

Agent Characteristics	<p>Agent Classification (HL): Schedule 1 Chemical Warfare Blister (Vesicant) Agent. HL is mixture of Sulfur Mustard (HD) and Lewisite (L) and shares properties of both. Its properties are related to the exact composition, and the composition will vary with manufacturing process and changes after dispersion. CAS: NA; Formula: NA; Molecular Weight: 186.4 g/mol assuming 63/37 weight % L and HD. This QRG is based on munitions-grade HL, which has a composition of 63/37 weight % L/HD. Given that the composition of HL in an actual incident may be unknown, the user should read the QRGs for Sulfur Mustard and Lewisite. Decontamination verification must include both HD and L. [Additional agent characteristics specifically for HD — CAS: 505-60-2; Formula: C₄H₈Cl₂S; Molecular Weight: 159.08 g/mol.] [Additional agent characteristics specifically for L — CAS: 541-25-3; Formula: C₂H₂AsCl₃; Molecular Weight: 207.35 g/mol.] Description: HL may have a geranium, garlic, onion, horseradish or mustard-like odor, depending on the amounts of HD and L present, but may be odorless otherwise. HL is a blister (vesicant) agent that has both immediate effects and also delayed health effects on the order of hours, and contains a reported, known human carcinogen. It can be manufactured at different concentrations; with impurities, additives, or thickening materials that will all affect physical properties, appearance, persistence and analytical detection limits. Environmental breakdown products of HL are easily formed and include both relatively non-toxic compounds, such as thiodiglycol (TDG), and highly toxic arsenic (III) compounds, such as arsenites, lewisite oxide, and 2-chlorovinyl arsenous acid (CVAA); some cause similar blistering as HL. Decontamination by-products of HL include toxic mustard sulfone/sulfoxide, as well as arsenic (V) compounds that are generally less toxic than arsenic (III) compounds, but may be considered hazardous. Persistence: HL may be considered a "semi-persistent" chemical warfare agent with liquid deposition on surfaces lasting for hours to days, with the composition changing over time. Persistence will depend upon amount and purity of the agent, method of release, environmental conditions, and the types of surfaces and materials impacted. Porous, permeable, organic or polymeric materials such as carpets and vinyl tiles can act as "sinks" for absorbing HL vapors and liquids, prolonging persistence. Many toxic environmental breakdown products and decontamination by-products are persistent. Under certain conditions, when protected from environmental degradation processes, L breakdown products and HD may persist in soils for decades. HD may persist as globules in water for decades, if not physically disturbed.</p>																																
	<p>Physical properties are listed at/near STP unless otherwise indicated. Properties are for the munitions-grade HL mixture (63/37 % L/HD, w/w). Other mixtures will have different properties. Conversion Factors: ppm = mg/m³ x 0.122; mg/m³ = ppm x 8.21 (assuming MW = 186.4). Also see HD and L QRGs. UKN = unknown</p> <table border="1"> <thead> <tr> <th>Vapor Density</th> <th>Vapor Pressure</th> <th>Volatility</th> <th>Boiling Point</th> <th>Freezing Point</th> <th>Flash Point</th> <th>Liquid Density</th> <th>Aqueous Solubility</th> <th>Non-aqueous Solubility</th> </tr> </thead> <tbody> <tr> <td>6.5 (air = 1)</td> <td>0.248 mm Hg (68°F/20°C)</td> <td>2,730 mg/m³ (68°F/20°C)</td> <td>UKN, but below 374°F/190°C</td> <td>-13°F/-25°C to -44°F/-42°C</td> <td>UKN, Assume 223°F/106°C (HD)</td> <td>1.66 g/mL (68°F/20°C)</td> <td>Slightly</td> <td>Common solvents, alcohols, gasoline, oils, fats</td> </tr> </tbody> </table>									Vapor Density	Vapor Pressure	Volatility	Boiling Point	Freezing Point	Flash Point	Liquid Density	Aqueous Solubility	Non-aqueous Solubility	6.5 (air = 1)	0.248 mm Hg (68°F/20°C)	2,730 mg/m ³ (68°F/20°C)	UKN, but below 374°F/190°C	-13°F/-25°C to -44°F/-42°C	UKN, Assume 223°F/106°C (HD)	1.66 g/mL (68°F/20°C)	Slightly	Common solvents, alcohols, gasoline, oils, fats						
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<p>AIR RELEASE SCENARIOS ARE ASSUMED MOST PROBABLE; HOWEVER, OTHER RELEASE SCENARIOS AND EXPOSURE ROUTES SHOULD BE CONSIDERED. Open Areas: HL has moderate volatility, and could be dispersed as a vapor or a liquid, depending upon the percentages of the HD and L within the mixture. The primary release/attack scenarios are cold weather operations and airborne releases. HL is expected to degrade in the environment fairly rapidly; however, liquid HL on surfaces could persist for days. Environmental conditions will affect the degradation and evaporation rates of HL with cooler and drier conditions enhancing persistence. HL has a freezing point at -25°C (-13°F), so the re-aerosolization of liquids and solids, as ambient temperatures rise, may present a real hazard. HL vapors are heavier than air, so vapors can accumulate in lower terrains. Water/Water Systems: HL released into water will likely hydrolyze within a few hours into vesicant and toxic compounds, which may persist for days to weeks. In sufficient amounts (relative to water volume), it may also form HD globules surrounded by a protective outer layer resistant to hydrolysis. These globules may settle out or be entrapped, persisting for years and posing a contact hazard to anyone disturbing them. Areas in which the globules may persist include stagnant volumes of water as small as puddles formed by precipitation events. If released into water systems such as reservoirs, treatment plants, distribution systems, public fountains or pools, their treatment processes may result in further reaction with HL. Water systems, plumbing, surfaces and equipment that have contacted contaminated water, including HD globules, must be evaluated for decontamination along with the bulk water. Indoor Facility: HL may be considered as a semi-persistent agent with moderate volatility, and could potentially be distributed throughout a building or facility from a point source. Liquid HL may result in localized areas of surface contamination. HVAC system intakes near to liquid HL should be investigated for contamination from HL vapors and aerosols. HL vapors are heavier than air so vapors can accumulate in lower levels or utility corridors inside the buildings.</p>																																	
Release Scenarios	<p>Onset</p> <p>Onset and severity of effects depend on dose, duration and route of exposure (not all signs/symptoms may develop). The effects caused by HD or L are not typically fatal immediately, but can require substantial supportive medical care, and secondary infections from blisters/tissue damage may also be fatal. L can cause immediate eye pain and eye/skin/respiratory tract irritation and skin redness within 15-30 minutes. Blister formation and deep skin burns are approximately 12 hours post exposure. Actual signs/symptoms of HD exposure (eye irritation, coughing, reddening and burning of skin) are delayed 1-48 hours after exposure, so those exposed may not be aware.</p>																																
	<p>Signs/Symptoms</p> <p>Symptoms will vary depending on exposure route; however, the following is a general list of all possible symptoms. The severity of effects depends upon the dosage. Mild: Mild effects are due to HD and delayed 1-48 hours (severity depends on dose): Eye irritation (tearing, grittiness), runny nose, sneezing, nosebleed, hoarseness, hacking cough. Moderate: Effects of HD delayed 1-24 hours: Mild effects plus reddening and swelling of eyelids, severe cough, shortness of breath, reddening of skin. Effects for L are immediate and include those for HD plus stinging, burning pain and itching, spasmodic blinking, nosebleed, difficulty breathing or shortness of breath. Severe: Effects of HD delayed 1-24 hours: Upper respiratory/lung damage may occur at high concentrations and longer exposure durations. Effects of L include corneal blistering and scarring, blindness, inflammation of lungs, lung edema, respiratory failure and death.</p>																																
	<p>Exposure Routes</p> <p>Inhalation: Vapor exposure is absorbed in mucous membranes (mouth, throat and lungs). Skin: Direct contact with HD and L mixtures can cause redness or blisters immediately. Warm and sweaty skin areas (underarms, groin) are most susceptible to exposure. Eyes: Eyes are the most sensitive to HD and L injury; effects noted immediately; irritation, burning, gritty feeling, itching, weeping, reddening, lid swelling, light sensitivity, pain and corneal injury. High concentration effects are extremely painful and generally require extended medical treatment. Ingestion: Consumption of contaminated food or drink could cause burning, nausea and vomiting.</p>																																
Health Effects	<p>Air: Acute Exposure Guideline Levels (AEGs) for general population one-time exposure emergency scenarios are not available for HL. However, AEGs are available for HD and for Lewisite (L-1) (complete definitions are available in Key References Cited/Used in NRT Quick Reference Guides for Chemical Warfare Agents). Because AEGs are not available for HL, use the lower of HD or L values from tables below. NA = not available.</p>																																
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<p>Exposure Guidelines are not available for HL directly. See below for HD/L values: IDLH: 0.7 mg/m³ (HD); 0.36 mg/m³ (L). IDLH for L based on proposed value that is toxicologically derived. STEL: 0.003 mg/m³ (HD); NA (L). Worker Population Limit (WPL) [an 8-hr time-weighted average occupational value] = 0.0004 mg/m³ (HD); = 0.003 mg/m³ (L); General Population Limit (GPL) [a 24-hr time-weighted average] = 2.0 x 10⁻⁵ mg/m³ (HD); = 0.003 mg/m³ (L). WPL and GPL for L based on detection limit and are not health-based. Soil: Industrial Exposure Scenario = 0.3 mg/kg (10⁻⁴ cancer risk) (HD); 3.7 mg/kg (L); Residential Exposure Scenario = 0.01 mg/kg (10⁻⁵ cancer risk) (HD); 0.3 mg/kg (L). Drinking Water (HD): Provisional Advisory Levels (PAL-1) for HD are not available due to the rapid hydrolysis of dissolved HD to TDG. In the absence of PALs, the U.S. Army's Military Exposure Guidelines (MEGs) may be used: the MEG at 5 L/day, for 7 days = 140 µg/L. Drinking Water (L): PAL-1 for L are not available. In the absence of PALs, the U.S. Army's MEGs may be used: the MEG at 5 L/day, for 7 days = 80 µg/L.</p>																																	

Personnel Safety	Note	Personal Protective Equipment (PPE) selection (levels A-D), medical surveillance requirements, First Aid options and personnel decontamination may vary depending upon the amount and purity of agent, site conditions and the release scenario. Additional information on personnel safety and PPE selection criteria can be found at: www.cdc.gov/niosh/ershdb . We also recommend that responders check their own internal procedures (i.e., SOPs), if they have them.																																																							
	Medical	Pre-incident: Annual physical and respiratory function exams. During Incident: Conduct periodic on-site medical monitoring, observe for any signs and symptoms as per Health Effects section above and treat accordingly as per First Aid section below.																																																							
	First Aid	Immediately remove person from affected area and remove contaminated clothing and articles. Wash bare skin immediately with water, or warm, soapy water if available, at normal household pressures (~50-60 psi) for three minutes, ensure thorough soaking. Rinse eyes exposed to liquid agent with potable water for 15 minutes. Antidote: Dimercaprol (a.k.a. British Anti-Lewisite, 2,3-dimercaptopropanol) available for L. Antidote should only be administered in hospital setting. NO ANTIDOTE AVAILABLE FOR HD; be aware effects of HD are delayed 1-48 hours. Send person for follow-up medical attention and evaluation. If cleared to resume work, continue to monitor for signs/symptoms and treat accordingly.																																																							
	PPE	GENERAL INFORMATION: NIOSH-certified Chemical, Biological, Radiological, Nuclear (CBRN) Self Contained Breathing Apparatus (SCBA), Air Purifying Respirators (APR) or Powered Air Purifying Respirators (PAPR), full-face masks, and protective clothing should be used. Pre-incident training and exercises on the proper use of PPE are recommended. Currently no inhalation exposure guidelines exist for HL mixture. Use HD and L exposure guidelines. The L component of HL does NOT provide sufficient warning properties that would allow appropriate use of APR/PAPR in most contamination scenarios (see Level C). Per NIOSH guidance - LEVEL A: Recommended for the initial response to an HL incident. Level A provides the greatest level of skin (fully encapsulating suit), respiratory (SCBA), and eye protection when the contaminant identity or concentration is unknown. Select Level A when the HL concentration is unknown or above the IDLH or AEGL-2, and when there is a potential of ocular or dermal exposure. LEVEL B (modified): Provides the highest level of respiratory protection (SCBA) when a lesser level of skin protection is required. Select Level B when the HL concentration is unknown or above the IDLH or AEGL-2 for either HD or L and dermal exposure is less of a risk. Level B differs from Level A in that it typically incorporates a non-encapsulating, splash-protective, chemical-resistant outer suit that provides protection against most liquids but is not vapor tight. The Level B PPE dress-out for HL should be modified to ensure there is no exposed skin or potential for ocular exposure. LEVEL C (modified): Level C may not be appropriate for an HL response since there are insufficient warning properties for HL inhalation exposures to permit the appropriate use of APR/PAPR. LEVEL D: Select Level D when the contaminant is known and the concentration is below the appropriate occupational exposure limit for the stated duration times. Since no such values exist for the HL mixture, values for both HD and L may have to be used. Downgrading PPE levels can be considered only when the identity and concentration of the contaminant and the risks of dermal exposure are known, and must be accompanied by on-site monitoring. Monitoring for HD and L is required during an HL response to ensure that exposure guidelines for either have not been exceeded.																																																							
Field Detection	Real-time field screening tools (results not confirmatory or quantitative): Caution should be given to equipment that has not been properly evaluated. False positive and false negatives may occur in the presence of interferents common in the environment. The following is a summary of minimum screening concentration ranges for equipment procured by many EPA and HAZMAT response teams. Other screening tools may be used by these teams and other agencies and responders, some with similar capabilities and limitations. NA = not available.																																																								
	Currently no instruments measure HL directly; see below for separate tables for field detection of HD and L:																																																								
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Sampling	<p>Note: This section on sampling contains general guidelines and does not replace the need for a site-specific sampling plan (See Key References Cited/Used)</p> <p>Sampling Concerns: Detection, sampling equipment and procedures, and analytical techniques will be site-specific and depend on: 1) physical state of the agent; 2) type of surfaces contaminated (e.g., porous vs. non-porous); 3) the purpose of sampling (e.g., characterization, decontamination efficacy and clearance); and 4) specific laboratory requirements. Few laboratories currently have capability to determine HL, particularly for large numbers of samples and in all types of media. The U.S. Environmental Protection Agency (EPA) has set up mobile and fixed labs and analytical assets for chemical agent analysis of environmental samples under their Environmental Response Laboratory Network (ERLN), see ANALYSIS section below (www2.epa.gov/emergency-response/environmental-response-laboratory-network). For sampling questions, call the EPA/HQ-EOC at 202-564-3850.</p>																																																								
	<p>Sample Locations and Planning: Initially consider air monitoring to ensure worker safety and to determine if there is a vapor plume that could impact other areas. Characterization sampling is initiated by targeted or judgmental sampling to identify "hot spots," potential agent flow paths, and media or objects potentially acting as sinks. Additional biased or random sampling can be used to determine the extent of potential contamination or to verify the efficacy of decontamination. More thorough probabilistic sampling (e.g., grid, statistical approach) may be required for the clearance phase or if there are large uncertainties about the area impacted or the amount released. Because HL may be considered a semi-persistent liquid, sample priorities should include surfaces that are potentially contaminated with aerosol/liquid (e.g., release site, low lying areas) and that humans are likely to contact or where vegetation is used as food.</p>																																																								
	<p>Note: There are no sampling and analytical methods specific for HL. Samples should be analyzed for presence of both HD and L agent and their breakdown products. See ANALYSIS section below to ensure sampling procedures are compatible with all analytes.</p> <p>[Additional note specifically for HD — HD breaks down in most environmental conditions to numerous breakdown products, especially TDG, which may be used as a marker to determine the extent of contamination of the parent HD.]</p> <p>[Additional note specifically for L — L breaks down in most environmental and decontamination conditions to numerous persistent toxic products, such as arsenites, lewisite oxide, and CVAA; some cause similar blistering as L. Because of low capacity for analysis that is specific for L and L-related compounds, total arsenic (As) may be used as a marker to determine the extent of contamination of the parent L. Arsenic is prevalent in many environments therefore determining background As levels is recommended.]</p> <p>Types of Samples:</p> <p>Air (Vapors are heavier than air): Samples are collected using appropriate solid phase absorbent media (tubes) or air sampler (e.g., SUMMA canister) at breathing zone level (~5 ft.) to assess inhalation exposure and at ground levels (~6 in.) to assess off gassing at surfaces. Determination of total As in particulates in air via high-volume air samplers is recommended.</p> <p>Water: Water should be collected in appropriate containers with addition of appropriate de-chlorinating agents and preservatives.</p> <p>Soil: For localized hot spot areas where soil deposition may occur (i.e., aerosol or liquid droplets), surface soil samples should be taken from a non-vegetated area to a depth of less than one inch. Sub-surface soil samples may not be necessary unless a large amount of liquid was poured on the ground, or if an underlying aquifer is endangered.</p> <p>Surface Wipes: Wipe samples are often desired to indicate absence of HL (as HD and L) on non-porous surfaces. Concurrent air monitoring is recommended.</p> <p>Bulk: For hot spot areas where liquid HL deposition may occur on porous surfaces (e.g., concrete, asphalt), actual pieces or cores of contaminated surface may be obtained using appropriate tools (scabbling, coring or drills) for subsequent laboratory extraction analysis for both HD and L. Bulk samples of suspected sink materials may be recommended to rule out secondary vapor phase disposition or absorption of HD and L into these materials.</p> <p>Other Sample Matrices: Contact EPA/HQ-EOC at 202-564-3850 for sampling instructions.</p>																																																								
	<p>Sample Packaging and Shipping: The packaging and shipping of samples are subject to strict regulations established by DOT, CDC, USPS, OSHA and IATA. Contact the sample-receiving laboratory to determine if they have additional packaging, shipping or labeling requirements.</p>																																																								
Anal ysis	<p>CAUTION: Many labs may not be able to perform analysis on all matrices (e.g., wipes and soil). The ERLN will use uniform, compatible sample prep and analytical methods. (See www2.epa.gov/emergency-response/environmental-response-laboratory-network). For access to the nearest ERLN laboratory specially trained and equipped for HD or L analysis, contact the EPA/HQ-EOC at 202-564-3850.</p>																																																								

Decontamination/Cleanup	<p>Decontamination/Cleanup Planning: Once site controls are in place, develop a site-specific decontamination/cleanup plan. Decontamination may require a “tiered approach” using a variety of techniques and products. Call the EPA/HQ-EOC at 202-564-3850 for more information.</p> <p>General Considerations: A cost vs. benefit evaluation should be undertaken for each decontamination strategy and approach that considers: public safety, total cost, impact on the facility, wastes generated, as well as the time the facility or item will be out of service and any socio-economic, psychological, and/or security impacts that may result. Large volumes of decontamination wastes may be generated that will need to be collected, treated and disposed of properly. Waste handling and disposal must be addressed as early in the decontamination and cleanup process as possible (see Waste Management section below).</p> <p>Disposal Option: The urgency to restore a facility as quickly as possible may result in the outright and timely removal and disposal of contaminated materials. Certain materials may be resistant to decontamination formulations, or may be cheaper to discard and replace than to decontaminate and restore.</p> <p>Monitored Natural Attenuation: HL degrades via natural processes. Environmental monitoring must be maintained during decontamination and recovery phases. Monitored natural attenuation may require institutional controls (e.g., access restriction and contaminant containment measures). The time to achieve clearance must be considered in the overall cost/benefit evaluation. This option is more passive than other options but is non-destructive to materials. Porous or permeable materials can adsorb HL thereby prolonging persistence.</p> <p>Fix-in-Place Option: The contaminated area may be resistant to decontamination products or may be unable or impractical to be treated. Physical barriers can be used to separate and immobilize the agent contamination from coming into contact with the environment or the public. This can be a temporary or permanent solution.</p> <p>Decontamination Strategy: A decontamination strategy can be developed by designating contaminated areas into three broad categories: 1) surfaces or hot spots, 2) large volumetric spaces, and 3) sensitive equipment or items. Areas in each category may be treated using one or more unique decontamination processes in a tiered approach to the overall site-specific decontamination strategy.</p> <p>Surfaces/Hot Spots: This category is for areas smaller in size but with higher levels of agent contamination. They may require more rigorous decontamination products and methods. 1) Hypochlorite solutions are effective but can be very corrosive to certain surfaces and materials and should be rinsed thoroughly afterwards. Household bleach solutions (≥5% sodium hypochlorite) are effective for decontamination of surfaces contaminated with HL with efficacy achieved with contact time of 30-60 minutes depending on surface material. Diluted bleach (<0.5% sodium hypochlorite) has been shown to be non-effective for these contact times. Calcium hypochlorite, present in commercial products, such as HTH (10% hypochlorite solution), is better for surfaces with high concentrations of liquids in localized areas. 2) Proprietary decontamination foams and gels such as DF-200®, CASCAD®, Decon Green®, or L-Gel® have been reported to be effective against HD on the order of minutes to hours, but not all have been thoroughly tested. Availability, cost and the need for specialized equipment may limit their use early in the response.</p> <p>Large Volumetric Spaces: This category is for areas larger in size but with lower levels of agent contamination. They may require less aggressive but more broadly applied decontamination products and methods. Approach is based on the presence of HD and/or L; no data is available for HL mixture. 1) Monitored Natural Attenuation is more passive than other decontamination options and is non-destructive to materials. This option may be preferable given the scope and severity of contamination. 2) Forced or Hot Air ventilation methods are recommended for vapor plume contamination or low concentration of HL in large volumetric spaces or open areas; efficacy typically can be achieved in hours to days with less waste and adverse impacts to materials. 3) Fumigation with modified vaporous hydrogen peroxide (VHP®) has been reported to be effective against HD. HVAC systems in large indoor spaces may require a separate decontamination strategy that could include the use of Hot Air ventilation or fumigation.</p> <p>Sensitive Equipment and Items: 1) Forced or Hot Air ventilation may be used for HL and can be used either in-situ or ex-situ to decontaminate these items. 2) modified VHP® fumigation can be used on these items for removal of HD with less corrosion to electronics than dilute hypochlorite solutions.</p> <p>CAUTION: Decontamination products may have unique safety/PPE requirements due to their own toxicity or that of breakdown products during use (e.g., bleach results in chlorine vapors). Strong oxidizers, such as hypochlorite, may react violently with organics. Under oxidizing conditions (i.e., bleach), HD can break down into several toxic by-products, such as mustard and vinyl sulfones. Hydrolysis of HD releases Cl ions that can affect the pH of solutions. Formulations should be chosen that do not allow the formation of these toxic breakdown products. Dirt, grime and other coatings can reduce the efficacy of decontamination; pre-cleaning surfaces with soap and water may be needed before the application of decontamination formulations but resulting pre-cleaning rinsates may contain and spread agent.</p> <p>Verification of Decontamination: Site and situation specific. Please contact EPA/HQ-EOC at 202-564-3850 for further assistance.</p>
Waste Management	<p>CAUTION: Federal requirements for transporting hazardous materials and procedures for exemptions are specified in www.fmcsa.dot.gov/safety-security/hazmat/complymregs.htm#hmp. These regulations differ from state-to-state. Detailed state regulations can be found at www.envcap.org/. Current resources on packaging, labeling and shipping are available at www.phmsa.dot.gov/hazmat.</p> <p>Waste Management: Under the Resource Conservation and Recovery Act (RCRA), waste generally is classified as hazardous waste (subtitle C) or solid waste (subtitle D). Under RCRA's statutory authority, a waste is considered hazardous if it: (A) causes or significantly contributes to an increase in mortality or an increase in serious, irreversible or incapacitating reversible illness or (B) poses a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed. The RCRA regulations generally define a waste as hazardous if it is: (1) a listed waste (40 CFR §261.31, §261.32), (2) exhibits specific characteristics (40 CFR §261.21-261.24) or (3) is a discarded commercial chemical product or discarded commercial chemical product or off-specification, container residues, and spilled residues thereof (40 CFR §261.33). The States (except for Alaska and Iowa) have the primary responsibility to implement the hazardous waste regulations and can impose more stringent requirements than the Federal program, so it is critical to open a dialogue with regulators as early as possible. Several states (CO, IN, KY, MD, OR, UT) have their own waste designations for CWA, which may be applicable for the cleanup of contaminated residues. HD and L are not hazardous wastes under the Federal regulations, but state codes may apply for HD and L contaminated residues, soils and debris. Because L contains As, state and local authorities may have specific regulations regarding disposal of As-contaminated wastes. Management of toxic decomposition products, associated residual decontamination solutions, local waste acceptance criteria, and transportation and handling requirements should be considered. The EPA has developed I-WASTE, a web-based tool that contains links to waste transportation guidance, treatment and disposal facilities, state regulatory offices, packaging guidance, and guidance to minimize the potential for contaminating the treatment or disposal facility. Access to this decision support tool requires pre-registration (www2.ergweb.com/bdrtool/login.asp).</p>