

PROCEDURES FOR THE ASSESSMENT AND REMEDATION OF CLANDESTINE METHAMPHETAMINE LABORATORIES



Solano County
Department of Resource Management
Environmental Health Services Division

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OF CLANDESTINE METHAMPHETAMINE LABORATORIES**

**COUNTY OF SOLANO
DEPARTMENT OF RESOURCE MANAGEMENT
Environmental Health Services Division**

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1.0. PURPOSE AND AUTHORITY

This document has been developed pursuant to the requirement specified in Health and Safety Code, Division 20, chapter 6.9.1, section 25400.35 to provide uniform procedures for the assessment and remediation of clandestine methamphetamine manufacturing sites. Drug labs other than methamphetamine production are rarely found in this area, this document is purposely limited to methamphetamine laboratory decontamination. This document is to be used by property owners and remediation consultants and contractors to develop and implement an appropriate remediation strategy, and by Solano County to evaluate work plans and assessments in a manner consistent with state law and best available practices.

Pursuant to Health and Safety Code, Division, 20, chapter 6.9.1, section 25400.17(b), the Solano County Health Officer has delegated authority for the regulatory oversight of these contaminated properties through a formal Memorandum of Understanding to Solano County Environmental Health Services Division. This document communicates the expectations of the Solano County Environmental Health Services Division (EHSD) relative to the standard of care that is to be used in assessment and remediation work. Pursuant to the Health and Safety Code pre- and post-remediation assessments are to be conducted by and work plans developed initially by a Certified Industrial Hygienist, and if soil and groundwater investigation is necessary a Registered Professional Engineer, Certified Engineering Geologist, or Professional Geologist. Remediation tasks are to be conducted by a licensed contractor whose personnel have 40-hr HAZWOPER training pursuant to California Code of Regulations, Title 8, Section 5192 and when applicable State of California Asbestos Abatement, Lead Abatement, or Hazardous Substance Removal Certifications.

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2.0. INTRODUCTION

Law enforcement personnel discover and seize Clandestine Methamphetamine Laboratories (Clan Labs) that illegally manufacture methamphetamine in Solano County. While law enforcement personnel arrange for the removal of chemicals and process equipment for evidence, the Property Owner is left to clean up the property, which may be highly contaminated with both precursor chemicals and the final drug product. If law enforcement advises EHSD personnel that a methamphetamine laboratory was seized on a property, then pursuant to Health and Safety Code, Division 20, chapter 6.9.1 the property is presumed to be contaminated and is found “unfit for occupancy” until demonstrated otherwise by a site assessment. The owner is responsible for assessing the level of contamination and “cleaning” up (decontaminating) the property. An effective remediation process requires coordination and cooperation between the Property Owner, the Property Owner’s environmental consultant and remediation contractor, local code enforcement personnel, city/ county building officials, and EHSD.

This document provides information necessary for planning and implementing an effective site assessment and remediation process. This information represents best practices in Clan Lab remediation as described in documents promulgated by a variety of State and Federal agencies and meets the requirements of Chapter 6.9.1 of the Health and Safety Code. The practices described herein represent state law, US EPA guidance, and best management practices in environmental health and industrial hygiene. EHSD’s role is to provide regulatory oversight and verify that processes reflect practices required by Health and Safety Code and, of greatest importance, protective of public health.

It is noted that this document borrows a significant amount of information from “*Criteria For the Assessment and Remediation of Clandestine Methamphetamine Laboratories*” developed by Sacramento County and “*Guidelines For Contamination Reduction And Sampling At Illegal Drug Manufacturing Sites,*” developed by the Washington State Department of Health (WDOH), Office of Toxic Substances, as well as other resources listed in Attachment III.

In using this document, Property Owners and their consultants and contractors must be mindful of the variation among both Clan Labs and the processing methods. The primary method used for the illegal manufacture of methamphetamine in Solano County is the Red Phosphorus Method; however other methods may come in use. The health and physical hazards between manufacturing methods vary significantly, and assessment and remediation methods will similarly vary.

3.0. REMEDIATION PROCESS

3.1. WHY REMEDIATION IS NECESSARY

Properties used as Clandestine Methamphetamine Labs will typically be found with a lab-like setting, including containers of chemicals and manufacturing equipment. While this material will be removed by the California Department of Toxic Substances Control (DTSC) contractor, EHSD experience and Health and Safety Code states that, until proven otherwise, contamination from the drug manufacturing process is presumed to be present. Typical areas of contamination include sinks, toilets, bathtubs, floor, walls, ceilings, carpets, drapes, furniture, and ventilation (heating and air conditioning) systems.

The potential health effects from long term exposure to low levels of the chemicals used and produced in the Clan Lab processes remain under study. However, Health and Safety Code, Division 20, chapter 6.91 specifies human occupancy standards for properties where Clan Lab activity was present.

3.2. WHAT ARE THE CONTAMINANTS OF CONCERN?

Each type of methamphetamine manufacturing process involves chemicals specific to the process. As previously noted, the Red Phosphorus Method is the most common method found in Solano County however other methods could be encountered. Information regarding process-specific chemicals is provided in Attachment II.

3.3. WHO DOES THE WORK?

While EHSD Hazardous Material Specialists respond to Clan Lab scenes, post the properties with warning notices, conduct inspections to document initial conditions, and write clandestine drug lab orders, EHSD does not conduct formal site assessments.

It is critical to have site assessment and remediation work directed by skilled, experienced professionals. Pursuant to Health and Safety Code and the California Business and Professions Code, tasks such as preliminary assessments, work plan development, and post-remediation assessments shall be conducted by a Certified Industrial Hygienist (CIH), and when applicable Registered Professional Engineer (PE) and/or Registered Professional Geologist. In this document, these professionals will be referred to as **“the Consultant.”** All documents produced in association with the site remediation shall be stamped and signed by the CIH and when applicable PE and/or PG who is directing the work.

The approved remediation plan shall be implemented by a contractor licensed by the Contractors State License Board. Additionally, if contaminated soil or ground water is suspected the contractor or subcontractor shall have a Hazardous Substance Removal Certificate issued by the Contractor’s State License Board. If asbestos and/or lead based paints are suspected to be present or encountered the contractor or subcontractor shall have all the necessary asbestos and lead certifications. In this document, the remediation contractor will be referred to as **“the Contractor.”** **All personnel working on the remediation must meet the training and medical surveillance requirements of the Cal/OSHA Hazardous Waste Operations and Emergency Response Standard, Title 8, California Code of Regulations, section 5192(40-Hr HAZWOPER training)** and if applicable, all necessary asbestos and lead training and certifications as specified in state laws and regulations.

EHSD personnel provide regulatory oversight and approval of Preliminary Site Assessment Work Plans. EHSD personnel do not direct the work of consultants or contractors. EHSD will provide applicable information regarding the Clan Lab and will provide regulatory oversight. EHSD expects consultants and contractors to utilize their professional expertise in preparing and implementing work plans described in this document.

3.4. PROPERTY USE

The property that housed the Clan Lab will be posted by the EHSD Hazardous Materials Specialist responding to the scene to prohibit occupancy. In so doing, EHSD is acting as an authorized agent of the Solano County Health Officer pursuant to Health and Safety Code. The posted property is unfit for occupancy under the Health and Safety Code, and the EHSD will place a lien on the property title. Entry into the property is prohibited until such time that an EHSD representative authorizes entry. **No personal**

belongings, furniture, or other items shall be removed from the posted property without consultation with the EHSD Hazardous Material Specialist or the Hazardous Materials Supervisor.

If a Clan Lab is discovered in a residence, apartment unit, hotel room or similar premises, entrance to the unit will be prohibited. The EHSD Hazardous Materials Specialist will not post only the room where the “cooking” occurred (e.g., bedroom, kitchen) within the premises; experience has indicated that contamination is rarely limited to the specific area of the “cooking” process. Additionally, depending upon the apparent extent of contamination, the EHSD Hazardous Material Specialist may post adjacent apartments, hotel rooms, and other proximal building units. However, depending on location and impact of the Clan Lab operations, outbuildings (i.e. sheds and unattached garages) or recreational vehicles may be posted without impacting the residence.

3.5. PRELIMINARY SITE ASSESSMENT (PSA)

Pursuant to the Health and Safety Code the operating assumption is that the illicit drug manufacturing process (“cooking”) has led to some level of chemical contamination, at a minimum in the immediate area around the “cooking” area. The goal of the PSA is to determine the level and extent of contamination in order that an effective Remediation Work Plan can be developed.

In the case of surfaces that are obviously or highly suspected to be contaminated, EHSD will waive sampling requirements for those items or materials that will be removed and properly disposed (see Section 7.0). Prior to disposal of the contaminated materials, the consultant/contractor shall ensure that the acceptable disposal facility has received their requested laboratory analysis and agrees to accept the material.

If methamphetamine laboratory processing activities such as “cooking” were conducted in a kitchen and staining is evident, the property owner may decide that it is more cost-effective to remove and dispose sheet rock, cabinets, appliances, and linoleum rather than to spend money on sampling to confirm that these materials are contaminated. It also may be decided to surface wash (Section 3.8.4) and encapsulate (Section 3.8.5) all surfaces in a room that appear to have been impacted; assessment sampling would not be required for these surfaces, but post-remediation sampling shall be done. Such plans should be disclosed in the PSA Work Plan.

3.5.1. PSA WORK-PLAN

A written PSA Work Plan shall be developed by the Consultant and submitted to EHSD for approval. **The PSA shall not commence until EHSD has reviewed and approved the PSA Work Plan. The Property Owner shall retain a consultant/contractor within 30 days after receipt of the EHSD’s written order notifying the Property Owner of the presence of a Clan Lab and evidence of contamination. The PSA Work Plan shall be submitted to EHSD for review within 30 calendar days of the Property Owner retaining a consultant and/or contractor.**

The PSA Work Plan shall include:

1. The physical location of the property.
2. A summary of the information obtained from law enforcement, EHSD, code enforcement, building departments, and other knowledgeable sources. The summary will include a discussion of the information’s relevance to the contamination, including areas suspected of being contaminated. Relevant information would include (as available):

- Duration of lab operation and number of batches processed.
- Drugs known to have been manufactured.
- Recipes and methods used.
- Chemicals and equipment found (by location).
- 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 site (e.g., dumping, burning, burial, venting, and/or drain disposal).
- Compare chemicals on the manifest with known methods of manufacture in order to identify other potential contaminants (see Attachment II).
- Determine whether the drug manufacturing method included the use of chemicals containing mercury or lead (e.g., lead acetate, mercuric chloride, mercuric nitrate). If these contaminants are found, remediation protocols will deviate from the generic remediation guidelines, and remediation planning and remediation will be more stringent.

EHSD will make reasonable attempts to obtain and provide relevant documents from law enforcement, code enforcement, and other environmental agencies. However, EHSD does not have the authority to compel the timely release of this information, and not every request will be successful.

3. A description of the areas to be sampled and the basis for the selection of the areas. This section should also document the decision process used in determining **not** to sample particular areas.

Consideration should be given to:

- Obviously stained areas.
- Immediate “cooking” area(s).
- Areas where chemicals were found.
- Adjacent rooms.
- Locations typically accessible for contact by occupants, particularly children.
- High traffic areas outside of the “cooking” area.
- Ventilation systems.
- Hard and soft surfaces, walls, floors, ceilings, appliances.
- Areas of potential waste disposal, such as sinks, floor drains, bathtubs, showers, and toilets.
- Septic systems, if present. (see section on Septic Tanks)

Potential areas of contamination can be divided into primary and secondary areas.

Typical primary areas would include:

- Processing and/or “cooking” areas. Contamination in these areas may be caused by spills, boil-over, fires, explosions, or by chemical fumes and gases created during “cooking”. Areas affected may include floors, walls, ceilings, glassware, containers, working surfaces, furniture, carpeting, draperies and other textile products, plumbing fixtures and drains, heating and air conditioning vents.
- Disposal areas. Indoor areas include sinks, toilets, bathtubs, plumbing traps and floor drains, vents, vent fans, and chimney flues. Outdoor contamination may be caused by dumping or burning on or near soil, surface water, groundwater, sewer or storm systems, septic systems, and cesspools.

- Storage areas. Contamination may be caused by spills, leaks or open containers.

Secondary areas of contamination may include:

- Locations where contamination may have migrated, such as hallways, garages, or other high-traffic areas.
 - Common areas in multiple dwellings, and adjacent apartments or rooms, including floors, walls, ceilings, furniture, carpeting, light fixtures, blinds, draperies and other textile products.
 - Common ventilation or plumbing systems in hotels and dwellings with multiple units.
4. Sampling protocols (see Section 3.6); analytical methods (see Section 5.0), laboratories to be used and their relevant certifications/accreditations (see Section 6.0). During each phase of sample collection, identical methods must be used to provide a basis for comparing results.
 5. A description of areas and items that will be remediated in lieu of sampling, if any (see Section 3.5).
 6. Estimated time of submittal of the PSA results and report to EHSD.

3.5.2. PSA REPORT

If the PSA determines that there are levels of contamination at the site that warrant remediation as required by this document, a PSA Report shall be prepared and submitted to EHSD. If results suggest that no further action be taken, the PSA Report shall be prepared in accordance with Section 3.5.3.

Components of the PSA Report shall include:

1. Location – Street address and mailing address of the contaminated property, owner of record and his/her mailing address, legal description, and clear directions for locating the property.
2. Site map – A diagram of the contaminated property, including floor plans of affected buildings, local drinking water wells and nearby streams (if potentially impacted) drawn to a scale of 1/4” to 1’ unless otherwise directed by the EHSD Hazardous Materials Specialist. The diagram shall show the location of damage and contamination and the location of sampling points used in the PSA; the sampling point locations shall be keyed to the sampling results and remediation recommendations.
3. A description of the sampling methods and analytical protocols used in the assessment.
4. A description of the sampling results. If providing a narrative, group results by location rather than by analyte.
5. Information regarding the background samples and results obtained (see Section 5.0).
6. Specific recommendations, including methods, for remedial actions required to meet State of California Re-occupancy standards (see Section 4.0).
7. A plan for the Post Remediation Site Assessment, including specific sampling requirements and methodologies, and locations at which samples are to be obtained.
8. The report shall be signed and stamped by the CIH and when applicable a PE, CEG, and/or PG preparing the report.

The PSA report must be thorough and specific in reporting findings and recommendations. The report must be specific enough that the “clean-up” Contractor doesn’t have to guess at the action required. Therefore, a recommendation such as “the stove and all adjacent impacted areas must be cleaned is insufficient. It is incumbent upon the Consultant to design the sampling program to provide sufficient data to make specific, rather than vague, specifications.

3.5.3. PSA SUGGESTS CLEAN SITE

While experience indicates that it is unlikely, sample results from the Preliminary Site Assessment may show that the Clan Lab activities did not leave areas of contamination at the property. If this is the case, the Consultant shall prepare a report to EHSD based on the analytical results, requesting that the property be declared remediated and fit for human occupancy. Property Owners and Consultants are cautioned that until EHSD reviews and accepts a report, the Property Owner pays the amount of the lien, lien is released and the property owner pays all additional costs of EHSD, no occupancy of the property will take place. The Consultant shall review Section 3.9, "Remediation Work Plan," to determine appropriate contents for this report.

3.6. SAMPLING PROTOCOL

EHSD has reviewed a number of sampling methods from a variety of sources, and has determined that a standard method based on the "Proposed Surrogate Method" devised by Bruce Lazarus, CIH, will be the benchmark for evaluating sampling protocols. Lazarus' paper describing this method was published in the Journal of Clandestine Laboratory Investigating Chemists, Volume 10, Number 2, April 2000. A brief review of Lazarus' perspective, taken from the article, as well as the "Surrogate Method" sampling protocol required by EHSD is presented in Attachment I.

3.6.1. WIPE SAMPLES AND RESULT REPORTING

To control variables with wipe sampling, the Consultant shall use a consistent wipe sample technique throughout the project, and describe the specific wipe sample process in the reports. The Department expects Consultants to follow the sample collection methodology described in Attachment I unless the Consultant provides a detailed justification for an alternative procedure that meets federal, state, and/or industry standards.

Recent work by the Washington Department of Ecology suggests that deionized water is not effective in lifting methamphetamine from sampled surfaces. Samples obtained using methanol as a solvent have shown much better recovery. Therefore, all wipe samples shall use methanol as the wetting/collecting solvent. Consultants are cautioned to use appropriate personal protective equipment when using methanol.

All wipe sample results shall be reported as weight/surface area, in mass/100cm² (see Section 5.0 for exceptions) A common investigation practice is to take several swipes of unknown and inconsistent surface areas for a composite sample; such practices **will not** be accepted, even if only to substantiate that contamination exists in a particular area.

Lazarus recommends a one square-foot surface area sample be obtained (see Attachment I). For general wipe sampling, the literature and regulatory agencies require a surface area of either 100 cm² or 1 ft². Health and Safety Code require a surface sample area of 1 ft² for lead and 100 cm² for methamphetamine, as this is consistent with other regulatory agencies for Clan Lab investigations.

Sample containers shall be glass bottles, as described in Attachment I. The literature suggests that the use of plastic bags presents a greater opportunity for the contaminant to transfer from the wipe to the bag than would be the case with a bottle. In most instances, the laboratory will prepare the samples for analysis in the sample bottles, allowing any sample transferred to the bottle wall to be collected.

3.6.2. COMPOSITE SAMPLES

Compositing of samples is a popular means of minimizing analytical costs. However, appropriate sampling and result reporting methods must be followed. Additionally, care must be taken when deciding to composite, for a positive lab result may require individual resampling of all surfaces represented by that composite sample. Therefore, it is highly recommended that composite samples be reserved for those areas, in the Consultant's judgment, are anticipated not to be contaminated. **The maximum number of wipe samples that may be composited is four.**

Don't composite an area or item that is likely to be contaminated (e.g., obvious staining) with areas unlikely to show contamination (e.g., remote from known "cooking" areas), if for no other reason than that EHSD will assume this is an attempt to dilute the sample from the likely contaminated areas to below instrument detection limits. The composite samples must be of like surfaces, such as walls with walls within each individual room.

There shall be no between-appliance compositing (e.g., stove AND refrigerator AND microwave). The Consultant may consider compositing samples within an appliance (e.g., in a stove: burners, oven, handles, knobs, surface, etc.), but defining 100 cm² sample areas will be difficult.

3.7. GROSS REMEDIATION

Materials associated with the operating Clan Lab, such as containers of chemicals and lab equipment should have been removed by the law enforcement's hazardous waste "clean-up" contractor at the time the lab was seized. If the Consultant finds any such materials during the site assessment process, the material should be left in place and the EHSD Hazardous Materials Specialist notified immediately. EHSD will contact the Department of Toxic Substances Control to determine whether the allowance of the use of the Clan Lab Account for legal transportation and disposal of these wastes as hazardous waste.

3.8. RESIDUAL REMEDIATION

A number of processes are associated with making the property suitable for occupancy, as determined by Solano County pursuant to Health Safety Code requirements.

Please Note! It is difficult to predict how significantly contaminated are areas adjoining a space used for "cooking"; long-term or high volume activities are likely to have impacted adjoining areas. As a result, it is generally most cost effective to assume low-level contamination by non-volatile materials and rid these and other areas of all potentially contaminated porous materials or items. Such decisions are to be reflected in the Remediation Work Plan.

All material disposal associated with the site remediation process shall be in accordance with Section 7.0, "Waste Disposal."

3.8.1. REMOVAL

1. Visibly contaminated (etched or stained) sinks, bathtubs, toilets and similar fixtures are to be intensively cleaned or be removed and evaluated for proper disposal (see Section 7).
2. Porous materials (e.g., carpeting, suspended ceiling panels, wallpaper, etc.) that can absorb dust, powder, aerosols and vapors from the "cooking" process shall be removed and properly disposed. In most cases, the cost of analytical testing, cleaning and post-testing exceeds the cost of

replacement of these articles. While EHSD strongly recommends that this apply to furniture and clothing, EHSD has no authority to require the disposal of personal property. However, EHSD will inform the owners of the personal property that they are assuming all public health risks associated with retrieving and using these items. For additional guidance and information on managing personal property, US EPA discussed the management of personal items in sections 3.8, 4.10, 4.13, 4.14, and 4.15 of their document titled Voluntary Guidelines for Methamphetamine Laboratory Cleanup. In this document US EPA also recommends the disposal of personal items.

3. “Popcorn” spray-on ceiling coatings applied prior to 1979 often contains asbestos and should be sampled to prove absence of asbestos. “Popcorn” ceilings containing asbestos should not be disturbed unless there is gross staining. If asbestos is present, any work shall be done by a Certified Asbestos Abatement Contractor under the direction of a Certified Asbestos Abatement Consultant. A sealant, of the type typically used for asbestos-containing spray-on finishes, should be applied to the ceiling if low concentrations of contaminants are detected.
4. Some nonporous and semi-porous surfaces (e.g., floors, countertops, tiles, walls, doors, and ceilings) can hold contamination from the “cooking” process, particularly in those areas where “cooking” and preparation was performed and chemicals were stored. Either intensive cleaning and encapsulation or complete removal and replacement of the surface are required. This could include removal and replacement of wallboard, floor coverings, concrete slabs, countertops and the hardware of cabinets and doors. Procedures that specify the protocols for intensive cleaning, encapsulation, and/or removal and replacement shall be described in the Remediation Work Plan.
5. Appliances that were in the room in which methamphetamine “cooking” was conducted shall be sent for disposal; (they have too many surfaces to sample to prove that they are sufficiently clean for food preparation or storage). All other appliances associated with food preparation or storage located outside the “cooking” area must be sampled and samples sent to an analytical lab for testing.
6. Painted surfaces in homes constructed before 1978 may contain lead and should be sampled to prove absence of lead or lead compounds. Paint that contains lead should not be removed unless there is gross staining; if lead or lead compounds are present, any such work must be done by a Certified Lead Abatement Contractor directed by a Certified Lead Assessor.

3.8.2. SURFACE WASHING

Surface washing takes many forms, including pressure washing, detergent-washer washing, solvent (alcohol) washing, steam cleaning, and others. The objective is to remove contaminants to below the Health and Safety Code Human Occupancy Standards by an efficient and cost-effective method that generates a minimal waste stream. US EPA discusses surface washing in Section 3.13 of their guidance document stating that experts recommend the use of a detergent and that cleaning should occur at least three times if the surfaces are not encapsulated. US EPA does not recommend the use of harsh chemicals such as bleach, Methanol, peroxide-based chemicals, or Tri Sodium Phosphate. Please Note, that all wash solutions and rinsates must be effectively collected for disposal (see Section 7.0).

3.8.3. ENCAPSULATION

Where porous or semi-porous surfaces (e.g., walls, wood flooring, panels, ceiling, concrete) have had levels of contamination that permitted in-situ cleaning instead of removal and replacement, such surfaces shall be encapsulated with an oil-based paint, varnish, or similar sealant. Water-based latex paints appear

to have a greater tendency to allow “bleed-through” than oil-based coatings or polyurethane coatings. The sealant is to be applied after surface washing has been completed. After the sealant has cured according to the manufacturer’s instruction, sampling and analysis must be conducted to assure that any remaining contamination is below the Health and Safety Code Human Occupancy Standards (see Section 4.0).

3.8.4. VENTILATION SYSTEM

Ventilation systems tend to collect fumes, vapors and dust, and redistribute them throughout a structure. The vents, stove hoods, ductwork, filters and even the walls and ceilings near the ventilation ducts can become contaminated. Absence evidence to the contrary, all air filters in the system shall be replaced, ventilation registers removed and cleaned, and surfaces near inlets and outlets cleaned. The cleaning of system ductwork should be considered, although the efficacy of duct cleaning is subject to debate; US EPA’s article on duct cleaning is at the following link:

<http://www.epa.gov/iaq/pubs/airduct.html>.

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 evaluating remediation and testing procedures. One strategy is to take samples from adjacent or connected areas/rooms/units, working outward from the lab site until samples show results below California Health and Safety Code Human Occupancy Standards (see Section 4.0).

Anecdotal evidence indicates that rooms adjacent to the “cooking” area may be impacted by active or passive ventilation (distributing fumes and vapors) or by poor chemical handling and hygiene practices. As is the case with other jurisdictions, EHSD will require evaluation and possible decontamination of areas adjacent to the “cooking” area. These areas may include hallways, garage, and other high traffic areas, as well as adjacent rooms. The Consultant shall consider this in the PSA Work Plan.

3.8.5. IMPACTED SOIL AND GROUNDWATER

Evidence that Clan Lab operations may have impacted soil or groundwater moves some portions of the Clan Lab remediation process out from the direct oversight of EHSD. Such potential impacts will be investigated and remediated under normal regulatory criteria for hazardous waste sites. Typically oversight for hazardous waste site remediation is conducted by the California Department of Toxic Substances Control; if groundwater may be impacted, oversight may be shared with the Regional Water Quality Control Board. These agencies may, at their discretion, transfer oversight responsibility to the Site Mitigation program of EHSD. Responsible parties have the option of requesting the Site Mitigation program to provide oversight of the voluntary remediation of the hazardous waste site component of the property; such oversight would be provided through a voluntary site mitigation agreement on a fee-for-service basis.

The variables associated with hazardous waste site remediation are numerous, and will not be discussed in this document. In the event that the Preliminary Site Assessment report identifies potential impacts to soil and/or groundwater, EHSD will work with the Property Owner and Consultant to determine the appropriate path for further assessment and mitigation activities and associated regulatory oversight. The Property Owner or the Consultant should contact Matthew Geisert, Hazardous Materials Supervisor, MS, RHSP and/or Misty Kaltreider, CEG, Engineering Geologist, the Technical Lead of the Site

Mitigation program for direction regarding soil and/or groundwater contamination. Mr. Geisert and Ms. Kaltreider can be reached at 707-784-6765.

Department of Toxic Substances Control (DTSC) has a significant backlog of remediation sites, but is the appropriate agency for handling complex soil remediation projects. EHSD can handle straight-forward remediation in a timely manner. A Property Owner with soil contamination can request EHSD to oversee the soil/groundwater investigation and cleanup if the consultants will be using soil/groundwater the San Francisco Regional Water Quality Control Board's Environmental Screening Levels, California EPA Human Health Screening Levels, US Environmental Protection Agency Preliminary Remediation Goals, or background levels in guiding remediation efforts. EHSD will inform DTSC and the appropriate Regional Board that the Property Owner has requested Solano County oversight. EHSD will contact the Regional Board and DTSC to verify that they are not interested in performing regulatory oversight before providing regulatory oversight for the assessment and remediation of impacted soil and groundwater. If the property owner or the Consultant wishes to utilize site specific risk-based cleanup levels, the site may be transferred to DTSC, Regional Board, or EHSD will select an independent toxicologist and require the property owner to directly pay for the cost of this professional because we do not have toxicologists on staff to review such cleanups.

3.9. REMEDIATION WORK-PLAN

If the results of the PSA show that the property requires remediation of chemical contamination before re-occupancy can be permitted, the Property Owner's representative must develop a remediation Work Plan for review by EHSD. While it is anticipated that the Consultant will prepare the Remediation Work Plan, it may also be prepared by the Contractor. **The remedial activities shall not commence until EHSD has reviewed and approved the Remediation Work Plan.** The written Remediation Work Plan must include:

1. Timeline – The timeline should identify the key work elements, indicate the estimated time to complete each element, and show start-end time estimates for each element.
2. Location – Street address and mailing address of the contaminated property, owner of record and his/her mailing address, legal description, and clear directions for locating the property.
3. Site map – A diagram of the contaminated property, including floor plans of affected buildings, local drinking water wells and nearby streams (if potentially impacted) drawn to a scale of 1/4" = 1' unless otherwise directed by the EHSD Hazardous Materials Specialist. The diagram shall show the location of damage and contamination and the location of sampling points used in the PSA; the sampling point locations shall be keyed to the sampling results.
4. PSA summary – A summary of the information and sampling results obtained in the PSA, and basis for remedial actions (or lack thereof) as proposed in the Remediation Work Plan.
5. Post Remediation Assessment - A plan for the Post-Remediation Assessment (see below), including sampling and analysis protocols.
6. Remediation Procedures – Specific remediation procedures will include a list of any and all materials to be removed, removal procedures, any proposed remediation processes.
7. Waste disposal plan – Provides information on waste disposal as described in the Waste Disposal section (Section 7.0) of this document. Identify the site(s) selected for disposal of waste generated during the remedial activities.
 - o Propose a means to provide evidence that Clan Lab debris (e.g., wallboard, carpets, and appliances) has been properly disposed.

3.10. POST REMEDIATION ASSESSMENT

The purpose of the post-remediation assessment is to establish that the property has been remediated up to the point at which residual contamination is below the State of California Human Occupancy Standards. The assessment should be conducted by the Consultant after remediation has been completed and/or the encapsulant has cured. Sampling protocols for the post-remediation assessment will have been defined in the approved Work Plan. In general, those areas of the property for which the PSA sampling showed levels above the State of California Human Occupancy Standards and were not removed and replaced (e.g., were cleaned, or cleaned and encapsulated) are to be sampled in the same manner used for the PSA. If all sample results fall below the human occupancy standards, then the remediation work is complete and the Consultant can prepare the final report. Any areas that fail the post-remediation sampling are to be re-cleaned/re-encapsulated, then re-sampled.

3.11. FINAL REPORT

There are two options for the Final Report of Remediation. If the remedial action consisted solely of removal of contaminated surfaces, such as cabinets, floor coverings, sheetrock and similar materials, and post-remediation sampling and assessment is not required by EHSD, then the Contractor must provide to EHSD signed and notarized written documentation establishing in detail that the remediation work has been completed in accordance with the approved Work Plan. This documentation shall include proof of proper disposal of contaminated items and building materials removed from the property as part of the remediation process. Any remediation activity other than removal of contaminated surfaces requires post-remediation sampling and assessment.

Where the Work Plan includes actions other than the removal of all contaminated surfaces, the Final Report of Remediation will have two components. The Contractor must provide to the Consultant signed written documentation establishing in detail that the remediation work has been completed in accordance with the approved work-plan. This documentation shall include proof of proper disposal of contaminated items and building materials removed from the property as part of the remediation process.

The Consultant will include the Contractor's documentation as an attachment to the Final Report. The Consultant's Final Report of Remediation will focus on the process and results of the post-remediation sampling and analysis, and will reference the Contractor's documentation as necessary to establish that the remediation has been completed in accordance with the approved work plan.

The Final Report must be signed and stamped by the CIH, signed and notarized by the Contractor, and if applicable signed and stamped by the PE and/or PG who conducted the Preliminary Site Assessment and the Post Remediation Assessment. EHSD will review the Final Report within 15 days of receipt.

If the Final Report is not satisfactory to EHSD, it will be returned to the Consultant and/or Contractor with comments for clarification, additional information, or other items that may remedy the report's deficiencies. Consultant and/or Contractor shall timely resolve the report's deficiencies and resubmit the report to EHSD for evaluation.

Within 10 days after EHSD determines that the final report meets the requirements of the approved work plan, State of California Human Occupancy standards, and the Property Owner pays the total amount of the lien, EHSD will write a No Further Action letter concurring with the reports

findings/recommendation of human occupancy and file the necessary paperwork to release the lien from the property title.

The Final Report is a technical document, summarizing the work performed under the Work Plan and presenting the data collected during the Post Remediation Assessment. The components of the Final Report shall include:

1. Case Narrative
2. Site Description
3. Summary of PSA findings and recommendations
4. Summary and documentation of remedial actions
5. Post-remediation assessment with detailed description and documentation, including lab reports and scaled site map keyed to sample locations
6. Post-remediation assessment results, with Consultant's analysis and all recommendations.

Unless otherwise specified: Surface sample data must be reported as $\mu\text{g}/100\text{cm}^2$ for Methamphetamine & $\mu\text{g}/1\text{ft}^2$ for Lead and Lead Compounds. Air sample data must be reported as ng/m^3 for Mercury and Mercury Compounds.

Analytical methodology must reference standard U.S. EPA methods, National Institute of Occupational Safety and Health (NIOSH) methods, or equivalent established methods used to analyze the samples.

4.0. HUMAN OCCUPANCY STANDARDS

Health and Safety Code require the following criteria to be met for all samples prior to EHSD writing a no further action letter allowing occupancy. These or similar criteria are currently in use by other state health agencies throughout the United States, and in California is the development of a State standard that represents minimal health risk from exposure to any remaining contamination. The Health and Safety Code assumes that any property may, at some point in time, be occupied by members of the general population susceptible to injury from exposure to chemicals associated with Clan Lab operations; such groups include the very young, the very old, and individuals with compromised immune systems. The following Human Occupancy Standards assume wipe sampling conducted according to Attachment I, or as otherwise developed in consultation with an analytical laboratory.

Wipe Sampling

Methamphetamine	1.5 $\mu\text{g}/100\text{cm}^2$ (H&SC 25400.16)
Lead & Lead Compounds	20 $\mu\text{g}/\text{ft}^2$ (H&SC 25400.16)

Air Monitoring

Mercury & Mercury Compounds	50 ng/m^3 (H&SC 25400.16)
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5.0. ANALYTICAL AND SAMPLING METHODS

Analytical methods are driven by the analyte, and sampling methods are frequently driven by the analytical method. EHSD expects that sampling methods will follow criteria for wipe and bulk sampling presented in Attachment I. Exceptions to this can be specific methods proscribed by the laboratory, or alternative methods in general use in environmental and occupational health practice. Examples include

methods from US EPA SW-846, OSHA Sampling and Analytical Methods, NIOSH Analytical Methods, and, in the case of lead, U.S. Health and Urban Development (HUD) guidelines.

Analytical methods for wipe and bulk samples are expected to be from US EPA SW-846 or the 600 Series in Appendix A of 40 CFR 136. Environmental Laboratory Accreditation Program (ELAP) laboratories may modify these methods as appropriate for an analyte.

Methamphetamine samples shall be analyzed by modified Method 8270 or NIOSH Methods e.g. 9106, 9109, and/or 9111. According to Washington Department of Ecology-accredited labs, modified Method 8015 is prone to false positives. As indicated above and in Attachment I, wipe samples are to be obtained with 11 cm #40 Whatman Filter Paper (p/n 1440-110) or similar (see Note to Attachment I) wetted with methanol, stored and shipped in appropriate sampling jars.

EHSD will not accept field analyses for clearance sample. Field analysis includes the use of colorimetric detector tubes, real-time direct reading instruments such as flame ionization and photo ionization detectors, any type of Haz Cat evaluation, and Marquis/Meth reagents, pH paper, or field detection methods.

6.0. LABORATORY REQUIREMENTS

All analyses are to be conducted by analytical laboratories which are accredited (Fields of Testing E114-E117); a list of such labs is available at www.waterboards.ca.gov/drinking_water/certlic/labs/index.html. This list is not limited to labs in California, as California has ELAP reciprocity with several states, and California's ELAP list includes many out-of-state labs.

EHSD strongly recommends that analysis for methamphetamine be conducted by laboratories accredited for such analyses by the Washington State Department of Ecology; these labs have historically had reciprocity under California ELAP as Washington ELAP labs. A list may be found at <http://www.ecy.wa.gov/apps/eap/acclabs/labquery.asp>.

7.0. WASTE DISPOSAL

All materials removed from a Clan Lab property as a result of having been impacted/contaminated by Clan Lab activities (operation, storage, spills, disposal) must receive special handling at the disposal or recycling facility. Examples of such materials are kitchen appliances, drapes, carpets, and building materials. Items such as appliances and furniture must be rendered unusable prior to disposal.

In general, those items which are first cleaned (e.g., washed with a surfactant and triple-rinsed) have historically been disposed at a Class III landfill. **Always contact the landfill to check the current status for acceptance of these materials.** These cleaned items are to be taken directly to the landfill for special handling, not to a transfer station. The landfill is responsible for verifying what wastes can legally be disposed at their facility and may request laboratory analysis before accepting these items.

Materials and debris which have not been cleaned are typically disposed at a Class II landfill. Some of the Class III Landfills may take these items on a limited basis but may require special handling.

For all disposed items, EHSD will require an inventory, as well as waste disposal receipts submitted with the final clearance report. For items that are required to be disposed as hazardous waste, copies of the

Uniform Hazardous Waste Manifests with the Treatment Storage and Disposal Site signature are a requirement.

Please Note! It is the Contractor's or Consultant's responsibility to perform the appropriate waste determination for all the wastes generated from the methamphetamine laboratory property. Each landfill facility has its own permit requirements and will likely require laboratory analysis and then review methamphetamine laboratory debris on a case by case basis. It is the Contractor's or Consultant's responsibility to contact the landfill to determine what waste determination process is necessary, if specific materials removed from a methamphetamine laboratory property will be accepted, and the conditions under which this waste will be accepted.

8.0. PLUMBING AND SEPTIC SYSTEMS

Because methamphetamine precursor chemicals are often discarded down the drain during processing activities, chemicals may remain in traps of sinks, and other plumbing fixtures resulting in them being structurally compromised and requiring attention. Generally, methamphetamine laboratory wastes chemicals discarded in the sewer are flushed from the system within minutes to hours after disposal. However, chemicals may remain in the system for a longer period if there are areas of low flow along the sewer line. If there is evidence that waste were dumped down a drain, the Consultant will need to work through a process to determine whether a septic system was impacted. The following process describes steps to evaluate the sewer/septic systems.

Element:

1. Evaluate tubs, sinks, toilets and similar for evidence of waste disposal. Staining from hydroiodic acid (red/orange) would be a good visual indicator.
 - a. If there is no evidence of disposal, the task is complete.
 - b. If there is evidence of disposal, continue to **Element 2**.
2. Assuming evidence of disposal, determine whether the property has a graywater system and whether it is on septic or sewer system. The Consultant shall contact local waste water agencies to inform them of the methamphetamine laboratory activities and obtain their concerns and any requirements before flushing the plumbing with copious amount of water. Local waste water quality agencies are the following :
 - **City of Benicia (707) 746-4394**
 - **City of Dixon (707) 678-7050**
 - **City of Fairfield (707) 428-7407**
 - **Fairfield Suisun Sewer District (707) 429-8930**
 - **City of Rio Vista (707)374-6747**
 - **Solano County Water Agency (707) 451-6090**
 - **Solano Irrigation District (707) 448-6847**
 - **City of Suisun (707) 421-7340**
 - **City of Vacaville (707) 449-5128**
 - **City of Vallejo (707) 648-4345**
 - **Vallejo Flood and Sanitation District (707) 644-8949**
 - a. If the property is on a sewer system, the task is complete.

- b. If the property is on a septic system, continue to **Element #3** .
3. Obtain a representative sample of the material in the septic tank. Have the sample analyzed for hazardous waste characteristics. Sample collections protocols will include the following:
 - Excavate tank to determine whether the tank consists of one or two chambers
 - Remove access cover from the first chamber and locate the outlet baffle
 - Collect samples from the baffle on the outlet end of the chamber
 - Use a sample collector such as a Sludge Judge and insert into the bottom of the tank
 - Trap the sample inside the collector
 - Fill two 40 ml vials
 - Place the samples containers into a cooler with ice or ice packs to maintain a temperature of 4 degrees Celsius
 - Replace access cover
4. Use an ELAP-accredited laboratory appropriate for the analysis.
 - a. If analysis indicates that the sample is non-hazardous, the task is complete.
 - b. If analysis indicates that the sample is hazardous, continue to **Element #5**.
5. Using resources such as the State Water Resources Control Board tables of disposal facilities to determine which facility will accept the mixed septic/hazardous waste. Use an appropriately-permitted hazardous waste transporter to pump the tank and transport the contents to the accepting facility, continue to **Element #6**.
6. Information regarding the positive analysis for hazardous waste characteristics shall be provided to the EHSD who will evaluate whether remediation action will be required for the leach field (see section 3.8.7).

ATTACHMENT I

The Surrogate Method

As noted in Section 3.6, the Department of Resource Management has reviewed a number of sampling methods from a variety of sources, and has determined that a standard method based on the “Proposed Surrogate Method” devised by Bruce Lazarus, CIH, will be the benchmark for evaluating sampling protocols. Lazarus’ paper describing this method was published in the Journal of Clandestine Laboratory Investigating Chemists, Volume 10, Number 2, April 2000. Most of the material in this Attachment is taken from this article.

In the Surrogate Method, a limited number of laboratory samples are taken from judgmentally-selected locations throughout the clandestine laboratory site and analyzed for the target analytes. This design method attempts to balance the necessary cost burden of assessment activities against the public health need. The surrogate approach is based on the following concepts:

- A. There is a lack of test methods and reference standards for many of the substances, and especially some of the organic drug compounds, which are associated with clandestine lab activities. In short, one can’t feasibly test for all hazardous materials associated with the “cooking” process, and even if test methods were available, it would be prohibitively expensive to do so.
- B. Some target chemicals tend to be more persistent in the environment, both in porous media and on non-porous surfaces, allowing for latent detection.
- C. The presence and concentration variability of target chemicals assessed at laboratory sites is assumed to be representative of similar conditions for the remaining Clan Lab chemicals. The premise assumes that if the target analytes are detected in significant concentration, then other Clan Lab method-specific chemicals not analyzed for are also present in concentrations of public health interest.

These assumptions define a data gap suitable for future study. However, absent an alternative method that concurrently minimizes the cost of investigation while providing adequate information to indicate potential public health risk, the Surrogate Method is the minimum level of site investigation acceptable to EHSD.

EHSD Criteria under the Surrogate Method follow.

A. Sample Types

A combination of wipe and bulk samples should be taken utilizing this protocol. Wipe samples should be taken of non-porous surfaces, whereas bulk samples should be taken of porous materials.

1. Wipe samples should be taken of sealed concrete (garage floors), vinyl flooring, sealed wood surfaces, tile, Formica, bathroom fixtures, appliance surfaces, painted surface of good condition, etc.
2. Bulk samples should be taken of unsealed or poor condition concrete and wood surfaces, dry wall, painted surfaces of poor condition, carpeting, carpet padding, upholstery, septic waste, and soils.

In some cases, particularly with painted surfaces, a decision must be made if a wipe sample or bulk sample would be more appropriate to recover and identify potential contamination. To address error associated with mass loading of bulk samples, particularly from painted surface and drywall, it may be appropriate to obtain bulk samples using a surface scraping technique.

B. Sample Locations and Quantities

Take one bulk or wipe sample from the following as associated with each major area of the location suspected by history and/or visual observations as being potentially affected by contamination:

1. Each major floor surface.
2. Each major wall surface.
3. Each major ceiling surface.
4. Each major home appliance (e.g., refrigerator, oven, microwave, dishwasher, washing machine, dryer, etc.).
5. Each major cabinet, counter, and/or built-in feature (e.g., kitchen cabinets, counters, vanities, etc.).
6. Each bathroom and/or kitchen fixture or grouping of fixtures.
7. Each major furniture grouping.

In establishing the number and location of samples at individual property sites, sampling of some locations or items may not be necessary if the need for remediation is apparent by observation or agreement of parties. Examples include fire-damaged surfaces, apparent direct chemical staining or damage, and/or obvious physical damage of an item or feature necessitating removal.

C. Collection Procedures

1. Wipe Samples

Wipe samples should be obtained using the following protocol unless otherwise instructed by the analytical laboratory. Note that these instructions differ from Lazarus' paper, as lab requirements have been refined.

- a. Use eight-ounce, wide mouth, borosilicate glass jars having phenolic screw top lids with Teflon liners.
- b. Prepare each sample by placing an 11 cm #40 Whatman Filter Paper (p/n 1440-110) or similar (see Note) into each sample jar. Add 5 ml of methanol to each pad and close the jar. Use appropriate personal protective equipment when using methanol.
- c. Select the surface location to be sampled.
- d. Squeeze excess methanol from the pad (back into the open jar) before wiping the sample area.
- e. Wipe a one hundred square centimeter (100 cm²) surface area, using a consistent wipe or blot pattern technique (i.e., concentric circle pattern starting in the upper left corner and ending in the center of the area). Use a 10-by-10 cm square template (usually made of Teflon or other material that will not contaminate the sample and is resistant to the solvent).
- f. Without allowing the filter to contact any other surfaces, fold the filter with the exposed side in, the fold it again. Return the filter to the glass jar and replace the lid.
- g. Wear disposable Nitrile or PVC gloves for each sample taken. Change gloves between samples.
- h. Obtain separate wipe samples (separate jar and pads) for each individual analyte, including pH, to be analyzed by the laboratory unless the laboratory explicitly states that multiple analytes can be tested from one pad. Otherwise, if multiple analytes are to be tested, then all wipe samples from a selected location should be of adjacent, contiguous surfaces. Do not re-wipe the same surface.
- i. Preservation of the samples for inorganic analysis is not normally required unless otherwise specified by the analytical laboratory.
- j. When appropriate, submit a sample blank consisting of a prepared sample jar taken to the field and returned to the laboratory for analysis.
- k. Label the jar, attach custody seal, and prepare sample for transport to the laboratory.
- l. See Section 3.6.2 for information on compositing samples.

2. Bulk Samples

Bulk samples should be obtained using the following protocol unless otherwise instructed by the analytical laboratory:

- a. Use four- or eight-ounce, wide mouth, borosilicate glass jars having phenolic screw top lids with Teflon liners.
- b. Select the media to be bulk sampled.

- c. Using an appropriate sampling tool/device, obtain a minimum of 30 grams for each bulk sample unless the analytical laboratory specifies a different quantity of sample.
- d. Wear disposable Nitrile or PVC gloves for each sample taken. Change gloves between samples.
- e. Unless otherwise specified by the analytical laboratory, multiple analytes, including pH, may be analyzed from single bulk sample representing each medium to be evaluated.
- f. Sampling tools/device should be cleaned and triple-rinsed with deionized water between each bulk sample or otherwise cleaned following a laboratory-recommended protocol between samples.
- g. For scrape samples of paint, etc., a polyethylene tray (or similar capture device) may be taped to the wall surface below the surface area to be scraped. Collect the sample in the tray and then transfer it to the sample container.
- h. Preservation of the samples for inorganic analysis is not normally required unless otherwise specified by the analytical laboratory.
- i. Bulk samples for organic analysis should be preserved at 4°C (usually applies to septic waste and subsurface soil samples recovered for volatile and semi-volatile hydrocarbon analysis).

D. Target Analytes

Analytes specified for analysis should be selected based on individual association with specific Clan Lab manufacturing processes, expected persistence in the environment, usefulness of data interpretation, application of available testing methods, laboratory capabilities, and cost of analysis. The table below provides selected target analytes and test methods appropriate for the most common Methamphetamine synthesis routes typically encountered in the United States.

This table should be used as a guide only, as it may not be necessary or appropriate to sample and analyze for every analyte listed.

Target Analytes for Three Common Methamphetamine Manufacturing Methods

Manufacturing Method	Methamphetamine ¹	Precursor	Hydrochloric Acid (Chloride)	Essential Chemicals (or by-products) ²
Red Phosphorous	Modified EPA Method 8270, NIOSH	Ephedrine by Modified EPA Method 8270	EPA Method 300	Total Phosphorous by EPA Method 6010 ³ Iodide by EPA Method 300
Ammonia	Modified EPA Method 8270, NIOSH	Ephedrine by Modified EPA Method 8270	EPA Method 300	Total Lithium or Total Sodium by EPA Method 6010 ³ Total Ammonia by EPA Method 350
Mercuric Chloride	Modified EPA Method 8270, NIOSH	Phenyl-2-Propanone by Modified EPA Method 8270	EPA Method 300	Mercury by EPA Method 7471A Total Lead by EPA Method 6010

NOTE: approved labs (e.g., ELAP labs) may select methods other than those listed in this table.

¹ Results for Modified EPA Method 8270 may be semi-quantitative depending on analytical laboratory capabilities.

² Select one or more analytes for sampling and analysis, based on property data and assessment needs.

³ Metals analysis may also be performed by EPA Method 6020.

ATTACHMENT II

Chemicals of Concern

Taken from the CSTI Clandestine Drug Laboratory Chemical Identification training manual, the following is a not an complete list of typical lab chemicals.

Methamphetamine Methods of Production and Chemicals Typically Used

- Hydroiodic Acid Method (Ephedrine)
 - Ephedrine
 - Hydroiodic acid
 - Red phosphorous
 - Sodium hydroxide
 - Hydrochloric acid
 - Freon
- Phenyl-2-Propanone Method (P-2-P)
 - Phenyl-2-Propanone
 - Methylamine
 - Methyl Alcohol
 - Mercuric chloride
 - Aluminum
 - Ether
 - Sodium hydroxide
- Sodium Metal Method (Nazi or Birch)
 - Ephedrine
 - Pseudo ephedrine
 - Anhydrous ammonia
 - Sodium (metal)
 - Lithium (metal)
 - Hydrochloric acid

ATTACHMENT III

Resources

Materials used the development of this document include:

State of California Emergency Response Program

https://www.dtsc.ca.gov/SiteCleanup/ERP/Off_Hwy.cfm

State of California Methamphetamine Laboratory Cleanup Program

<http://www.emd.saccounty.net/EC/CUPA/Pages/EMDForms-CUPA-Forms.aspx>

Criteria for the Assessment and Remediation of Clandestine Methamphetamine Laboratories

Sacramento County Environmental Management Department

<http://www.emd.saccounty.net/EC/CUPA/Pages/EMDForms-CUPA-Forms.aspx>

Chemical Exposures Associated with Clandestine Methamphetamine Laboratories using the Hypophosphorous and the Phosphorous Flake Method of Production

National Jewish Medical and Research Center

https://www.nationaljewish.org/NJH/media/pdf/pdf-EnvOccChemical_Exposures.pdf

Guidelines for Cleaning Up Former Methamphetamine Labs

Kansas Department of Health and Environment

http://www.kdheks.gov/methlabs/ml_cleanup.html

Guidelines for Contamination Reduction and Sampling at Illegal Drug Manufacturing Sites

Washington State Department of Health, Community and the Environment

www.doh.wa.gov/CommunityandEnvironment/Contaminants/DrugLabs/MethLabs

Clandestine Laboratory Contaminated Properties: Assessment and Remediation Strategies,

Bruce Lazarus, CIH

Journal of Clandestine Laboratory Investigating Chemists, V. 10, No.2, April 2000

Clandestine Drug Labs

California Office of Environmental Human Health Assessment

<https://oehha.ca.gov/risk-assessment/ clandestine-drug-labs>

Clandestine Drug Lab Cleanup Program

Oregon Public Health Services, Environmental Services and Consultation

www.oregon.gov/oha/ph/HealthyEnvironments/HealthyNeighborhoods/ClandestineDrugLabs/

Meth and Clandestine Drug Labs

Minnesota Department of Health

<http://www.health.state.mn.us/divs/eh/meth/index.html>

Surface and Dermal Monitoring for Toxic Exposures

Ness, Shirley A. 1994. Van Nostrand Reinhold, New York.

Voluntary Guidelines for Methamphetamine Laboratory Cleanup

US Environmental Protection Agency, August 2009

www.epa.gov/emergency-response/voluntary-guidelines-methamphetamine-laboratory-cleanup