

CLANDESTINE DRUG LABS

Issues Related to Decontamination of Properties

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The Salt Lake Valley Health Department



Drugs You Can Make at Home

- Methamphetamine
- LSD
- Ecstasy
- GHB (“date rape drug”)
- Known as “Club Drugs”, associated with dance parties known as “Raves”
- Methamphetamine is easiest to produce, the drug most commonly found in labs

Production of Methamphetamine

- Relatively easy – “If you can bake cookies, you can make meth”
- Most common method in Utah uses phosphorus, ephedrine, and iodine (“red, white, blue”)
- Precursors mixed together, product is extracted, precipitated, then purified
- Purity and yield depend on quality of reagents and skill of cook

First Component: Red

- Refers to red phosphorus
- Brownish-red powder
- Can burn or explode under the right conditions
- Extracted from matchbook striker plates or road flares

Red Phosphorus (“Red”)



Extraction of Red Phosphorus



Second Component: White

- Refers to ephedrine or pseudoephedrine
- White or off-white powder (sometimes pink if extracted from cold pills)
- Mild stimulant, extracted from the ephedra plant
- May be extracted from cold pills or obtained as pure tablets

Ephedrine (“White”)



Extraction of Ephedrine



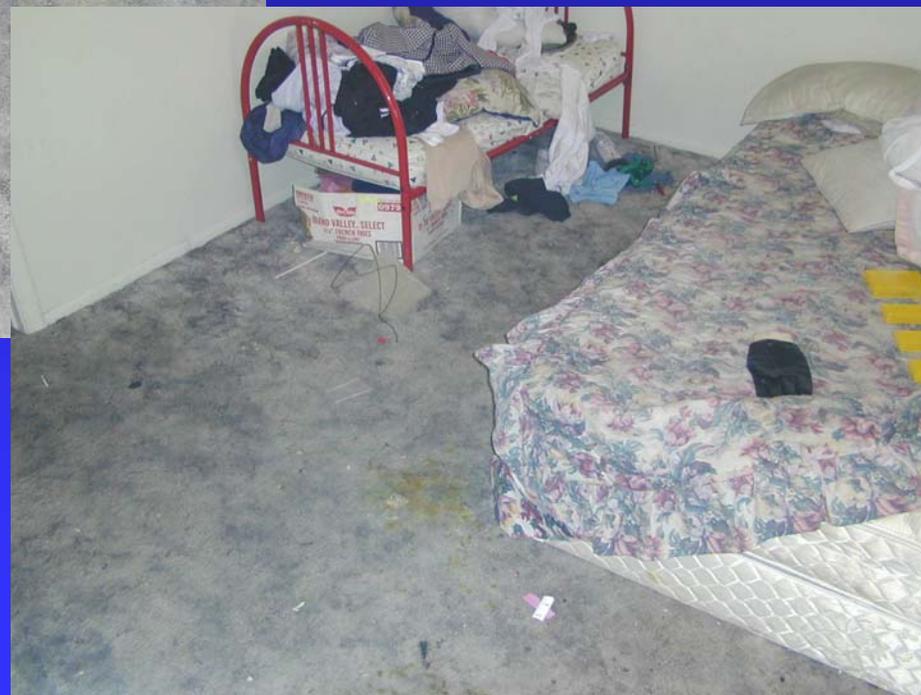
Third Component: Blue

- Refers to iodine crystals
- Blue-gray in appearance, almost like lead pellets
- May be obtained pure or extracted from disinfectant solution
- Used as a disinfectant in livestock operations
- Leaves distinctive, yellow-blue or brown stains on surfaces

Iodine (“Blue”)



Iodine Contamination



What Does a Lab Look Like?



Purification of Meth

- Sodium hydroxide (lye) added to reaction to change acidity
- Organic solvent (kerosene, ether) added to extract product
- Hydrochloric acid added to precipitate drug
- Drug is removed, purified with acetone, then dried

Corrosive Materials



Finished Product



Other Ways to Cook Meth

“Nazi” or “Cold cook” method

- Uses ephedrine, ammonia, and sodium or lithium metal
- Fast, efficient
- Requires supplies of anhydrous ammonia, rarely seen in Utah

“P-2-P” or “Biker” method

- Combines phenyl-2-propanone and methylamine
- Very slow, difficult
- Older, “obsolete” method
- May be used by some cooks

Public Health Concerns

- Houses with clandestine labs are often dirty, in poor condition
- Floors, walls, ceilings may be contaminated with chemical residues; contamination may be spread throughout the house by occupants
- Chemical wastes may be stored or dumped on the property

Unsanitary Conditions



Solid Waste Left on Premises



Basic Rules of Toxicology

- **“Dose makes the poison”**
- **Long-term exposure to low doses may eventually produce same symptoms as short-term exposure to high doses**
- **The fact that something is toxic does not necessarily mean it is a hazard to health**

Acute vs. Chronic exposure

- **Acute:** Exposure which occurs over a short time. High doses usually required to cause an effect
- **Chronic:** Exposure which occurs over the space of months to years, usually involves lower amounts of toxicant.

How Dangerous Are Meth Labs?

It all depends on:

- Who you are
- Where you are
- What you are doing
- When you are doing it
- How long you are doing it
- How much chemical is present

Hazard Depends on Situation

- Contamination in most former meth labs is restricted to low levels of meth residue
- Houses are not considered hazardous waste sites under EPA or State hazardous waste regulations
- “Cooking” meth in a house exposes a person to different hazards than occupying the house afterwards

Chemical Hazards of Production

- Toxic gases are produced that can cause death or injury (phosphine is the most deadly)
- Flammable chemicals are used in process
- Caustic chemicals such as hydrochloric and sulfuric acids are used for extraction
- Chemicals may condense on surfaces
- There are unknown hazards from meth by-products

Hazardous by-Products

- Produced during reaction, may occur with or without heating
- Major by-products are phosphine gas and hydriotic acid
- Other by-products may be present, depending on purity of reagents

Phosphine Gas

- Chemical formula:
 PH_3
- Toxicity: High
- Flammability:
Extreme
- Reactivity: Very Low
- Primary route of toxicity is by inhalation
- Causes lung edema, asphyxia
- Heavier than air, collects in low places
- Waste gas vented into “death bags”

“Death Bag”



Potential for Exposure

- Phosphine is always a gas at room temperature
- Complete ventilation of house over period of several days will eliminate most residue
- Primarily a hazard for first responders
- Not considered to be a long-term hazard for occupants

Iodine/Hydriotic Acid

- **Chemical Formula:**
 I_2/HI
- **Toxicity: High**
- **Flammability: Very Low**
- **Reactivity: Moderate (oxidizer)**
- **Upper respiratory tract/mucous membrane irritant**
- **Corrosive, oxidizer**
- **Stains surfaces easily**
- **Volatile (crystals can emit vapors)**
- **Vapor can be fatal in low concentrations**

Potential for Exposure

- Contamination is often easily detected, due to distinctive smell and obvious stains on surfaces
- Stains can persist for years and “bleed through” paint, creating vapor
- Vapor can be removed by venting the house; inadequate ventilation can cause buildup to toxic levels
- Residue reacts with spray starch
- Stained items/surfaces may be discarded

Spray Starch Test Results

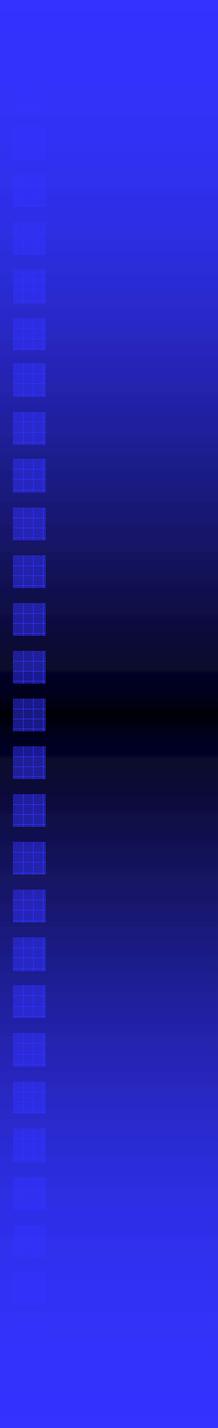


Real World Tests



Flammable Materials

- Organic solvents used for extraction of drug from reaction mixture
- Common solvents are methanol, ethanol, isopropanol, acetone, kerosene, chloroform, ether
- Red phosphorus is a primary reagent of the reaction



Red Phosphorus

- Chemical Formula: P
- Toxicity: Low (unless contaminated with yellow phosphorus)
- Flammability: Low
- Reactivity: Low
- Extracted from matchbook striker plates, road flares
- Primary reagent of meth production
- Will convert to yellow (white) phosphorus when heated

Potential for Exposure

- All organic solvents are volatile
- Most have a distinctive smell, odor threshold is usually well below toxic levels
- Most of the residue will evaporate after removing the source and ventilating the structure for several days (length of time depends on the outside temperature)

Corrosive Materials

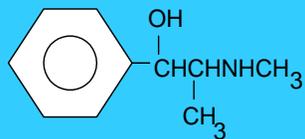
- Change pH of reaction mixture, which in turn changes solubility of methamphetamine
- Include sulfuric and hydrochloric acids and sodium hydroxide
- Used to precipitate drug from reaction mixture
- Can pose a significant contact hazard if residue is not removed or neutralized

Potential for Exposure

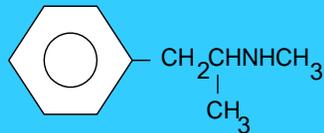
- **Strong acids react immediately when spilled, little residue remains after reaction**
- **Sodium hydroxide powder can remain on surfaces after spills, cause contact burns**
- **Residues can be easily removed or neutralized by soap and water solution**

Methamphetamine

- Toxicity: Moderate
- Flammability: Low
- Reactivity: Very Low
- Powerful CNS stimulant
- Highly addictive
- Usually smoked or injected
- “High” lasts longer than cocaine
- Prescribed for weight loss, ADD-type behaviors



EPHEDRINE



METHAMPHETAMINE

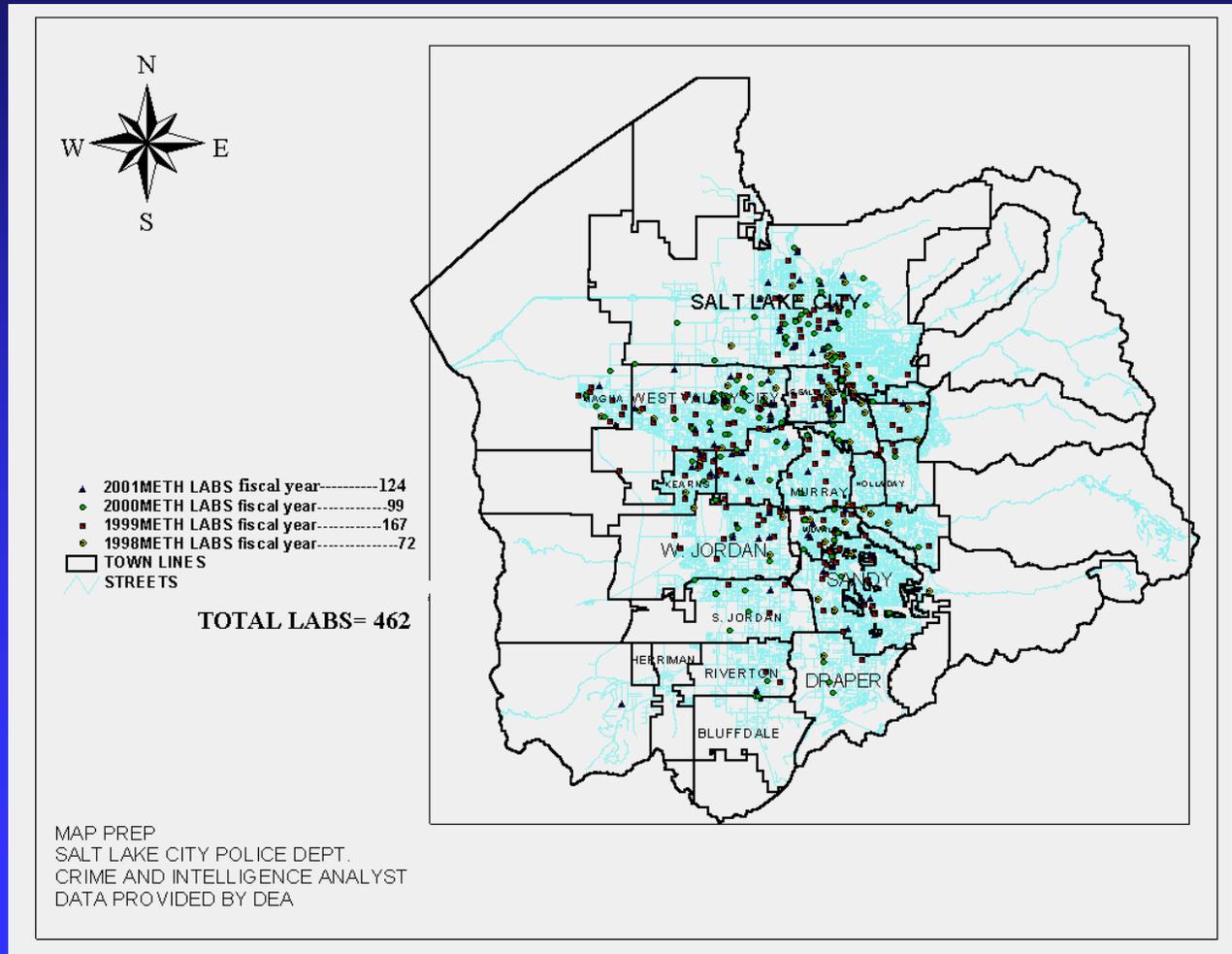
Potential for Exposure

- Meth is not volatile at normal temperatures; does not evaporate
- Vapor/fumes form during production and smoking, can condense on walls, ceilings
- Dust forms while drying and processing product
- Reaction mixture may “boil over” and splash on walls, floors, ceiling
- Residue levels may be close to prescribed dosage, can remain for years afterward

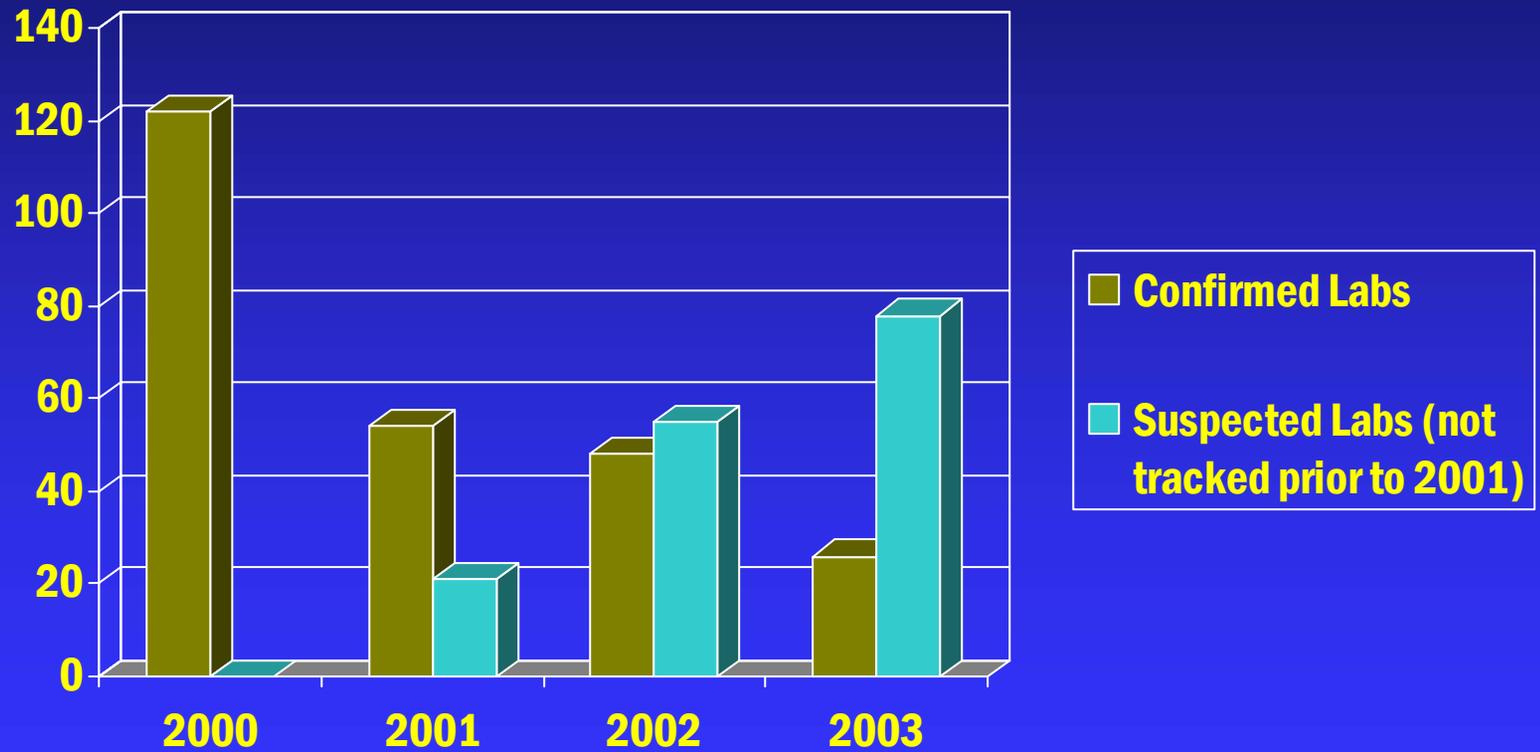
Part II: Health Department Response to Meth Labs

**Overview of the Salt Lake Valley
Health Department's Chemically
Contaminated Properties
Regulation**

Meth Labs in Salt Lake County



Number of Labs Reported to SLVHD



What Can the Health Department Do?

Section 26A-1-114 of Utah Code

1) A local health department may:

(a) enforce state laws, local ordinances, department rules, and local health department standards and regulations relating to public health and sanitation,....;

(b) establish, maintain, and enforce isolation and quarantine, and exercise physical control over property and over individuals as the local health department finds necessary for the protection of the public health

Health Department Regulations

- Originally decontamination was mandated by Salt Lake Valley Health Regulation #3-5.14
- Did not outline or mandate any process for decontaminating property or record-keeping

Health Dept Reg. #3-5.14

- **5.14 Prevention of Toxic Substances Required.** Every owner of a dwelling or dwelling unit shall provide and maintain the dwelling or dwelling unit free of health hazards due to the presence of toxic substances, including lead based paint.

Health Dept Regulation #32

- Specifically addresses chemically-contaminated properties
- Mandates certain steps in decontamination process
- Requires sampling and testing for certain chemical residues to verify property is decontaminated
- Adopted July 12, 2001, took effect August 1st

What does SLVHD do When Notified of a Lab?

- Lab-certified health inspector investigates report
- Depending on situation, inspector may inspect property or advise and educate owner/occupants
- Home is closed to entry if there is sufficient evidence of meth production

Closed to Entry Placard

**CHEMICAL HAZARDS
CLOSED TO ENTRY
BY ORDER OF
THE SALT LAKE VALLEY HEALTH
DEPARTMENT**

Date Posted

It is a misdemeanor to occupy these premises,
or to remove or deface this placard.
(UCA 76-6-206, 76-8-301, 76-8-417)

Posted By

Address

Entry by authorized decontamination personnel is allowed between the hours of _____ and _____
for the purpose of cleaning or making required repairs. No one may sleep, prepare meals, or carry out any other activity at any
time. Anyone doing so is in violation of laws pertaining to interfering with a health official.

Phone



Closed to Entry Restrictions

- No one may enter house without specific permission of Health Department
- Contractors may enter to do sampling or an assessment of property for estimates
- Other persons (owner, occupant) may be given permit letter specifying time of entry or are accompanied by health inspector

Closed To Occupancy Placard

CLOSED TO OCCUPANCY BY ORDER OF THE SALT LAKE VALLEY HEALTH DEPARTMENT

Date Posted

It is a misdemeanor to occupy these premises,
or to remove or deface this placard.
(UCA 76-6-206, 76-8-301, 76-8-417)

Posted By

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Entry by authorized persons is allowed between the hours of _____ and _____ for the purpose of cleaning or making required repairs. No one may sleep, prepare meals, or carry out any other activity at any time. Anyone doing so is in violation of laws pertaining to interfering with a health official.

Phone



Closed to Occupancy Restrictions

- No entry or occupancy at night, usually between hours of 8 PM and 8 AM
- Persons with legal access to property (owner, occupants) may enter during daylight hours for repairs, cleanup, etc.
- Properties may be closed to occupancy for lack of utilities, filthy or unsanitary conditions, or structural deficiencies

Chemical Warning Placard

WARNING **POSSIBLE CHEMICAL HAZARD**

Entry may be unsafe due to residual chemical contamination. Hazardous or dangerous chemicals may be present or have been removed from the premises.

FOR MORE INFORMATION CONTACT
THE SALT LAKE VALLEY HEALTH DEPARTMENT

Date Posted

It is a misdemeanor to remove
or deface this placard.
(UCA 76-8-301, 76-8-417)

Posted By

Address

Phone



Warning Placard Restrictions

- **No Restrictions – Property is still open to entry and occupancy**
- **An assessment of chemical contamination is required before placard may be removed**
- **Police may placard door if they are unable to contact Health Department Representative**

Decontamination Process

- Remove all obviously contaminated items and surfaces
- Decontaminate all cleanable items and surfaces
- Sample for any contamination that may remain

Remove All Contamination

- Includes all items that are obviously contaminated, such as stained furniture or drywall
- Includes items that are likely to be contaminated and are not smooth, cleanable, and non-absorbent
- Surfaces that are non-porous but are visibly stained

Removal of Contaminated Surfaces



Decontaminate All Surfaces

- Decontamination solution used to oxidize residues (bleach solution is most common)
- Soap and water used to flush away residues
- Chemical neutralization of acids/bases

Post-Decontamination View



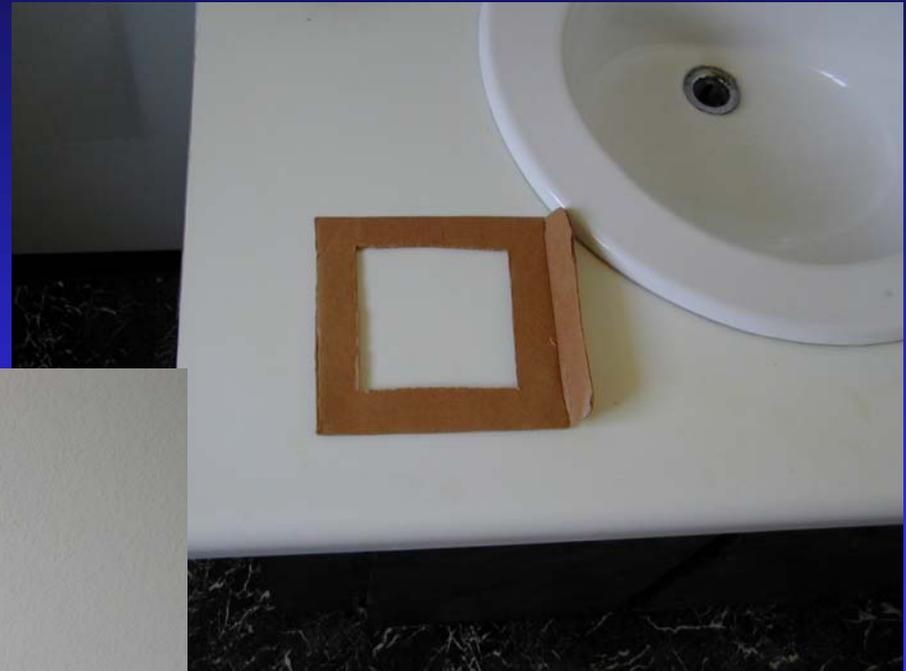
Sampling for Contamination

- Several samples taken throughout house to detect meth residue
- Samples are “swiped” from an area 10 cm by 10 cm (roughly 4 inches by 4 inches)
- Samples submitted to laboratory for analysis, expressed as total meth per 100 sq cm surface area

Testing and Standards

- Only methamphetamine residue test required, unless sampling is waived because house is demolished or all contaminated surfaces are removed
- Allows up to 100 nanogram (ng, one-billionth gram)/100 square centimeters of surface area
- 5-6 tests per contaminated structure required
- Other tests (mercury, lead, VOC's) may be required, based on production method used

Sampling for Meth Residue



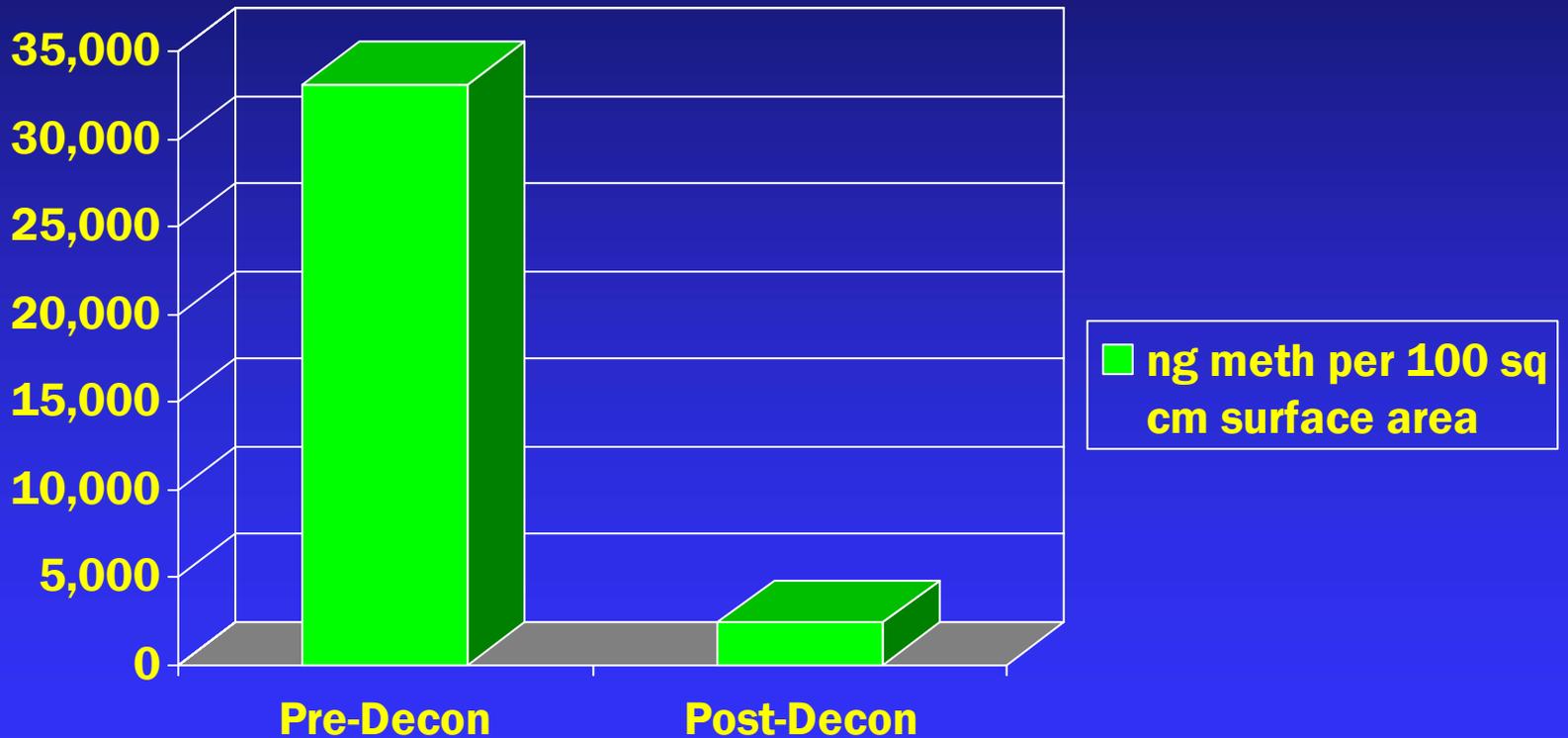
How Much Meth is Present?

- Average meth level on surfaces in labs prior to decontamination is 33,143 nanograms (ng) per 100 cm² surface area; range is from 30 ng to 771,000 ng/100 cm² (total of 18 properties sampled)
- Sampling before decontamination is not required under new regulations

How Much Meth is Left?

- Average meth residue level after first decontamination is 2,389 ng/100 cm², range is 10 ng to 59,000 ng/100 cm² (total of 34 properties sampled)
- Additional decontamination often required to remove remaining residue

Average Levels of Meth Residue



How Hazardous is It?

- Prescription dose of methamphetamine is usually 5 mg (5,000,000 ng), twice daily.
- Pre-decontamination levels of meth in some labs may approach or exceed prescription dosage, especially for children (adjusted for weight)
- No long-term studies of hazards of low-level exposure to methamphetamine residue

How is Process Started?

- Health Department receives complaint from individual or referral from Law Enforcement
- HD representative performs a preliminary assessment of property
- Property is closed to entry or released to owner, based on likelihood of contamination and other evidence

Owner's Responsibilities

- If contaminated, owner must decontaminate prior to allowing occupancy
- Owner has option of doing work personally, or may hire a listed contractor
- After decontamination, owner certifies that property is safe to occupy

Contractor Responsibilities

- Do a pre-decontamination site assessment
- Submit a written work plan
- Post-decontamination site assessment
- Testing for chemical residues
- Written final report

Components of Work Plan

- **Outlines who will do the work**
- **Describes what will be discarded or decontaminated**
- **Specifies areas that will be decontaminated**
- **Indicates where the waste will be discarded**
- **Lists location and types of tests performed**

Final Report

- Includes outline of decontamination
- Describes the process and materials used to decontaminate
- Includes copies of test results
- Owner signs release form certifying property is safe

“What If I Don’t Want to Decontaminate my Property?”

- Testing allowed at start of process**
- If under limits, property is not considered to be significantly contaminated, no action required**
- Property may be left contaminated if secured from unauthorized entry**
- Criminal sanctions if owner allows occupancy of a closed property**

Health Dept. Reg. #32-22.1

- Any person who is found guilty of violating any of the provisions of these rules and regulations, either by failing to do those acts required herein or by doing a prohibited act, is guilty of a class B misdemeanor, pursuant to Section 26-24-22, Utah Code Annotated, 1953, as amended. If a person is found guilty of a subsequent similar violation within two years, he is guilty of a class A misdemeanor, pursuant to Section 26-24-22, Utah Code Annotated, 1953, as amended.

Advantages of New System

- Uniform process mandated
- Testing results provide tangible evidence of decontamination
- Reports provide valuable documentation
- Testing provides data regarding efficacy of decontamination methods

Concerns about our Regulation

- Health Department is not informed about all contaminated properties
- No data available on long-term effects of low-level, long-term exposure to meth
- Properties are only sampled, significantly-contaminated areas may remain if not decontaminated properly
- No certification or special training required for contractors

Part III: Real World Application

Case Studies of Actual Labs Decontaminated Under the New Regulation

Example Case #1

- House that new owner suspected to be a meth lab, due to neighbor reports
- No contamination noted during initial assessment
- Iodine “bled” through paint months after initial inspection, new inspection of house 18 months later found extensive iodine staining

Results

- Tests showed elevated levels of methamphetamine throughout house
- Highest level was 56,000 ng/100 sq cm in room where staining was heaviest
- Contractor completely gutted most of the house, due to extensive iodine staining

Conclusions

- Iodine staining was most prevalent in basement laundry room
- Humidity from washer may have helped “draw out” the iodine residue under the paint
- Elevated meth residue levels were discovered at least 18 months after any cooking occurred

Case Example #2

- Large house recently occupied by new owners
- Owners received reports of drug manufacturing by previous owners
- Property was assessed by a listed contractor, some suspected iodine stains found
- Owners had two different contractors sample property

Results

- All four samples taken by contractors for testing were below the limit of 100 ng/100 sq cm
- Suspected stains were determined not to be iodine, no other obvious signs of contamination were noted

Conclusions

- Owners completely cleaned the house prior to moving in; they may have unwittingly decontaminated the house at that time

Case Example #3

- Large lab was found in storage unit; unit measured about 10 ft by 30 ft
- Preliminary sample in unit revealed methamphetamine levels above 29,000 ng
- Contractor who assessed property noticed a 2-inch gap between the walls and the ceiling and a tube placed in the gap on one side
- Health Department required sampling of adjacent units to determine extent of contamination

Gaps and Vent Tube



Results of First Round

- Samples showed methamphetamine levels of over 10,000 ng and 9,000 ng in adjacent units
- These units also had gaps in walls, raising possibility of contamination in adjacent units
- Health Department required sampling of these units to determine contamination

Results of Second Round

- All adjacent units had levels of methamphetamine significantly above the regulatory limit
- Gaps were found in all walls in all the units, allowing any vapors from process to spread throughout the complex
- Owner will sample adjacent units

Layout of Storage Units

1,650 ng meth per 100 sq cm	9,623 ng meth per 100 sq cm	Lab Site 27,488 ng meth per 100 sq cm	10,703 ng meth per 100 sq cm	3,570 ng meth per 100 sq cm
7,610 ng meth per 100 sq cm				
4,460 ng meth per 100 sq cm				

Conclusions

- Contamination was found several units not adjacent to the unit that was used as a lab
- The gaps between the walls and ceiling and the tube allowed the heated reaction vapor to spread to other units
- Sampling is continuing at this time

Case Example #4

- Large, older house with basement and detached garage
- Mother (owner) lived upstairs, adult children (meth cooks) lived downstairs
- Lab was found in garage, lab equipment and glassware were found in a basement bathroom
- No evidence of contamination was noted in upstairs portion of house

Lab Setup and Glassware



Results

- Investigation revealed that mother was unaware of cooking in house
- Preliminary sample from upstairs kitchen was negative; downstairs samples all revealed significant contamination
- House had a single heating system, samples were taken upstairs near vents
- Low levels of contamination were found upstairs near the heating vents

Results of Preliminary Sampling

Downstairs Samples		Upstairs Samples	
Bedroom ceiling	17,494 ng/ 100 sq cm	Kitchen stove top	<100 ng/ 100 sq cm
Bedroom table	1,375 ng/ 100 sq cm	Computer room	692 ng/ 100 sq cm
Bathroom ceiling	29,611 ng/ 100 sq cm	Bathroom ceiling	325 ng/ 100 sq cm

Conclusions

- Meth dust or vapor from the cooking process probably was circulated through the house by the furnace fan
- Affected areas upstairs were decontaminated as well as rooms in basement

Lessons Learned

- Meth and iodine vapor can migrate throughout a structure, and significantly contaminate surfaces in rooms not used for cooking
- High levels of meth residue may be present without obvious signs of contamination
- Iodine can “bleed” through paint months or years after initial contamination
- Proper decontamination of property can remove almost all chemical residues