CLANDESTINE AND METHAMPHETAMINE LABORATORIES; LABORATORY RECOGNITION, HAZARD IDENTIFICATION AND SAMPLING METHODS

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The Problem

- Ongoing presence of clandestine methamphetamine “laboratories”
- Residences, motel rooms, condominiums, automobiles, dumpsters, etc.
- Fires, explosions, solvents, acid gases, Ph₃, NH₃, metals
- Product precursors, residuals and final product
- Occult hazards from surface contamination
- An occupational and public health problem
Not all clandestine laboratories are making methamphetamine:

- Marijuana grow labs
  - Amphetamine – Speed, Crank
  - GHB – Date Rape, Scoop
  - LSD – Acid
  - MDMA – XTC, Ecstasy, Love Drug, Adam
- Processing of other narcotics
Data on methamphetamine labs collected from 16 states from Jan 2000, through June 2004 revealed:

- Nearly 1,800 meth events
- 10% of events involved fire or explosion
- 31 percent of the events involved injuries, with police officers most often injured
- 1,154 people underwent decontamination, 60 percent of which were emergency responders

Source: MMWR April 15, 2005 / 54(14);356-359
The Trends

- Following the highest number of DEA reported seizures in 2004 (over 18,000):
  - With passage of national and state laws decreasing access to precursors, lab seizures trended downward from 2005-2007 with a low of just over 6000 lab seizures in 2007.
  - Beginning in 2008 number of seizures has trended up-ward. Average now is about 10-11,000 DEA reported seizures per year.

  - Source: http://www.justice.gov/dea/concern/map_lab_seizures.html
DEA 2011 Results

Calendar Year 2011
Total: 10,287
Total of All Meth Clandestine Laboratory Incidents Including Labs, Dumpsites, Chem/Glass/Equipment

Source: El Paso Intelligence Center (EPIC)/National Seizure System (NSS)
Methods of Manufacture

Red Phosphorus Method (Hot, Red P)

- Extract ephedrine-pseudoephedrine
- Add red phosphorus & iodine
- Let react for 8-72 hours
- Cool, filter red phosphorus
- Add sodium hydroxide
- Extract with solvent
- Salt out free base
- Purify as needed
Methods of Manufacture

Anhydrous Method (Birch, Cold, Nazi)
- Extract ephedrine-pseudoephedrine
- Add ammonia & lithium metal
- Let react for approx 3 hours
- Add sodium hydroxide
- Extract with solvent
- Salt out free base
- Purify as needed
Methods of Manufacture

One Pot or “Shake and Bake” Method

- Modification of the Birch or Anhydrous method
- Done in a single container, mix all the ingredients, agitate and vent cap
- Usually less than 1 gm produced
- In some localities, this is becoming THE way to make methamphetamine. May have a lot of separate batches
- Bring them all together to “salt out’
# Methods Summary

## Red Phosphorus Method
- Ephedrine
- Solvents
- HCl Generators
- Acids & Alkalis
- Iodine
- Red Phosphorus

## Anhydrous Ammonia Methods
- Ephedrine
- Solvents
- HCl Generators
- Acids & Alkalis
- Reactive Metals
- Anhydrous Ammonia

**Key Differences**
Potential hazards in clandestine meth “labs”

- Fire
- Explosions
- Solvent exposure
- Acids
- Bases
- Metals
What Status can Labs be Found

- Setup and Active
- Setup and Inactive
- Boxed or Stored
- Discarded
What Status can Labs be Found

Setup and Active

- Key indicators include:
  - Complete “Lab” setup
  - Active heat sources
  - Obvious chemical reactions

- Most dangerous situation!
  - Monitor for flammable/explosive atmosphere
  - Monitor for toxic gas and vapors
Setup and Inactive

- Key indicators include:
  - Partial “Lab” setup
  - No active heat sources
  - No obvious chemical reactions
- Should be relatively stable
  - Monitor air quality
  - Splash hazard potential
What Status can Labs be Found

Boxed or Stored

- Key indicators include:
  - NO “Lab” setup
  - Materials stored or hidden
- Should be relatively stable
  - Should not need to take any actions
  - Chemical hazards may be present
What Status can Labs be Found

Discarded

- Key indicators include:
  - Can be found anywhere
  - All of the typical “precursors”

- Can be very unstable/dangerous!
  - Possible toxic or explosive reactions
  - Potential for splash hazards
Existing Guidance

- DEA “Red Book”: Guidelines for Law Enforcement for the Cleanup of Clandestine Drug Laboratories
Existing Guidance

- EPA “Green Book”: Voluntary Guidelines for Methamphetamine Laboratory Cleanup
Existing Guidance

- NIJ: CBRN Protective Ensemble Standard for Law Enforcement, NIJ Standard-0116.00
Determination of PPE requirement is made during initial “size-up” and site assessment.

- Includes tactical PPE as well as OSHA levels of protection
  - Level A
  - Level B
  - Level C
  - Level D

Best practice is to change to next lower level as soon as conditions warrant.
Determination of PPE requirement is made during initial site assessment and included in the site safety plan

- Includes OSHA levels of protection
  - Level A
  - Level B
  - Level C
  - Level D

- Best practice is to change to next lower level as soon as conditions warrant
4 Law Enforcement Response Levels (LERLs) based on mission requirements, expected mission duration, durability requirements of different operations and activities, and hazards in the CBRN threat environments.
Initial Site Visit

- Determine presence of toxic atmospheres (PID, toxic gas meter, Dragger tubes)
- Determine level of PPE:
  - For general sampling in non-toxic atmospheres we wear level “D”
  - If performing remediation-type activities, or performing activities that increase exposure risk - go to level “C” or “B”
Initial Site Visit

- Information gathered during criminal investigation
- What type of manufacture occurred
- Length/number of cooks
- Location of cook
- Proximity of ventilation to cook area
- Visual extent of contamination
Visual extent of contamination
- Iodine stains-Starch test
- Puddles/spills-pH, PID (neutralize, absorb)
- Missed bulk chemicals (notify DEA contractor)
- White powder-spot test for meth, pH. Be prudent

Take measurements/floor plan
Take photographs
Select initial sampling locations
Determine availability of utilities (power, water)
In general, all the suspected clandestine methamphetamine laboratories had widespread surface contamination by methamphetamine residues throughout the house or structure.
Method development intent & issues

- Detection of methamphetamine residues
- Determine degree and extent of surface contamination
- Determine degree and efficacy of decontamination
- Confirm decontamination
Method development intent & issues

- Utilize sampling methods consistent with common IH techniques
- Develop sampling techniques compatible with multiple analytic endpoints
- Evaluate multiple types of sampling media, make selection based on cost, ease of use, availability as well as performance
- Establish criteria for use of “direct reading” methods
Three wipe-based methods developed that rely on laboratory analysis for identification and quantification:

- NMAM 9106: Wipe, desorb, liquid:liquid extraction, derivatize, GC-MS
- NMAM 9109: Wipe, desorb, solid phase extraction, derivatize, GC-MS
- NMAM 9111: Wipe, desorb, LC-MS

Two wipe-based field methods developed. These are semi-quantitative methods that use colorimetric or immunochemical detection. Samples may be analyzed subsequently with above methods.
When possible, conduct a site assessment to determine possible hazards

- Type of laboratory: active, in-active, stored or dumped
- If possible, prior to tactical operations notify the fire department, HAZMAT, EMS, contractors
- Establish decontamination measures and RIT/back-up teams
Assume the worst, hope for the best

- Wear highest level of protection that is practical for the situation
- Be observant and monitor for physical and chemical hazards
- Secure the scene and begin stabilization/mitigation
As conditions warrant, step down in level of PPE

- Wearing of PPE is physically stressful
  - Increased heat stress
  - More physical exertion-heavy and bulky
- Sensory impairment- poor vision/hearing
- Increased risk of trips and falls
For further information

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