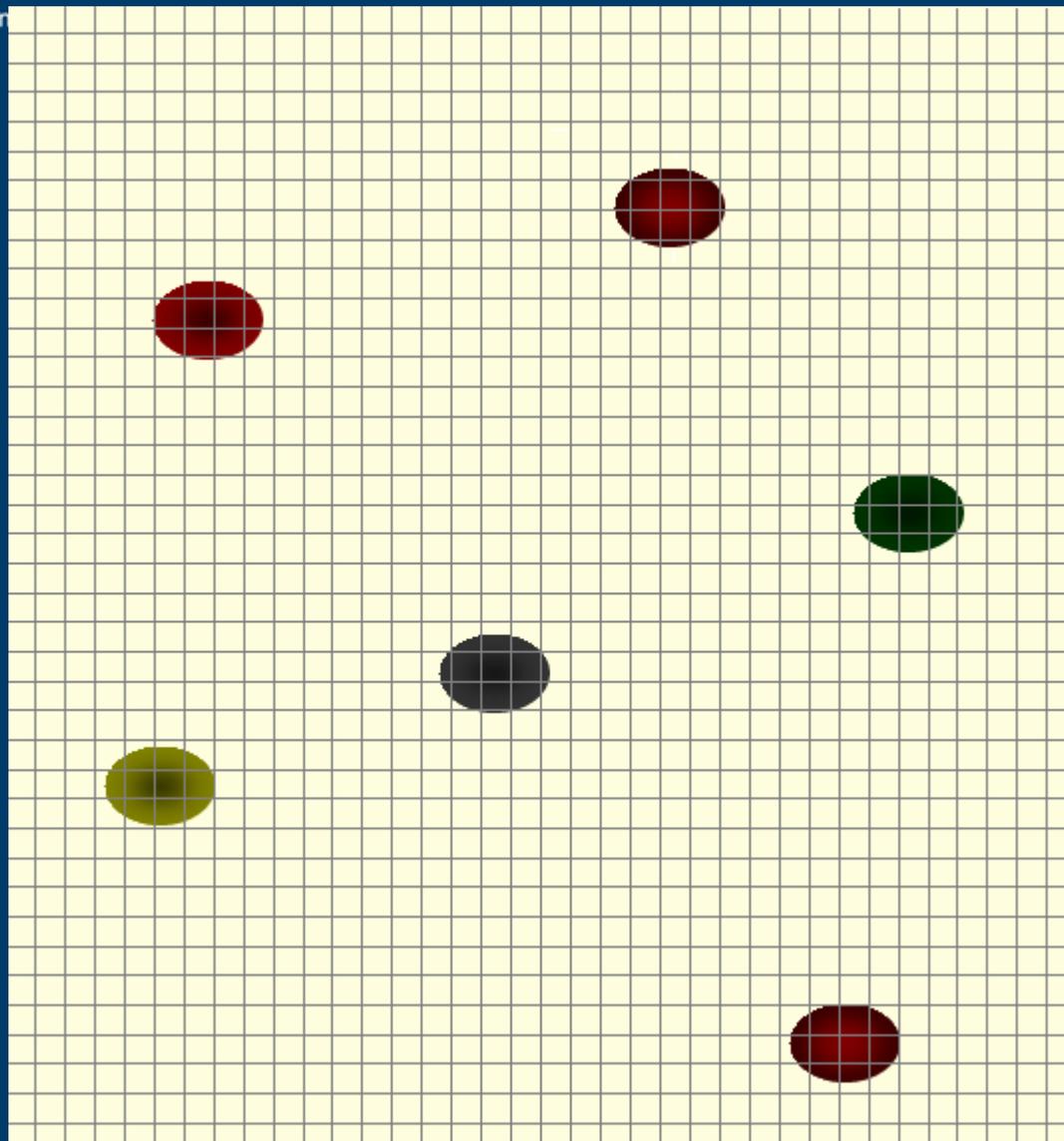


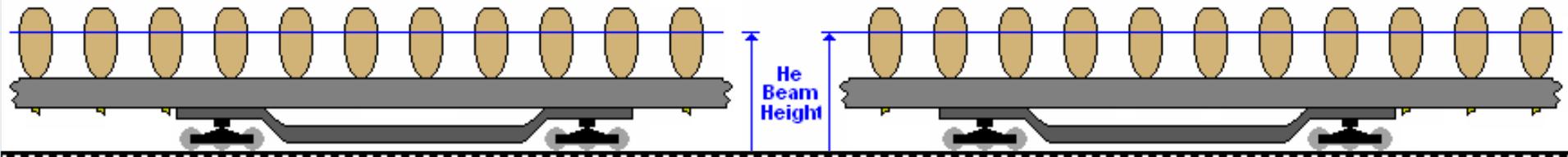
# Semi-Quantitative Mapping and Identification of Dispersed Chemicals using an Ambient-Air Ion Source/Mass Spectrometer

*Andrew H. Grange*



# Superfund Site





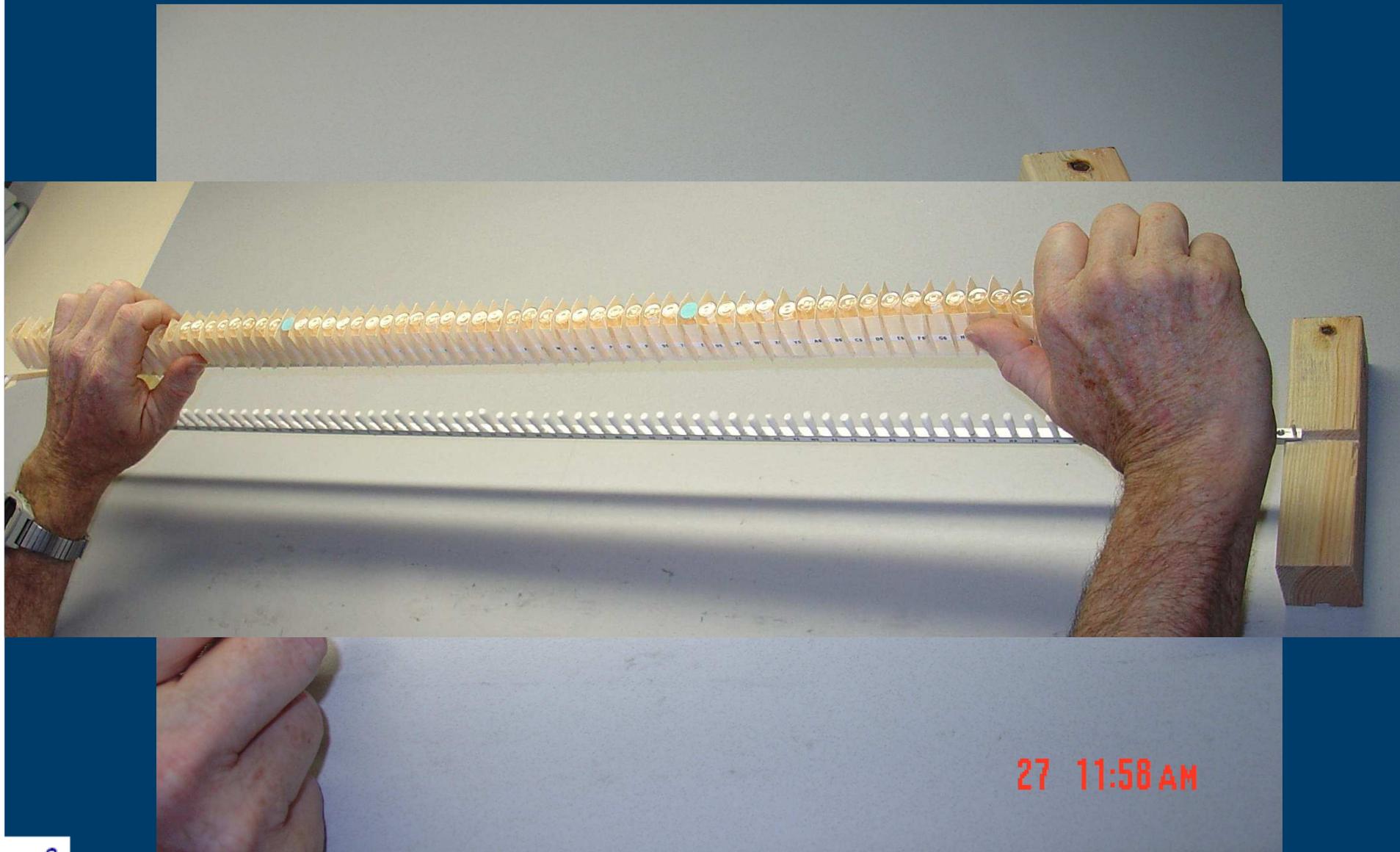
# Autosampler



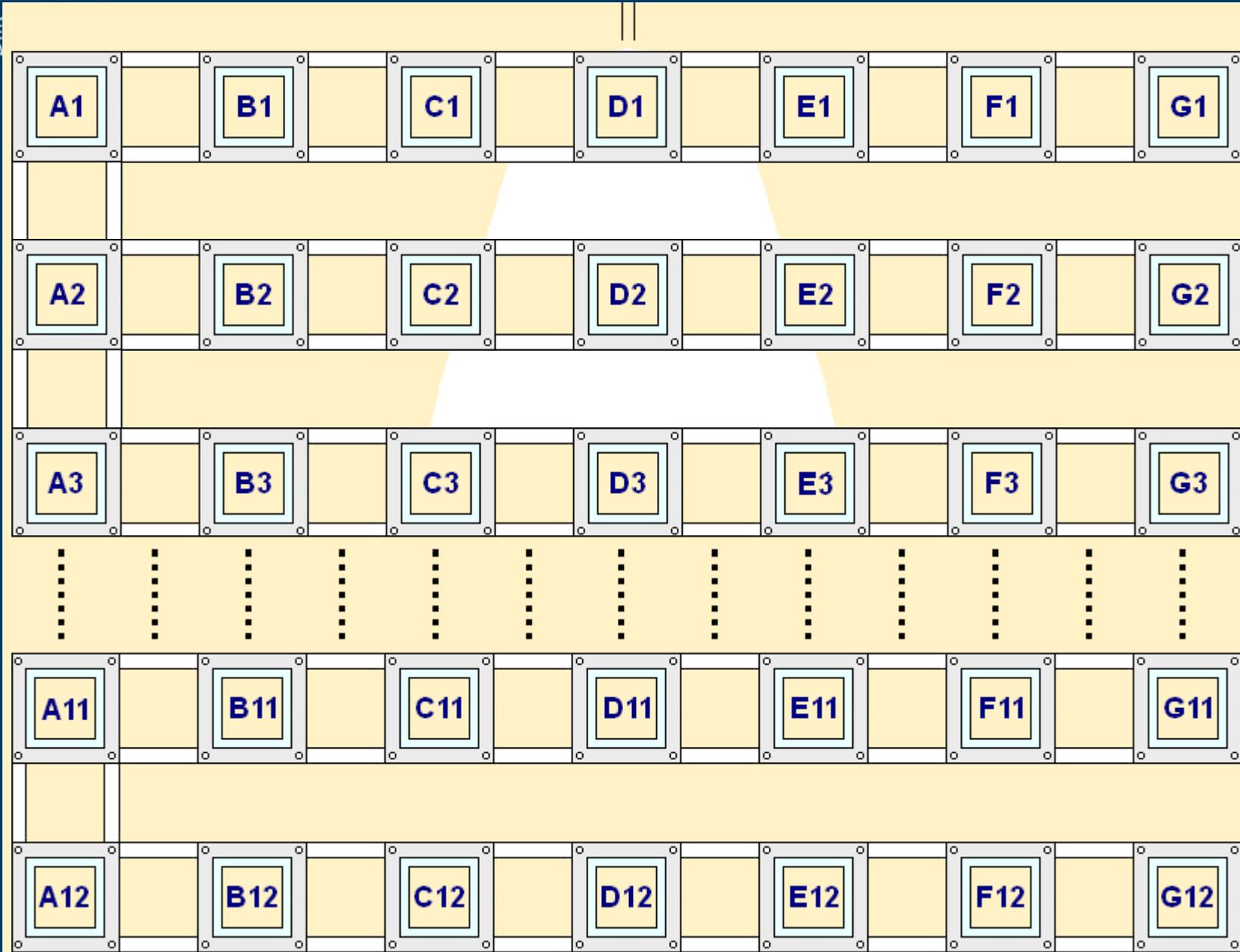
# Wipe Sample Transport

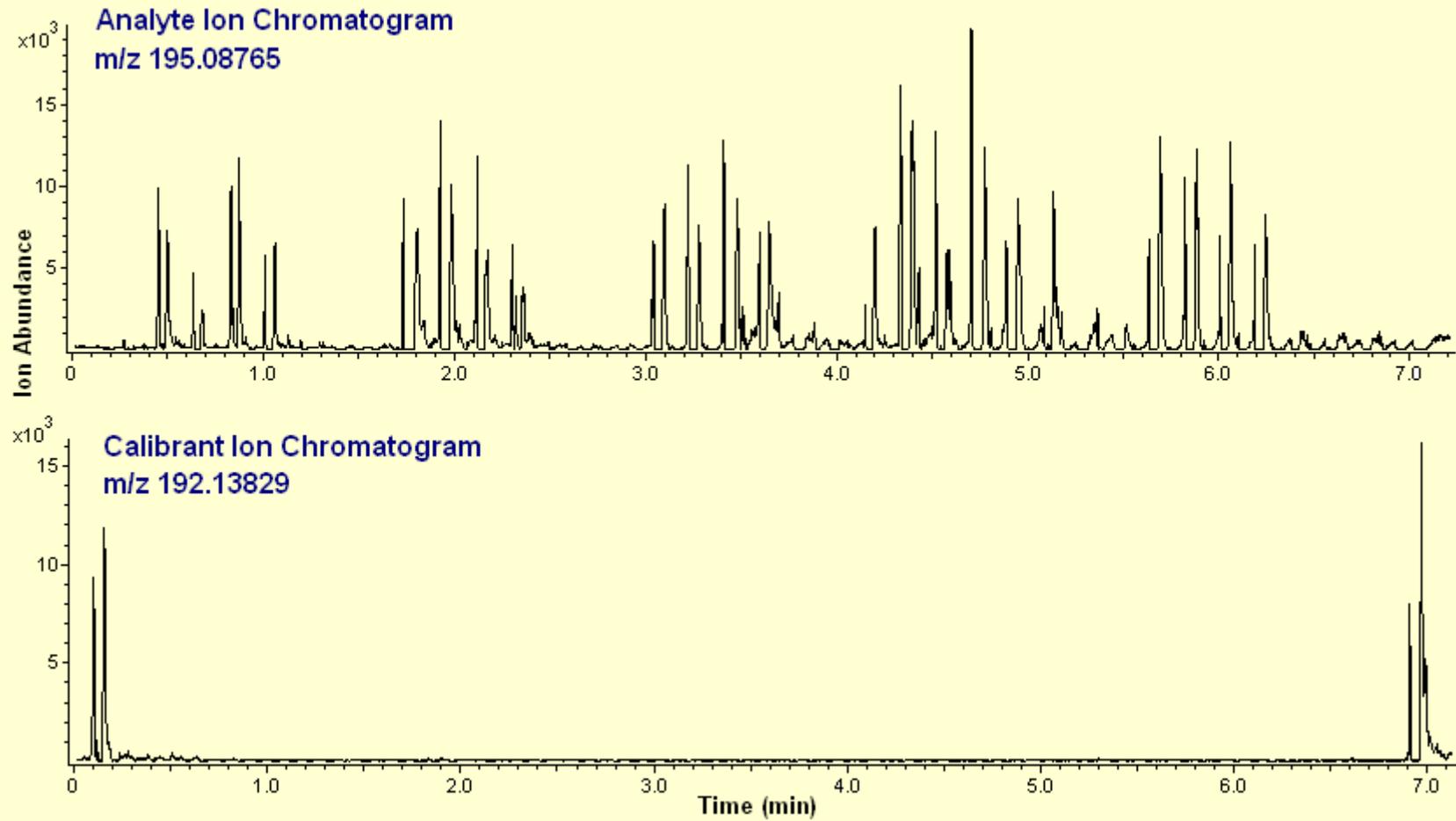


# Sample Preparation



# 7 x 12 Sampling Pattern

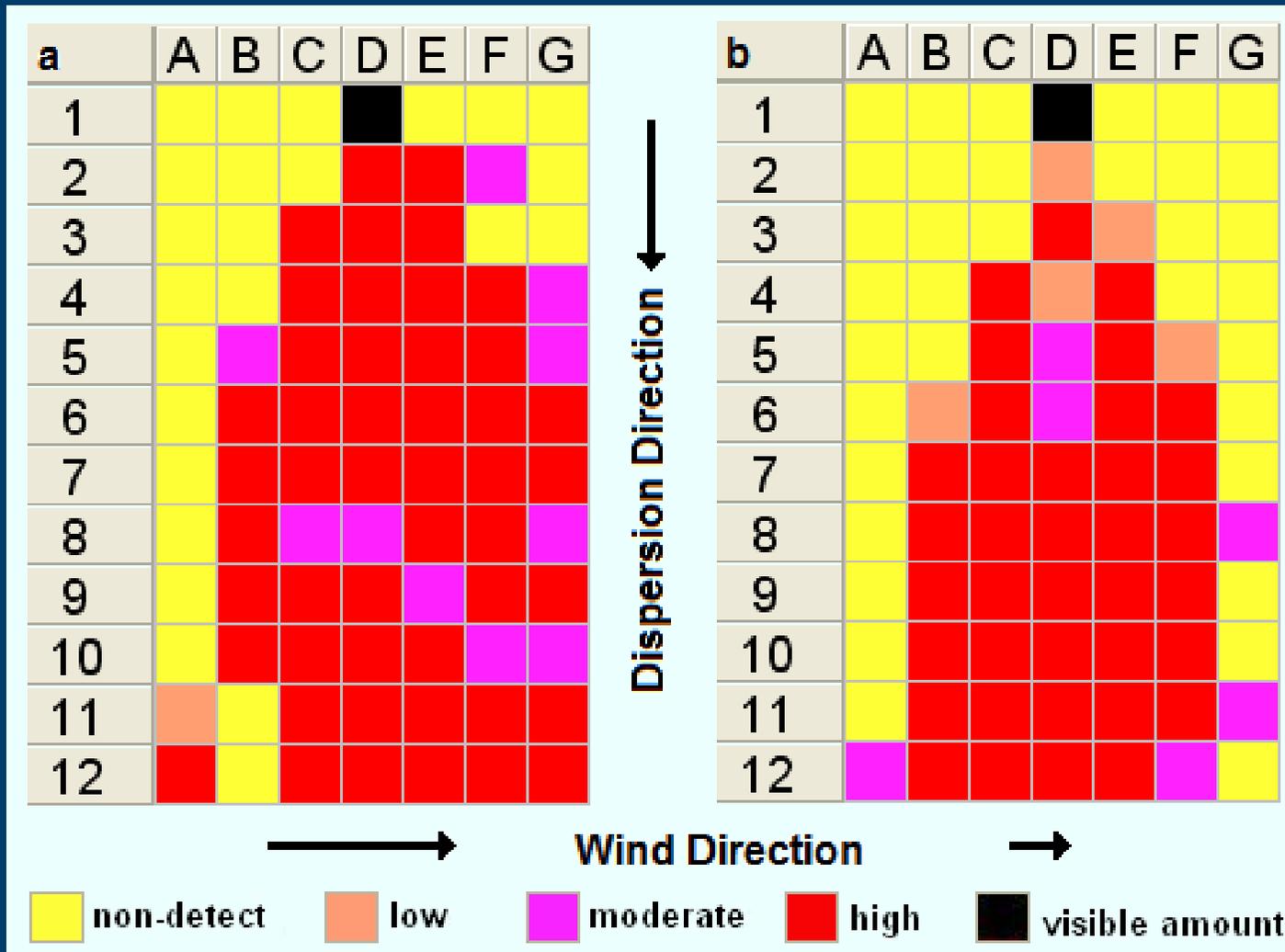






United States  
Environmental Protection  
Agency

# Semi-Quantitation Maps



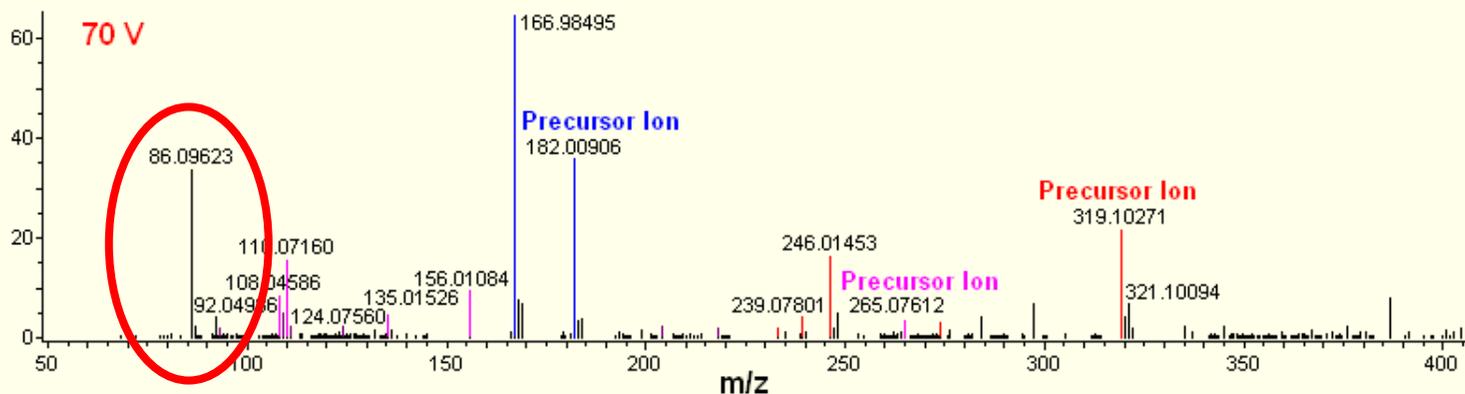
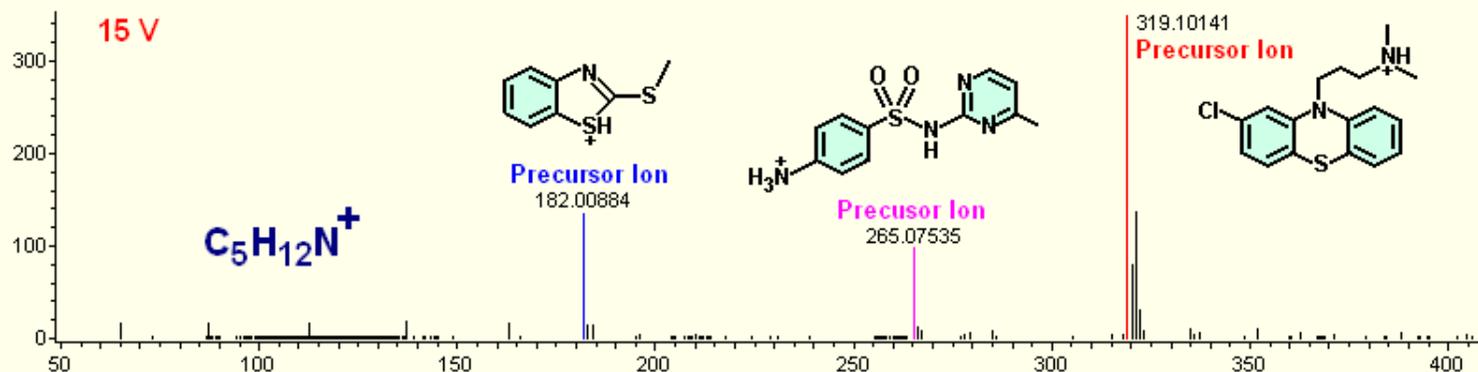
# Compound Identification and Separation by Exact Mass and RIAs

## Deconvolution of Composite Mass Spectra

### 3-Component Mixture

Uniquely Correlated  
Product Ions

319.10141	Precursor Ion
246.01453	Product Ion
239.07800	Product Ion
274.04535	Product Ion
233.00609	Product Ion
265.07535	Precursor Ion
110.07160	Product Ion
156.01083	Product Ion
124.07560	Product Ion
111.04825	Product Ion
182.00883	Precursor Ion
166.98495	Product Ion





**In 2008 alone, 6783 methamphetamine lab incidents were tallied by the Drug Enforcement Administration.**

**“Generally, it is more cost-effective to remediate an entire lab than to take pre-remediation samples in an attempt to avoid having to remediate certain areas of a former lab.”**

**U.S. EPA Guidelines for Voluntary Methamphetamine Laboratory Cleanup, 2009**

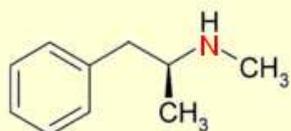
**NIOSH 9106 and NIOSH 9109 (GC/MS after derivitization)**

**NIOSH 9111 (LC/MS)**

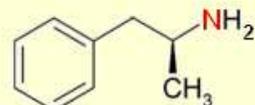
**To detect meth on surfaces requires wipe sampling, ~~extraction, clean-up, blow down,~~ and mass spectral analysis using selected ion monitoring.**

**Cheap real estate test before purchases? Annual motel room screens?  
Wipe sample kits – mail in swabs?**

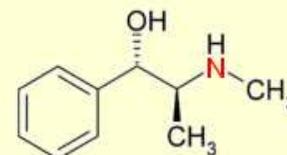
# Illicit Smoked Drugs



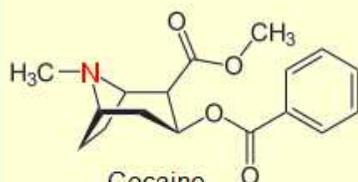
Methamphetamine  
149.1199



Amphetamine  
135.1042



Pseudoephedrine  
165.1148



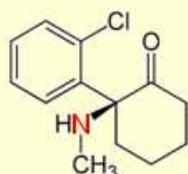
Cocaine  
303.1465



Heroin  
369.1571



Morphine  
285.1359



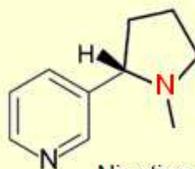
Ketamine  
237.0915



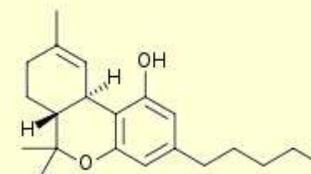
Phencyclidine  
243.1982



Fentanyl  
336.2196



Nicotine  
162.1152



Tetrahydrocannabinol (THC)  
314.2240

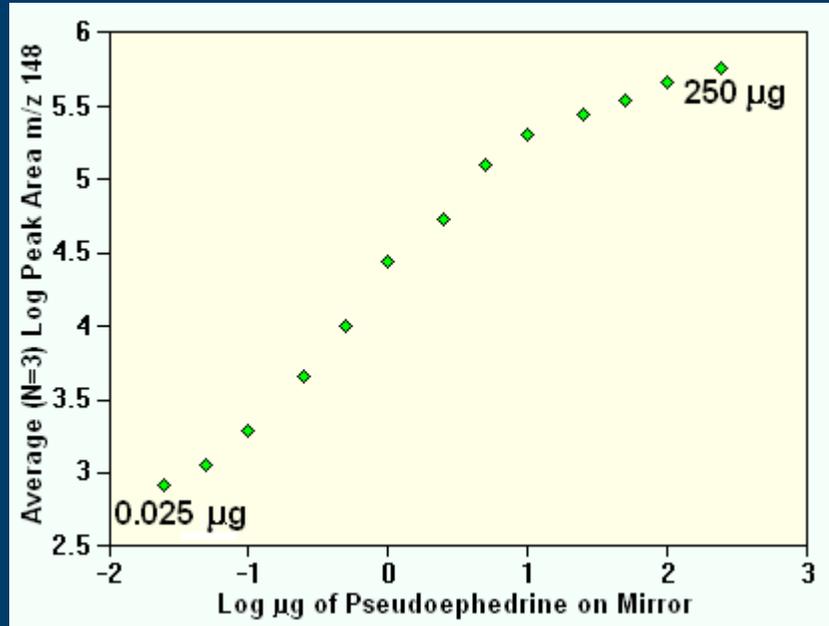
## Mirror: bare and with paint



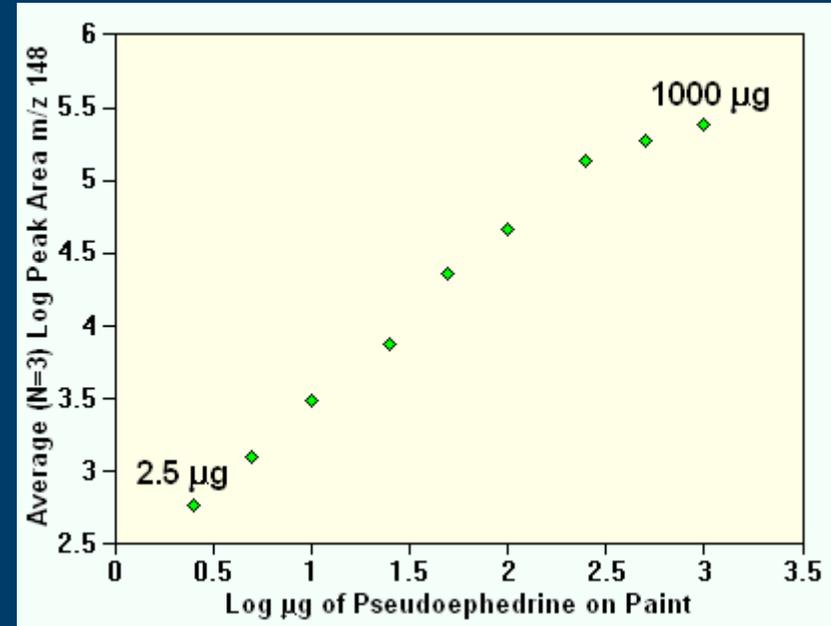
# Dynamic Ranges

## Pseudoephedrine

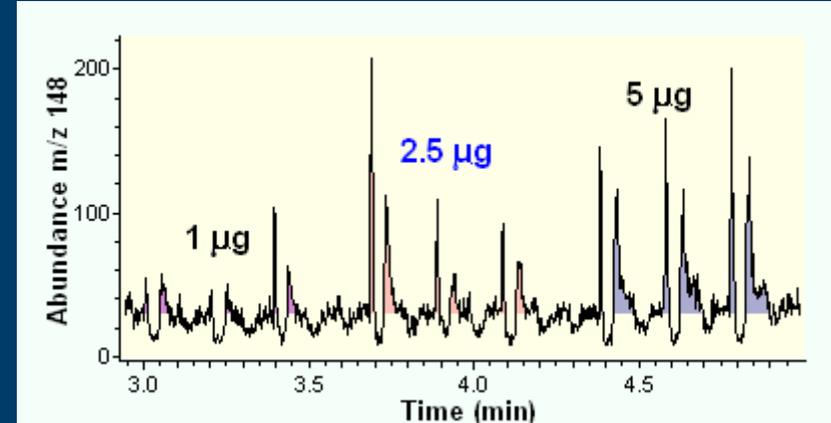
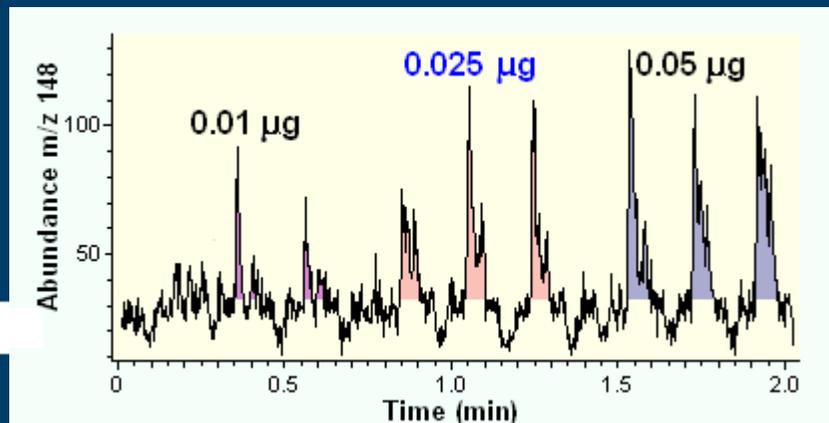
### Mirror



### Acrylic Latex Paint



# Detection Limits



# Detection Limits

## Pseudoephedrine

### Mirror

0.025  $\mu\text{g}/100 \text{ cm}^2$

NIOSH 9106: 0.05  $\mu\text{g}/100 \text{ cm}^2$

### Acrylic Latex Paint

2.5  $\mu\text{g}/100 \text{ cm}^2$

NIOSH 9111: 0.1  $\mu\text{g}/100 \text{ cm}^2$

Detection based limits for clean up: 0.1 – 0.5  $\mu\text{g}/100 \text{ cm}^2$

13 states

Health effect based limit for clean up: 1.5  $\mu\text{g}/100 \text{ cm}^2$

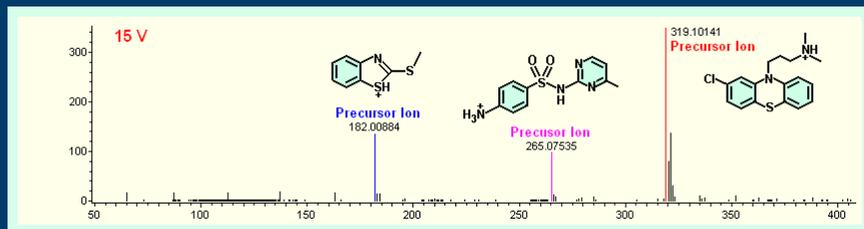
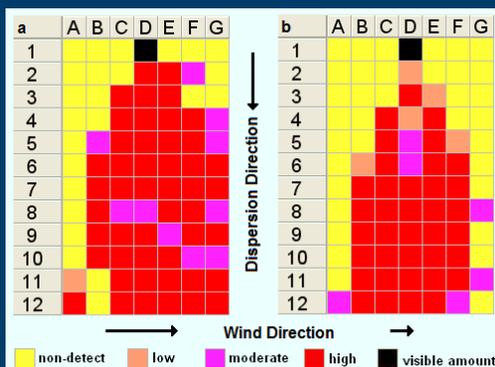
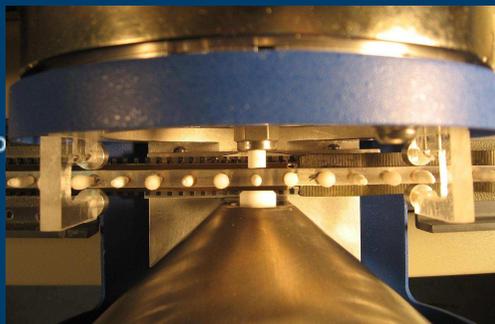
California

Meth cooks: 0.01 - 860  $\mu\text{g}/100 \text{ cm}^2$

Multiple smokes: 1.54 – 5.10  $\mu\text{g}/100 \text{ cm}^2$

Single smoke: 0.02 – 0.07  $\mu\text{g}/100 \text{ cm}^2$

} Martyny, et al.



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*Environmental Forensics*  
2008 Vol. 9:127-136

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*Rapid Commun. Mass Spect.*  
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