

**Guidelines for Cleanup of Residential Property
Used to Manufacture Methamphetamine**

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Virginia Department of Health

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I. Background

On April 18, 2012, Governor McDonnell approved legislation, introduced as House Bill 796 by Delegate Nick Rush, which required the Virginia Board of Health (Board) to establish guidelines for the cleanup of residential property formerly used as clandestine methamphetamine laboratories. After the law became effective on July 1, 2012, the Virginia Department of Health (VDH) convened a working group to develop a set of draft guidelines for review and approval by the Board. Along with staff from VDH, this workgroup included representatives from the Department of Environmental Quality, the Virginia State Police, the Department of Emergency Management, the Department of Housing and Community Development, the Town of Christiansburg, ServPro, and the Virginia Association of Realtors. On March 20, 2013, Governor McDonnell approved additional legislation, House Bill 1615, which expanded the scope of the guidelines to all residential properties where methamphetamine was manufactured as well as establishing residential property disclosure notifications. House Bill 1615 has a delayed effective date of July 1, 2014 to allow time for the Board's Guidelines to be established. The guidelines offered here represent the consensus of the participating members and their best efforts to assure the cleanup guidelines meet nationally recognized models put forth to prevent further contamination of residential property and to protect public health.

In the Southeastern United States, methamphetamine production by illicit or clandestine laboratories has been on the rise in recent years (Office of National Drug Control Policy, 2010). Methamphetamine manufacturing operations have been discovered in various settings including, but not limited to, occupied and abandoned houses, apartments, motel rooms, sheds, and motor vehicles. For the purposes of these guidelines, the cleanup recommendations are limited to residential properties.

The Board developed these guidelines based on nationally recognized standards, relevant peer reviewed literature and input from industry and governmental stakeholders and subject matter experts. It is important to emphasize that the standards and procedures contained in these documents are guidelines; guidelines do not have the force of law and adherence is voluntary. At the same time, the purpose of the Guidelines are to provide clean-up procedures and standards determined by the Board to be "best practices" reasonably calculated to assure that current and future property owners and occupants who follow the Guidelines can remediate methamphetamine contamination to a level that does not pose a threat to persons occupying residential dwelling units in Virginia. Nothing in these Guidelines shall be construed to establish a factual or proximate causal relationship between the risks associated with the manufacture of methamphetamine and any exposure or other injury sustained by current or future owners, occupants or inhabitants of residential dwelling units. In addition, the Board and its designees do not conduct inspections of residential properties to document or enforce compliance with these Guidelines.

II. Definitions

Methamphetamine means any substance which contains any quantity of methamphetamine, including its salts, isomers, and salts of isomers; methamphetamine is a schedule II central nervous system stimulant (base formula C₁₀ H₁₅ N).

Residential property or residential dwelling unit means a structure or part of a structure that is used as a home or residence by one or more persons who maintain a household including, but not limited to, a manufactured home.

III. Health Concerns Related to Manufacture of Methamphetamine

Several processes and many different combinations of chemicals made as ‘recipes’ are used to manufacture or ‘cook’ methamphetamine (See Appendix A). The release of these vapors presents a potential exposure hazard for occupants of the premises where the methamphetamine was manufactured. Each process uses and produces gases or vapors at some point during the cooking operation. The distribution of gases and vapors may be extended or spread by a building’s heating, ventilation and air-conditioning (HVAC) system.

Both acute (short-term) and chronic (long-term) health hazards may result from the manufacturing of methamphetamine. 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, explosion, and direct skin contact with chemicals. Headaches, dizziness, nausea and other health effects can result from inhalation of vapors.

The potential for exposure to methamphetamine residues on surfaces and porous articles depends on accessibility of residues to surfaces 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 outdoor buildings such as unattached garages and sheds. Methamphetamine exposures may occur via dermal, ingestion or inhalation pathways. Methamphetamine residues may directly irritate the skin, or may be absorbed into the body through the skin, which may result in dermal exposure. If hand to mouth behavior occurs when hands have been in contact with toxic chemicals, the chemicals may be ingested into the body which may result in ingestion exposure. Hand to eye behavior may also introduce toxic materials to the eyes. Lastly, inhalation exposure may occur if vapors or associated chemical particles are breathed in.

IV. Methamphetamine Contaminants

The two primary methods generally used to manufacture methamphetamine are the One-pot/Ammonia reduction method (Table 1) and, to a lesser extent, the Red Phosphorous method (Table 2). Each method uses commonly found household products that, when used for household purposes, are generally considered safe. However, someone with a basic chemistry background and a good teacher can mix household products to make methamphetamine. In addition to making methamphetamine, hazardous chemicals that are produced in the manufacturing process may be corrosive, flammable, explosive, and toxic. Each pound of methamphetamine made can produce nine to eleven pounds of toxic waste. Methamphetamine “cooks” may dispose of toxic waste without any consideration to the environment or human health. Chemicals are commonly dumped in the sink, bath tubs, and outdoors and have the potential to pollute surface or groundwater supplies. Chemical spills and chemicals found in unmarked containers or stored improperly can put humans at risk of exposure.

Common chemicals used or produced by the One-pot/Ammonia reduction method and the associated health hazard include:

Table 1. Chemicals and hazards associated with the One-pot/Ammonia reduction method

Chemical	Potential Hazard*
Ammonia	Corrosive, toxic, flammable
Lithium	Reacts violently with water to produce hydrogen gas (explosive)
Pseudoephedrine/ephedrine	
Hydrochloric acid	Corrosive, toxic
Sodium hydroxide	Corrosive, toxic
Solvents (methanol, petroleum distillates)	Flammable, toxic
Sulfuric acid (salting process)	Corrosive, toxic

* These potential hazards identified are for the concentrated chemical and may not be applicable to the concentration of the chemical found in the source.

Common chemicals used or produced by the Red Phosphorus method and the associated health hazard include:

Table 2. Chemicals and hazards associated with the Red Phosphorus method

Chemical	Potential Hazard*
Red Phosphorous	Decomposes to phosphine gas in presence of moisture and oxygen, explosive when mixed with organic material
Iodine	Corrosive, reactive, toxic
Hydriodic acid	Corrosive, toxic
Hydrogen Peroxide	Supports combustion, reactive, explosive, toxic
Pseudoephedrine/ephedrine	
Sodium hydroxide	Corrosive, toxic
Hydrochloric acid	Corrosive, toxic
Solvents (methanol)	Flammable, toxic
Sulfuric acid (salting process)	Corrosive, toxic

*The potential hazards identified are for the concentrated chemical and may not be applicable to the concentration of the chemical found in the source.

After law enforcement seizes methamphetamine, there remains some low risk of exposure to chemical residues, particularly when the Red Phosphorus method is used. Chemical residues or gross contamination can often be identified by chemical odors, spills, staining, and opened containers of chemicals; however, residual contamination may remain on surfaces even after bulk chemicals and odors have been removed. Depending on the levels of any remaining contamination in the household and the method used to make methamphetamine, the property

owners should consider whether to allow persons inside the dwelling unit before a preliminary assessment has been made and any necessary clean-up has been completed in accordance with these Guidelines.

V. Methamphetamine Site Cleanup

A. General

The toxicity of methamphetamine residues depend upon the amount of the residue and the chemicals that make up the residue. The amount of residues depend upon the quantity of the methamphetamine manufactured, the period of time over which it was produced, the methods of chemical storage and disposal, the occurrence of chemicals, and the physical characteristics of the structure in which the methamphetamine was manufactured. The chemicals in the residue will vary with the method of methamphetamine manufacture (Appendix A).

The level and extent of contamination, and the type of contaminant material determines the necessary cleaning methods, and the likelihood that cleaning activities will be successful. For example, single cleaning events consisting of wash-rinse cycles may not be sufficient to remove contamination from household items; generally three wash-rinse cycles are recommended (USEPA, 2009). In some instances, it may often be more cost effective to discard porous furnishings (e.g. upholstery, carpet, draperies) rather than trying to clean them.

Cleaning of a residential dwelling unit should occur after the complete removal of bulk chemicals and hazardous materials has been made and law enforcement has removed any defensive measures (e.g. anti-personnel devices or “booby traps”). The Board recommends review of recommended cleaning procedures for specific items in the US Environmental Protection Agency *Voluntary Guidelines for Methamphetamine Laboratory Cleanup* (“EPA Guidelines”) (USEPA, 2009).

B. Homeowner and Worker Safety

The Board recommends that no assessment or clean-up commence until law enforcement has secured the dwelling unit. A methamphetamine manufacturing operation may create health hazards, including the potential for explosion; some of these risks will be reduced by the law enforcement seizure activity

Once seizure is complete, however, residents and other individuals should consider using Personal Protective Equipment (PPE) when initially re-entering the site, as chemical residue or other bulk materials used in the production process may still be present. Long sleeves, pants, and boots can be worn to minimize direct contact with remaining contaminants on site. A respirator (mask) can be used to minimize inhalation risks.

Adequate safety precautions should be taken by everyone who enters the structure before remediation is complete. In addition, persons conducting cleanup activities should wear appropriate PPEs to include protective clothing, gloves, eye protection, and respiratory protection. While these Guidelines only address assessment and clean-up related to

methamphetamine manufacturing operations, asbestos and lead may be present, particularly in older structures, and persons undertaking remediation activities should consider whether additional hazards may exist in the dwelling unit. Consultation with a professional who is trained to determine the risks and to recommend appropriate clean-up practices, policies and procedures is recommended.

Law enforcement personnel should follow the Virginia State Police *2005 Best Practices Protocol For Use by Law Enforcement and Emergency Response Agencies Regarding the Clean-up of Abandoned and Deactivated Methamphetamine Production Sites and the Retention and Handling of the Byproducts of Methamphetamine Production*.

C. Interior Remediation

This section provides a general overview of a typical remediation sequence. The sequence outlined here assumes that law enforcement has already removed any bulk chemicals and manufacturing equipment. Removal of any bulk chemicals or manufacturing equipment should be coordinated with the responsible law enforcement agency, and transportation and disposal of chemicals must follow all applicable regulations.

Overview of the remediation sequence

1. Thoroughly ventilate the structure.
2. Perform a preliminary assessment.
3. Conduct any pre-remediation sampling determined to be necessary.
4. Develop a work plan based on the preliminary assessment and any sampling results.
5. Remove all contaminated materials that will be permanently discarded.
6. Thoroughly vacuum interior surfaces using a high-efficiency particulate air (HEPA) vacuum.
7. Complete an initial washing of interior surfaces.
8. Clean and seal the HVAC system. Do not operate the HVAC system again until all further remediation activities are completed.
9. Flush plumbing traps.
10. Use a detergent and water solution to wash ceilings, walls, floors and other non-porous items that will be kept.
11. Conduct any post-remediation sampling determined to be necessary.
12. Encapsulate ceilings, walls and floors.
13. Develop a final report.

1. Ventilation

Thorough ventilation of the structure should be done before, during and after remediation activities. Open all doors and windows and use fans, blowers or a negative air machine equipped with a HEPA filter. Do not use the HVAC system for ventilation—doing so may spread contamination to previously uncontaminated areas of the structure. Take precautions to avoid discharging exhaust air to air intakes of adjacent structures. After

the initial airing, ventilation must be continued throughout the decontamination activity. The property should be protected from adverse weather effects during this time period (e.g., rain, freezing temperatures, etc.). Venting will not remove methamphetamine residues and is not a cleanup method.

a. Pre-Remediation Ventilation

The site should be ventilated prior to the entry of cleanup personnel. In some cases, law enforcement personnel will have already ventilated the site before completing criminal investigation activities or the removal of bulk chemicals or manufacturing equipment. If the dwelling unit was sealed after these activities, the dwelling unit should be ventilated again before remediation occurs. Ventilation should be performed for a minimum of twenty-four hours and preferably forty-eight hours prior to undertaking further remediation activities.

b. Continued Ventilation

It is important to continue ventilation throughout the remediation process (except when it would interfere with air monitoring). To protect assessment or clean-up workers and to limit cross-contamination, leave windows open and use fans, blowers, or a negative air unit with a HEPA filtration system during the cleanup. A negative air unit equipped with a HEPA filtration system will limit or prevent the transfer of airborne contamination from dirty to clean areas.

c. Post-Remediation Ventilation

Ventilate the property for a minimum of two days after cleanup is completed. After cleaning and ventilating the property, recheck for new staining and odor (the presence of which would indicate that additional cleaning is necessary).

2. Preliminary Assessment

The purpose of a preliminary assessment is to obtain and document the information required to plan and carry out a remediation process for the specific dwelling unit. The preliminary assessment should include a review of records related to the methamphetamine manufacturing operation and a physical examination of the site to identify actual and potential hazards.

All available records related to the methamphetamine manufacturing operation should be reviewed. These records may include law enforcement reports and any waste removal documents. Relevant information acquired through this record review may include the duration of the methamphetamine manufacturing operation; the manufacturing process; the chemicals found on site; the location of “cooking”, storage, and disposal areas; and sites of observed contamination.

After reviewing any available records relating to the methamphetamine manufacturing operation, the dwelling unit should be inspected to determine and document the actual

conditions inside the dwelling unit and to conduct any pre-remediation sampling. The site survey should:

- a. Describe the layout and construction of the dwelling unit , including the location and size of rooms, location of doors and windows, the ventilation system, appliances, and any furnishings that remain in the dwelling unit ;
- b. Document the areas of heaviest contamination based on staining or other visual or olfactory evidence;
- c. Examine the ventilation system for visual signs of contamination;
- d. Examine the plumbing system for visual signs of contamination such as staining and etching;
- e. Identify the type of wastewater disposal (e.g., septic system or public sewer) serving the site;
- f. Identify potential sources of cross-contamination to adjacent structures or other units; and
- g. Identify evidence of outside contamination such as disposal of chemicals by burning or dumping.

3. Pre-remediation Sampling

The decision to conduct sampling prior to remediation should be weighed against the cost and potential benefits of the sampling results. Sampling is not inexpensive and, if it is likely that extensive remediation will be necessary regardless of sampling results, then the owner of the dwelling unit and contractor may reasonably elect to avoid those costs and simply begin remediation without sampling. On the other hand, if there is evidence that contamination is limited to specific areas of the structure, or the contamination may not be extensive, sampling may show that remediation of a more limited scope is appropriate under these Guidelines. The decision as to the necessity of pre-remediation sampling should be made by the clean-up contractor or other qualified professional on a case-by-case basis. If pre-remediation sampling is performed, it should be done in accordance with Table 4.

4. Work Plan

These Guidelines anticipate that the information from the preliminary assessment and the results of any pre-remediation sampling should be used to develop a remediation work plan. The work plan is a guide for accomplishing remediation in accordance with these Guidelines.

The work plan should summarize the information obtained during the preliminary assessment, describe worker protections to be taken, describe the cleanup methods that

will be implemented, and describe any post-remediation sampling to be conducted. The description of the cleaning methods should include:

- a. A list of the items that will be removed from the structure;
- b. A list of the surfaces to be cleaned on-site;
- c. Procedures for cleaning;
- d. Areas to be encapsulated and the methods and materials of encapsulation;
- e. Location and procedures for on-site decontamination; and
- f. Methods to be used to prevent the off-site contamination.

The EPA Guidelines list additional items that are recommended for inclusion in the work plan.

5. Removal of Materials to be Permanently Discarded

The first remediation step following ventilation should be removal and disposal of all materials that will be permanently discarded. Visibly stained materials, chemical odor-emitting materials or materials that are visibly damaged by contamination should be discarded. The EPA Guidelines offer the following considerations to help determine whether to discard or clean other materials and items:

- a. **Potential for Contact.** Consider whether inhabitants of the structure are likely to come into contact with the item regularly (such as bedding). Discard contaminated items with a high potential for human contact (e.g., children's toys and bottles) more readily than items with a low potential for human contact.
- b. **Intrinsic or Emotional Value.** Weigh the intrinsic or emotional value of the item with how much it would cost to effectively clean the item. If sampling will be conducted, the cost of cleanup includes the cost of sampling to ensure the item is cleaned. In many cases it is more cost-effective to dispose of an item and replace it than it is to clean it. In some circumstances however, items of great emotional value, such as wedding albums, may be salvaged.
- c. **Porosity.** Consider the porosity of the item or material. In general, porous items and materials are easily penetrated or permeated by hazardous gases, liquids or residues. Non-porous surfaces are more resistant to this type of contamination. As a result, contamination is often located in porous items and on the surface of non-porous items. Thus, it is generally more difficult to eliminate contamination from porous items and materials.

For example, carpeting is highly porous and therefore likely to be contaminated, is difficult to thoroughly clean, typically has a relatively low intrinsic or emotional value, and has a high potential for contact by children crawling or playing on the floor. Therefore, carpet should typically be discarded.

Minnesota (Minnesota Department of Health, 2010) offers the following 2x2 table to illustrate the process for deciding to clean or discard materials:

Table 3. Decision aid for determining whether to salvage or discard an item.

<p>High Value – High Contact Items E.g., Mattresses, carpeting, large upholstered items should almost always be discarded.</p>	<p>High Value – Low Contact Items E.g., In some circumstances, photographs may be salvaged without cleaning, or large appliances may be cleaned and saved.</p>
<p>Low Value – High Contact Items E.g., clothing, plastic toys and toothbrush should always be discarded.</p>	<p>Low Value – Low Contact Items E.g., A screw driver, garden rake or other metal or hard material item may be cleaned in some circumstances.</p>

All materials that are discarded should be disposed of in a manner that will prevent salvage and reuse by other persons.

6. HEPA Vacuum the Interior

After removal of materials to be permanently discarded, thoroughly vacuum all surfaces with a vacuum equipped with a HEPA filter. Household vacuums are not recommended since they lack adequate filtration and may simply further spread contaminants. Vacuuming with a HEPA filter will effectively remove particulate contamination as well as dust and cobwebs that may interfere with washing. HEPA vacuuming alone is not sufficient to decontaminate most surfaces.

7. Initial Washing

Perform an initial washing of walls and floors with a detergent-water solution to reduce contamination and thereby help prevent exposure of workers and reduce recontamination of cleaned areas. A household detergent or soap product should be used for all washing solutions. The water does not have to be hot. *Bleach is not recommended* because it may react with some chemical pre-cursors or by-products of methamphetamine production to produce other toxic compounds.

8. Clean and Seal HVAC System

In structures with an HVAC or other forced air system, including kitchen and bathroom vents, fumes and other contaminants from methamphetamine production are likely to accumulate in the vents, ductwork, and filters and on the walls and ceilings near the ventilation ducts. The systems may also spread contamination to any area served by the

system, including other rooms and sometimes other dwellings. To limit the further spread of contamination, the HVAC system should be shut down and remain out of operation until all remediation activities are completed.

Adequate cleaning of HVAC systems requires special tools and training. HVAC systems should be cleaned by contractors who specialize in cleaning these systems or who have experience cleaning ventilation systems in former methamphetamine manufacturing sites. Some ductwork cannot be properly cleaned of contamination; it is recommended that insulation-lined ducts and flexible ductwork be discarded and later replaced after the rest of the system is cleaned.

After cleaning, the HVAC should be sealed at all openings. The system should remain sealed until all remediation activity is complete.

9. Flush Plumbing Traps

Methamphetamine chemicals may be poured down the waste drains while manufacturing is active and the traps of sinks, bathtubs, and showers may contain concentrations of these chemicals. In addition, the plumbing fixtures themselves may be compromised by the chemicals. If visible or other tangible evidence of dumping is detected, the clean-up contractor may want to consider having the system tested for the presence of VOCs, which present a flammability hazard, with a photoionization detector (PID) prior to taking remediation steps related to the plumbing system. The outfall of the wastewater system should be verified as well. Different steps may be required for the plumbing system of a structure served by an onsite sewage disposal system than for one served by a public sewerage system. In addition, some structures may have an illegal “straight pipe” that discharges sewage to the ground or to surface water. In instances where the structure is served by an onsite sewage disposal system or a straight pipe is encountered, the local health department should be contacted for instructions prior to flushing traps or disposing of any liquid into the plumbing system.

Plumbing fixtures with visible signs of contamination such as etching or staining should be removed and permanently discarded as they will be difficult to clean. Porcelain and stainless steel fixtures in which the surface is not pitted or damaged may be cleaned using the procedures outlined herein. When staining is noted around plumbing fixtures or if a strong chemical odor is emitted by the plumbing system, the drain system should be flushed using a generous amount of water to reduce the concentration of chemicals in the system. The entire system should be flushed at the same time. Flushing of the system should not be done until there is verification that waste will be properly disposed of. Additionally, if the wash and rinse water from the cleanup will be disposed of via the household plumbing system, flushing should be delayed until that part of the remediation is completed.

10. Detergent Wash

Ceilings, walls, floors and all household items that will not be discarded should be washed using a solution of household detergent and water. Use the manufacturer’s instructions for mixing the solution. The water does not have to be hot. *Bleach is not*

recommended because it may react with some chemical pre-cursors or by-products of methamphetamine production to produce other toxic compounds.

It is important that the washing be thorough. The entire surface, and not just spots, must be covered by the cleaning step. The typical procedure is to start with the ceiling, then from the top to the bottom of the walls and finally the floor. Follow the wash with a thorough rinse using clean water and clean rags. Change the wash solution, the rinse solution and rags frequently. Allow the surfaces to thoroughly dry and then repeat the wash and rinse steps at least two additional times.

Wash and rinse water typically may be disposed of via the structure's plumbing system, provided that the structure is connected to a public sewer system. The concentration of cleaning solutions may upset the functioning of an onsite sewage disposal system (septic system). If the structure is not served by public sewerage, the wash and rinse water can be collected for proper off-site disposal; one possible method is to have a licensed sewage handler empty the septic tank before remediation begins to provide storage capacity in the tank and then pump the tank again before the liquid reaches the effluent port on the tank.

It is important to prevent recontamination of cleaned areas and items. Once a room has been adequately cleaned (at least three wash-rinse cycles), seal the room using 6.0 mm plastic sheeting and do not re-enter the room. Similarly, household items that are cleaned onsite should be bagged or wrapped in plastic after they have been cleaned. Items may be stored offsite after they have been sufficiently cleaned. Do not return these items until remediation of the structure is completed.

11. Encapsulation

Encapsulation of surfaces with primers, paint and other sealants may provide additional protection against the migration of contaminants to the surface of the material. Encapsulation is recommended for all porous surfaces that are suspected of contamination and that are not removed from the unit. However, encapsulation is ***not a substitute for cleaning***. Encapsulation should be done after surfaces have been cleaned in accordance with these guidelines and allowed to dry thoroughly. If post-remediation sampling is to be conducted, encapsulation should be performed only after sampling shows that washing has reduced contamination to the recommended level.

Oil-based paint, epoxy coatings, and polyurethane should be used to encapsulate surfaces. Surfaces should be primed with a high quality, non-latex primer that will be durable over time and meets the recommendations of the finish-coat manufacturer. Follow the manufacturer's recommendations for application methods, thickness, and drying or curing time between coats. Complete coverage of the surface is important and may require multiple applications of finish.

Spray application may provide more thorough coverage than hand-rolling and is therefore recommended in many remediation guidelines, particularly for textured plaster and drywall surfaces that may be damaged by hand-rolling.

12. Post-remediation Sampling

The Board recommends sampling of the dwelling unit following the completion of all remediation activity. Such sampling provides evidence that the remediation activity was done in accordance with these Guidelines and that the dwelling unit has been successfully decontaminated. The health based standard for residual methamphetamine contamination on surfaces in dwelling units is 1.5 micrograms per centimeter squared ($\mu\text{g}/100\text{cm}^2$). This level is based on peer-reviewed scientific literature recommending a health-based exposure standard from California (Salocks, 2009) (See Also Appendix B); the literature indicates that a residual level of $1.5\mu\text{g}/100\text{cm}^2$ or less of methamphetamine contamination protects humans from negative health effects. As such, a residual level of $1.5\mu\text{g}/100\text{cm}^2$ or less of methamphetamine contamination meets the recommended safe level under these Guidelines.

Sampling should be done by a qualified professional and analyzed by a properly certified laboratory. Table 4 below contains recommended standards and possible locations for testing for volatile organic compounds (VOCs), metals (lead and mercury), corrosives (as a measure of pH) and residual methamphetamine. At a minimum, the Board recommends sampling for residual methamphetamine contamination in accordance with Table 4 at indoor locations where human contact with methamphetamine vapor or other chemicals may be likely to occur, including in any common areas of a multi-family community. Sampling in accordance with Table 4 may also be conducted on a case by case basis at locations identified in the site assessment as demonstrating visual signs or other evidence of methamphetamine contamination.

Table 4. Tests, chemicals, locations and guidelines for sampling.

Test	Chemical(s)	Sampling Location	Guideline
VOCs	Benzene, Coleman fuel, naphtha, petroleum distillates	Indoor air, outdoor over contaminated soil, drains, septic systems	Less than 1 parts per million (ppm)
pH	Acids and bases	Food preparation areas, visible contamination, septic system, areas where chemicals stored	pH 6 to 8
Metals*	Mercury and Lead	Contact VDH	Contact VDH
Wipe sample	Methamphetamine	Case by case	1.5 micrograms per centimeter square ($\mu\text{g}/100\text{cm}^2$)
Visual	Iodine and red phosphorous	Stained area	Remove stained surfaces and appliances

*Two methods commonly used to make methamphetamine in Virginia do not require mercury or lead. If mercury and lead are identified, please contact the Virginia Department of Health.

For manufacturing operations utilizing the Red Phosphorous method, please consult the Virginia Department of Health for sampling guidance. In addition, consult the table in Appendix A for a list of some of the common contaminants associated with methamphetamine manufacturing using two of the most common methods.

13. Final Report

A final report documenting that the dwelling unit has been remediated according to applicable guidelines should be prepared by the clean-up contractor or other qualified professional. The final report should document all assessments, remediation activity, and post-remediation sampling completed at the dwelling unit, including the dates and the names of the persons who were in charge of each activity. A copy of the final report should be provided to the property owner.

The following items are suggested for inclusion in the final report:

- a. Physical address of the residential property and a description of the structures on the property;
- b. A summary of the pre-remediation site assessment, including any known information about chemicals that were present and removed from the site both before and during the remediation process, the methamphetamine production method, and any areas where contamination was observed;
- c. The names and qualifications of the clean-up contractor or other qualified professional and the laboratory that analyzed any samples;
- d. The cleanup plan and documentation that the cleanup was completed, including a description of the areas that were decontaminated and the methods used;
- e. The waste management procedures, including handling and final disposition of waste; and
- f. The sampling plan, a description of the sampling methods, a list of the areas sampled and the results of all laboratory analysis.

D. Recommendations for Specific Items and Materials

1. Walls

Remove and replace wall absorbent materials (e.g., drywall, plaster, wallpaper) that are visibly stained or are emitting chemical odors. Other smooth, painted surfaces should be washed as outlined above and should be encapsulated. Textured walls, especially those that were installed prior to 1980, may contain asbestos and should be tested for asbestos presence before cleaning or removal. Asbestos-containing materials should be addressed according to applicable guidelines.

2. Ceilings

Ceilings typically have some of the highest contamination levels. Although ceilings have a low potential for human contact, they should be cleaned in accordance with these guidelines and should be encapsulated. As with walls, any absorbent materials that are stained or emit chemical odors should be removed and replaced.

Textured ceilings (e.g. “popcorn” or spray-on finishes) and tiled ceilings should be sampled for asbestos and methamphetamine contamination. Ceiling tiles in areas of heavy contamination that do not contain asbestos should be removed and replaced. When no asbestos contamination is present, ceiling tiles in areas of low potential contamination and textured ceilings may be encapsulated after vacuuming with a HEPA vacuum. Any asbestos-containing materials should be addressed according to applicable guidelines.

3. Floors

Resilient floors (e.g., vinyl) should be removed and replaced if stained or damaged. Porous and absorbent materials such as cork, unfinished wood and carpet (including any carpet pad) should be removed and replaced. Simply covering a contaminated floor with new materials is not a suitable remediation method, since the contaminants may still migrate to the surface of the new material.

After finish-flooring materials are removed, HEPA vacuum the subfloor to remove any contaminated dust and debris and then wash with a detergent solution before installing the new finish flooring materials.

Floors that will not be removed should be washed with a detergent solution in accordance with these guidelines and should be encapsulated with a suitable product (e.g., polyurethane for wood floors). Any ceramic or stone tile floors that will remain should be washed and, if porous, re-glazed. Grout should be ground-down and the tile or stone re-grouted and sealed.

4. Kitchen Countertops

Kitchen countertops have a high potential to transfer contamination, both through direct human contact and through food preparation activities. Consideration should be given to simply replacing any countertops likely to be highly contaminated. All countertops with visible or olfactory signs of contamination such as staining, etching, or chemical odor-emission and countertops constructed of porous materials (wood, granite) should be discarded.

Some countertops built of solid, man-made materials may be effectively decontaminated by sanding to remove some of the material and washing with detergent. Stainless steel can be decontaminated by washing with a detergent solution. It is recommended that stone and ceramic tile countertops in high contact areas be discarded. If not discarded, the grout should be removed and new grout placed and sealed.

5. Concrete, Cement and Brick

Exposed concrete, cement and brick are problematic because the materials are absorbent and difficult to thoroughly clean and because the materials are often structural elements that are expensive to remove and replace. Exposed masonry surfaces should be washed with a detergent solution. Power-washing, using a wet vacuum to remove excess water, or steam cleaning with extraction is recommended by some authorities (EPA, Minnesota). Masonry surfaces that will remain exposed should be encapsulated after cleaning.

6. Appliances

All appliances that have been used directly in the production or storage of methamphetamine and any appliances or electronics that show visible signs of contamination should be discarded. To prevent contamination of workers who may handle these items at disposal or recycling facilities, the exterior of appliances that will be discarded should be washed.

For any appliances that will be kept, thoroughly wash and rinse both the interior and exterior surfaces. Repeat at least once. Sampling of potential contact surfaces of appliances is highly recommended to assure that they have been adequately decontaminated.

7. Wood

All removable wood surfaces with visible signs of contamination should be discarded. Any wooden items that will not be discarded should be triple washed with a detergent solution, allowed to dry thoroughly and then encapsulated with a properly applied non-water based sealant.

8. Windows

Window glass should be cleaned at the same time as the surrounding wall surfaces. Triple clean with a standard household window washing solution, and, as with other surfaces, replace the cleaning cloths for each round of cleaning. Window trim should be cleaned or discarded in the same manner as other wall surfaces.

9. Electrical fixtures, outlet and switch plates

Switch plates and electrical plates should be discarded; these items tend to be high-contact and low cost. It is recommended that switches, receptacles and light fixtures should also be discarded, since they will be difficult to clean and, again, are typically low cost items. Any electrical fixtures that will not be discarded should be temporarily removed, washed, and thoroughly dried before re-installation.

NOTE: Be sure to take adequate safety precautions when working with any electrical items. Do not attempt to wet-clean electrical items in place or to remove electrical fixtures before ensuring that electricity to the fixture is turned off.

10. Non-porous household goods

All household goods such as dishes and flatware should be discarded if there is any indication that they have been used in the methamphetamine manufacturing process. Other ceramic, metal, hard plastic and glass items that were not used in the methamphetamine production process may be cleaned using a detergent solution.

11. Toys and other children's items

Children have a greater risk for health effects if exposed to methamphetamine and other chemicals. Children's items are typically highly absorbent and present. Therefore, the Board recommends that all children's items be discarded. Any toys that have the potential to be placed in the mouth and any toys that show signs of contamination should be discarded. Plastic baby bottles and nipples, as well as infant/toddler eating utensils should be discarded. Stuffed toys and other toys made of porous materials are difficult to adequately clean and discarding is recommended.

12. Personal items and medical devices

Personal items such as eye glasses and other medical devices that are made of hard plastic or metal and which would be expensive to replace may be decontaminated by triple washing with detergent.

13. Machine washable fabrics, bed coverings, clothing or draperies

Absorbent materials can accumulate vapors that are dispersed during the cooking process or can collect dust and powder from chemicals used in drug manufacture. Machine-washable porous materials such as draperies, bed coverings, and clothing should be washed three times with detergent and water or disposed of in accordance with the waste disposal plan if such materials were found in rooms assessed as contaminated or rooms serviced by the same HVAC system as the room where methamphetamine was manufactured. When washing, *do not use detergents with bleach*, oxidizing detergents, or fabric softener and do not dry between washings.

14. Upholstered furniture, mattresses, carpet or other non-machine washable fabrics

Non-machine washable porous materials such as upholstered furniture, mattresses, and carpeting will be difficult or impossible to decontaminate economically. In rooms assessed as contaminated and rooms serviced by the same HVAC as the room where methamphetamine was manufactured, these non-machine washable porous materials should be disposed of. It may be possible to strip the existing upholstery from furniture, clean, and seal any wooden parts and install new upholstery.

15. Sewerage & Septic Systems

As previously stated, most liquid chemical by-products are dumped into bathtubs, sinks, drains, and toilets. This waste is flushed from the plumbing where it enters the

wastewater system serving the property, typically either a sewerage system or onsite septic system.

Discarded chemicals are typically flushed within minutes or hours when connected to a sewerage system. Chemicals may remain in the system longer if connections are on a line of very low flow.

Microorganisms in septic systems are capable of breaking down much of the waste associated with the production of methamphetamine. However, large scale methamphetamine manufacturing operations or sites in operation for an extended period of time may generate a voluminous amount of chemicals which can affect pH, sludge buildup, and bacterial die-off if disposed of into the septic system. The EPA recommends field screening of the septic tank if there is evidence that methamphetamine waste may have been disposed of in the septic system. Several states recommend that remediation procedures for septic systems be based on the level of VOC found in effluent samples.

An assessment of the septic system should be conducted to determine if evidence suggests that chemicals have been disposed of in the septic system. Evidence of waste disposal may include, but is not limited to: witness statements; stained or etched sinks, bathtubs, or toilets; chemical odors coming from plumbing or septic tank; visual observations of unusual conditions within the septic tank; or stressed or dead vegetation over the drain-field (Minnesota Department of Health, 2010). If no evidence of waste disposal is found then no further action may be necessary.

If evidence of disposal in the septic system is found then the septic tank should be pumped and the contents taken to an approved sewerage disposal facility. The disposal facility should be contacted prior to pumping to determine if additional actions, such as sampling of waste, will be required prior to disposal. Though sampling of waste may not be necessary, disposal of waste should comply with all local, state and federal disposal requirements and proper precautions should be taken during pumping and disposal.

16. Soils

The site assessment should also include an outdoor evaluation of the ground to determine if it is visibly stained or otherwise affected (e.g. odors, burn piles, dead vegetation or remnants of reaction waste). If burn or trash pits, discolored soil or dead vegetation are found, affected soil should be removed and disposed of in accordance with applicable state and federal solid waste laws and regulations.

17. Wells

Private wells constructed pursuant to the Virginia Department of Health's Private Well Regulations are located and constructed to protect from potential sources of contamination known at the time of permitting. Disposal of chemicals in onsite septic systems, on the ground surface, or in burn pits could be considered a potential source of contamination for private wells. If visible evidence suggests that chemical byproducts of methamphetamine manufacturing were disposed of in a dumpsite, burn pit or trash pit

adjacent to a private well, the cleanup contractor should consider consulting with the Virginia Department of Health, Office of Environmental Health Services, for recommended testing and remediation actions.

18. Surface Water

The potential release of by-product chemicals to surface water should be evaluated during the site assessment when applicable. If evidence suggests chemicals may have been disposed directly into or adjacent to surface waters, contact the Virginia Department of Environmental Quality.

VI. Methamphetamine Testing

It is cost prohibitive to test households for every chemical that could be used for the production of methamphetamine or that is generated as part of the cooking process. Also, many of these chemicals are present in commonly used household products. Because the long-term health effects of exposure to methamphetamine residue have not been firmly established, many states have adopted clean-up standards that are based on analytical detection limits. It is assumed that the cleaning method used to reduce a methamphetamine residues will also reduce other potential chemical contamination caused by methamphetamine production. In 2007, the California Department of Toxic Substances Control was the first government agency to develop a health-based remediation standard. The residual amount of methamphetamine allowed on surfaces in homes formerly used to manufacture methamphetamine is 1.5µg/100cm².

While the Virginia Department of Health cannot recommend, endorse, license, or otherwise approve methamphetamine cleanup companies, the Virginia Department of Health does maintain a list of contractors that have indicated their ability to perform methamphetamine cleanup activities in Virginia.

VII. Re-Entry into the Residential Dwelling Unit and Property Owner Notification

It is recommended that the property not be rented, sold, or occupied until the assessment and cleanup following these Guidelines have been completed. It is further recommended that local building departments be contacted prior to remediation activity to ensure compliance with applicable provisions of the Uniform State Building Code (USBC) and any local ordinances such as public health nuisance ordinances. Additionally, §15.2-1716.2 of the Code of Virginia authorizes localities to adopt an ordinance providing that persons convicted for manufacture of methamphetamine pursuant to §§18.2-248 or 18.2-248.03 of the Code of Virginia are liable at time of conviction or in a separate civil action to the locality or any other law enforcement entity for the cost of cleanup.

Effective July 1, 2014, if landlords of single-family or multi-family residential properties have actual knowledge that the dwelling unit was previously used to manufacture methamphetamine and has not been cleaned up according to these guidelines, the landlord must provide the prospective tenant a written disclosure with this information pursuant to §§55-225.17 and 55-248.12:3 of the Code of Virginia. In the case of the sale of a residential dwelling unit, if the owner of such property has actual knowledge that the residential property was used for the manufacture of methamphetamine and has not been cleaned up according to these guidelines, the

owner must provide the prospective purchaser a written disclosure with this information pursuant to §55-519.4 of the Code of Virginia. This information will be provided to the purchaser on a form provided by the Virginia Real Estate Board, effective July 1, 2014.

For more information or clarification, please refer to the points of contact listed below.

Table 5. Important contacts.

Topic	Agency		
Methamphetamine Site Seizure and First Response	Virginia State Police	Appomattox Chesapeake Culpeper Fairfax Richmond Salem Wytheville	(800) 552-0962 (800) 582-8350 (800) 572-2260 (800) 572-4510 (800) 552-9965 (800) 542-5959 (800) 542-8716
Health Hazards and Concerns			
Health hazards, exposure routes, exposure risk	Virginia Department of Health Office of Epidemiology, Toxicology		(804) 864-8182
Cleanup			
Developing a cleanup plan, sampling and remediation	Virginia Department of Health Office of Epidemiology, Toxicology		(804) 864-8182
Contractor cleanup list	Virginia Department of Health Office of Environmental Health		(804) 864-7400
Environmental Contamination, Waste Disposal			
Outdoor contamination and remediation (soil, water); waste disposal	Virginia Department of Environmental Quality	Abingdon Glen Allen Harrisonburg Lynchburg Richmond Roanoke Woodbridge VA Beach	(276) 676-4800 (804) 527-5020 (540) 574-7800 (434) 582-5120 (804) 698-4000 (540) 562-6700 (703) 583-3800 (757) 518-2000

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Appendix A. Methods of Methamphetamine Production.

Current methods for methamphetamine production and toxic byproducts.

Method	Chemical Reaction	Chemical Contaminants	Hazard Category	Health Hazard Potential
Iodine/Red Phosphorus	Reduction of ephedrine	Phosphine Gas	Toxic Gas	<p>Acute: May cause lung irritation, cough, and chest tightness. Persons acutely exposed to phosphine may exhibit agitated, psychotic behavior. Signs and symptoms of acute phosphine toxicity may include rapid and/or irregular heart rate, low blood pressure, shock, nausea, abdominal pain, vomiting, diarrhea, and cardiac arrest.</p> <p>Chronic: May cause anemia, bronchitis, gastrointestinal symptoms (nausea, vomiting, abdominal pain, and diarrhea), and neurological effects (tremors, double vision, impaired gait, and difficulty speaking). Liver damage and jaundice, as well as renal failure are also potential consequences of long-term exposure to phosphine gas.</p>
	Reduction of ephedrine	Red Phosphorus	Flammable Solid	<p>Acute: May cause irritation of the skin, eyes, upper respiratory tract, gastrointestinal tract, and mucous membranes. Inhalation of red phosphorus dust may cause bronchitis. Ingestion of red phosphorus may also cause stomach pains, vomiting, and diarrhea.</p> <p>Chronic: Chronic exposure may cause kidney and liver damage, anemia, stomach pains, vomiting, diarrhea, blood disorders, and cardiovascular effects. Chronic ingestion or inhalation may induce systemic phosphorus poisoning.</p>

Method	Chemical Reaction	Chemical Contaminants	Hazard Category	Health Hazard Potential
	Production of Hydrogen Iodide	Iodine	Irritant Vapor	<p>Acute: Iodine vapor may cause eye, skin, nose and throat irritation, coughing, wheezing, and laryngitis. Exposure to high concentrations may result in airway spasm, chest tightness, breathing difficulty, severe inflammation, and fluid accumulation in the voice box, upper airways, and lungs. Some people develop allergic hypersensitivity to iodine vapor.</p> <p>Chronic: Studies of the effects of long-term inhalation of iodine vapors by humans are not conclusive. Studies in laboratory animals indicate that long-term inhalation of iodine vapor may disrupt thyroid function and reduces the ability of the lungs to take up oxygen. Adverse changes in the lungs of exposed animals may include edema, scaling of bronchial epithelium, and bleeding.</p>
	Production of Hydrogen Iodide	Hydrogen Sulfide	Toxic Gas	Exposure to low concentrations of hydrogen sulfide may cause irritation to the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Brief exposures to high concentrations of hydrogen sulfide (greater than 500ppm) may cause a loss of consciousness.
	Pseudoephedrine Extraction	Polar solvents (methanol or denatured alcohols)	Fire Hazard	
	Product Isolation	Strong Base	Corrosive Compound	

Method	Chemical Reaction	Chemical Contaminants	Hazard Category	Health Hazard Potential
	Methamphetamine Extraction	Coleman fuel, naphtha, lighter fluid, Freon, carbon tetrachloride, etc	Flammable (except freons or heavily chlorinated solvents—which are asphyxiants)	
	Methamphetamine Salting from Solvent Phase	Hydrochloric acid gas (HCl)	Corrosive compound	Acute: May cause irritation of the respiratory tract with burning, choking, coughing, eye irritation and severe burns. Ulceration of nose and throat may also occur.
One-pot/Ammonia Reduction	Reduction of ephedrine	Dry Lithium (from batteries)	Corrosive, Flammable and Water-Reactive Solid	May cause burns and pulmonary edema.
	Reduction of ephedrine	Ammonia	Corrosive Compound	Exposure to high levels of ammonia in air may irritate skin, eyes, throat, and lungs and may cause coughing and burns. Lung damage may occur after exposure to very high concentrations. Some people with asthma may be more sensitive to breathing ammonia than others. Swallowing concentrated solutions of ammonia may cause burns in the mouth, throat, and stomach.
All Methods		Methamphetamine Residuals	Controlled Substance	May cause chemical addiction, personality and behavior pattern changes

Appendix B. State Methamphetamine Cleanup Guidelines and Standards

A search for required and recommended sampling results to confirm successful remediation of methamphetamine manufacturing operations was completed using multiple Internet search engines. The search revealed twenty-two states with mandatory residual standards for methamphetamine and one, North Carolina, with a recommended level. The results of these mandatory state cleanup guidelines and standards are listed below in Table 5. Seventeen states set required maximum residual levels for one or more precursors typically used for the illegal manufacture of methamphetamine, also found below.

Seven other states including Illinois, Iowa, Missouri, North Dakota, Ohio, Oklahoma and Wisconsin recommended that post-remediation testing in some circumstances. However none of these states provide sampling guidance and only one, Illinois, suggests a maximum post-remediation standard.

Cleanup Guidelines and Standards by State.

State	Chemical Test & Standard ¹									
	Methamphetamine ($\mu\text{g}/100\text{cm}^2$ unless otherwise specified)	VOCs ²	Lead	Mercury	Corrosives	Ephedrine; pseudo- ephedrine	Red Phosphorus	Iodine Flakes, Crystal	Tincture of Iodine	Amphetamine
Alaska	0.1	1ppm total hydrocarbons & VOCs	2mg/100cm ²	5ng/m ³ in air	NV	NV	NV	NV	NV	NV
Arizona	0.1	NV	4.3 $\mu\text{g}/100\text{cm}^2$	3.0 $\mu\text{g}/\text{m}^3$ in air	6-8 pH	0.1 $\mu/100\text{cm}^2$	Removal of stained material or cleaned pursuant to standards		NV	NV
Arkansas	0.05	NV	3.21 $\mu\text{g}/100\text{cm}^2$	0.667 $\mu\text{g}/100\text{cm}^2$	NV	1860 $\mu\text{g}/100\text{cm}^2$	6190 $\mu\text{g}/100\text{cm}^2$	NV	NV	NV
California	1.5	NV	NV	NV	NV	NV	NV	NV	NV	NV
Colorado	0.5	NV	40 $\mu\text{g}/\text{ft}^2$	1 $\mu\text{g}/\text{ft}^2$	NV	NV	NV		22 $\mu\text{g}/100\text{cm}^2$ (if not removed)	NV
Connecticut	<0.1	<1ppm total VOCs in air	<40 $\mu\text{g}/\text{ft}^2$	<1 $\mu\text{g}/\text{ft}^2$	NV	<0.1 $\mu/100\text{cm}^2$	Removal of stained material	22 $\mu\text{g}/100\text{cm}^2$	Removal of stained material	NV
Hawaii	0.1	1ppm total hydrocarbon and VOCs in air	2 $\mu\text{g}/100\text{cm}^2$	50ng/m ³ in air	NV	NV	NV	NV	NV	NV
Kansas	1.5	NV	NV	NV	NV	NV	NV	NV	NV	NV
Idaho	0.1	NV	NV	NV	NV	NV	NV	NV	NV	0.5 $\mu\text{g}/100\text{cm}^2$
Indiana	0.5	NV	NV	NV	NV	0.5 $\mu\text{g}/100\text{cm}^2$	NV	NV	NV	NV
Kentucky	0.1	<1ppm total VOCs in air	NV	NV	6-8 pH				Removal of stained material	NV
Michigan	0.5	NV	40 $\mu\text{g}/\text{ft}^2$	1 $\mu\text{g}/\text{m}^3$	NV	NV	NV	NV	NV	NV
Minnesota	1.5	<1ppm total VOCs in air	40 $\mu\text{g}/\text{ft}^2$	<0.3 $\mu\text{g}/\text{m}^3$	NV	NV	NV	NV	NV	NV

State	Chemical Test & Standard ¹									
	Methamphetamine ($\mu\text{g}/100\text{cm}^2$ unless otherwise specified)	VOCs ²	Lead	Mercury	Corrosives	Ephedrine; pseudo- ephedrine	Red Phosphorus	Iodine Flakes, Crystal	Tincture of Iodine	Amphetamine
Montana	0.1	1ppm total VOCs in air	20 $\mu\text{g}/\text{ft}^2$	50ng/m ³ in air	NV	NV	NV	NV	NV	NV
Nebraska	≤ 0.1	≤ 1 ppm	$\leq 40\mu\text{g}/\text{ft}^2$	$\leq 300\text{ng}/\text{m}^3$	NV	NV	NV	NV	NV	NV
New Hampshire	0.1	1ppm total VOCs in air	40 $\mu\text{g}/\text{ft}^2$	1 $\mu\text{g}/\text{m}^3$	6-8 pH	0.1 $\mu\text{g}/100\text{cm}^2$	Removal of stained material	Removal of stained material; 22 $\mu\text{g}/100\text{cm}^2$		NV
New Mexico	1.0 $\mu\text{g}/\text{ft}^2$ (including precursors)	≤ 1 ppm	$\leq 40\mu\text{g}/\text{ft}^2$	$< 0.3\mu\text{g}/\text{m}^3$	6-8 pH	NV	Discard stained material	Discard stained material	NV	NV
North Carolina	< 0.1 (recommended level)	NV	4.3 $\mu\text{g}/100\text{cm}^2$	0.3 $\mu\text{g}/\text{m}^3$	NV	NV	NV	NV	NV	NV
Oregon	0.5 $\mu\text{g}/\text{ft}^2$ (composite samples)	NV	NV	NV	NV	NV	NV	NV	NV	NV
South Dakota	0.1	< 1 ppm	NV	NV	6-8 pH	NV	Removal of stained material			NV
Tennessee	0.1 (on hard surfaces)	1ppm in air, measured under normal inhabitable conditions	40 $\mu\text{g}/\text{ft}^2$	50ng/m ³ in air	NV	NV	NV	NV	NV	NV
Utah	≤ 1.0	≤ 1 ppm	$\leq 4.3\mu\text{g}/100\text{cm}^2$	$\leq 0.3\mu\text{g}/\text{m}^3$	6-8 pH	$\leq 0.1\mu\text{g}/100\text{cm}^2$	No visible residue	No visible residue	NV	NV
Washington	< 0.1	1ppm total hydrocarbon & VOCs in air	$\leq 20\mu\text{g}/\text{ft}^2$	$\leq 50\text{ng}/\text{m}^3$ in air	NV	NV	NV	NV	NV	NV
West Virginia	0.1	NV	NV	NV	NV	NV	NV	NV	NV	NV

1. Where indicated by the standard, a value is provided. If no value is provided, then 'NV' is indicated denoting its absence.

2. VOCs means *volatile organic compounds*.

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Appendix C: Fate and Transport of Chemicals Associated with Methamphetamine

Environmental Fate and Transport of Methamphetamine Manufacturing Chemicals

Chemical	Form	Source	Hazard	Fate and Transport
Ammonia	Colorless gas with pungent odor, anhydrous form is liquid under pressure	Cold Packs	Corrosive, toxic	Lighter than air gas, likely to dissipate into atmosphere
Hydriodic acid	Clear colorless liquid with pungent odor		Corrosive, toxic	Miscible with water and slightly heavier. What does not react with soil may leach to shallow groundwater.
Hydrochloric acid	Clean colorless liquid with pungent odor	Muriatic acid	Corrosive, toxic	Miscible with water and slightly heavier. What does not react with soil may leach to shallow groundwater.
Iodine	Solid purple crystal or flakes, dark red solution (mixture of ethanol, iodine crystals and sodium iodide)	Tincture	Corrosive, reactive, toxic	Crystal or flakes, slightly soluble in water.
Lithium	Soft silvery-white metal	Batteries	Reacts violently with water to produce hydrogen gas (explosive)	Metal will transform to LiOH and Li ₂ O. LiOH may be mobile in soil.
Methanol	Clear colorless liquid	Coleman fuel, lighter fluid	Flammable	Methanol is miscible in and lighter than water. When released to the ground in sufficient quantities to get into the subsurface it will leach into percolating water and may reach the groundwater. Methanol is biodegradable.
Petroleum distillates (Naphtha)	Clear colorless liquid with a hydrocarbon odor	Coleman fuel, lighter fluid	Flammable	Naphthas are hydrophobic and lighter than water. In sufficient volume, they will move through the subsurface until they encounter a low permeability soil or groundwater. Naphthas slowly biodegrade.
Pseudoephedrine/ephedrine	White crystalline powder	Medicines		Completely soluble in water. As a crystal may be transported by wind. Dissolved in water or subject to water will leach through soil. Moderately biodegradable.
Red Phosphorous	Odorless red to violet solid	Striker strips/matchboxes	Decomposes to phosphine gas in presence of moisture and oxygen, explosive when mixed with organic material	Harmful to aquatic organisms. Insoluble in water. Will remain on ground surface if released.

Appendix D. Cleanup Checklist

List of steps for documenting cleanup activities

	Task (Refer to Guidelines for specific information)	Yes	No	Not Applicable
1	Pre-remediation ventilation completed.			
2	Preliminary assessment completed.			
3	Pre-remediation sampling conducted.			
4	Work plan based on the preliminary assessment and any sampling results provided			
5	Contaminated materials that will be permanently discarded removed and properly disposed of			
6	Interior surfaces vacuumed using a HEPA vacuum			
7	Initial washing of interior surfaces			
8	HVAC system cleaned			
9	Flush plumbing traps			
10	Ceilings, walls, floors and other non-porous items that will be kept washed three times with detergent solution (not bleach)			
11	Ceilings, walls and floors encapsulated			
12	Post-remediation sampling conducted			
13	Septic tank pumped (if applicable)			
14	Develop a final report			
15	Property owner provided with copies of all documentation, including sample results, work plan, and final report			

Appendix E. Code of Virginia Excerpts Related to Methamphetamine Cleanup and Notification.

§ 15.2-1716.2. Methamphetamine lab cleanup costs; localities may charge for reimbursement.

Any locality may provide by ordinance that any person who is convicted of an offense for manufacture of methamphetamine pursuant to § [18.2-248](#) or [18.2-248.03](#) shall be liable at the time of sentencing or in a separate civil action to the locality or to any other law-enforcement entity for the expense in cleaning up any methamphetamine lab related to the conviction. The amount charged shall not exceed the actual expenses associated with cleanup, removal, or repair of the affected property or the replacement cost of personal protective equipment used. (2012, cc. [517](#), [616](#).)

§ 18.2-248.04. Methamphetamine Cleanup Fund established.

There is hereby created in the state treasury a special nonreverting fund to be known as the Methamphetamine Cleanup Fund, hereafter referred to as "the Fund." The Fund shall be established on the books of the Comptroller. All moneys assessed against a person convicted of manufacture of methamphetamine as methamphetamine cleanup funds pursuant to subsection C1 of § [18.2-248](#) shall be paid into the state treasury and credited to the Fund. Interest earned on moneys in the Fund shall remain in the Fund and be credited to it. Any moneys remaining in the Fund, including interest thereon, at the end of each fiscal year shall not revert to the general fund but shall remain in the Fund. Moneys in the Fund shall be used solely for the purposes of restoration to an environmentally sound state sites used for the criminal manufacture of methamphetamine. Expenditures and disbursements from the Fund shall be made by the State Treasurer on warrants issued by the Comptroller upon written request signed by any agency of the Commonwealth, law-enforcement agency, or locality with the responsibility for and engaged in a specific methamphetamine site cleanup. (2012, c. [219](#).)

§ 32.1-11.7. Guidelines for cleanup of residential property used to manufacture methamphetamine.

The Board, in consultation with the Department of Environmental Quality and other relevant entities, shall establish guidelines for the cleanup of residential property formerly used to manufacture methamphetamine. (2012, c. [778](#); 2013, c. [557](#).)

§ 55-225.17. (Effective July 1, 2014) Required disclosures for property previously used to manufacture methamphetamine; remedy for nondisclosure.

A. If the landlord of a residential dwelling unit has actual knowledge that the dwelling unit was previously used to manufacture methamphetamine and has not been cleaned up in accordance with the guidelines established pursuant to § [32.1-11.7](#), the landlord shall provide to a prospective tenant a written disclosure that so states. Such disclosure shall be provided prior to the execution by the tenant of a written lease agreement or, in the case of an oral lease agreement, prior to occupancy by the tenant.

B. Any tenant who is not provided the disclosure required by subsection A may terminate the lease agreement at any time within 60 days of discovery that the property was previously used to manufacture methamphetamine and has not been cleaned up in accordance with the guidelines established pursuant to § [32.1-11.7](#) by providing written notice to the landlord in accordance with the lease or as required by law. Such termination shall be effective as of (i) 15 days after the date of the mailing of the notice or (ii) the date through which rent has been paid, whichever is

later. In no event, however, shall the effective date of the termination exceed one month from the date of mailing. Termination of the lease agreement shall be the exclusive remedy for the failure to comply with the disclosure provisions required by this section and shall not affect any rights or duties of the landlord or tenant arising under this chapter, other applicable law, or the rental agreement. (2013, c. [557](#).)

§ 55-248.12:3. (Effective July 1, 2014) Required disclosures for property previously used to manufacture methamphetamine; remedy for nondisclosure.

A. If the landlord of a residential dwelling unit has actual knowledge that the dwelling unit was previously used to manufacture methamphetamine and has not been cleaned up in accordance with the guidelines established pursuant to § [32.1-11.7](#), the landlord shall provide to a prospective tenant a written disclosure that so states. Such disclosure shall be provided prior to the execution by the tenant of a written lease agreement or, in the case of an oral lease agreement, prior to occupancy by the tenant.

B. Any tenant who is not provided the disclosure required by subsection A may terminate the lease agreement at any time within 60 days of discovery that the property was previously used to manufacture methamphetamine and has not been cleaned up in accordance with the guidelines established pursuant to § [32.1-11.7](#) by providing written notice to the landlord in accordance with the lease or as required by law. Such termination shall be effective as of (i) 15 days after the date of the mailing of the notice or (ii) the date through which rent has been paid, whichever is later. In no event, however, shall the effective date of the termination exceed one month from the date of mailing. Termination of the lease agreement shall be the exclusive remedy for the failure to comply with the disclosure provisions required by this section and shall not affect any rights or duties of the landlord or tenant arising under this chapter, other applicable law, or the rental agreement. (2013, c. [557](#).)

§ 55-519.4. (Effective July 1, 2014) Required disclosures; property previously used to manufacture methamphetamine.

Notwithstanding the exemptions in § [55-518](#), if the owner of a residential dwelling unit has actual knowledge that such residential property was previously used to manufacture methamphetamine and has not been cleaned up in accordance with the guidelines established pursuant to § [32.1-11.7](#), the owner shall provide to a prospective purchaser a written disclosure that so states. Such disclosure shall be provided to the purchaser on a form provided by the Virginia Real Estate Board and otherwise in accordance with this chapter. (2013, c. [557](#).)

Appendix F. Administration Review

This guideline will be reviewed by the Virginia Department of Health Chief Deputy Commissioner for Public Health and recommendations made to the Virginia Board of Health, in consideration of the Code of Virginia Title 32.1-11.7 and other available sources of information, as needed but no less frequently than every two years after initial date of approval.

Approver: “Signature on File”
Cynthia C. Romero, MD, FAAFP
State Health Commissioner

Date: September 12, 2013