‘FIT FOR USE’ STANDARDS FOR SITES ASSOCIATED WITH CLANDESTINE DRUG LABS

PROPOSAL AND BASIS FOR ALTERNATIVE STANDARDS

SPILL PREVENTION & RESPONSE DIVISION
PREVENTION & EMERGENCY RESPONSE PROGRAM

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INTRODUCTION

In July of 2003, the Alaska State Legislature passed House Bill (HB) No. 59, "An Act relating to the evaluation and cleanup of sites where certain controlled substances may have been manufactured or stored". The impetus for the bill was the increase in clandestine methamphetamine drug manufacturing activities in Alaska. The bill was designed to provide a mechanism for property owners impacted by the manufacture of illegal drugs to have the property declared 'fit for use' after being cleaned.

HB 59 was incorporated into Alaska Statute (AS) 46.03.500 – AS 46.03.599 and directs ADEC to develop and adopt regulations for the evaluation and cleanup of sites where certain illegal substances were manufactured or stored, specifically:

1) establish health standards,
2) identify analytical methods,
3) develop sampling protocols, and
4) develop decontamination guidelines.

ADEC submitted the final fiscal note (#3) attached to HB 59 in April of 2003 that was subsequently approved by the legislature. The fiscal note states that 'the evaluation and cleanup process for illegal drug sites proposed in this bill will require the Department to develop health standards, sampling protocols, analytical methods, and decontamination guidelines for lead, mercury, volatile organic compounds (VOCs), and methamphetamines." The house bill passed in July of 2003 is inconsistent with this fiscal note and tasked the Alaska Department of Public Safety (ADPS) to provide a listing of substances to ADEC that is to be used as the basis of the standards and cleanup guidance. In August 2003, ADPS submitted the substance list in AS 11.71.200[1]. This list, itemizing twenty-nine chemical substances associated with illegal drug manufacturing, is used by ADPS in case investigations and charging documents to support prosecution of the unauthorized manufacture of controlled substances. Limits were to be established for each substance specified by AS 11.71.200 for purposes of determining whether the property is 'fit for use'.

The purpose of this paper is to explain and support the ADEC's rationale for establishing standards for determining if properties are 'fit for use'. These standards would be applied to posted properties based upon limits set for methamphetamine and

[1] Email from Lt. Hans Brinke, ADPS to Clara Crosby, ADEC dated 8/18/03.

VOCs with additional sampling for lead and mercury required when the amalgam (P2P) method has clearly been used to manufacture methamphetamine. As noted, the statutes currently imply that 'fit-for-use' standards are to be established for the extensive listing of substances provided by ADPS.

BACKGROUND

To meet ADEC obligations within AS 46.03.500 – AS 46.03.599, the ADEC's Prevention and Emergency Response Program (PERP) established an internal workgroup. The workgroup was tasked to review the legislative intent, evaluate the methamphetamine manufacturing methods used in Alaska and the associated chemicals, identify established health standards for the twenty-nine substances listed in AS 11.71.200, research other state regulations for reoccupation or 'fit for use' criteria, identify sampling protocols and analytical methods, and develop decontamination guidelines.

MANUFACTURING METHAMPHETAMINE IN ALASKA[2]

There are three (3) primary methods and variations on these methods used to manufacture methamphetamine. These are the red phosphorus, birch, and amalgam or P2P methods. The amalgam method has generally fallen out of favor throughout the United States. The red phosphorus and birch method are the primary cooking methods and are the only two methods that have been found in Alaska.[3]

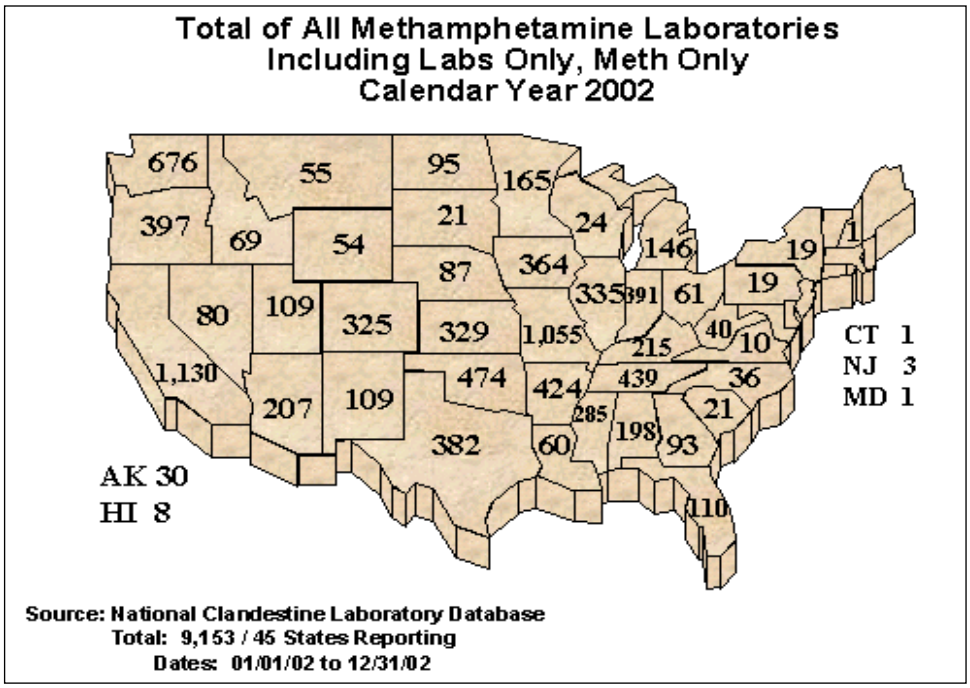
The Red Phosphorus Method is also called "Red P," "HI" Method, or the Red, White and Blue Method. Substances commonly associated with this method include hydriodic acid (HI), hydrochloric (muratic) acid, sulfuric acid, sodium hydroxide (lye), sodium chloride (salt), red phosphorus, iodine, isopropyl alcohol, ethyl alcohol (ethanol), methyl alcohol (methanol), hydrogen peroxide, naphtha (Coleman fuel), charcoal lighter fluid (mineral spirits, petroleum distillate), acetone, benzene, toluene, ethyl ether (starting fluid), freon, hydrogen chloride gas, and chloroform. Other substances that may be used include acetic acid, methyl-ethyl-ketone (MEK), and hypo phosphorus acid. Wastes generated during manufacturing include potentially flammable extraction process sludges,

[2] Sources for the compiled information within this section includes: *Cleanup of Clandestine Methamphetamine Labs Guidance Document*; Colorado Department of Public Health and Environment, July 2003 and from communications with the Alaska Statewide Drug Enforcement Unit and State Clandestine Lab Investigative Laboratory.

[3] Information received in meeting with Amanda Leffel, ADEC and Sgt. Ron Wall, Statewide Drug Enforcement Unit; Tuesday, October 14, 2003. Additional confirmation was received by Scot Tiernan, ADEC from Southeast Alaska Narcotics Enforcement Team.

phosphine gas, hydriodic acid, hydrogen chloride gas, phosphoric acid, and yellow or white phosphorus.

The birch method, also called the “Ammonia” or “Nazi” Method, is reportedly not as common in Alaska as the Red P method. The ammonia method relies on a plentiful supply of anhydrous ammonia that is most commonly found in commercial freezers and agricultural applications in the lower 48. In Alaska, clandestine methamphetamine manufacturing laboratories using this method would most likely be located near shore based fish processing plants or fish processing vessels. Substances associated with this method include anhydrous ammonia, lithium metal, sodium metal, isopropyl alcohol, ethyl alcohol (ethanol), methyl alcohol (methanol), hydrogen chloride gas, hydrochloric (muratic) acid, sulfuric acid, sodium chloride (salt), toluene, naphtha, freon, ethyl ether, chloroform, and methyl-ethyl-ketone (MEK). Wastes generated include potentially flammable extraction process sludge and hydrogen chloride gas.



Source: US. Drug Enforcement Administration - http://www.usdoj.gov/dea/concern/map_lab_seizures.html

The third method is the Amalgam or P2P method. This method uses phenyl-2-propanone (P2P) and methylamine as precursors. Mercuric chloride, lead acetate, and many other substances are used in the synthesis of methamphetamine via the amalgam

method. While this cooking method can result in lead and mercury contamination, the general reasons it fell out-of-favor are: 1) the limited availability of the precursor since it became regulated; 2) the length of time needed to produce the desired drug; 3) low yield, and 4) low concentration of the finished product.

LIST OF ADPS SUBSTANCES AND STANDARDS FOR DETERMINING FITNESS

'Fit-for-use' standards were to be identified for each substance on a list provided to ADEC by ADPS. ADPS submitted to ADEC the list of substances in AS 11.71.200. Specifically Sec. 46.03.530, Standards for determining fitness reads as follows:

a) Property for which a notice was received under AS 46.03.500(b) is not fit for use if sampling and testing of the property under AS 46.03.520 shows the presence of substances for which the department has set a limit under (b) of this section.
b) The Department of Public Safety shall annually submit a list of substances to the Department of Environmental Conservation. The department shall adopt regulations that set the limit for each substance specified by the Department of Public Safety for purposes of determining whether the property for which a notice was received under AS 46.03.500 is fit for use. The department may also determine whether there are other substances associated with illegal drug manufacturing sites that may pose a substantial risk of harm to persons who occupy or use the site or to public health and may adopt regulations that set limits for those substances for the purposes of determining whether the property for which notice was received under AS 46.03.500 is fit for use.

The substances listed in AS 11.71.200 are a catalogue of chemical precursors, reagents, catalysts, and solvents that can be used to manufacture a wide variety of illicit drugs including methamphetamine, LSD, ecstasy, or PCP. The drug manufacturing problems in Alaska are from the illegal production of methamphetamine. The workgroup targeted the concerns from substances associated with methamphetamine manufacturing processes.

Several of the substances listed are commonly used household products that are not generally stored in the quantities required to manufacture drugs. When a bust occurs, law

enforcement personnel remove the bulk of the substances and paraphernalia that are directly associated with the illicit manufacturing of methamphetamine. Contamination remaining on porous surfaces, furniture, carpeting, walls, etc. may still be a concern. It is this hazard that HB 59 attempts to address - the removal of residual contamination that remains inside a residence.

'Fit-for-Use' or Decontamination Standards

The workgroup researched multiple sources to identify health-based or chronic exposure standards for the twenty-nine (29) substances listed in AS 11.71.200. The information about the toxicity of many of these substances is minimal. Human health standards do not exist for all listed substances that might be encountered at a methamphetamine lab. In the absence of finding these standards, the workgroup resorted to looking for worker exposure limits. While the workgroup recognized that worker exposure levels are not generally applicable for the type of exposures anticipated in a residence (chronic, low-level exposure), the workgroup researched available standards for the 29 substances listed in an attempt to identify *any* available exposure limit.

Table 1 and 1A contain the worker and human health exposure limits identified. These tables also summarize the research performed by ADEC in our attempt to adopt standards for the twenty-nine substances. Definitions of each reference value and their application are found below. Values listed were derived from multiple sources including: U.S. Environmental Protection Agency (EPA), National Institute of Safety and Health (NIOSH), and Occupational Safety and Health Administration (OSHA).

EPA IRIS RfC

The Inhalation Reference Concentration (RfC) for chronic non-carcinogenic health effects is based on the assumption that thresholds exist for certain toxic effects. The RfC considers toxic effects for both the respiratory system and for effects peripheral to the respiratory system. In general, the RfC is an *estimate* (with uncertainty spanning perhaps orders of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of harmful effects during a lifetime. RfCs values listed were obtained from the EPA Integrated Risk Information System (IRIS).

OSHA

The Occupational Safety and Health Administration, U.S. Department of Labor established Permissible Exposure Limits (PEL) based on an allowable Time Weighted Average (TWA) concentration for a normal 8-hour workday or 40-hour workweek.

ACIGH

The American Conference of Governmental Industrial Hygienists (ACGIH®) is a member-based organization and community of professionals that advances worker health and safety through education and the development and dissemination of scientific and technical knowledge. Examples of this include their annual editions of the Threshold Limit Values or *TLVs®*. TLVs are not standards but guidelines designed for use by industrial hygienists in decisions-making regarding safe levels of exposure to various chemical substances and physical agents found in the workplace. In using these guidelines, industrial hygienists are cautioned that the TLVs are only one of multiple factors to be considered in evaluating specific workplace situations and conditions. (Reference: http://www.acgih.org/TLV/)

NIOSH

The National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL) are the recommended maximum exposure level of a compound that a worker should be exposed to, in order to avoid adverse health effects. REL are time-weighted average concentrations for up to a 10-hour workday during a 40-hour workweek.

NIOSH IDLH

NIOSH has developed concentration values that they deem are Immediately Dangerous to Life and Health (IDLH). In the event of an accidental exposure to a chemical, this is the concentration below which an individual could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects.

Although OSHA, NIOSH, and ACGIH standards are useful, especially as they are often the only standards that exist for some substances, these values are derived for a healthy

portion of the population and include considerations other than health protection such as expense to the industry to comply. To protect worker health, many of them require regular medical monitoring, which is not instituted in a residential setting.

EPA Indoor Air Guidance (IAG)

EPA lists chemicals that may be found at hazardous waste sites and indicates whether, in their judgment, they are sufficiently toxic and volatile to result in a potentially unacceptable indoor inhalation risk. Under this approach, a chemical is considered sufficiently toxic if the vapor concentration of the pure component poses an incremental lifetime cancer risk greater than 10^{-6} or results in a non-cancer hazard index greater than one. A chemical is considered sufficiently volatile if its Henrys Law Constant is 1×10^{-5} atm-m^3/mol or greater.

ATSDR

'The U.S. Department of Health and Human Services, the Agency for Toxic Substances and Disease Registry (ATSDR) is a sister federal agency to the Center for Disease Control and Prevention (CDC). ATSDR is the principal federal public health agency involved with hazardous waste issues. The agency helps prevent or reduce the harmful effects of exposure to hazardous substances on human health. ATSDR was created by the Superfund Law in 1980. By Congressional mandate, ATSDR also produces "toxicological profiles" for hazardous substances found at National Priorities List (NPL) sites (the nation's most serious hazardous waste sites). These hazardous substances are ranked based on frequency of occurrence at NPL sites, toxicity, and potential for human exposure. Toxicological profiles are developed from a priority list of 275 substances' (Reference: http://www.atsdr.cdc.gov/toxpro2.html).

The ATSDR Minimal Risk Levels (MRLs) were developed as an initial response to the mandate. MRL values developed for individual substances will provide an estimate of the daily human exposure to a dose of a chemical that is likely to be without an appreciable risk of adverse, noncancer effects over a specific duration of exposure. The MRLs are values that public health officials can consider when making recommendations to protect populations living near hazardous waste sites or chemical emissions. ATSDR notes that

MRLs are not intended to define clean up or action levels for ATSDR or other Agencies[4]. MRLs exist for six (6) of the 29 substances listed within Table 1. These values are contained within Table 1A.

USFDA:

Although Food and Drug Administration (FDA) assists the Drug Enforcement Agency (DEA) in deciding how stringent DEA controls should be on drugs that are medically accepted but that have a strong potential for abuse, FDA does not regulate or establish health-based standards for skin (percutaneous) absorption exposures. The primary concern at a former illegal meth lab is chronic percutaneous exposure to residual contamination not an appropriate prescription dose. FDA doses are not included within Table 1 or 1A.

The goal conveyed by the Alaska legislature was to establish standards that property owners could use to have their property declared 'fit for use'. Meeting these standards were expected to protect residents from the residual contaminants derived from illegal production of methamphetamines. Unfortunately, little appears to be known about the potential long-term health risks associated with chronic low-level exposure to residual contaminants – especially to those more sensitive individuals that could be present in a residential setting. Individuals at the greatest risk include elderly, pregnant women, infants, toddlers, and children. The primary exposure routes for these residents include both chronic percutaneous and chronic respiratory exposure. Possible ingestion concerns also exist for infants and toddlers.[5]

Of the standards listed within Tables 1 and 1A, the EPA Indoor Air Quality (IAQ) standards and the ATSDR Minimum Risk Levels (MRLs) are the most valid in consideration of exposure levels and durations. Although ATSDR sets limits for oral exposure, limits for percutaneous or dermal routes for MRLs are not derived because ATSDR has not established a method suitable for this route of exposure.

[4] Reference: http://www.atsdr.cdc.gov/mrls.html

[5] Washington Office of Environmental Health Assessments *Review of Contaminant Levels: Guidelines for Clandestine Drug Lab Cleanup.* Dated September 2000.

OTHER STATE METHAMPHETAMINE REGULATIONS AND GUIDELINES

A very small percentage of states within the U.S. have adopted regulations for clandestine drug lab cleanup or decontamination standards: Arizona, Oregon, and Washington. This small percentage belies the extent of the clandestine drug laboratory problem throughout the U.S. The states of Arizona, Oregon, and Washington base their determination that cleanup was sufficient upon meeting a standard for methamphetamine as an indicator.

The workgroup contacted the toxicologist for Washington State – the state that pioneered efforts to tackle the problem of clandestine lab decontamination standards – to inquire about the basis of their decontamination[6] standard. Acknowledging that the standard is not a health-based standard but one that is based upon achievable and measurable results[7], the Washington Office of Environmental Health Assessments recommended the current decontamination standard for methamphetamine at $0.1\mu g/100cm^2$. Additionally, it is assumed that the cleanup processes necessary to reduce the levels of methamphetamine to $0.1\mu g/100cm^2$ should be sufficient to reduce the concentrations of other methamphetamine manufacturing precursors to acceptable levels[8]. Unfortunately, no study or evidence to support this assumption has been located.

A majority of compounds used in the preparation of methamphetamine are household products including the solvents such as Coleman fuel, mineral spirits, and starting fluid. As a result, Washington also sets a decontamination standard for VOCs. After the gross removal of materials by law enforcement and sufficient ventilation of the structure, the concentration of VOC's should be significantly reduced. If during decontamination, provisions provide for the removal of those products (carpets, etc.) that might absorb VOC's in the highly contaminated area and the structure ventilated again, VOC contamination should be further reduced to an acceptable standard.

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[6] Decontamination is defined within WA's *Review of Contaminant Levels: Guidelines for Clandestine Drug Lab Cleanup* as "the process of reducing levels of known contaminants to the lowest practical level using current available methods and processes."

[7] Washington Office of Environmental Health Assessments *Review of Contaminant Levels: Guidelines for Clandestine Drug Lab Cleanup.* Dated September 2000.

[8] Memorandum to the File from Scot Tiernan dated December 26, 2003; *Cleanup of Clandestine Methamphetamine Labs Guidance Document*, Colorado Department of Public Health and Environment dated July 2003; and DRAFT *Revised Minnesota Department of Health General Cleanup Guidelines for Clandestine Drug Labs*, Minnesota Department of Health, dated September 2003, page 20 .

Table 2 summarizes clandestine drug lab cleanup programs, regulations, and recommendations for the states of Arizona, California, Colorado, Illinois, Kansas, Minnesota, Oregon, Washington, and Wisconsin[9].

FINDINGS and DISCUSSION

The impetus for HB 59 was the increase in clandestine methamphetamine drug manufacturing activities in Alaska and the focus of the workgroup was toward addressing contamination associated with methamphetamine labs. The manufacturing of many drugs such as LSD and ecstasy require special training, equipment, and chemicals - often in large volumes. This means clandestine labs manufacturing these drugs are more difficult to establish and support. No reports of these types of clandestine drug labs have been provided to ADEC. However, clandestine labs that manufacture methamphetamine are more common because the cooking methods are relatively simple, use readily available substances, and are 'cooked' using recipes easily obtained from publications, acquaintances, and the internet.

The gaps in available human health or workplace exposure limits are readily apparent in Table 1 and Table 1A. This information indicates that only sixteen of the twenty-nine substances have established workplace exposure limits or MRLs. As noted previously, workplace exposure limits are not appropriate for use in establishing limits for residential exposure given the differences in exposure routes and durations, and the fact that workplace exposure has been established for healthy adult populations. The cost associated with establishing valid human health standards for the type of chronic low-level exposure to substances is significantly above that allotted by the fiscal note or consistent with ADEC's role and resources. In the absence of human health standards or chronic low level exposure limits, ADEC focused upon reducing the potential exposure to as low as practicable and looked to the experience and expertise of other jurisdictions with similar problems.

The workgroup was also aware that the original bill paralleled the State of Washington's standards based upon establishing limits for methamphetamine, VOCs, lead, and mercury and was subsequently changed while in process. Review of the Alaska House

[9] Memorandum to the File from Scot Tiernan dated December 26, 2003

Finance Committee meeting notes dated March 18, 2003 attached to the bill includes documentation of several legislators' concerns associated with these four (4) substances – that background levels of mercury and lead may result in false positives perpetually dooming a home owner to fail to meet 'fit for use' standards. ADEC also recognizes that the possibility of obtaining false positives for lead and mercury exists as these materials were commonly added to paints.

In an effort to address the legislature's concerns and to minimize the possibility of false positives, the workgroup recommends that the testing for lead and mercury not be required unless it is evident that the amalgam (P2P) method was used in the process of methamphetamine production. Where precursors - specifically P2P and methylamine - clearly indicate the amalgam method was used or is suspected, testing for lead and mercury will be required. In these cases, background samples identifying the pre-existing mercury or lead levels are also recommended. Again, it should be emphasized that the P2P method has been abandoned in favor of simpler methods using lithium and sodium metal.

Typical cleanup costs range from $3,500 to $5,000, but in certain cases may exceed $20,000[10]. Additional costs associated with unwarranted sampling and analysis of the twenty-nine substances would not enhance the safety of the property but alternatively place an excessive and pointless financial burden upon home owners to demonstrate 'fit for use' compliance. The analytical methods and estimated cost associated with the clandestine drug lab contaminants - lead, mercury, VOCs and methamphetamine are summarized in Table 3.

[10] http://healthlinks.washington.edu/nwcphp/wph97/methlab.html, University of Washington Health Sciences Libraries

TABLE 1

Chemical	CAS #	Used to Produce	ATSDR[a]	ACGIH TLV [b]	EPA IRIS RfC [c]	OSHA [d]	IDLH [e]	NIOSH [f]	EPA Indoor Air Guidance (RfC) [g]
Anthranilic Acid, its esters, and its salts	118923	Quaalude							
Benzaldehyde	100527	Meth (P2P method)			0.1 mg/kg/day				0.35 mg/m3
Benzyl Cyanide	140294	Meth (P2P method)							
Ephedrine, its salts, optical isomers, and salts of optical isomers	299423	Meth (Red P, Birch methods)							
Ergonovine, and its salts	60797	LSD							
Ergotamine, and its salts	379793	LSD							
N-acetylanthranilic acid, its esters, and its salts	89521	Quaalude							
Nitroethane (1,1-Dichloro-1-Nitroethane)	79243	Meth (P2P method)		100 ppm TWA		100 ppm TWA	1000 ppm	100 ppm TWA	
Norpseudoephedrine, its salts, optical isomers, and salts of optical isomers	2153982	Meth (Red P and Birch methods)							
Phenylacetic acid, its esters, and its salts	103822	Meth (P2P method)							
Phenylpropanolamine, its salts, optical isomers, and salts of optical isomers	14838154	Meth (Red P, Birch methods)							
Piperidine and its salts	110894	PCP							
Pseudoephedrine, its salts, optical isomers, and salts of optical isomers	90824	Meth (Red P and Birch methods)							
3,4-Methylenedioxyphenyl-2-propanone	2503460	Meth (P2P method)							
any salt, optical isomer, or salt of an optical isomer of the following:									
ethylamine	75047	MDMA, Meth		5 ppm TWA		10 ppm TWA	600 ppm	10 ppm TWA	
hydriodic acid (hydrogen iodine)	10034852	Meth (Red P method)							
isosafrole (1,2-methylenedioxy - 4-propenyl-benzene)	120581	MDMA							
methylamine	74895	MDMA, Meth		5 ppm TWA		10 ppm TWA	100 ppm	10 ppm TWA	
N-methylephedrine	552794	Meth (Red P, Birch methods)							
N-methylpseudoephedrine		Meth (Red P, Birch methods)							
piperonal	120570	MDMA							
propionic anhydride	123626	Fentanyl							
safrole (1,3-benzodioxole, 5-(2-propenyl)	94597	MDMA							
Acetic Anhydride	108247	Meth (P2P method)		5 ppm TWA		5 ppm TWA	200 ppm		
Acetone (2-propanone)	67641	Meth (Red P, Birch, & P2P methods)	refers to OSHA & NIOSH standards	500 ppm TWA	0.9 mg/kg/day	1000 ppm TWA	2500 ppm (LEL)	250 ppm TWA	0.35 mg/m3

Chemical	CAS #	Used to Produce	ATSDR[a]	ACGIH TLV [b]	EPA IRIS RfC [c]	OSHA [d]	IDLH [e]	NIOSH [f]	EPA Indoor Air Guidance (RfC) [g]
Anhydrous Ammonia	7664417	Meth (Birch method)	refers to OSHA standards	25 ppm TWA		50 ppm TWA	300 ppm	25 ppm TWA	
Benzyl Chloride	100447	Meth (P2P method)		1 ppm TWA	0.1 mg/m3	1 ppm TWA	10 ppm	1 ppm TWA	
Ethyl Ether	60297	Meth (Birch method)		400 ppm TWA	0.2 mg/kg/day	400 ppm TWA		400 ppm TWA	
Hydriotic Acid	10034852	---							
Hydrochloric Gas (hydrogen chloride)	764710	ALL	refers to OSHA standards	5 ppm TWA	0.02 mg/m3	5 ppm TWA	50 ppm	5 ppm TWA	
Hydrophosphoric Acid		Red P							
Iodine and Crystal Iodine	7553562	Red P		0.1 ppm TWA		0.1 ppm TWA	2 ppm	0.1 ppm TWA	
Lithium Metal	7439932	Meth (Birch method)							
Potassium Permanganate	7722647	Cocaine							
Red Phosphorus	7723140	Meth (Red P method)	refers to OSHA, NIOSH & ACGIH standards*	0.02 ppm TWA *		0.1 mg/m3 TWA *	5 mg/m3 *	0.1 mg/m3 TWA *	
Toluene	108883	Meth (Red P, Birch, & P2P methods)	refers to OSHA standards	100 ppm TWA	0.4 mg/m3	200 ppm TWA	500 ppm	100 ppm TWA	0.4 mg/m3
2-Butanone (Methyl Ethyl Ketone)	789303	Meth (Birch method)	refers to OSHA, NIOSH & ACGIH standards	200 ppm TWA	0.6 mg/kg/day	200 ppm TWA	3000 ppm	200 ppm TWA	
Methamphetamines	51570								
Lead	7439921		refers to OSHA standard	0.05 ppm TWA		0.05 mg/m3 TWA	100 mg/m3	<0.01 mg/m3 TWA	
Mercury	7439976		refers to OSHA standard	0.025 ppm TWA	0.0003 mg/m3	0.1 ppm TWA	10 mg/m3	0.05 ppm TWA	0.0003 mg/m3

[a]. Agency for Toxic Substances and Disease Registry ToxFAQs
[b]. http://www.osha.gov/
[c]. http://www.epa.gov/iris/subst/
[d]. http://www.osha.gov/
[e]. http://www.cdc.gov/niosh/database.html
[f]. TWA - Assumes exposure 10 hour work day during 40 hour work week
[g]. http://www.epa.gov/correctiveaction/eis/vapor/appd-f.pdf Assumes exposure 24 hours/day, 350 days/year, for 30 years
***** - values for elemental phosphorus

CAS - Chemical Abstracts Service number
LEL - Lower Explosive Limit

TABLE 1A ATSDR Minimum Risk Levels

Chemical	CAS #	Used to Produce	Route	Duration	MRL	Factors	Endpoint	Draft 0r Final
Acetone (2-propanone)	67641	Meth (Red P, Birch, & P2P methods)	Inhalation Oral	Acute Int. Chronic Int.	26 ppm 13 ppm 13 ppm 2 mg/kg/day	9 100 100 100	Neurol. Neurol. Neurol. Hemato.	Final 05/94
Anhydrous Ammonia	7664417	Meth (Birch method)	Inh. Oral	Acute Chr. Int.	1.7 ppm 0.3 ppm 0.3 mg/kg/day	30 10 100	Resp. Resp. Other	Draft 09/02
Iodine and Crystal Iodine	7553562	Red P	Oral	Acute Chronic	0.01 mg/kg/day 0.01 mg/kg/day	1 1	Endocr. Endocr.	Final 07/99
Red Phosphorus	7723140	Meth (Red P method)	Inh. Oral	Acute Int.	0.02 mg/cu. m 0.0002 mg/kg/day	30 100	Resp. Repro.	Final 09/97
Toluene	108883	Meth (Red P, Birch, & P2P methods)	Inh. Oral	Acute Chr. Acute Int.	1ppm 0.08 ppm 0.8 mg/kg/day 0.02 mg/kg/day	10 100 300 300	Neurol. Neurol. Neurol. Neurol.	Final 09/00
Mercury	7439976	Meth (P2P)	Inh.	Chr	0.0002 mg/cu m	30	Neurol.	Final 03/99

The toxicological profiles include an examination, summary, and interpretation of available toxicological information and epidemiologic evaluations of a hazardous substance. During the development of toxicological profiles, MRLs are derived when ATSDR determines that reliable and sufficient data exist to identify the target organ(s) of effect or the most sensitive health effect(s) for a specific duration for a given route of exposure to the substance. MRLs are based on noncancer health effects only and are not based on a consideration of cancer effects. Inhalation MRLs are exposure concentrations expressed in units of parts per million (ppm) for gases and volatiles, or milligrams per cubic meter (mg/m3) for particles. Oral MRLs are expressed as daily human doses in units of milligrams per kilogram per day (mg/kg/day).

ATSDR uses the no-observed-adverse-effect-level/uncertainty factor (NOAEL/UF) approach to derive MRLs for hazardous substances. They are set below levels that, based on current information, might cause adverse health effects in the people most sensitive to such substance-induced effects. MRLs are derived for acute (1-14 days), intermediate (>14-364 days), and chronic (365 days and longer) exposure durations, and for the oral and inhalation routes of exposure. Currently MRLs for the dermal route of exposure are not derived because ATSDR has not yet identified a method suitable for this route of exposure. MRLs are generally based on the most sensitive substance-induced end point considered to be of relevance to humans. ATSDR does not use serious health effects (such as irreparable damage to the liver or kidneys, or birth defects) as a basis for establishing MRLs. Exposure to a level above the MRL does not mean that adverse health effects will occur.

MRLs are intended to serve as a screening tool to help public health professionals decide where to look more closely. They may also be viewed as a mechanism to identify those hazardous waste sites that are not expected to cause adverse health effects. Most MRLs contain some degree of uncertainty because of the lack of precise toxicological information on the people who might be most sensitive (e.g., infants, elderly, and nutritionally or immunologically compromised) to effects of hazardous substances. ATSDR uses a conservative (i.e., protective) approach to address these uncertainties consistent with the public health principle of prevention. Although human data are preferred, MRLs often must be based on animal studies because relevant human studies are lacking. In the absence of evidence to the contrary, ATSDR assumes that humans are more sensitive than animals to the effects of hazardous substances that certain persons may be particularly sensitive. Thus the resulting MRL may be as much as a hundredfold below levels shown to be nontoxic in laboratory animals. (Source: http://www.atsdr.cdc.gov/mrls.html)

TABLE 2

STATE METHAMPHETAMINE REGULATIONS AND GUIDELINES

STATE	STATE REGULATIONS (YES/NO) Lead Regulatory Agency	CLEANUP GUIDELINES	TRAINING REQUIRED	CLEANUP STANDARDS for REOCCUPATION	POST CLEANUP TESTING REQUIREMENTS
ARIZONA	YES Arizona Bureau of Technical Registry	YES	YES	YES Title 4, Chapter 30, R4-30-305 Red Phosphorus – Removal of stained material or cleaned pursuant to stds. Iodine Crystals – Removal of stained material or cleaned pursuant to stds. **Meth – 0.1ug/100 cm^2;** Ephedrine – 0.1ug/100 cm^2 Psuedoephedrine – 0.1ug/100cm^2 VOCs in air < 1ppm; Corrosives - surface ph 6-8; LSD – 0.1 ug/100 cm^2. Ecstasy – 0.1 ug/100 cm^2. In certain cases: lead - 4.3ug/100cm^2 ; mercury - 3.0 ug/m^3 (air)	YES Title 4, Chapter 30, R4-30-305 Red Phosphorus – Removal of stained material or cleaned pursuant to stds. Iodine Crystals – Removal of stained material or cleaned pursuant to stds. Meth – 0.1ug/100 cm^2; Ephedrine – 0.1ug/100 cm^2; Psuedoephedrine – 0.1ug/100 cm^2 VOCs in air < 1ppm; Corrosives - surface ph 6-8; LSD – 0.1 ug/100 cm^2 Ecstasy – 0.1 ug/100 cm^2. In certain cases: lead - 4.3ug/100cm^2; mercury - 3.0 ug/m^3 (air)
CALIFORNIA	California Department of Toxic Substances required to remove contaminates from drug labs for law enforcement	None specified.	NO	No standard found. Has a program to develop risk assessed health based standards.	Not specified although testing is based upon risk assessment.
COLORADO	NO Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (303) 692-3300	YES	NO - Use of a Certified Industrial Hygienist recommended	Recommendation to cleanup to Meth at 0.5ug/ ft^2.	Testing for Meth at 0.5ug/ft^2recommended. Test for Mercury and Lead if P2P method used. Recommend indoor testing for VOCs in cases of moderate to heavy contamination. Soil, and surface and ground water testing may be recommended.
ILLINOIS	NO	YES	Recommend Certified Industrial Hygienist for sampling	NONE - Suggest risk evaluation based on population occupying space.	No guidelines for cleanup or sampling found.
KANSAS	NONE FOR CLEANUP	YES	Recommends using environmental companies trained in hazardous substance cleanup and removal.	NONE	Air testing mandatory if property posted prohibiting occupancy.

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MINNESOTA	NO	YES Provided by Minnesota Department of Health	NO	NO However, local cities and county governments may have established requirements.	Testing for Meth recommended
OREGON	YES Oregon Department of Human Services Public Health.	YES	YES	YES Meth: **0.5mg/ft^2.** Lead: 10 micrograms/ft^2. Mercury: 0.05 micrograms/ft^2 Corrosives: pH 2-12.5 (Aqueous waste) Ref: upper and lower limits as defined by 40 CFR 261.22	Meth: 0.5 mg/ft^2. Lead: 10 micrograms/ft^2. Mercury: 0.05 micrograms/ft^2 Corrosives: pH 2-12.5 (Aqueous waste) Ref: upper and lower limits as defined by 40 CFR 261.22
WASHINGTON	YES Washington State Department of Health 1-888-586-9427 http://www.doh.wa.gov/	YES	YES	YES WAC 246-205-541 Meth: **0.1 microgram/100cm^2** Lead: <= 20 micrograms/ft^2 Mercury: <= 50 nano grams per cubic meter in air and VOC: 1 part per million total hydrocarbons and VOCs in air.	WAC 246-205-541 Meth: <.1 microgram/100cm^2 Lead: <= 20 micrograms/ft^2 Mercury: <= 60 nano grams per cubic meter in air and VOC: 1 part per million total hydrocarbons and VOCs in air.
WISCONSIN	NO	YES	NO	NO	Testing not recommended unless Lead or Mercury are present

TABLE 3

COSTS ESTIMATES AND ANALYTICAL METHODS ASSOCIATED WITH THE CLANDESTINE DRUG CONTAMINANTS LEAD, MERCURY, VOLATILE ORGANIC HYDROCARBONS, AND METHAMPHETAMINES

Contaminate	Analytical Method	P2P[1] Method	Protocols	Labs[2]	Approximate Cost [3]
Lead (PB)	*3050 – Solid *3051 – Microbial Digestion *6010 – ICP (*Individually Coupled Plasma*) Emission Spectroscopy *6020 - ICP Mass Spectroscopy	Wipe		CTE	$43 to $54
Mercury (HG)	*7470 – Water *7471 – Solids/oils	Wipe		CTE	$40 to $75
Volatile Organic Hydrocarbons (VOCs)	*8260 – Solid/Liquid *5035 – Extraction procedure Methanol/ Sodium Bi-sulfide Air – SUMA Canister Air – Passive Charcoal Badge		 Follow instructions with kit	CTE Air Toxics, Folsom CA	$262 $180 to $385 Under Research
Methamphetamines (Meth)	Field test kits (Simon Reaction)		Follow instructions with kit	None in Alaska with High Pressure Liquid Chromatography – See State of Washington List of Labs Performing Meth Analysis	(Alturas $50.00/each on special– wipe samples normally $75 - $150) Simon Reaction kits field kits $30-$100

* EPA SW 846 Hazardous Waste Methods

[1] Amalgam Method aka P2P (phenyl-2-propanone): This is the only manufacturing method using lead and mercury.

[2] SGS CTE is an ADEC certified lab in Anchorage Alaska. Additional information may be found on the following websites: http://www.sgsenvironmental.com/laboratories/ or http://www.state.ak.us/dec/deh/laboratories/home.htm

[3] The values presented in this table were quoted to the Department and represent a range of costs. These values are a limited sampling of the marketplace and are subject to change.

RECOMMENDATION

The statutes currently imply that standards are to be established based upon a list that is submitted to the ADEC from ADPS on an annual basis. The list submitted to ADEC was that list of substances found in AS 11.71.200. Human health standards have not been established for all of the twenty-nine listed substances. The chemicals listed are precursors, catalysts, reagents, and solvents that can be used to manufacture a wide variety of illicit drugs. No other state uses this type of chemical list to establish realistic and achievable cleanup standards.

Based on the preliminary research and the fact that no health-based standards exist for methamphetamine or many of the substances used in methamphetamine production, ADEC recommends adopting existing 'fit for use' cleanup standards, sampling protocols, analytical methods, and decontamination guidelines based upon limits set for methamphetamine and VOCs. Testing and compliance with cleanup standards for lead and mercury will only be required if the amalgam (P2P) method was clearly used, based upon the following reasons:

- The amalgam method has not been found to be used in the State of Alaska.
- The possibility of obtaining false positives for lead and mercury exists. These materials were commonly added to paints or regions of Alaska have naturally occurring high background levels of these substances.

This approach is consistent with the supporting fiscal note and with other states where clandestine drug lab cleanup guidelines and regulations exist.