Clandestine Drug Labs General Cleanup Guidelines

Minnesota Department of Health

September 2003

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September 24, 2003

NOTE: After addition of most changes suggested by those who have generously contributed their time and expertise to work on this guidance, the main text of the MDH Cleanup Guidance is complete ... this time around. This "September 24, 2003" draft is lacking its unfinished Glossary, References, Acknowledgements, and Contacts sections, and several proposed appendices, all still in progress.

Conference attendees will be notified by email when the complete cleanup document, and other materials distributed at this conference or introduced at this conference are added to the MDH Meth Lab website.

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MINNESOTA DEPARTMENT of HEALTH
GENERAL CLEANUP GUIDELINES for CLANDESTINE DRUG LABS

September 24, 2003 DRAFT

Introduction

The purpose of these guidelines is to provide information about cleanup of clandestine drug laboratory (clan lab) sites, after gross chemical removal, and prior to reoccupation. They were adapted from the Washington State Guidance for Contamination Reduction and Sampling at Illegal Drug Manufacturing Sites and from other sources, by the Minnesota Department of Health (MDH) with assistance from other Minnesota colleagues (see Acknowledgements).

Most Minnesota clan labs have produced methamphetamine (meth). This document is based on cleanup of meth labs. Contractors working on remediation of non-meth labs may contact MDH for advice on sampling and cleaning those labs. Other drugs that have been made in illegal labs in Minnesota include: Phenlyl-2-Propanone (P2P), LSD, PCP (angel dust), MDA/MDPP (Ecstacy), Methaquaalude, Methcathinone (Cat) and GHB (gamma-hydroxybutyrate).

There is no statewide law that requires cleanup of clan labs, or that stipulates the type of training or equipment required of those who clean them. MDH strongly recommends that clan labs be cleaned by contractors who are trained and equipped to conduct hazardous chemical remediation. Some clan lab cleanups may be considered an "uncontrolled hazardous waste site" and require the use of Hazwoper-certified personnel Additionally, OSHA standards and other applicable requirements should be observed by workers engaged in clan lab remediation.

Although MDH strongly recommends that all former clan lab sites be cleaned to the levels or limits found in this document, MDH only has explicit statutory authority to *require* cleanup of licensed facilities (e.g., hotels, motels, etc.) unless the Commissioner determines that a site constitutes a "public health threat." Some Minnesota cities and counties have enacted ordinances that specify requirements for cleanup of private dwellings contaminated by clan labs. Other cleanups may be voluntary, or may be required under existing housing laws. (See Appendix A)

Several processes and many different combinations of chemicals ("recipes") are used to manufacture ("cook") meth **(Reference).** Each process produces gas or vapor at some point(s) during the cooking operation. The release of these vapors presents an exposure hazard for cooks, residents and future occupants of the lab structure **(Reference.)** The distribution of gases and aerosols is often extended by a building's heating, ventilation and air conditioning (HVAC) system. A forced air system can distribute the vapors throughout a single or multi-dwelling complex.

Both acute (short term) and chronic (long term) health hazards result from the manufacturing of meth. Acute exposure hazards come from direct contact with product or waste, and inhalation of product or waste. Burns, tissue irritation and rashes can result from chemical spills and skin contact. Headaches, dizziness, nausea, and other health effects can result from inhalation of vapors. **(Reference).**

The vapors produced by meth manufacture are deposited on surfaces. Methamphetamine particles carried with the vapors are also deposited. Levels of meth vapor and particle residue are used as an indicator of surface chemical contamination in this guidance. The current MDH indoor cleanup level for methamphetamine is **one microgram per square foot** of surface area.

The *potential for exposure* to meth lab residues on surfaces and porous articles depends upon:

- Accessibility of residues, and frequency of direct contact. The likely use of a contaminated area is an important factor in estimating frequency of contact. For example, residues in a kitchen or bathroom of a house will likely be contacted more frequently than residues in a non-residential outbuilding.

- Ability of volatile residues to become airborne. For example, residues in ventilation systems may be dispersed throughout a building.

- Characteristics of the inhabitants or users of the contaminated site. For example, toddlers who crawl on contaminated carpet or floors will have high frequency of skin contact with toxic residues over a considerable area of skin. These residues may directly irritate the skin, and may also be absorbed into the body through the skin. If hand to mouth behavior occurs when hands have been in contact with toxic chemicals, these will be ingested into the body. Hand to eye behavior will introduce toxic materials to the eyes. Toddlers are at greatest risk for hand to mouth and hand to eye behaviors, but all people exhibit them.

The *toxicity* of meth lab residues will depend upon the amount of the residue, and the chemicals in the residue. The amount of residues will depend upon the size of the meth lab, the length of time it operated, methods of chemical storage and disposal, occurrence of chemical spills, as well as on the physical characteristics of the structure in which the meth lab occurred. The chemicals in the residue will vary with the method of methamphetamine manufacture. **Reference)**

Because of the great uncertainties involved in estimating the risk (determined by exposure and toxicity) posed by chemical residues from methamphetamine laboratories, a level of **1 ng/ft^2** of surface area has been chosen to provide a safe level for almost all situations and people. This level is based on guidance from the States of Washington and Oregon **(Reference).**

When a cleanup to this level is impractical, meth lab program staff at MDH should be contacted for advice about the suitability of a higher cleanup level. In general, higher cleanup levels should not be used unless the likelihood of frequent contact with contamination is low, and the exceedance of the 1 |ig/ft^2 cleanup level is small.

Levels of meth residue as high as 1,200 micrograms per square foot have been found on indoor surfaces. In one case, levels of 11,900 micrograms per square foot were found on carpeting from a former Minnesota lab. Meth or other chemical lab residues may present a chronic exposure hazard to people living in uncleaned lab sites after removal of bulk chemicals **(Reference)**

The level and extent of contamination, and the type of material contaminated determines the cleaning methods necessary, and the likelihood that cleaning activities will be successful. Conclusions from a Minnesota study of cleaning methods **(Reference)** indicate that a single

cleaning event may not achieve the MDH guideline level (< 1 ug / ft^2) when pre-cleaning samples are above one hundred micrograms per square foot. Removal rates of 70-90% were typically achieved with each wash-and-rinse cleaning event. This study and subsequent contractor experience suggest that is may often be more cost effective to discard porous furnishings (e.g., upholstery, carpet, draperies) rather than trying to clean them, and to paint or paper walls after a single wash.

Because every clan lab site is different, there is no template for clan lab remediation. However, the steps in remediation of a clandestine lab, after the conclusion of law enforcement seizure of the lab, may include the following steps, not necessarily in the following order:

- Crime scene evacuation
- HazMat removal of chemicals and equipment
- Determination of public health nuisance
- Establishment of an entry plan
- Assessment of site conditions
- Preliminary assessment
- Work plan development
- Site cleanup and disposal
- Clearance sampling
- Additional cleanup, sampling and disposal

Clandestine Lab Site / Crime Scene Evacuation

Evacuation of a clan lab site or structure will generally be required at the time of seizure but may possibly be extended following assessment by the contractor. In the first case, the fire department, chemical assessment ("Hazmat") team or law enforcement personnel on-site will make evacuation decisions based on the apparent, immediate chemical hazard.

For example, the presence of an active lab, anhydrous ammonia in a corroded container, or quantities of highly flammable chemicals, constitute an acute chemical hazard and may result in the complete evacuation (e.g., in a motel or multiple dwelling) of an affected building or even neighboring structures. Law enforcement and other first responders at the site will assess the existing potential for fire, explosion, and contamination and determine what immediate steps needed to reduce potential for harm.

An inactive lab, or one where no apparent, imminent threat of exposure or explosion exists may require only limited evacuation at the time of seizure. However, if contractor assessment or sampling later indicate that contamination may have traveled to another unit, apartment or building, further evacuation may be required after law enforcement have left the site.

Most law enforcement agencies in Minnesota will post clan lab properties with signs warning of possible chemical contamination and/or surround the site with yellow crime scene tape. At most Minnesota labs, chemicals and equipment are removed from the site by a contractor for the U.S. Drug Enforcement Administration (DEA). This process is called Gross Chemical Removal though it is often mistakenly referred to as "Cleanup."

Contractor Qualifications and Equipment

Because of the serious hazards posed by the materials in clan labs, it is necessary to ensure that cleanup activities are conducted safely and in accordance with applicable environmental and health requirements. MDH recommends that personnel engaged in cleanup activities have, at least 40-hour hazwoper (Level I) training (40-hour Safety and Health Training for Hazardous Waste Site Personnel) plus experience in hazardous waste site cleanup or specific training in clan lab cleanup. It is also recommended that cities, counties and individuals who contract for clan lab remediation services require that there be at least one Level 1 person on-site at all times during the cleanup.

The contractors listed on the MDH meth lab website (www.health.mn.us/divs/eh/meth) are experienced hazardous materials contractors who have worked with MDH to develop this guidance and have agreed to conduct remediation activities in accordance with the guidelines. If and when a training program for clan lab contractors become available in Minnesota, names of contractors who have successfully completed that training will be added to the website list.

Other staff equipment and training recommendations:

- Cleanup personnel must be provided with appropriate Personal Protection Equipment (PPE) and be instructed in safe work practices, including basic hygiene and personal decontamination procedures.

  Personal Protective Equipment (PPE), including protective clothing, gloves and approved respiratory protection should be worn by individuals involved in the remediation of residues from former clan labs. Properly fitted air-purifying respirators equipped with combination mechanical/chemical cartridge filter elements (e.g., activated carbon/VOC filter) are recommended for use by cleanup contractors.

- Cleanup contractors should be equipped with intrinsically safe (e.g., ignition-proof) equipment.

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Personal Protective Equipment Standards may be found on the OSHA website at www.OSHA.gov. (See Standards - 29 CFR: General description and discussion of the levels of protection and protective gear: Part 1910.120 App B.)

Site Entry and Notification

The cleanup contractor will generally arrive on-site some days after the crime scene is secured, lab operations have been concluded, and after gross chemical removal by the DEA contractor. Before entering the site, the contractor should determine a Site Entry Plan. The Site Entry Plan documents the hazard potential for acute chemical exposure, particularly from airborne (e.g., solvent vapor) or other (e.g., solids or liquids) hazards. Decisions about crime scene entry should be made in consultation with other officials responsible for the site.

Contractors should also consult law enforcement and other local authorities to determine whether the Minnesota State Duty Officer has been notified of the clan lab site. If such notification has not been made, the Duty Officer must be contacted at (800) 422-0798 or in the metro area, at (651)649-5451.

Recommendations for Preliminary Assessment

Once site entry requirements are established, a Preliminary Assessment is conducted. All services associated with sampling and/or remediation must be completed in coordination with local (police, fire or narcotics taskforce), state (Bureau of Criminal Apprehension-BCA), or federal (Drug Enforcement Agency-DEA) law enforcement officials to ensure the integrity of the crime scene. Cleanup contractors must also work closely with the local public health and/or other agency under whose authority the cleanup is being conducted. Entry into a lab site must be cleared by law enforcement.

As described below, the objectives of the preliminary assessment are to: 1) identify the process or processes used (e.g., anhydrous, red phosphorus, etc.) to manufacture the drug; 2) rule out the use of more toxic chemicals such as mercury or lead; 3) determine the scope of testing or remediation needed at a former clandestine lab site, and 4) judge and document whether habitable structures are safe for occupancy.

The preliminary assessment must be conducted by qualified personnel such as local public health agencies and/or cleanup contractors.

Steps in the assessment are to:

- Identify the drugs manufactured; identify lab site chemicals and methods:
    - Acquire information about chemicals removed from the site. This information may be available from:
        - local law enforcement, narcotics taskforce, fire department or HazMat team who were active at the site and may have their own or other agency lists of chemicals removed;
        - DEA contractor. DEA contractor will complete a manifest that lists categories (e.g., corrosives, solvents, etc) of chemicals removed and may also be able to provide packing lists with more specific information on chemicals and amounts removed.
        - DEA EPIC (El Paso Information Center) Form. The EPIC Form can be accessed through the lead law enforcement agency at the clan lab site.
    - Interview HazMat team members, law enforcement personnel, or Minnesota Pollution Control Agency (MPCA) staff to collect lab information, including:
        - duration of lab operation and number of batches cooked or processed;
        - drugs known to be manufactured;
        - recipes and methods used;
        - chemicals and equipment found;
        - location of contaminated cooking and / or storage areas;

- visual assessment of the severity of contamination inside and outside of the structure where the lab was located;
- assessment of contamination of adjacent rooms, units, apartments or structures;
- disposal methods observed at or near the lab site (e.g., dumping, burning, burial, venting, and/or drain disposal).

  - Compare chemicals on the manifest or packing slip with known methods of manufacture in order to identify other potential contaminants and drugs other than methamphetamine.

  - Determine whether the drug manufacture method included the use of **mercury,** or **lead (Reference).** If these contaminants are found, cleanup protocols will deviate from the generic cleanup guidelines, and cleanup planning and remediation will be more stringent. MDH and MPCA must be notified if either element is present and consulted about cleanup methods. **Do not begin cleanup!**

- Determine appropriate cleanup methods for individual chemicals found at a specific location. Necessary cleanup activities could include:

  - removal of unused, unopened chemicals from a storage area;
  - testing and no further action;
  - cleanup and final testing of cooking, storage or adjacent areas, with or without pre-testing;
  - hazardous waste decontamination and final testing of an entire structure;or
  - demolition, in cases of severe contamination.

Pre-Cleanup Recommendations

Cleanup should be completed in compliance with Occupational Safety and Health Administration (OSHA) requirements and MDH Cleanup Guidelines.

The following pre-cleanup activities are recommended:

- Prior to writing a workplan, the contractor should review available site information and evaluate evidence of contamination in 'cooking' and storage rooms; in adjacent rooms, apartments and common areas of multiple dwellings.

- If not done previously, the contractor should decide whether the severity and type of contamination requires shutting down power sources in the structure. Potential damage to pipes and furnishings should be evaluated as part of this decision.

- After inspecting the site, indoors and outdoors, and noting all stains, residues, spills, suspect powders, storage areas, dumps and burn pits, the contractor should establish a workplan, according to OSHA requirements for worker safety. MDH recommends that the workplan include:

- a timeline, indicating major elements of the cleanup and the time it will take to accomplish them;
- project identification information, including street address and legal description of the property, and street address and contact information for the property owner;
- a site map showing location of contamination and sampling points:
  - inside areas may include: materials and surfaces in cooking and adjacent areas, ventilation shafts of forced air systems, and; compromised plumbing and plumbing fixtures.;
  - outside areas may include: dumping, burning or burial areas; drinking water wells or cistern well pits; septic tanks and drain fields if sewering of lab wastes is known or suspected.
- preliminary and final cleanup plans, including procedures to be followed and materials to be removed or decontaminated;
- preliminary and final testing plans, including sampling points and results for all pre- and post-cleanup testing that is conducted;
- a waste disposal plan for materials removed from the structure and wastes produced during the cleaning, including plans for solid waste, hazardous waste, and household hazardous wastes produced.

- If law enforcement or local authorities have not already done so, the contractor must notify MPCA when there is evidence of serious potential contamination of septic systems, soil or groundwater, in the basement or outside of the structure. If MPCA has been notified, the contractor may also wish to establish communication with the agency to exchange information and facilitate the cleanup.

  NOTE: Minnesota Statutes 115.061 states: "...it is the duty of every person to notify the (Pollution Control) Agency immediately of the discharge, accidental or otherwise, of any substance or material under its control which, if not recovered, may cause pollution of waters of the state, and the responsible person shall recover as rapidly and as thoroughly as possible such substance or material and take immediately such other action as may be reasonably possible to minimize or abate pollution of waters of the state caused thereby.

- The contractor should notify the lead law enforcement agency for the site, if lab remnants or other evidence of illegal manufacture are discovered that may have been overlooked during the gross removal and criminal investigation.

- In addition to personal protective gear, the following equipment and supplies will be required:
  - Photoionization detector (PID) or similar device;
  - pH paper;
  - de-ionized water;
  - camera;
  - ruler;
  - masking tape;
  - sample collection supplies supplied or recommended by the chemical laboratory, including gauze pads, methanol, sample containers and cooler.

Site-Type Considerations

In addition to information about duration of lab operation, methods and chemicals, etc., the site of the lab, it's structural characteristics, and its potential future use must be considered when designing a cleaning plan. Labs have been found in a variety of places in Minnesota; clan lab sites may be loosely categorized as follows:

- Private, residential property: single family home, apartment or multiple dwelling;
- Licensed facility, residential or non-residential: hotel, motel, mobile home park, restaurant, grocery store, child or adult foster care facilities etc.;
- Attached garage or building: connected to a residence or licensed facility listed above;
- Separate garage or building: garage, barn, pole barn, tool shed, etc., adjacent to or on the same property as a residential structure or licensed facility;
- Residential vehicle: motor home or manufactured home designed for residential purposes;
- Other vehicle: van, bus, automobile, truck, etc;

  Other: other lab sites that do not fall into any of the previous categories, e.g., tent, deer stand, etc.

Given the large number of variables to be considered when designing sampling and remediation plans, there is no template for cleaning or sampling labs in any of these categories. The following may be helpful in assessing the sites.

- Residential vehicles should be sampled and cleaned using similar procedures as for as stationary residences. Contractors who have performed cleanups on manufactured homes warn that these structures contain many porous and absorbent materials and may be difficult and costly to remediate. When such structures are of little value, cleanup costs may exceed that value and demolition should be considered.

- It is generally considered that other vehicles are rarely worth the cost of remediation. Decisions must be based on severity of contamination vs. cleanup cost.

- Other sites must be evaluated individually.

NOTE: Only the most heavily contaminated meth lab furnishings and vehicles require special disposal. Most can generally be disposed of in regular landfills and salvage yards. However, all items should be disabled or damaged in such a way that they will not be salvaged for later use by others.

Disposition of Lab-Site Furnishings

Disposition of the contents of a structure where a lab has been seized will depend on many factors, including a contractor's assessment of the degree of contamination (e.g. proximity to lab activity, staining or obvious contamination), legal status of the resident or owner, and legal status of the property. Another consideration may be the value or relative value (e.g., heirloom or precious items) of the item to its owner. Costly cleanup or refinishing of an item may be requested when disposal may be more cost-effective. When a contractor is asked to remediate furnishings or provide advice about safety of these items, the following may apply:

- Clothing, household linens, and other fabric items: Washable fabrics, including clothing linens and soft toys, except those with obvious chemical staining or contamination, can generally be machine-washed twice with hot water and detergent.

- Dishes, flatware, and other hard (non-porous) household goods: Washable household items, including ceramics, hard plastics, metals and glass, may also be twice-washed and rinsed using hot water and detergent. Any item that show evidence of have been used for the cooking process (e.g. acid etching, chemical staining...) should be discarded.

- Household items made of wood and wood-like composites: Disposition of these generally porous items may be dependent on the finish and ability of the item to be detergent washed, as well as on considerations of value, and assessed potential contamination. Such items, if considered cleanable, should be twice-washed, rinsed, and possibly coated with an oil-based finish, depending on degree of contamination.

- Upholstered furniture: Disposal of these items is the preferred option. Cleaning of upholstered items that are not discarded due to obvious contamination, will usually consist of vacuuming using a machine equipped with a HEPA filtration system, followed by hot water detergent scrubbing and extraction. Again, decisions may be made on a cost-benefit basis when obvious contamination does not exist.

- Household books and paper items: Paper goods are extremely porous. Any paper items near the area of a known lab should be discarded. Paper goods stored in filing cabinets, closed bookcases or cupboards in rooms where wipe samples show low levels of contamination should be salvageable. Given the uncertain history of most lab sites, disposition of such porous materials should err on the conservative side.

Elements of a Cleanup

- Ventilation of the structure throughout cleanup:

  During a criminal investigation or gross chemical cleanup, the lab site is generally vented for the safety of onsite personnel. However, it may be sealed, for security reasons, when law enforcement and HazMat crews leave the scene. Short-term venting may not be sufficient to clear all contaminants from the air inside the structure. Note that venting will not remove residues and is not a cleanup method.

  Therefore, a former lab site should be thoroughly vented before cleaning. After the initial airing, ventilation should be continued throughout the cleanup except when venting may impede assessment. Care must be taken that vented contaminants are exhausted to the outdoors and not to the air intakes of adjacent structures. **This is especially important when using methanol or other solvent materials to clean surfaces.** Use of respirators may be required, if adequate ventilation cannot be obtained.

- Indoor ambient air quality evaluation:

  This is done with a photo ionization detector (PID) to detect the presence of volatile organic chemicals commonly used in manufacturing. A sweep through the entire building should be made with an accurate record kept of all readings in every room. Additionally, each septic system drain (floor, tubs, sinks) should be probed to determine if any chemicals have accumulated in the drain trap—requiring removal.

- Evaluation and remediation of chemical spills and residues:

  Powders and liquids throughout the structure should be tested to determine their corrosivity, toxicity and flammability. pH paper with de-ionized water should be used in all suspect locations. An accurate record of findings should be made. (See Evaluation of Corrosives, below.)

  Acids should be neutralized with sodium bicarbonate (baking soda); and bases with weakly acidic wash solutions (e.g., vinegar, citric or acetic acid). Solids can be scooped up and packaged for proper waste disposal. Liquids can be adsorbed with clay or another non-reactive material and packaged for proper waste disposal. Working with corrosives can be dangerous for staff unfamiliar with their properties. pH paper should be used to check a surface after neutralization.

- Areas of no visible contamination:

  In portions of the structure away from cooking areas where no visible staining or contamination is present, testing may exclude the need for any cleanup. If pre-cleanup testing is not chosen, rooms and surfaces that are smooth and easily cleanable, should be HEPA-vacuumed and then twice-washed with a standard detergent solution and rinsed.

  Such surfaces include floors, walls, ceilings, windows, doors and non-fabric furniture. Porous drop ceilings in these areas should be HEPA-vacuumed. Popcorn ceilings, may contain asbestos and should be left undisturbed and a sample collected to determine the level of contamination.

  An area far from the drug cooking area can be cleaned and then serve as a storage area for any portable items cleaned during remediation. The doors or openings to these areas should be cordoned off with heavy mil plastic sheeting (4-6 mil) to avoid recontamination during further cleaning of the site.

- **Note:** Special care should be taken throughout the assessment process to note and sample high-traffic areas and pathways such as hallways to and from cooking areas, and between chemical storage and cooking areas. High-traffic floors and carpeting often reveal high levels of contamination even when removed from cooking area.

- Evaluation of porous, semi-permanent furnishings:

Absorbent materials can accumulate vapors that are created and dispersed during the cooking process, or can collect dust and powder from chemicals used in drug manufacture. Professional judgment, and information from the preliminary assessment must be applied to decisions regarding the cleaning or removal of these goods.

Disposal of these items is the preferred option. If chemical odors are present, or porous materials show signs of spillage or discoloration, they must be discarded. For costly items (e.g., new or expensive carpeting or draperies), cleaning may an acceptable course of action, particularly in a short-term lab, or in rooms where sampling indicates no or low levels on contamination. In areas of moderate to high contamination, these goods should be discard. Decisions, actions taken, disposal sites and methods should be documented as part of the final workplan.

Cleaning of porous materials that are not discarded will usually consist of vacuuming using a machine equipped with a HEPA filtration system, followed by (at least one) hot water detergent scrubbing and extraction. For non-washable materials such as lined curtains, when those materials are not heavily contaminated, dry-cleaning is permissible.

In areas of mild to moderate contamination, pre-testing should not be necessary, if the cleanup protocol includes thorough detergent cleaning. It is rarely cost-effective to pre-sample such items in order to justify their disposal. However, if property owners wish to avoid cleaning or disposal of goods, testing will be required. In such cases, a sample of fabric may be needed for laboratory analysis.

- Evaluation of plumbing fixtures:

Sinks, bathtubs and toilets are frequently used for the disposal and dumping of lab chemicals. Visibly contaminated (etched or stained) appliances should be removed and properly disposed. Etching and staining also indicate the need for decontamination of the plumbing system. Porcelain and stainless steel, unless pitted or damaged can be successfully cleaned.

- Evaluation of other household appliances:

Appliances, such as refrigerators and stoves, that have insulation or other inaccessible parts that either show visible contamination or are suspected to be contaminated should be removed and discarded.

Appliances can be evaluated on a case-by-case basis, with attention to: 1) site type (e.g., residence or licensed facility their proximity to lab activity, 2) use during drug manufacture (e.g., chemicals stored in refrigerators, or cooked on stoves); 3) use in the home (e.g., washer/dryer vs. refrigerator); 4) ability to be cleaned (hard metal vs. porous material); and 5) cost benefit of disposal vs. cleaning. They may then be cleaned and tested at the discretion of the property owner.

- Evaluation and decontamination of plumbing, septic and sewer:

Solid wastes from labs are frequently burned or dumped outside the structure but most liquid chemical byproducts are dumped into laundry and bathtubs, sinks, drains, and toilets. Chemicals and contaminated wastes can collect in drains, traps and septic tanks. Sewered wastes may give off chemical fumes. A PID may be used to assess VOCs in plumbing.

If staining or presence of VOCs indicate dumping into municipal sewer systems, household plumbing should be aggressively flushed. The appropriate wastewater management authority should be contacted and advised of the presence of an illicit drug laboratory.

If the dwelling is served by a septic system, and the tank liquid is believed to be contaminated, the contractor should contact MPCA. The contractor must never enter a septic tank for assessment or sample collection.

Plumbing fixtures, such as sinks and bathtubs may have to be discarded, if surfaces are permanently affected by acid etching or other chemical damage.

- Evaluation and cleaning of heating and ventilation systems:

Heating and air conditioning systems tend to collect fumes and dust and redistribute them throughout the structure. The vents, ductwork, filters, walls and ceilings near ventilation ducts can become contaminated. If assessment information or visible contamination indicate the ventilation system is compromised, the contractor should replace all filters in the system, remove and clean vents, clean the surfaces near system inlets and outlets, and clean ductwork.

Any ventilation system that is constructed of non-porous material such as sheet metal or the equivalent may be HEPA-vacuumed. The system should then be washed down to arms length with an appropriate grease cutting soap or detergent and rinsed, repeating two additional times. All filters should be replaced and properly discarded. Plastic ductwork, if readily accessible, may be removed and replaced. If inaccessible, it can be HEPA-vacuumed, washed and rinsed to arms length.

Ducts constructed with an internal lining of reinforced fiberglass should be carefully HEPA-vacuumed at least to arm's length (further, if visible contamination indicates this is necessary). If supply air diffusers cannot be easily cleaned, it may be more cost-efficient to replace them. Post-remediation testing of the site with the ventilation system operating can be used as verification of effective decontamination.

If wipe samples indicate high levels of contamination, spray sealing with an epoxy-type sealant may be considered. Vent sealing is a cleanup measure that is sometimes used after a structure has been contaminated by fire, and may be appropriate at some lab sites.

In motels, apartments, row-houses or other multiple-family dwellings, a ventilation system may serve more than one unit or structure. These connections must be considered when writing the cleanup and testing portions of the workplan. One strategy is to take samples from adjacent or

connected areas/rooms/units, working outward from the lab site until samples show low levels or no contamination.

- Detergent (or surfactant) washing of contaminated hard surfaces:

Hard interior surfaces such as walls, tile and wood flooring, ceilings and paneling; and hard furniture or appliances (wood or porcelain) can also retain contamination from the meth cooking process, especially in those areas in and adjacent to areas where the cooking and preparation took place. Analyses of wipe samples of hard surfaces will indicate levels of contamination on those surfaces and may also be the best indicators of the contamination in adjacent fabrics and other soft furnishings. In the absence of sampling, remediation may include:

Interior surfaces should generally be twice scrubbed using a standard detergent solution (contractors have advised using Simple Green or (TSP) Trisodium Phosphate) and then rinsed with clear water. If a surface has visible contamination or staining, complete removal and replacement of that surface section is recommended. This could include removal and replacement of wallboard, floor coverings and counter tops; stained and etched furniture and plumbing fixtures.

Methanol cleaning has been shown to be more effective in some situations, such as on countertops and stoves which will not be painted. Staff using methanol must always wear appropriate PPE; and remove methanol traces completely.

Generally, wastewater may be sewered, but if it contains decanted or spilled chemicals, it should not be disposed of in a septic system.

- Encapsulation:

When indicated by pre-sampling or other assessment procedures, and in areas of high contamination, interior surfaces should be coated with an oil base paint, epoxy or polyurethane coating after scrubbing. Latex paints may require multiple coats to achieve suitable coverage. If surfaces (e.g., ceiling tiles, sprayed ceiling) cannot be scrubbed, the contractor must use best professional judgment (plus testing and assessment information) to decide whether painting will be sufficient. Spray painting is recommended where possible.

When paint or another physical barrier is applied, the encapsulant should be allowed to dry for the time stipulated by the manufacturer. Complete coverage may require more than one coat. These areas should be monitored and the barrier maintained to assure that the contamination is contained. If staining, odors or discoloration appear after the coating dries, removal and replacement of that surface section may be necessary.

NOTE: Painting by cleanup contractors may be neither practical nor cost-effective. This work may be done by owners or their painting contractors, after clearance by the contractor. Final sampling should be conducted after paint is thoroughly dry and the structure vented of paint fumes.

- Final ventilation:

Final ventilation, after cleanup, is recommended. After the cleaning and final airing, the property should be checked for re-staining and odors. These signs would indicate that the initial cleaning was not successful, and further, more extensive steps should be taken.

- Exterior contamination:

The exterior of the structure should be inspected for evidence of contamination. Liquid and solid waste materials are often dumped into the toilet, bathtub, or floor drain; dumped outside of the structure, buried, or burned. Where waste materials are dumped, soil and ground water contamination threats exist.

In rural areas septic tanks and drinking water wells can become contaminated. The extent and magnitude of the contamination problem is often determined by the size of the cooking operation and/or how long cooking has been taking place. The larger or longer an operation has been running the more waste is produced. On average, a single "cooked batch" of methamphetamine will yield one half gram of drug and generate about 2 gallons of chemical waste.

Burial of waste is not very common but does occur. Burn pits or barrels are fairly common and are used to reduce the volume of waste liquid and solids. Additionally, chemical containers are often stockpiled on the property because discarding them in the common trash may arouse suspicion. These stockpiles of containers may also prove to be a source of contamination.

The MPCA is the lead state environmental regulatory agency for determining exterior environmental impact. If soil, air or water contamination is indicated by staining (discoloration) of soil or dead vegetation, large burn pits or dump areas, or signs of dumping in a well or septic system, MPCA should be contacted for evaluation of the situation, and potentially for remediation services.

Post-Cleanup Requirements

After completion of the cleanup and sampling, according to the workplan and this guidance, the contractor should prepare a final report, including written documentation that work has proceeded according to plan, and that contamination has been reduced to acceptable levels according to these Guidelines, current best practice, and the professional judgment of the contractor.

Depending on local requirements, this report may need to be sent to local health authorities or other agency monitoring cleanup. Property owners and/or others contracting clan lab cleanup services should also be encouraged to provide a copy of the final report to MDH, so that the completion of the work will be noted in the MDH Meth Lab Database.

Sampling Guidelines

The primary sampling methodology for lab cleanups must reference standard U.S. Environmental Protection Agency (EPA) methods or equivalent established methods. A sampling plan should be developed with input from local public health officials and law enforcement agencies to ensure that an adequate scope of sampling is achieved based on local regulations and specific information available about the individual lab site.

Decisions regarding the sampling plan can be made based on the assessment information, chemicals used and duration of lab operation, and professional judgment. Variations on the pre-test, clean, post-test design may include the following considerations:

- As a rule, pre-cleanup sampling will not be necessary. Exception may be made, for example, when a stakeholder (insurance company, bank or property owner) wishes to prove contamination prior to remediation, or when it is believed that pre-sampling will reduce overall cleaning costs.

- Cleaning may not be required, when pre-cleaning samples indicate low levels or no contamination in some areas.

- In areas of moderate to heavy contamination, cleanup may be carried out without previous sampling.

- In areas of obviously mild contamination, cleanup may be done without post-cleanup sampling, based on best judgment and adjacent sampling results.

After cleanup and encapsulation, only small amounts of residual chemicals should remain (see criteria below). In cases of moderate to heavy contamination, indoor air should be screened with FID or PID or similar instrument after cleaning to determine that the lab has been cleaned to reasonable background levels.

The primary chemicals of concern are the drug manufactured, solvents, lead and mercury. For many drug lab chemicals, there are no existing numeric standards. Therefore, MDH has established the following provisional cleanup limits and guidelines based on best judgment and current practice. Data on lab samples must be reported as ppm for VOCs, as jag/ft^2 for surface samples, and as |ig/m^3 for air samples.

Cleanup Criteria

Testing may include surface wipes for methamphetamine, volatile organic solvent monitoring in air, with a PID or similar device, and surface pH evaluation. Chemical-specific testing is listed in Table 1 below and described further in the following text. All septic tanks should be tested for the presence of solvents, and soil testing may be indicated in particular instances. Lead and mercury testing should be limited to illicit drug laboratories where there is clear evidence or high suspicion of use of these metals. All areas tested should be photographed for documentation. Ground and surface water testing may also be indicated; levels for these are not included in this document.

Table 1: Chemical Specific Remediation Levels

Chemical	Remediation Level or Action Taken
Corrosives [#]	Surface pH 6-8
Volatile Organic Compounds / Solvents [$]	Total VOCs (volatile organic compounds in air) < 1 ppm. (Note that common error for PIDs can be as much as +/- 5ppm.) .
Methamphetamine	< 1 $\mu g/ft^2$
Ephedrine/Pseudoephedrine	< 1 $\mu g/ft^2$
Red Phosphorus	Removal of stained material
Iodine flakes, crystals, prill	Removal of stained material
Tincture of Iodine	Removal of stained material
Mercury	Mercury < 0.3 $\mu g/m^3$ (0.036 ppb) in air. The detection limit for many mercury analytical methods is significantly greater than 0.3 $\mu g/m^3$. Sensitive analytical methods are available (OSHA ID-140 or portable Lumex® or Tekran® mercury vapor analyzers[+]).
Lead	Lead < 40 $\mu g/ft^2$ wipe sample

* Corrosives include but are not limited to Hydrochloric Acid, Sulfuric Acid, Sodium Hydroxide, Anhydrous Ammonia, Phosphoric Acid, Muriatic Acid.

[$] VOCs/Solvents include but are not limited to Acetone, Benzene, Ether, Freon, Hexane, Isopropanol, Methanol, Toluene, Xylene. This level is for air monitoring only and does not apply to septic tanks.

[+] Tekran, Inc., Toronto, Canada; OhioLumex, Cleveland, Ohio

NOTE: (09/2003) To our knowledge, neither mercury nor lead has been found in a Minnesota lab to date. Lead and mercury were (uncommonly) present at past lab operations, so cleanup levels are included here, in the event they may be needed and to raise awareness of their potential use. Typically, the processes (methods using phenyl-2-propanine (P2P) precursor) that used lead and mercuric compounds have been abandoned in favor of simpler methods using lithium or sodium metal.

Additional notes on Table 1:

- Acids and Bases/Corrosives: Surface pH testing should provide reasonable assurance that common acids and bases are not present at levels posing a health hazard.

  pH testing will be completed on all horizontal surfaces. The acceptable pH range is between 6 and 8.

- VOCs: Volatile organic compound testing in air will provide reasonable assurance that common solvents are not present at levels posing a health and safety hazard.

  Volatile organic compound testing should be completed in all rooms of the structure, as well as over soils suspected of contamination with meth lab chemicals. The instrument may also be employed to detect sources of residual contamination, such as in heating vents and sewers.

Measured levels must reach < 1 part per million (ppm). Calibrated photoionization detectors are acceptable measurement instruments, although other suitable technology can be used as well. Such instruments provide real-time, direct read measurements of VOC air concentrations.

Septic tank liquids should be collected and analyzed for solvents. If specific solvent concentrations exceed applicable standards, then additional sampling of the leach field is required. MPCA should be contacted for correct procedures for collection of samples.

- Methamphetamine; Ephedrine; Pseudoephedrine: Methamphetamine testing has been selected as the principal indicator of contamination based on previous studies and general experience demonstrating elevated levels in meth laboratories. Cleaning to < 1 jag/ft^2 should also provide reasonable assurance that ephedrine and pseudoephedrine levels are within acceptable limits.

Wipe samples should be limited to non-porous surfaces and can include floors, walls, countertops, tables, etc. Composite sampling can be used to determine if contamination exists but cannot provide information about location specific concentrations. Most sample collection should be discrete. It is recommended that vertical (walls, doors) and horizontal (floors, countertops) surfaces be sampled.

Testing should be done on separate locations/components of a ventilation system, specifically including the supply air diffuser and the ductwork immediately adjacent to the supply air diffuser. This testing should be done after the furnace has been supplying heated air for at least one hour.

If a kitchen is in the structure, additional wipes should be collected and analyzed from the countertop/sink/stovetop, and from the floor in front of the stove.

If a bathroom is in the structure, additional wipes should be collected and analyzed. Generally samples should be selected from the toilet, tub/shower and sink surfaces, although specific sampling may vary depending on individual situations.

After cleaning and sealing, any area showing visible stain that could reasonably be associated with drug manufacture should be tested.

After a sample is collected from a porous article such as upholstered furniture, rugs or carpet, a section of material should be removed (cut) from the article and placed in a wipe sample bottle.

- Phosphorus; Iodine: Removal of stained materials is the best means of remediating for contamination involving red phosphorus, iodine crystals, and tincture of iodine. Although not preferred, where removal of stained material is not a reasonable option (such as on concrete), the surface can be power-washed, allowed to dry, and then sealed. However, stains may reappear at a later time.

- Mercury and Lead: When lead or mercury is discovered or there is evidence that that may be present, notify MDH or MPCA.

  If mercury is found or highly suspected, all traps in the plumbing system should be evaluated for the presence of mercury and either replaced or cleaned.

- Other chemicals of concern should be evaluated individually. Toxicological databases such as TOXLINE or HSDB (Hazardous Substances Data Base) may be used to obtain references that might aid in identifying a critical study on which a hazard estimation can be based. Washington State Cleanup Guidelines or the EPA Risk Assessment Guidance for Superfund (RAGS) can be consulted for additional guidance. An MDH toxicologist may also be consulted.

Sampling Methods and Procedures

Quality assurance and quality control in clan lab sample analysis does not begin in the laboratory. Without the proper controls in place prior to analysis, testing may be performed on non-representative, improperly collected, mislabeled, or improperly stored samples, resulting in inaccurate results, potential harms and additional costs.

Care should therefore be taken to:

- Determine numbers of samples and sampling sites with careful consideration of obvious contamination, and reliability/completeness of information about site history prior to seizure. Do consider: how long cooking operations have taken place, where the cooking operations were located, and the structure of the ventilation system for the building (re: distribution of residue).

- Collect samples in a uniform manner, as directed, using approved equipment and methods; and changing gloves with each sample.

- Label samples accurately. Seal, store and provide documentation according to instructions given.

- Keep samples clean and dry. Store samples in a cooler. Protect the cooler from excessive heat or cold. Deliver samples to the laboratory within the required period of time.

Procedures for sampling are as follows:

- Evaluation of corrosives:

  Corrosive residues and spills may occur in drug preparation and manufacturing areas; in places where chemicals have been stored, and in other areas of a lab site. pH paper with de-ionized water should be used in all suspect locations. pH measurements can be completed using deionized water and high quality pH test strips providing reasonable visual determination in the range of 6-8. Several ml of water should be applied to a surface, allowed to stand for 3-5

minutes, and then tested with the strip. An accurate record of findings and locations must be made.

- Wipe samples for determining methamphetamine concentrations:

The sampler must wear gloves to avoid contaminating samples. Prior to sampling, a clean, glass sample vials containing a cotton gauze pad, pre-soaked in methanol, should be labeled with sample number, date, time, location and samplers ID or initials. The methanol wipes are used to determine if methamphetamine residue exists on the surface to be tested.

Discrete samples are taken from a one square foot area. Areas can be measured with a ruler and marked by using tape, chalk, or some other non-permanent marking tool. The methanol-soaked gauze pad (supplied by the laboratory) is used to wipe the surface to be tested. To sample the marked area, complete a wiping motion over the entire area horizontally (side to side) using only one side of the gauze, and completing at least 5 swipes from left to right. Turn the gauze over to expose a clean side and then complete a wiping motion over the entire area vertically (up and down), at least five times. The pad should then be rolled into a cylinder and secured in the glass vial.

Samples should be analyzed by a laboratory certified by MDH. **[Note:** (09/2003) MDH certification of laboratories for meth analyses is not yet in place but is expected to be before the end of 2003. Names of labs currently recommended can be obtained from MDH.] Such laboratories will have an acceptable QA/QC program and are able to meet the desired level of detection. Laboratory reports must include methods, QA/QC, and detection limits

Outdoor Sampling Information

Outdoors sampling and assessment may be appropriate, where contamination is evident (e.g., browned or patchy, vegetation; burn pit with chemical containers).

The Minnesota Pollution Control Agency (MPCA) and other appropriate regulatory agents (e.g., county environmental agency) should be notified and consulted regarding the evaluation of outdoor locations. MPCA consultants will determine, over the telephone or in-person, whether sampling or remediation is indicated. In cases where there has been significant environmental contamination, MPCA will provide the necessary services by using their staff or contractor.

- Septic tank sampling

Contents of septic tanks should be tested for pH during the on-site sampling. Samples should be collected after obtaining instructions from MPCA for proper collection procedures, and tested for solvents using a suitable analytic technique (MPCA 468 volatiles).

- Soil sampling

Soil samples should also be collected from suspected sources of outdoor contamination. Decisions regarding sampling location and depth must be made, based on the circumstances of the site. Samples should be placed in a glass jar, filled to the top to minimize head space, and secured with a septum lid or suitable alternative as accepted by the analytical laboratory. Each container should be properly labeled. Specific analytical methods used will depend on the chemical contaminants suspected to be present.

If the concentrations of solvents in septic tank liquids are found to be in excess of applicable standards, soil samples should be collected from below the leach lines. Samples should be placed in glass jars, filled to the top to minimize head space, and secured with a septum lid or suitable alternative as accepted by the analytical laboratory. The jars should be labeled with date, time and sample location.

Sample Shipment

Various regulations apply to the shipment of hazardous materials. When samples are to be shipped, rather than hand-carried to a laboratory, these regulations and the specific requirements of the shipping agent must be followed.

For example, FedEx Ground accepts certain hazardous materials for ground transport within the continental U.S. only. FedEx instructions require that shipments are labeled, marked, classified and packaged according to government rules and regulations. Hazardous materials prepared for shipment via FedEx Ground cannot be shipped internationally, nor can they be dropped off at any FedEx location. Information on acceptable materials, packaging and labeling, can be obtained by calling (800) 762-3725 on online at: http://www.fedex.com/us.

Shipping requirements for other carriers will be similar but should be obtained specifically for the carrier to be used.

METHLAB CONTACTS

For further information, call:

- MDH : 651-215-0778, 651-215-0777, or toll-free, 1-800-657-3908 (press "2" on your touch-tone phone)
- general meth lab information, MDH Meth Lab Program, MDH Cleanup Guidelines, cleanup contractors and labs, legal issues, existing city and county ordinances
- MPCA: 651-297-8610, or toll-free at 1-800-657-3864
- environmental impacts to soil, water, septic systems, etc.
- The State Duty Officer - 1-800-422-0798 or in the metro area, (651) 649-5451.
- to report meth labs and other hazardous spills

Factsheets and other information on meth lab-related topics from Minnesota and other states can be found at the MDH Meth Labs Website at: http://www.health.state.mn.us/divs/eh/meth/

Or write to: Minnesota Department of Health Meth lab Program
121 East Seventh Place, Suite 220
St. Paul, Minnesota 55101

The Minnesota Bureau of Criminal Apprehension (BCA) has a list of individuals throughout the state who are trained methlab responders. They are a valuable resource for information about drug lab processes, chemicals, and activities. For further information contact MDH at numbers above.

Other Methlab contacts include:

Minnesota Bureau of Criminal Apprehension (BCA) - 651-642-0610
Minnesota Department of Agriculture - 651-297-5387
Minnesota Department of Health (re: labs in licensed facilities) - 320-650-1055
Minnesota Department of Transportation - 651-405-6120
Occupational Health and Safety Administration (OSHA) - 651-284-5060, or toll-free at 1-800-657-3776
United States Drug Enforcement Administration (DEA) -612-348-1339

Minnesota Department of Health
with partial support from the U.S. Agency for Toxic Substances and Disease Registry

Upon request, this material will be made available in an alternative format