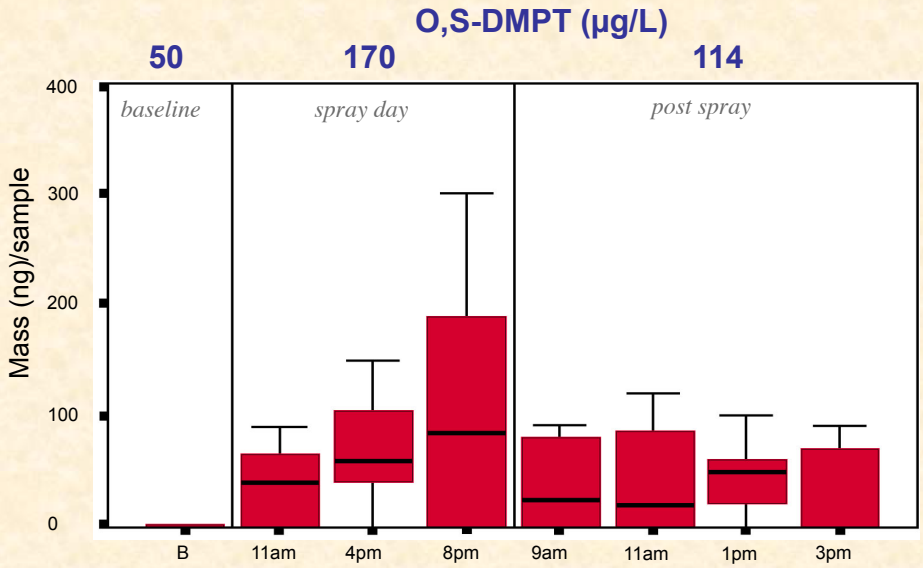


○ = participating home
▿ = deposition plate
▬ = 200 lpm air sampler
★ = 30 lpm dual air sampler
✦ = 25 lpm air sampler
= airplane flight path

Sampler locations and airplane flightpath

Methamidophos Deposition

Sampler Location	Loading (ng/cm^2)
North field boundary	2,131
East field boundary	5,653
Soccer field (median)	2.9
East housing (median)	2.4



Child Hand Wipe Levels over Time
(ng/sample)

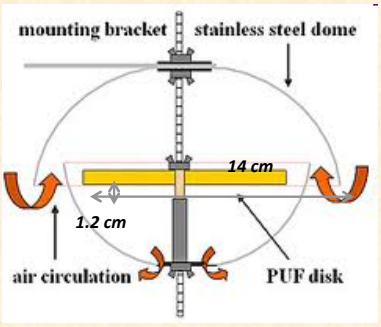
Community Pesticide Air Monitoring Program

- **Background**
  - WA State Legislature allocates funds to WA Department of Health for air monitoring
  - UW tasked with monitoring organophosphorus pesticides
- **Charge from legislature**
  - Are nearby residents and bystanders at risk from airborne OP pesticides?
  - Sampling in central WA, March-July 2008
  - June 2009 report: levels within current guidelines

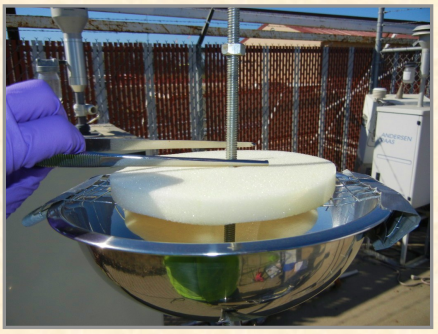
Passive Air Sampling

- **Advantages**
  - No power source needed
  - Integrates exposure over extended time period
  - Quiet, non-invasive
  - Low cost
- **Disadvantages**
  - Samples gases and vapors rather than particles
  - Cannot provide instantaneous results
  - Sampling rates affected by meteorology

FIELD STUDIES
Polyurethane Foam Passive Sampler



Picture: Shoeib and Harner (2002)



Picture: Yakima Valley, 2011

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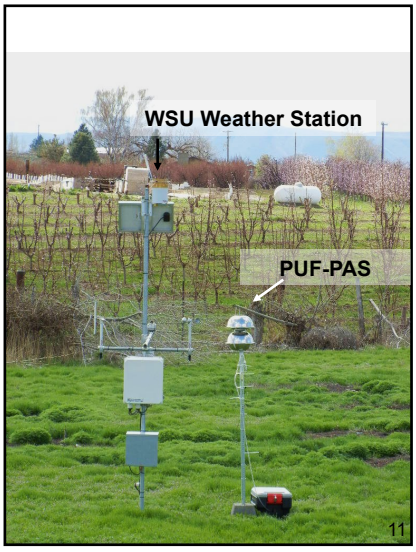
Outdoor Residential Sampling using PUF-Passive Air Sampling Devices



Passive Air Sampling at a Farmworker Home

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Possible Pesticide Drift Monitoring Strategies to Address Public Health Concerns

- Air and deposition sampling of adjacent properties for primary drift
- Passive air sampling in nearby communities for secondary drift
- Vegetation sampling from home gardens
- Periodic sampling of drinking water sources

References by Presentation Slide

SLIDE 2: Matthews G, Bateman R, Miller P. Pesticide Application Methods. Wiley; 2014.

SLIDES 4-7: Weppner S, Elgethun K, Lu C, Hebert V, Fenske RA. 2006. The Washington Aerial Spray Drift Study: children's exposure to methamidophos in an agricultural community following fixed-wing aircraft applications. J Expo Anal Environ Epidemiol 16:387-96.

SLIDE 8: Fenske RA et al. 2009. Organophosphorus Pesticide Air Monitoring Project. Final Report to the Washington Department of Health. Available at http://www.doh.wa.gov/DataandStatisticalReports/EnvironmentalHealth/Pesticides/AirMonitoringStudy

SLIDES 9-12: Armstrong JL, Yost MG, Fenske RA. 2014. Development of a passive air sampler to measure airborne organophosphorus pesticides and oxygen analogs in an agricultural community. Chemosphere 111:135-43.