APPENDIX A—RECOMMENDED QUESTIONS ON DECONTAMINATION EQUIPMENT

APPENDIX A—RECOMMENDED QUESTIONS ON DECONTAMINATION EQUIPMENT[1]

Buying detection, protection, and decontamination equipment to respond to the threatened terrorist use of chemical or biological warfare agents may be new for Public Safety Agencies. To help procurement officials obtain the best value for their domestic preparedness dollar, the staff of the Center for Domestic Preparedness (Fort McClellan, AL), military Chemical/Biological Units, the National Institute of Justice, and members of a Federal Inter Agency Board (that includes representatives from the State and local law enforcement, medical, and fire communities) have compiled a series of questions. These questions should assist officials in selecting products from the large number in the present-day marketplace. Requesting vendors to provide written responses to your specific questions may also be helpful in the decision process.

1. What decontamination operations does the system support — personnel, vehicles, and/or buildings?
2. What chemical warfare agents and biological agents has the decon equipment been designed against?
3. What chemical warfare and biological simulants has the decon equipment been tested against? Has the equipment been tested against live agents? Which ones?
4. Who conducted the tests and when? Have the test results been verified by an independent laboratory or only by the manufacturer?
5. Is the test data available? Where? How can I get a copy?
6. What decontamination agents does the system use? What precautions are required in storing, transporting, and mixing the concentrated decontamination reagent?
7. How much does the decon agent cost (per person treated or per vehicle treated) and what is the recommended quantity that a department should keep on hand? What are the shelf life and storage requirements? Is expedited logistics support for decon reagent available in an emergency? What are the costs, response times and time delays?
8. What water sources does the system support — hydrant, open water source (pond, river)? How much water is consumed per hour?
9. Does the system heat the water? If so what is the energy source? Does the heater capacity become the limiting factor on throughput during cold weather operations?
10. Does the system include equipment for managing run-off? What are the hazards and precautions?
11. What is the design throughput of the system — people per hour, vehicles per hour, square meters per hour?
12. Has the system been tested in extended operations? Is the system capable of continuous operations or must the processing be stopped periodically to replenish consumables? How long between required maintenance? Equipment?
13. What is the minimum suite of equipment for decon operations? How long does it take to set up the equipment? How many personnel are required for set up, continuous operations, and breakdown?

[1]Information provided by the National Domestic Preparedness Office (NDPO) in coordination with the National Institute of Justice and the Technical Support Working Group.

14. How large is the equipment — weight and volume? What is the recommended method of transport? Are there any transportation limitations?
15. For personnel decon, does the design provide for gender separation if disrobing is required?
16. What training is required to set up, operate and maintain the system? Does the company provide those services? Are training materials (videos, books, CD-ROMs) available for use by new personnel? What are the costs of training materials?
17. Has the system been tested in extreme weather conditions — cold, rain, heat, and wind? At what wind speed does the tent become a kite?
18. How is the equipment decontaminated after use? What are the sampling procedures to verify safety?
19. What are the procedures and costs for disposing of expended decontamination solution?
20. How long has the company/manufacturer been involved with the Chem-Bio-Nuc and first responder industries?
21. Ask for names and phone numbers of departments currently using the company's equipment. Ask to follow-up (on the phone) any written testimonials.
22. What additional items are required to operate/maintain the equipment? At what cost?
23. What type of warranty/maintenance support is offered? Cost?
24. What is the return rate on the equipment under warranty? What are the top five reasons for failure?

APPENDIX B—REFERENCES

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1. John A. Barrett, William M. Jackson, Imran A. Baig, Amy L. Coverstone, Craig E. Harfield, Richard D. Arcilesi, James Butler, William Burton, and Charles W. Williams, Jr., *Wide Area Decontamination: CB Decontamination Technologies, Equipment and Projects, Final Report;* Chemical Warfare/Chemical Biological Defense Information Analysis Center, Edgewood, MD, March 1999.

2. Armando S. Bevelacqua and Richard H. Stilp, *Terrorism Handbook for Operational Responders*, Emergency Film Group, Edgartown, MA, January 1998.

3. Robert E. Hunt, Timothy Hayes, Warren B. Carroll, *Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident*, Battelle, Columbus, OH, September 1999.

4. A.K. Stuempfle, D.J. Howells, S.J. Armour, C.A. Boulet, *International Task Force 25: Hazard from Industrial Chemicals Final Report*, Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD, AD-B236562, ERDEC-SP-061, April 1998.

5. *Responding to A Biological or Chemical Threat: A Practical Guide*, U.S. Department of State, Bureau of Diplomatic Security, Washington, DC, 1996.

6. *2000 Emergency Response Guidebook, A Guidebook for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident*, U.S. Department of Transportation, Research and Special Programs Administration, Tempest Publishing, Alexandria, VA, January 2000.

APPENDIX C—DECONTAMINATION SHELTERS

APPENDIX C—DECONTAMINATION SHELTERS

Decontamination Shelters	Manufacturers
First Response Shelters	TVI Corporation 7100 Holladay Tyler Road Suite 300 Glenn Dale, MD 20769 301–352–8800 (Phone) 301–352–8818 (Fax)
Quick-E WMD Command Post	TVI Corporation 7100 Holladay Tyler Road Suite 300 Glenn Dale, MD 20769 301–352–8800 (Phone) 301–352–8818 (Fax)
Emergency Shelter	Zumro, Inc. P.O. Box 655 Willow Grove, PA 19090 800–932–6003 (Phone)
SC Spill Containment	North Eastern US Better Products Company States: MA, CT, VT, NH, ME, RI, NY, NJ, and PA Dan Meloche 800–423–0686 (Phone) 508–885–9955 (Fax) Western US SC Spill Containment Karl & Vera Steiner 888–775–3030 (Phone) 208–834–2652 (Fax)

APPENDIX D—DECONTAMINATION EQUIPMENT TRAILER

APPENDIX D—DECONTAMINATION EQUIPMENT TRAILER

The Boston Fire Department recently completed the construction of a new Mobile decontamination unit, shown in figure 1. This unit is a 22 ft International box truck that has been outfitted to function as a decontamination unit, responding to hazardous materials incidents. The unit provides 6 indoor showers and 4 outdoor showers using warm water and a sheltered area for changing to address modesty issues. It has been outfitted with polyethylene walls, floor and ceiling, plumbing, electrical, ventilation equipment, supplied air, and a hot water system. In preliminary testing by the Boston Fire Department it was found that it would take a civilian 6 min to 7 min to move through the decontamination sections and 5 min to 7 min for a firefighter dressed in level A. The decontamination unit also carries military field shower units and emergency decontamination shelters. The showers in the units are capable of supplying warm water for decontamination. The water heater used for the field shower is capable of delivering 33000 British thermal unit (Btu).

Figure 1. Mobile decontamination unit

The unit is divided into four sections. Smoked-out plastic curtains divide each section including the entrance and exit to provide privacy. The first section is the entrance, shown in figure 2. The entrance is utilized as a storage area for the water heater, when the unit is not in use as a clothing removal area.

Figure 2. Section 1, entrance

Sections 2 and 3 house the showers. Section 2 houses the primary showers. Four showerheads are located in this section for decontamination purposes (fig. 3). Section 3 includes 2 showerheads, one on each wall (fig. 4).

Figure 3. Section 2, primary showers

Figure 4. Section 3, secondary showers

Finally, section 4 comprises a storage and redressing area and is used to store victim clothing, storage shelving, decontamination supplies and solutions, supplied air, and extra tentage (fig. 5). Section 4 also includes a ventilation system that draws air from all four sections through a HEPA filter and vents to the outside (fig. 6).

Figure 5. Section 4, storage area

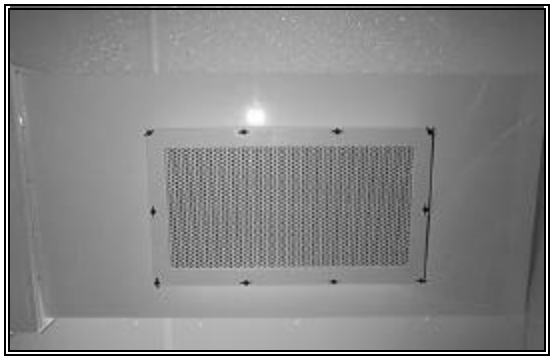

Figure 6. HEPA filter

The hot water system employed in the decontamination unit is equipped with a military M80 diesel or JP8 fired boiler that requires 240 VAC input from the generator (fig. 7). This unit was provided by the SBCCOM under a Cooperative Research & Development Agreement with the City of Boston for evaluation. The heater itself is capable of 500000 Btu and can deliver 9 gallons per minute (gpm). The heated water is mixed in a mixing chamber with cold water to supply the entire unit. The approximate weight of the water heater is 350 lb, not including the extra hoses and mixing box used to incorporate the cold water.

The entire system must be pressurized to no more than 40 lb psi. As a result, a fire engine is utilized as a manifold to regulate the pressure from any water source (i.e., hydrant). Liquid runoff and waste runs via gravity feed through drains that are located in the floor of every section into a collapsible holding tank (fig. 8). A hazardous materials contractor then removes the contaminated water from the container.

Figure 7. Generator

Figure 8. Holding tank

The department is currently in the process of working on revisions to their design to ensure optimal trailer levels in the future. The Boston Fire Department built the decon unit using the knowledge they have acquired during working hazardous materials incidents. However, there are many commercial decontamination trailer vendors available. Below are the names and contact information for some of them.

Advanced Containment Systems Inc. (ACSI)
8720 Lambright Road
Houston, TX 77075
800–927–2271 (Phone)

American Engineering
15886 Michigan Road
Argos, IN 46501
219–892–5151 (Phone)

Maryland Trailer Sales
410–866–4053 (Phone)

Resun Leasing, Inc.
P.O. Box 1069
Edgewood, MD 21040
800–321–7971 (Phone)

HazDecon
810 W. Alex Bell Rd
Dayton, OH 45459

APPENDIX E—INDEX BY DECONTAMINANT NAME

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APPENDIX F—DECONTAMINANT DATA SHEETS

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Decontaminant

Calcium Hypochlorite

Permissible Exposure Limit

Information not available

Health Effects

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. WATER REACTIVE.

Inhalation: Corrosive. Extremely destructive to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema.

Ingestion: Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach. Can cause sore throat, vomiting, and diarrhea.

Skin Contact: Corrosive. Symptoms of redness, pain, and severe burn can occur.

Eye Contact: Corrosive. Contact can cause blurred vision, redness, pain, and severe tissue burns.

Chronic Exposure: Repeated exposures to calcium hypochlorite may cause bronchitis to develop with cough and/or shortness of breath.

Aggravation of Pre-existing Conditions: No information found.

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person.

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 min while removing contaminated clothing and shoes. Wash clothing before reuse.

In all cases get medical attention immediately.

Environmental Hazards

Stability: Rapidly decomposes on exposure to air. May decompose violently if exposed to heat or direct sunlight. Thermally unstable; decomposes at 177 °C (350 °F).

Hazardous Decomposition Products: Calcium hypochlorite gives off oxygen, chlorine, and chlorine monoxide.

Incompatibilities: Calcium hypochlorite is a strong oxidizer. Reacts with water and acids, giving off chlorine gas. Forms explosive compounds with ammonia and amines. Incompatible with organic materials, nitrogen compounds, and combustible materials.

Environmental Conditions

Information not available

Environmental Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a Resource Conservation and Recovery Act (RCRA) approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from Federal disposal regulations. Dispose of container and unused contents in accordance with Federal, State, and local requirements.

Accidental Release Measures: Remove all sources of ignition. Keep water away from spilled material. Ventilate area of leak or spill. Wear appropriate personal protective equipment as required.
Spills: Clean up spills in a manner that does not disperse dust into the air. Use nonsparking tools and equipment. Pick up spill for recovery or disposal and place in a closed container. Do not seal tightly.

PPE Required

Personal Respirators (NIOSH approved): For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator.

WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron, or coveralls, as appropriate, to prevent skin contact.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eyewash fountain and quick-drench facilities in work area.

Decontaminant

Sodium Hydroxide Solutions (More than 10 % NaOH)

Permissible Exposure Limit

1.2 ppm (v)

Health Effects

Emergency Overview

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS, AND OTHER MATERIALS.

Inhalation: Severe irritant. Effects from inhalation of mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.

Ingestion: Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, and a fall in blood pressure. Damage may appear days after exposure.

Eye Contact: Corrosive! Causes eye irritation, and with greater exposures it can cause burns that may result in permanent vision impairment, and even blindness.

Environmental Hazards

Decomposition by reaction with metals such as aluminum, magnesium, tin, and zinc releases flammable and explosive hydrogen gas.

May cause fire and explosions when in contact with incompatible materials (10 % to 60 % Sodium Hydroxide solution).

Not an explosive hazard when using a sodium hydroxide solution less than 8 %.

Environmental Conditions

Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatibilities. Store above 16 °C (60 °F) to prevent freezing. Always add caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not store with aluminum or magnesium. Do not mix with acids or organic materials.

Environmental Considerations

This material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from Federal disposal regulations. Dispose of container and unused contents in accordance with Federal, State, and local requirements.

Accidental Release Measures: Contain and recover liquid when possible. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.

PPE Required

Personal Respirators (NIOSH approved): If the personnel exposure limit is exceeded, a half-face dust/mist respirator may be worn for up to 10 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eyewash fountain and quick-drench facilities in work area.

Decontaminant

Sodium Hydroxide Solution (0.8 % to 8 %)

Permissible Exposure Limit

1.2 ppm (v)

Health Effects

Potential Health Effects: The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms that are referenced in the descriptions below.

Environmental Hazards

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: No hazardous decomposition products.

Hazardous Polymerization: Will not occur.

Incompatibilities: Acids, aluminum, tin, and zinc metals.

	Conditions to Avoid: Heat, moisture, and incompatibles.
Environmental Conditions	Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatibilities. Store above 16 °C (60 °F) to prevent freezing. Always add the caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not store with aluminum or magnesium. Do not mix with acids or organic materials.
Environmental Considerations	This material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use, or contamination of this product may change the waste management options. State and local disposal regulations may differ from Federal disposal regulations. Dispose of container and unused contents in accordance with Federal, State, and local requirements. Accidental Release Measures: Contain and recover liquid when possible. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.
PPE Required	Personal Respirators (NIOSH approved): If the personnel exposure limit is exceeded, a half-face, dust/mist respirator may be worn for up to 10 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eyewash fountain and quick-drench facilities in work area.

Decontaminant

Sodium Hypochlorite

Sodium hypochlorite is manufactured only in solution form. Industrial grade sodium hypochlorite contains from 10 % to 15 % by weight NaOCL (10 % to 17.8 % available chlorine) with about 0.50 % to 1.00 % excess NaOH for stability control.

Permissible Exposure Limit

0.5 ppm (v)

Health Effects

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED.

Inhalation: May cause irritation to the mucous membranes of the respiratory tract.

Ingestion: Do not give any liquid to an unconscious person. Drink large quantities of gelatin solution or milk. If these are not available, drink large quantities of water. Do NOT give vinegar, baking soda or acidic antidotes. GET MEDICAL ATTENTION IMMEDIATELY.

Skin Contact: May cause moderate skin irritation and reddening of the skin.

Eye Contact: May cause severe irritation.

Environmental Hazards

Conditions to Avoid: Stability decreases with concentration, heat, light exposure, decrease in pH, and contamination with heavy metals, such as nickel, cobalt, copper, and iron.

Materials to Avoid: Strong acids, strong oxidizers, heavy metals (which act as catalysts), reducing agents, ammonia, ether, and many organic and inorganic chemicals such as paint, kerosene, paint thinners, shellac, etc.

Hazardous Decomposition Products: Chlorine, hydrochloric acid, hypochlorous acid (HOCL). Composition depends upon temperature and decrease in pH. Additional decomposition products that depend upon pH, temperature, and time are sodium chloride, sodium chlorate, and oxygen.

Environmental Conditions

Handling and Storage: Store in vented, closed, clean, noncorrosive containers in a cool, dry location, away from direct sunlight and not adjacent to chemicals which may react with the bleach if spillage occurs. If closed containers become heated, the containers should be vented to release decomposition products (mainly oxygen under normal decomposition). Do not mix or contaminate with ammonia, hydrocarbons, acids, alcohols, or ethers.

Environmental Considerations

Disposal Considerations: Can be neutralized with weak reducing agents such as sodium sulfite, bisulfite, or thiosulfite (DO NOT USE SULFATES OR BISULFATES). Dispose of in accordance with all applicable local, county, State, and Federal regulations.

PPE Required

Always use only NIOSH/MSHA-approved respirators with acid-type canisters; in the case of a fire, use self-contained breathing apparatus.

Ventilation: No special ventilation is required unless bleach is exposed to decomposition conditions, i.e., heat or acidic conditions.

Protective Clothing: Avoid contact with the eyes. Wear chemical goggles and/or face shield if there is the likelihood of contact with the eyes. Avoid prolonged or repeated contact with the skin. Wear chemical-resistant gloves and other clothing as required to minimize contact.

Other Protective Clothing or Equipment: Safety showers and eyewash fountains should be available in storage and handling areas.

Work/Hygienic Practices: All employees who handle sodium hypochlorite should wash their hands before eating, smoking, or using the toilet facilities.

Decontaminant

Sodium Hypochlorite Solution (Bleach)

1. Sodium Hypochlorite (as NaOCl) –4 % to 7 %; Water –93 %

Permissible Exposure Limit

0.5 ppm (v)

Health Effects

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED.

Ingestion: May cause erosion of the mucous membranes. Symptoms include vomiting, circulatory collapse, confusion, coma, and death. May cause edema of pharynx, glottis, larynx, and perforation of the esophagus or stomach. Effects are less damaging at lower concentrations.

Skin Contact: Contact may cause severe irritation with blistering and eczema, especially at higher concentrations.

Eye Contact: Contact may cause severe irritation and damage, especially at higher concentrations.

Chronic Exposure: A constant irritant to the eyes and throat.

Aggravation of Pre-existing Conditions: Persons with impaired respiratory function may be more susceptible to the effects of the substance.

Environmental Hazards

Stability: Slowly decomposes on contact with air. Rate increases with the concentration and temperature. Exposure to sunlight accelerates decomposition. Sodium hypochlorite becomes less toxic with age.

Hazardous Decomposition Products: Emits toxic fumes of chlorine when heated to decomposition. Sodium oxide at high temperatures.

Hazardous Polymerization: Will not occur.

Incompatibilities: Ammonia (chloramine gas may evolve), amines, ammonium salts, aziridine, methanol, phenyl , acetonitrile, cellulose, ethyleneimine, oxidizable metals, acids, soaps, and bisulfates.

Conditions to Avoid: Light, heat, and incompatibles.

Environmental Conditions

Keep in a tightly closed container; store in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Environmental Considerations

Ventilate area of leak or spill. Wear appropriate personal protective equipment as required. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials,

such as sawdust. Do not flush to sewer! U.S. Regulations require reporting spills and releases to soil, water, and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is 800–424–8802.

Dilute with water and flush to sewer if local ordinances allow, otherwise, whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use, or contamination of this product may change the waste management options. State and local disposal regulations may differ from Federal disposal regulations. Dispose of container and unused contents in accordance with Federal, State, and local requirements.

PPE Required

Personal Respirators (NIOSH approved): If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eyewash fountain and quick-drench facilities in work area.

Decontaminant

C8 emulsion (tetrachloroethylene (15 %), water (76 %), anionic surfactant (1 %), calcium hypochlorite (8 %))

Permissible Exposure Limit

Information not available.

Health Effects	Information not available.
Environmental Hazards	Information not available.
Environmental Conditions	Information not available.
Environmental Considerations	Information not available.
PPE Required	Information not available.
Decontaminant	***Decontaminating Solution-2 (DS-2) (Diethylenetriamine (70 %), 2-methoxyethanol (28 %), sodium hydroxide (2 %))***
Permissible Exposure Limit	Information not available.
Health Effects	Information not available.
Environmental Hazards	DS2 ignites spontaneously on contact with calcium hypochlorite.
Environmental Conditions	Information not available.
Environmental Considerations	DS2 is extremely corrosive and should not be used on people or on electronics or other sensitive equipment.
PPE Required	Information not available.
Decontaminant	***BX24***
Permissible Exposure Limit	1 ppm to 3 ppm.
Health Effects	General advice. The product in normal conditions of storage and employment is not dangerous and the concentration reached during use is not harmful at all for humans or animals.
Environmental Hazards	Stability: Stable under ordinary conditions of use and storage (stable for at least 3 years) if stored in recommended containers. The accidental penetration of water into a storeroom with poor ventilation or fire are the only ways to generate strong and concentrated releases of active chlorine reaching a dangerous level. Reactivity Conditions: Humidity causes chlorine release.

Incompatibilities: Nitrogen compounds such as ammonia, amine, urea, and similar; reducers, and organic oxidizable substances.

Conditions to Avoid: Heat dangerous substances deriving from decomposition of chlorine (240 °C to 250 °C), humidity.

Flammability: None.

Thermic Decomposition can be controlled by large quantities of water.

Environmental Conditions

Store in original containers within a cool, dry, and well ventilated room or area, separate from other chemical components to ensure against chlorine production. Storerooms must be appropriately built to avoid infiltration of water. Containers should be stacked properly in order to avoid breakage or damage with consequent deterioration of the product.

Storage temperature from –30 °C to +60 °C.

Environmental Considerations

BX24 has negligible impact on the environment, because of its chemical characteristics and the low specific quantities that are used in the decontamination process.

Disposal Considerations: In the event of an accidental leak or spillage, small quantities can be eliminated with water. Keep in mind the affect of active chlorine on water and on water treatment plants.

If compounds of chlorine donors are disposed, they must be considered active and dangerous wastes. Official regulations regarding local specific requirements for destruction and/or disposal must be determined. If the material is dry, incinerator destruction is recommended. The product must be poured into a clean container and transported there. During cleaning operations, BX24 does not have to be mixed with wastes or other products, like oil, sawdust, fine dust, etc. Do not destroy full or partially full containers in common waste compactors. Do not transport the product if wet. A method for destruction residue involves its neutralization into a waste, which can be eliminated without danger.

	Waste Disposal: Destruction by sodium sulphite in controlled conditions and by experienced personnel. Special Shipping Information: Warning in case of fire.
PPE Required	Safety glasses, adequate ventilation, and gloves.
Decontaminant	***Chloramine-B***
Permissible Exposure Limit	Information not available.
Health Effects	Information not available.
Environmental Hazards	Information not available.
Environmental Conditions	Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatibilities.
Environmental Considerations	Information not available.
PPE Required	Safety glasses, adequate ventilation.
Decontaminant	***Super Tropical Bleach (STB)***
Permissible Exposure Limit	Information not available.
Health Effects	Information not available.
Environmental Hazards	Information not available.
Environmental Conditions	Information not available.
Environmental Considerations	Information not available
PPE Required	Information not available.