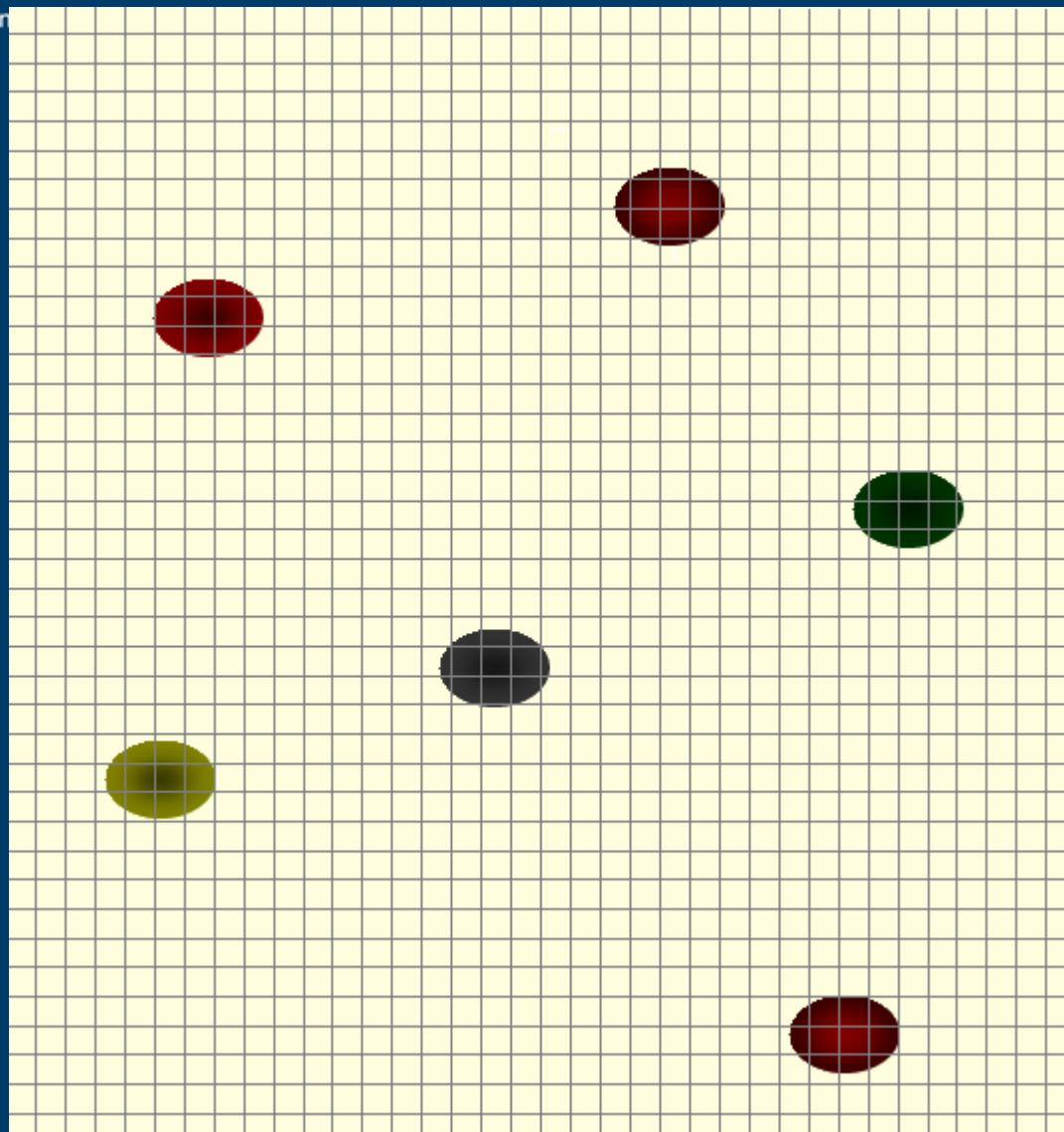


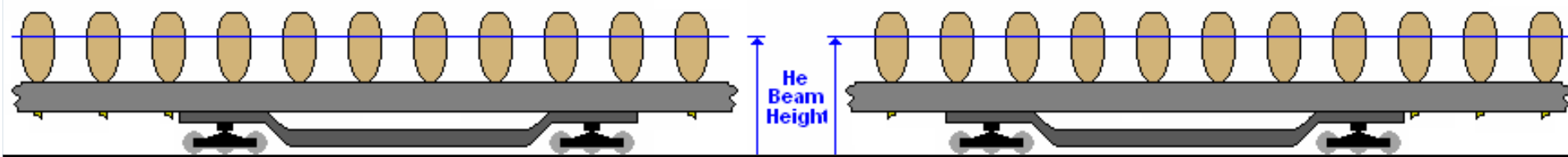
Semi-Quantitative Mapping and Identification of Dispersed Chemicals using an Ambient-Air Ion Source/Mass Spectrometer

Andrew H. Grange



Superfund Site





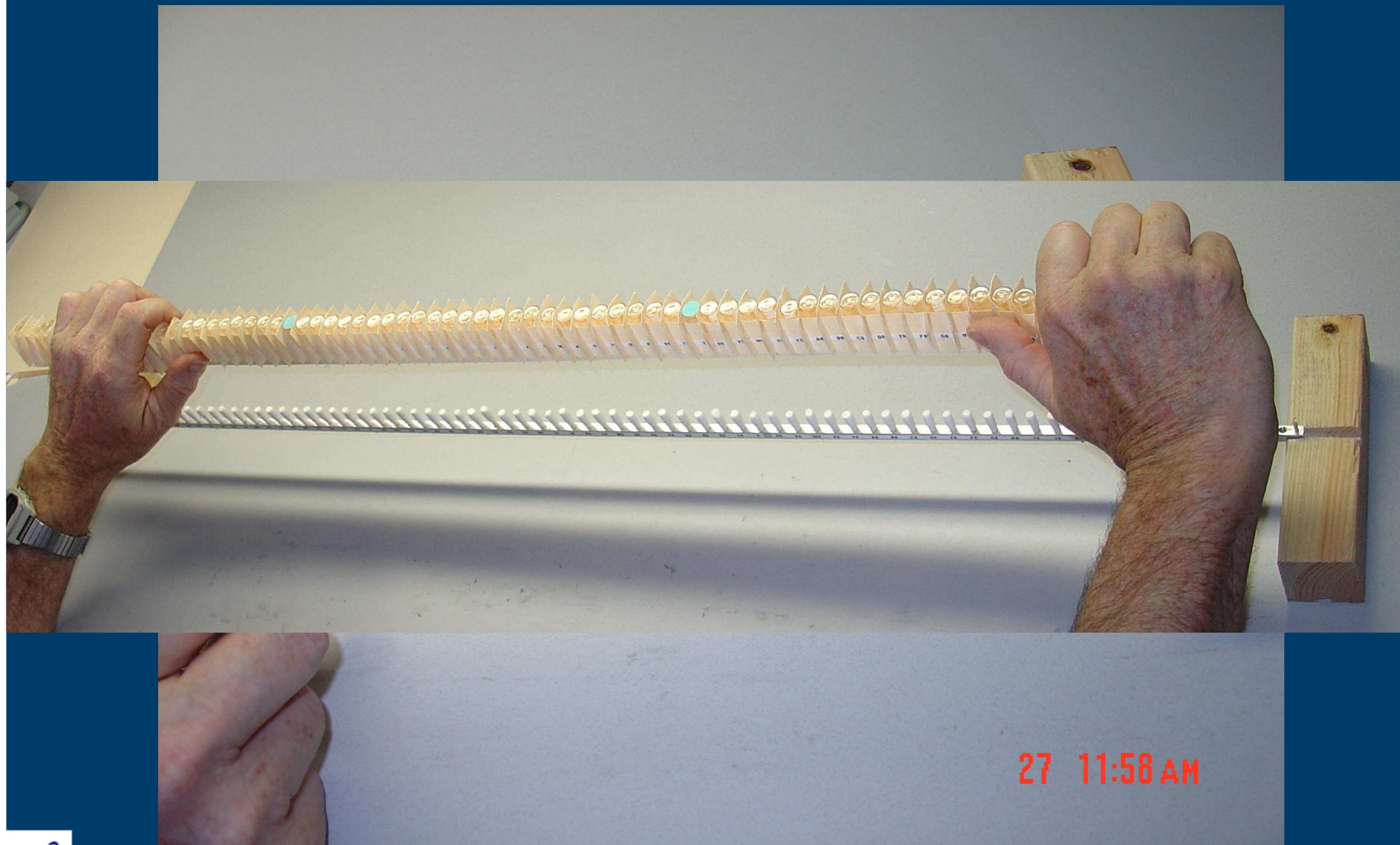
Autosampler



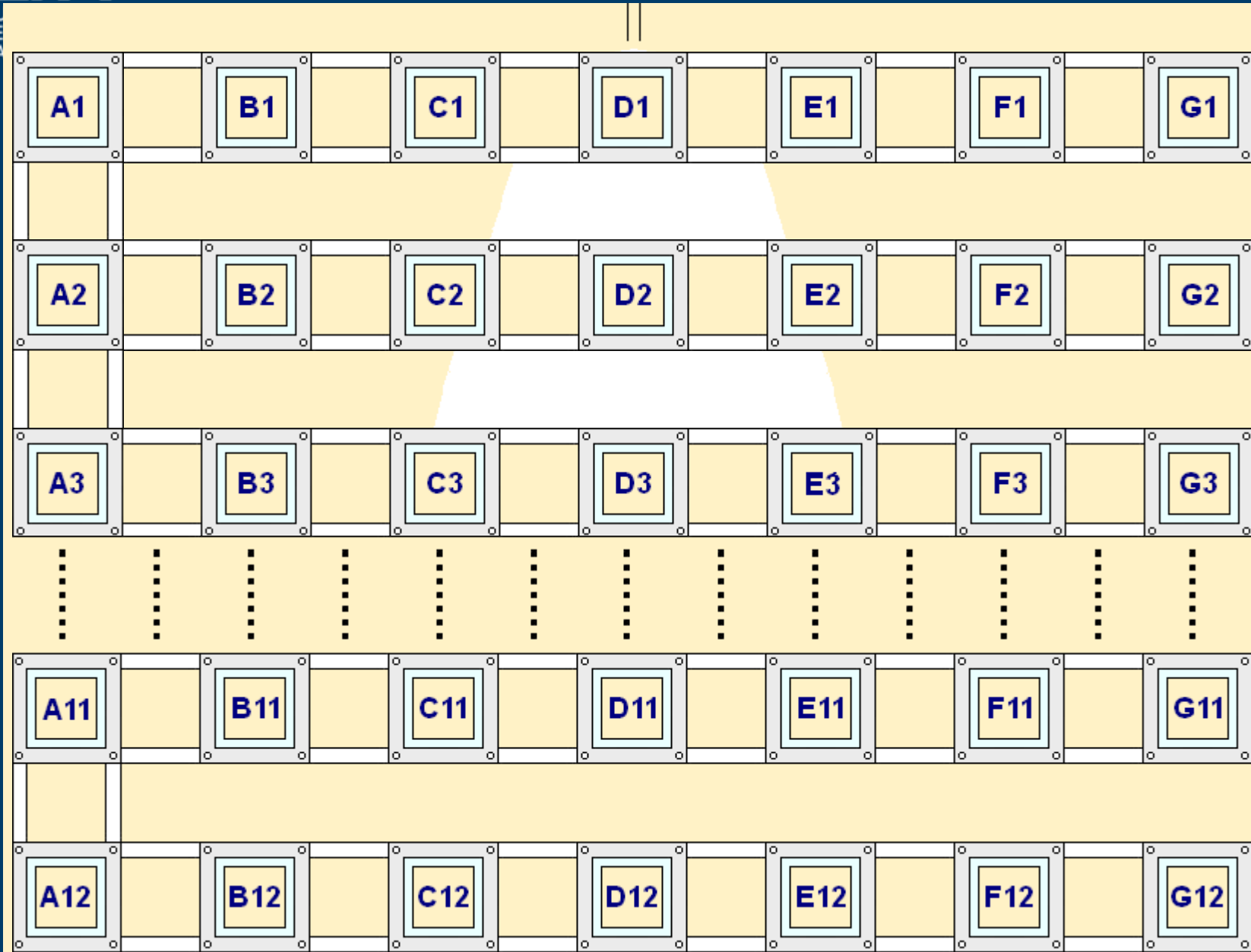
Wipe Sample Transport

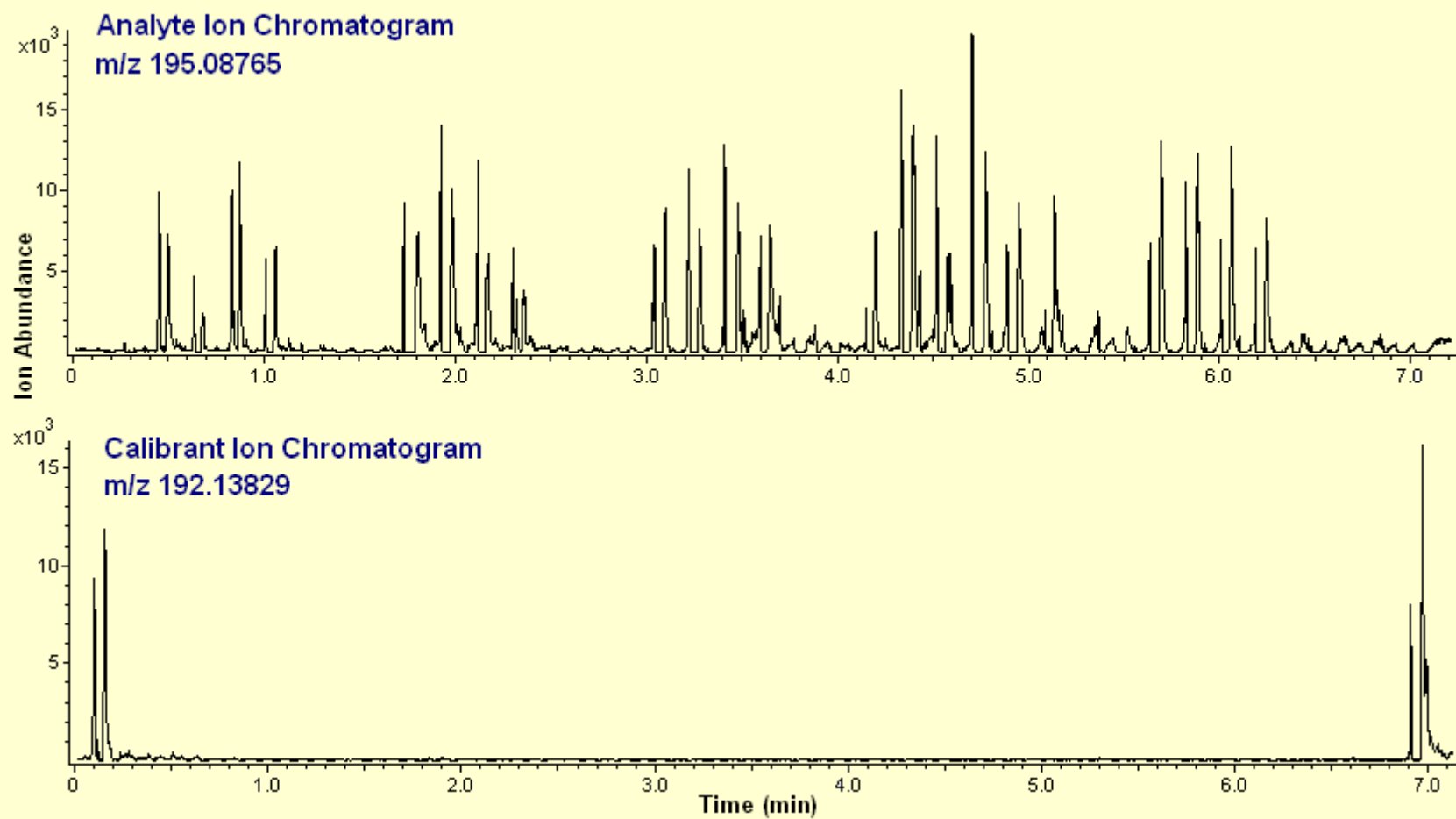


Sample Preparation



7 x 12 Sampling Pattern

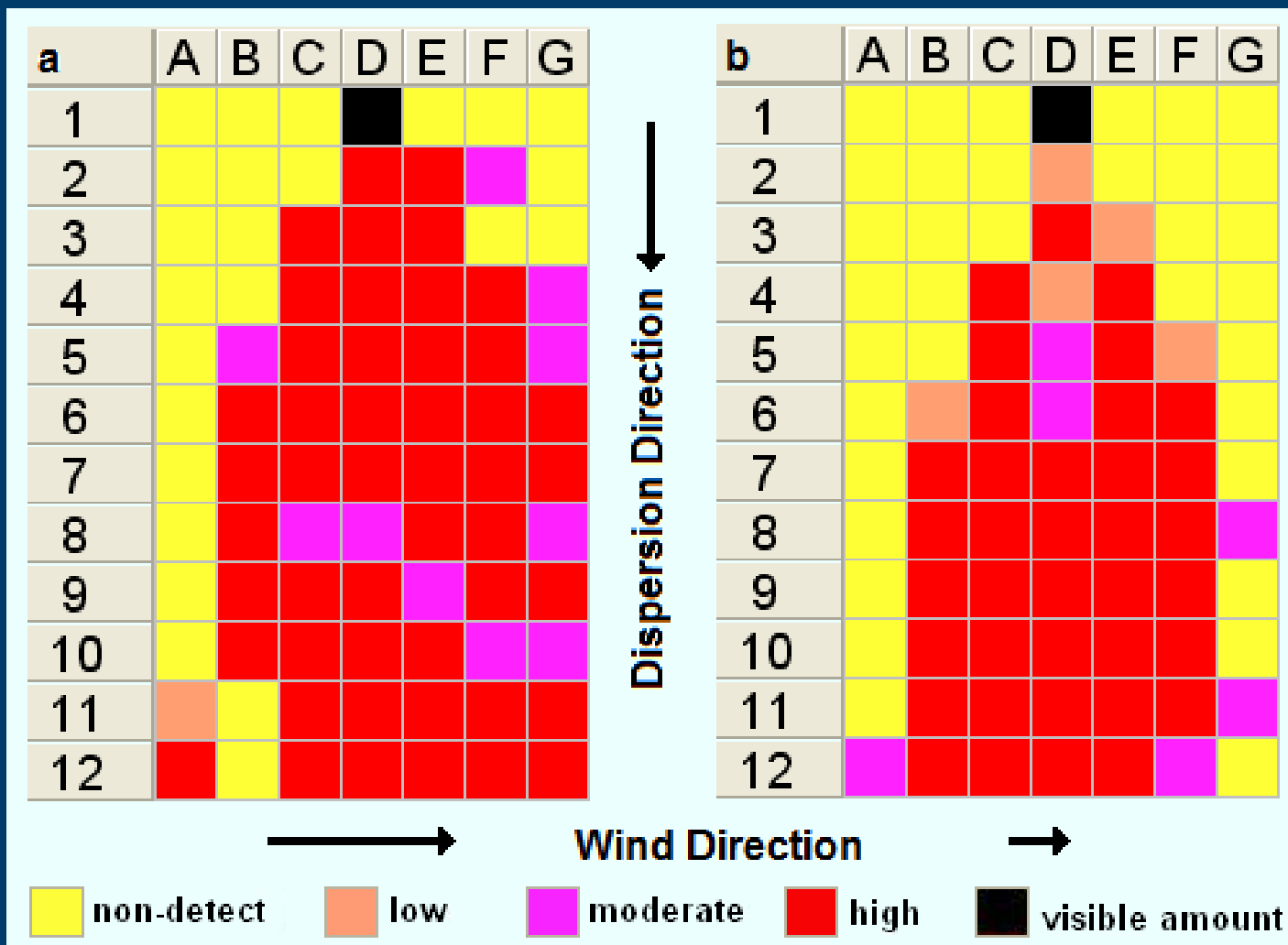






United States
Environmental Protection
Agency

Semi-Quantitation Maps

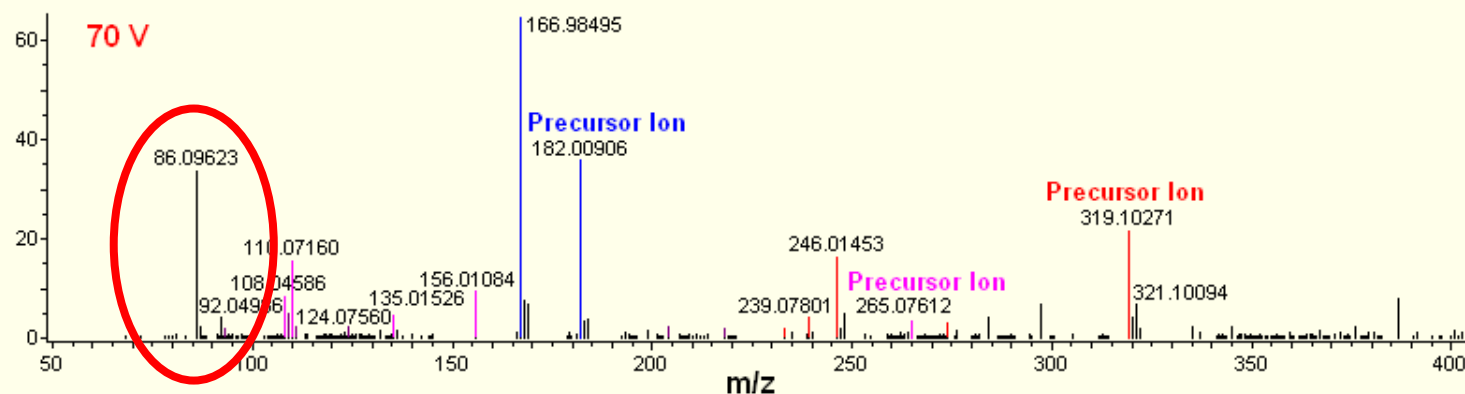
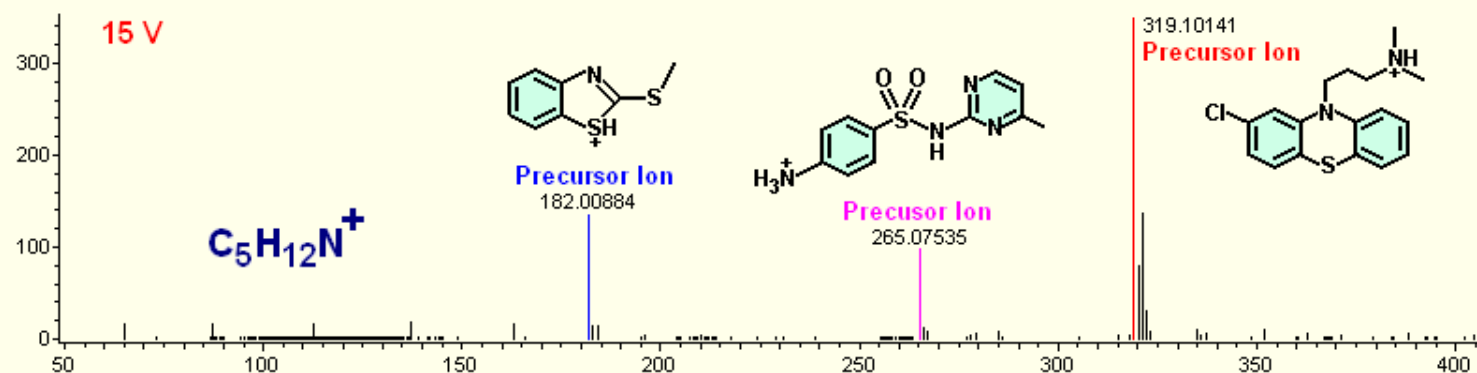


Compound Identification and Separation by Exact Mass and RIAs

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

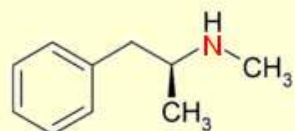
NIOSH 9106 and NIOSH 9109 (GC/MS after derivitization)

NIOSH 9111 (LC/MS)

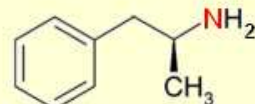
To detect meth on surfaces requires wipe sampling,
~~extraction, clean-up, blow down,~~ and mass spectral analysis
~~using selected ion monitoring.~~

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

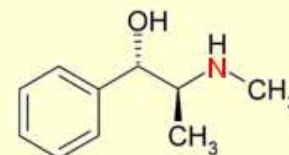
Illicit Smoked Drugs



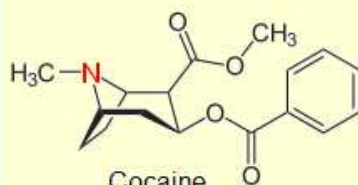
Methamphetamine
149.1199



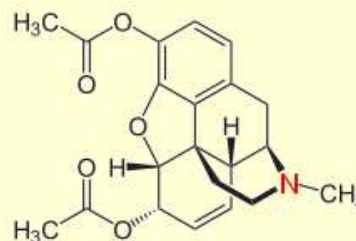
Amphetamine
135.1042



Pseudoephedrine
165.1148



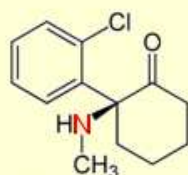
Cocaine
303.1465



Heroin
369.1571



Morphine
285.1359



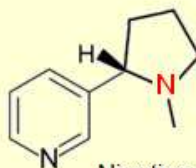
Ketamine
237.0915



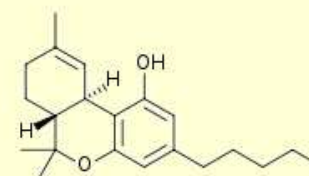
Phencyclidine
243.1982



Fentanyl
336.2196



Nicotine
162.1152



Tetrahydrocannabinol (THC)
314.2240

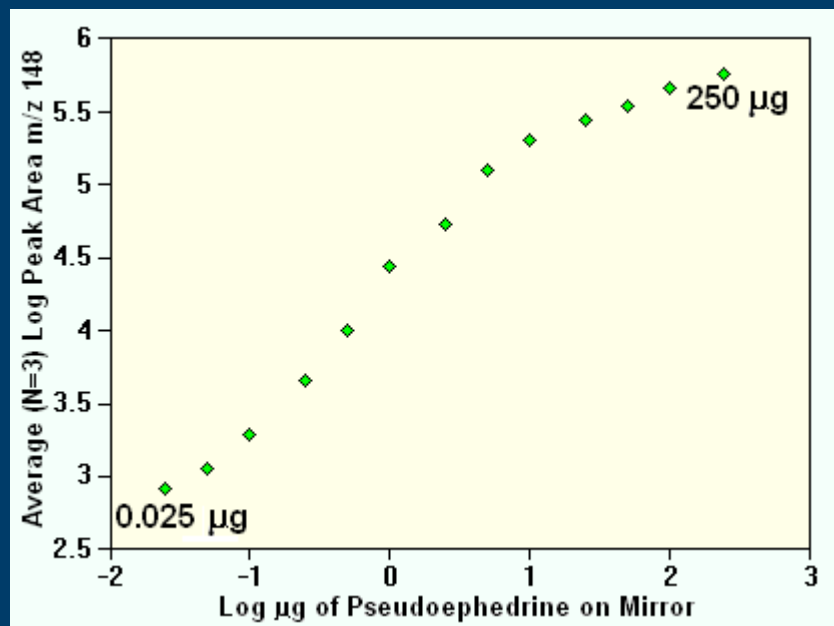
Mirror: bare and with paint



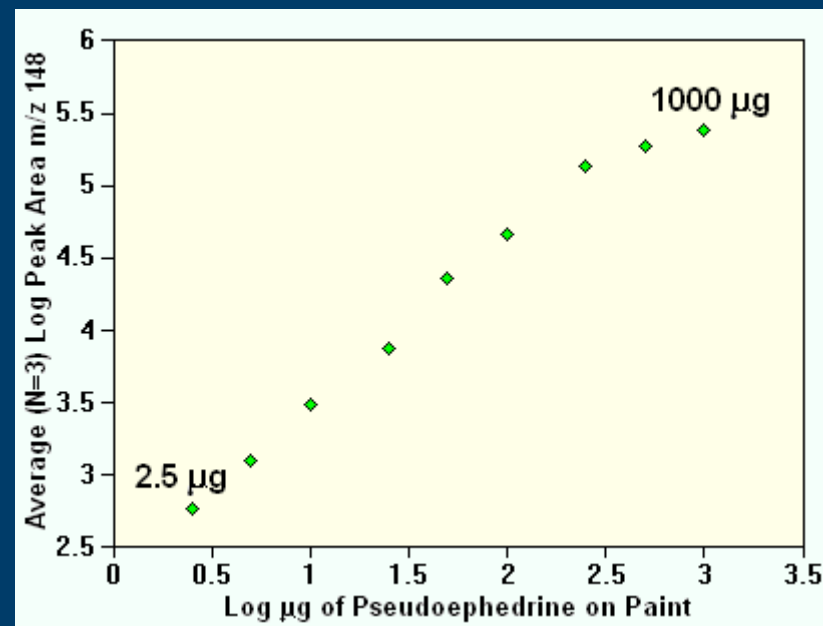
Dynamic Ranges

Pseudoephedrine

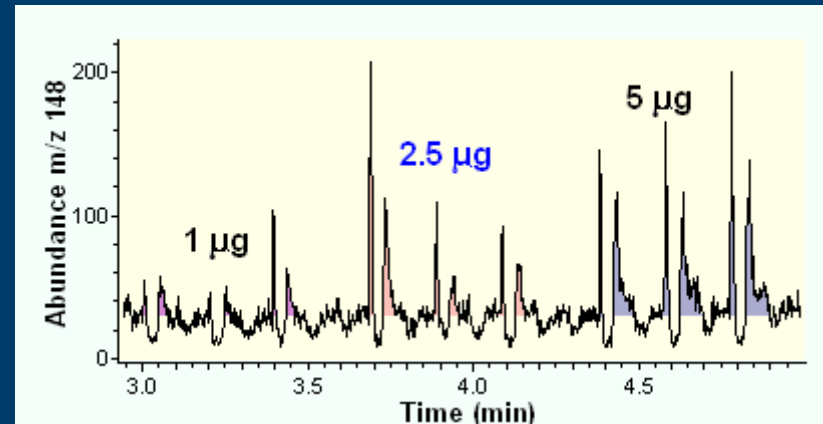
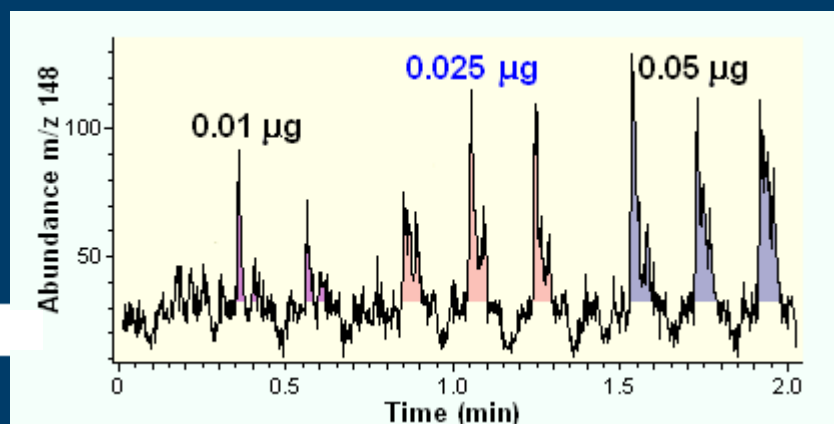
Mirror



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

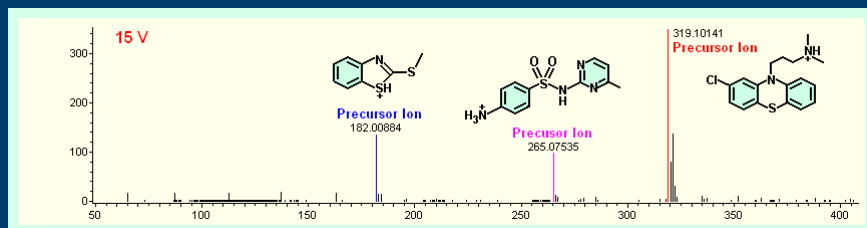
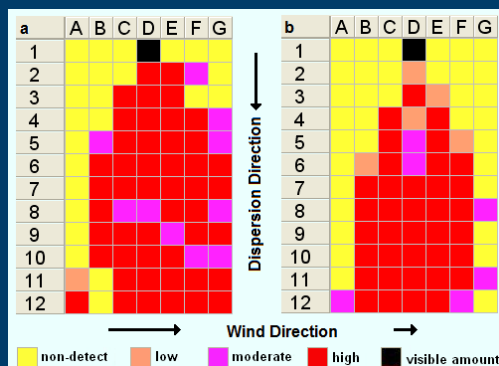
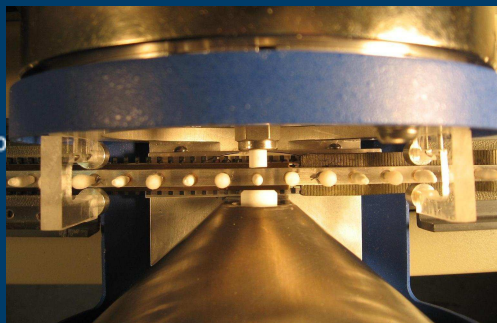
California

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.



Grange, A.H.
Environmental Forensics
2008 Vol. 9:127-136

Grange, A.H.
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2008 Vol. 9:137-143

Grange, A.H.
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