Hospital Decontamination Wastewater Management

Technical Work Group Recommendations

For Portable Decontamination Tents

Sponsored by:

Wisconsin Department of Natural Resources
Wisconsin Division of Public Health

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Hospital Decontamination Wastewater Management Technical Work Group
Recommendations For Portable Decontamination Tents

Introduction

A technical work group was assembled by the Wisconsin Department of Natural Resources and Wisconsin Division of Public Health to develop recommendations for the management of hospital decontamination wastewater from portable decontamination tents. The recommendations address the following:

I. Siting considerations for portable hospital decontamination tents

II. Wastewater containment volume design criteria

III. Types of decontamination wastewater storage/containment

IV. Conveyance methods of decontamination wastewater

V. Decontamination wastewater spill clean-up

The recommendations provide technical information to assist hospitals in developing emergency response planning documents and wastewater management plans. Each hospital has different site characteristics, equipment, and capacity to manage varying numbers of contaminated patients, and will establish decontamination wastewater containment strategies specific for their site. Information is presented in a numerical order format purely for ease in referencing, and does not imply a ranking of importance unless it is specifically noted as a priority list.

There are currently no legislative or regulatory requirements regarding the containment or treatment of wastewater from portable hospital decontamination tents. However, decontamination wastewater that is discharged to land or surface water would be considered a spill subject to the requirements of Chapter 292.11, Wis. Stats.

Homeland Security Presidential Directive 8 (HSPD 8) recognizes hospitals as first responders. The priorities of first responders are to: 1) undertake emergency action to save lives and protect themselves and the public; 2) stabilize the incident, and 3) protect property and the environment. Reasonable efforts to contain hospital decontamination wastewater and avoid or mitigate environmental damage from uncontrolled discharges to land and water should be attempted. The development of a wastewater management plan for hospital decontamination tents that assesses the containment of decontamination wastewater is construed as due diligence to prevent and mitigate environmental damage.

For more information on wastewater management plans, see:

1. "Recommendations for the Management of Wastewater During Decontamination at the Hospital Site", developed by the State Expert Panel on the Management of Biological, Chemical and Radiological Effluent, August 2005, available through the Wisconsin Division of Public Health, Hospital Disaster Preparedness Program. You may contact Dennis Tomczyk, Director, Hospital Disaster Preparedness, at 608-266-3128 or email at tomczdj@dhfs.state.wi.us. The document may also be downloaded from the Department of Natural Resources web site: http://dnr.wi.gov/org/water/wm/ww/security/ , click on "Brochures and Technical Articles" link in left column.

2. "Planning for Decontamination Wastewater: A Guide for Utilities, National Association of Clean Water Agencies, 1816 Jefferson Place, NW, Washington DC, 20036-2505. The document is a planning tool to prevent, detect, and respond to the impacts of decontamination wastewater that contains chemical, biological, or radioactive substances. A free copy of the guidance document can be downloaded from the National Association of Clean Water Agencies web site: http://www.nacwa.org/advocacy/security/.

The technical recommendations contained in this report are supplemental to the State Expert Panel's report.

Members of the Hospital Decontamination Wastewater Management Technical Work Group are listed in Appendix A.

I. Siting Considerations for Portable Hospital Decontamination Tents

Incident Command System (ICS) is a standardized management tool for planning and structuring emergency responses. ICS must be used for planned events, natural disasters, and acts of terrorism. Throughout emergency responses, ICS objectives are established based upon the following priorities:

First Priority:	Life Safety (patients, public, first responders)
Second Priority:	Incident Stabilization
Third Priority:	Property Preservation (buildings, environment)

Siting considerations for portable hospital decontamination tents have been organized according to ICS priorities. Many factors are critical in developing a site plan for decontamination tents. Weather considerations and adequate water pressure were identified as key factors in determining the location of portable hospital decontamination tents to protect life safety. Hospitals should consider having a secondary tent site option for locating the decontamination tent to address seasonal weather variations. See Appendix B for guidance on water pressure factors.

A. LIFE SAFETY

1. Weather considerations:
    a. Prevailing winds at the proposed site location
    b. Seasonal variations such as where snow banks and drifts occur
2. Security needs for protecting:
    a. Patients/staff
    b. Hospital
    c. Building grounds
3. Traffic flow patterns for:
    a. Ambulances and other first responder vehicles
    b. Pedestrians
    c. Contaminated patients
    d. Easy and rapid access to Emergency Room for patients/staff
4. Location considerations for treatment activities:
    a. Secondary tent site location
    b. Ability to handle gurneys for non-ambulatory patients
    c. Triage activities
    d. Proximity to Emergency Room for follow-up treatment
    e. Pre- and post- decontamination shelters for patients awaiting further assessment in inclement weather
    f. Safety issues related to slips and falls

5. Utilities:
    a. Access to a water spout, an adequate water supply and pressure, and heated water
    b. Locate tent away from air intakes of the hospital building, including doors and windows (avoid intake of volatiles from decontamination tent activities to hospital buildings)
    c. Adequate lighting
    d. Accessibility to emergency communications such as loud speaker, public announcement system, bull horn, etc
    e. Electrical hookups for air supply, heaters, etc.
    f. Locate the tent's portable water heater (if used) so exhaust fumes do not enter air intakes
6. Storage and removal of contaminated items:
    a. Clothing storage area
    b. Bagged patient valuables
    c. Equipment and supplies
7. Containment of decontamination wastes

B. INCIDENT STABILIZATION

1. Provide patient support activities for:
    a. Toilets
        i. Portable restrooms (port-a-potties)
        ii. Bathroom access for decontaminated patients
        iii. Commodes
        iv. Bed pans for non-ambulatory patients
    b. Augmentation trailers
        i. Food
        ii. Water
        iii. Supplies
        iv. Clothing
        v. Portable showers for support staff
2. Accommodate hospital staff activities for:
    a. Shift rotations into area
    b. Storage of contaminated haz-mat clothing, etc.
3. Conduct site safety checks:
    a. Adequate ventilation in tent
    b. Sufficient air supply for respirators for first responder staff
    c. Adequate water supply for decontamination tent
    d. Adequate heat/shelter for patients in decontamination, pre- and post-decontamination area
    e. Sample decontamination wastewater to determine type and concentration of pollutants if unknown
    f. Adequate containment of decontamination wastewater

4. Safety:
    a. Remove contaminated patient clothing and transport to secure site for final disposition
    b. Secure decontamination tent/shelters with anchors provided in asphalt/concrete and use sand bags as additional anchors

C. PROTECT PROPERTY AND THE ENVIRONMENT

1. Control/minimize spread of contamination:
    a. Design adequate location size for clearly identified decontamination and post-decontamination areas to minimize size of remediation areas
    b. Identify proximity to decontamination wastewater containment/disposal options (see III. Types of Decontamination Wastewater Storage/Containment for more complete information):
        i. Storm sewers which could be plugged to act as temporary containment
        ii. Sanitary sewer manholes for allowed discharges of decontamination wastewater to publicly-owned treatment works (POTWs)
        iii. Short-term on-site containment
    c. Determine slope of decontamination area and assess wastewater flow directions:
        i. Design so uncontained decontamination wastewater spills flow away from hospital and other buildings and people
        ii. Protect surrounding area homes, day care facilities, nursing homes and businesses from uncontained flows of decontamination wastewater
        iii. Identify possible collection points and containment areas of wastewater (may want to have an engineer help with this assessment)
    d. Prevent entry of uncontained decontamination wastewater spills into storm water sewer inlets or structures with heavy, impervious manhole/catch basin covers or berms
    e. Consider impervious surfaces to minimize impacts to groundwater
    f. Identify areas for cleaning activities and pick-up locations for patient valuables collected prior to decontamination
2. Conduct remediation activities:
    a. Identify where the tent will be moved to after use so it can be disposed of or properly cleaned
    b. Contain wastewater created during the decontamination of equipment, supplies, vehicles, etc.
    c. Consider the remediation actions impact on the facility's operational activities over an extended period of time after the incident

II. Wastewater Containment Volume Design Criteria

A. Treatment of Contaminated Patients

Flow Chart 1: Notification of Hospitals, describes the decision making and communication process as contaminated victims are assessed. Flow Chart 2: Wastewater Management Plan, describes the process used in determining whether to discharge decontamination wastewater to a sanitary sewer, a holding tank, or other type of containment.

B. Wastewater Management Plans

A Wastewater Management Plan for each decontamination event will be developed in collaboration with the hospital and publicly-owned treatment works (POTW) with input from the Department of Health and Family Services (DHFS), Department of Natural Resources (DNR), and Emergency Management (EM). The decision to allow the discharge of decontamination wastewater to the sanitary sewer will be made on a case-by-case basis in conformance with the wastewater utility's sewer use ordinance (SUO). The SUO establishes the requirements for using the sewerage system. Typically, the SUO defines the types of wastes that can be discharged into the sewerage system, imposes requirements on industrial waste dischargers, establishes requirements for hooking into the sewerage system, and provides enforcement mechanisms for illegal or unapproved discharges.

Toxic compounds such as mercury, PCBs (Polychlorinated Biphenyls), DDT (1,1-trichloro-2,2-bis(*p*-chlorophenyl) ethane), and radioactive materials should be identified in advance as contaminants that are not allowed to be discharged into the sanitary sewer.

The following determinations need to be made prior to discharging hospital decontamination wastewater to the sanitary sewer:

1. Type of contaminant(s) identified by asking the patients, workplace or responders at the accident site.
2. Conformance of discharged contaminants with the POTWs sewer use ordinance.
3. Sources of other industrial chemical discharges which may be present in the sewer lines which could mix with the decontaminated wastewater in the sewer system that would create gases or corrosives (ex. cyanide and acids)
4. Location of hospital in relationship to POTW for dilution and mixing considerations while wastewater is flowing in the sanitary sewer to the POTW.

The OSHA Best Practices of Hospital-Based Receivers of Victims, http://www.osha.gov/dts/osta/bestpractices/html/hospital_firstreceivers.html studies suggest that 100 grams of contaminant on a victim is a reasonable estimate for planning purposes. This value, along with the spill history data, decontamination shower flow, and hospital flow-through wastewater discharge can be used to estimate anticipated discharge levels. This should help expedite decision-making for discharge or holding of reasonably anticipated chemical incident decontamination wastewater.

If necessary, chemical manufacturers can be contacted to help assess the chemicals contained in different compounds. OSHA Hazard Communication Standard 29 CFR 1910.1200(i)(2) states: "Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit."

Table 1: Data Indicators for WI Hazardous Substance Releases, provides information on the number of decontamination incidents that occurred at hospitals in Wisconsin during 1993-2004, and the compounds identified as the contaminate substance. The compound list may be useful for local POTWs to assess their ability to receive these types of contaminants. However, decontamination events may involve multiple chemicals, and organic chemical names can be similar but possess different properties. In addition, there can be multiple names for chemicals. Care should be used in accurately identifying contaminate compound names.

If decontamination wastewater cannot be discharged to the sanitary sewer, containment will need to be provided. The basin containment volume of the hospital decontamination tent will be exceeded after 6 patients (160 gallon tent containment volume ÷ 55 gallons water/2 people) or 14 minutes at operational capacity. If fewer than 6 patients are decontaminated, the storage volume of the tent basin should be sufficient to contain decontamination wastewater until a determination can be made to discharge it to the sanitary sewer or to treat and dispose of off-site. These and other capacity calculations are based on a 5 minute decontamination shower with a water flow rate of approximately 11 gal/min/2 people. Note that some types of contaminants may need a longer decontamination period, and the length of decontamination should be determined on a case-by-case basis.

Options for short-term on-site decontamination wastewater storage capacity for more than 6 decontamination patients should be available if:

1. The decontamination wastewater cannot be discharged to a sanitary sewer, or
2. A determination to discharge cannot be made within 14 minutes of the start-up of patient decontamination.

Each hospital will need to plan for the type of on-site containment that is best suited for their site. Considerations should be made to prevent the freezing of liquid in containers during cold weather which could result in the container being compromised and a release of wastewater to the environment.

C. Identification of Contaminants in Contained Decontamination Wastewater

1. The 54th Civil Support Team (CST) is Wisconsin's full time response team for emergencies or terrorist events that involve weapons of mass destruction or toxic industrial chemicals. The 54th CST may be called to assist in determining the types of contaminants in contained decontamination wastewater. The local Incident Commander would request the 54th CST through Wisconsin Emergency Management.

   Stationed in Madison, WI, the 54th CST is able to deploy within 90 minutes, and travel to assist local first-responders in determining the nature of an attack or event. CST provides initial advice on what the contaminant agent may be, and assists first responders in the detection assessment process. Chemical analysis performed on suspected contaminants can usually be performed within 4 hours of environmental sample preparation. Some examples of situations where the 54th CST may be called in are:

   a. Testing for known or suspected use of chemical, biological or radiological weapons.
   b. Multiple people presenting with unexplained radiological, chemical, or biological symptoms.
   c. When local hazmat teams are overwhelmed or otherwise unable to assist in obtaining environmental samples for investigation of suspicious hazardous materials exposures.

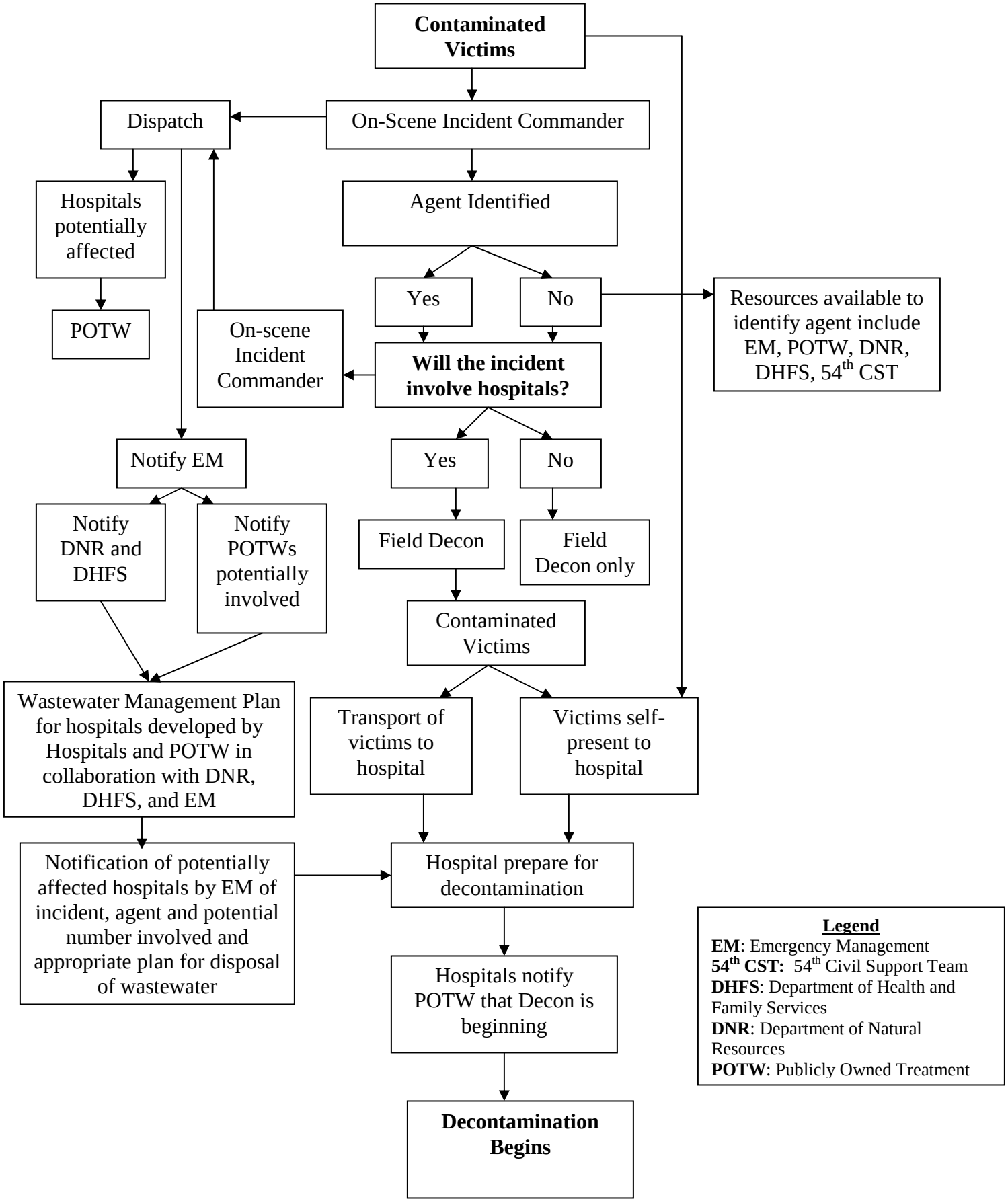
2. Wisconsin State Lab of Hygiene

   The Wisconsin State Laboratory of Hygiene (WSLH) can provide consultation and test decontamination wastewater for chemical, biological, and radiological agents or facilitate provision of specialized testing from another laboratory. WSLH staff can be contacted by calling the 24/7 pager system at (608) 263-3280.

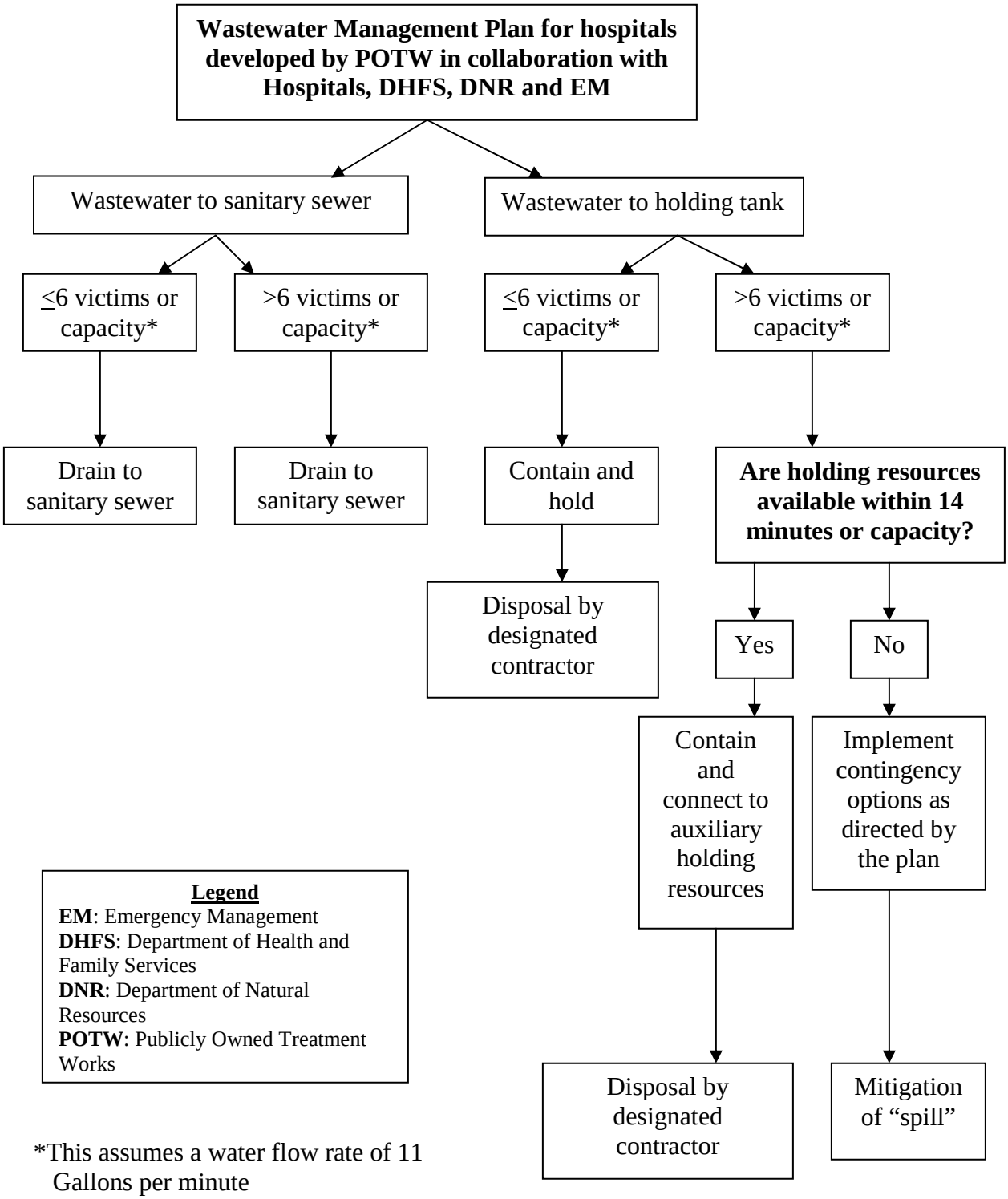
3. Agency for Toxic Substances & Disease Registry (ATSDR)

The Agency for Toxic Substances and Disease Registry (ATSDR), based in Atlanta, Georgia, is a federal public health agency of the United States Department of Health and Human Services. Their web site: http://www.atsdr.cdc.gov, provides information on chemicals and other toxic substances to help emergency staff respond quickly to incidents involving chemical agents or hazardous substances. The "Toxic Substances" link contains evaluations of hazardous substances and their potential health effects, including toxicological profiles. Contact information for The ATSDR Information Center is 1-888-422-8737 or 404-498-0110.

Flow Chart 1: Notification of Hospitals



Flow Chart 2: Wastewater Management Plan



*This assumes a water flow rate of 11 Gallons per minute

II. **Types of Decontamination Wastewater Storage/Containment**

A. Short-term On-site Wastewater Containment Options

Short-term on-site containment should be used if more than 6 patients are to be decontaminated, because the containment volume of the decontamination tent will be exceeded. Wastewater management plans should prepare for securing on-site containment of decontamination wastewater for a minimum of 24 hours after a haz-mat emergency response event for transport to off-site disposal options if the wastewater cannot be discharged to a sanitary sewer.

Emergency responses are a cooperative effort, and it is expected that hospital staff will work with the publicly-owned wastewater treatment (POTW) facility and public works department staff to determine the best on-site wastewater containment option. Sanitary sewer and storm sewer plugging should only be performed by employees of the local agency that has jurisdiction over the operation and maintenance of these systems within the community, usually the wastewater utility or public works department. Improper plugging of a sanitary sewer can cause overflows and basement backups of untreated wastewater which can spread diseases and cause environment damage.

Types of on-site containment to consider are:

1. In-Ground Permanent Holding Tanks

Although expensive, in-ground permanent holding tanks can be plumbed with open-shut valves that allow the discharge of decontamination wastewater to the sanitary sewer system after it is determined to be an allowable discharge. If an outlet pipe from the tank extends and connects to a public sewer line, then the tank is considered as part of the building plumbing. The tank should comply with the Department of Commerce plumbing regulations of chapter Comm 82, Wis. Adm. Code.

If, however, the tank is not directly connected to a public sewer line (such that it would require pumping to empty it) then the tank is considered a “storage tank” subject to s. NR 213.15, Wis. Adm. Code, and chapter Comm 82, Wis. Adm. Code. Although a “stand alone” storage tank is subject to Department of Natural Resources requirements, the DNR does not require the submittal of plans for review and approval, or any notification of a proposed installation. But the standards from s. NR 213.15 are still applicable, and a storage tank should be constructed in accordance with these standards which are summarized below. For recommendations on sizing storage tanks, see Appendix C.

A storage tank structure for hospital decontamination wastewater should be designed and constructed such that:

a. It is watertight – The standard for water tightness is from s. Comm 82.25 (2), Wis. Adm. Code (see appendix D)
b. It is constructed with materials that are compatible with the anticipated wastewater and non-corrosive, or are protected as necessary against corrosion.
c. It has an inspection manhole, vent, and high water alarm.
d. Periodic testing is performed to ensure maintenance of tank integrity.

2. Storm Sewer Plugging

On-site containment can be achieved by placing a plug in an existing storm sewer downhill from the hospital site, discharging decontamination wastewater into a storm sewer manhole, and using the capacity of the storm sewer pipe as a temporary storage area until the wastewater can be pumped out and treated. Storm sewer manholes should be located and labeled as storm sewers. This option must be planned in advance so that the suitability of using existing storm sewers can be evaluated for the:

a. proximity to the proposed decontamination tent site
b. capacity sizing of the storm sewer pipe
c. effectiveness of proposed plug materials
d. presence of allowed non-storm water discharges in the storm sewer (ex, non-contact cooling water discharges)
e. construction of the storm sewer (storm sewers which utilize a French drain system of discharge to sandy soils should not be used because adequate containment will not be provided)

Storm sewer plugging should be considered a very short-term option because it is difficult to create a tight plug, and pipes are not often grouted between sections. Both of these conditions allow for leakage. Also, the use of storm sewers is weather dependent. In wet weather conditions, the storm sewers cannot be used.

Plug materials include sand bags or inflatable ancillary sewer plugs. Larger POTWs may have ancillary sewer plugs which could be used in a decontamination event. Confined space entry procedures may need to be followed when installing plugs within the manholes by wastewater utility or public works employees.

3. Sanitary Sewer Plugging/Lift Station Capacity

On-site containment can be achieved by placing a plug in an existing sanitary sewer downhill from the hospital site, discharging decontamination wastewater

into a sanitary sewer manhole, and using the capacity of the sanitary sewer pipe as a temporary storage area. Sanitary sewer manholes should be located and labeled as sanitary sewers. Confined space entry procedures should be followed when installing plugs within the manholes.

Downstream lift stations may be also be shut off and excess capacity in the sanitary sewer line and wet well of the lift station can serve as a temporary containment area. Once the decontamination wastewater has been assessed for toxicity it can be: 1) pumped out and treated, or 2) allowed to flow to the POTW for treatment.

This option must be planned in advance so that the suitability of using existing sanitary sewers/lift stations can be evaluated for the:

a. proximity to the proposed decontamination tent site
b. capacity sizing of the sanitary sewer pipe
c. evaluation of wet well capacity of lift stations (if available)
d. effectiveness of proposed plug materials
e. quantity of existing wastewater flow in pipe and fluctuations in flow during peak use periods
f. estimated total containment holding capacity (existing flow plus decontamination wastewater volume) over time to estimate when capacity will be used up and back-up of upstream sewers may occur
g. type of other industrial chemical discharges which may be present in the sewer lines which could mix with the decontaminated wastewater in the sewer system and create gases or corrosives (ex. cyanide and acids)

Sanitary sewer plugging should be considered a very short-term option. Serious health hazards can result if untreated wastewater backs-up into homes or businesses when the capacity of the plugged sanitary sewer line/lift station has been exceeded.

4. Flexible Watertight Storage Bags

Flexible watertight storage bags come in many sizes. They are used for a variety of purposes, including by the military as portable fuel stations. Flexible storage bags inflate as fluids are pumped inside the bags. Smaller bags can be filled and stacked. The bags can be used on the ground or mounted on a truck. Truck-mounted bags allow easy removal from the site for off-site disposal and treatment of decontamination wastewater. The storage bags can be collapsed, folded, and stored for long period of time without structural degradation.

5. Polyvinyl Drums

Polyvinyl water-tight drums can be considered as a last option. These drums are hard-to-find specialty items and may require special ordering. Drums need to be

labeled as to contents when used as long-term storage prior to final transport for treatment. The drums can be moved and stored separately. Due to their small capacity size, they need to be carefully monitored while they are being filled with wastewater to ensure there is no overflow. They typically come in 55 or 85 gallon size. Some 55 gallon drums are designed to fit inside 85 gallon sized drums which allows more efficient stacking of stored empty containers. The 85 gallon size watertight drums can also be used to provide watertight containment of other types of inserted wastewater-filled containers.

6. Rigid Polyvinyl Tanks

Rigid polyvinyl tanks can be purchased at farm and agricultural suppliers. They are a low-cost approach to on-site storage, but may be difficult to store.

7. Portable Pools

Sturdy, vinyl, chemical resistant portable pools are sometimes used for on-site containment. Avoid inexpensive "kiddy pools".

8.Steel Drums

Steel Drums are not recommended because of their weight and reactivity with corrosive agents.

9. Other

Some local fire departments may have folding tanks which can be hauled in immediately to provide short-term on-site storage.

Containment of decontamination wastewater in vacuum trucks with a "shock-treatment" application of chlorine or other appropriate materials may be successful pre-treatment options for some biological contaminants prior to discharge into a sanitary sewer and treatment at a POTW.

B. Transportation and Long-term Off-Site Wastewater Containment/Treatment Options

1. Transportation

Contractual obligations and mutual aid agreements for possible transportation of wastewater are important to secure before emergencies occur. Pre-planned agreements allow the investigation and informed selection of potential services prior to actual emergency responses.

Transportation of the decontamination wastewater through public areas may be an issue if there is an unknown contaminant. Hospitals will also need to maintain "chain-of-custody" of the decontamination wastewater for off-site disposal

options. Security should be provided around the short-term hospital storage area until the wastewater is transported off-site.

Transportation options include:

a. Some POTWs own vacuum trucks which may be used for transportation of decontamination wastewater to other treatment locations.
b. Contracts with licensed commercial waste haulers may be used for the transportation and ultimate treatment of decontamination wastewater at a POTW.
c. If decontamination wastewater cannot be treated at a POTW due to radiological, biological, or chemical contaminants, most commercial waste haulers cannot contract for the disposal of these materials. Licensed hazardous waste haulers will need to remove wastewater determined to be a hazardous waste.
d. For some types of pollutants, such as pesticides, they may be unsuitable for discharge to a POTW, but may be suitable for land spreading if they are considered a beneficial agricultural use. Appropriate approvals from the Department of Agricultural and the Department of Natural Resources may be necessary for land spreading decontamination wastewater.

For a current list of licensed Hazardous Waste Transporters listed by County, see this web site:
http://dnr.wi.gov/org/aw/wm/faclists/WisLic_HWTrans_byCnty_withWaste.pdf

2. Off-site Containment/Treatment Options

   Commercial waste haulers may pump wastewater into trucks or pump to other on-site storage tanks at other sites, such as in-ground tanks at POTWs. Separate containment structures at POTWs allow the controlled slow release of decontamination wastewater to the POTW treatment system which helps prevent biological die-offs.

3. Consider these safety and clean-up liability factors when deciding options:
   a. Decontamination tent sump pumps can be used to pump wastewater into waste hauler trucks to reduce truck equipment contamination.
   b. Response time for commercial waste haulers could be delayed due to the need to dispose of other wastes in trucks. Trucks used to pick up decontamination wastewater need to be cleaned of previously hauled wastes. It may take 48 hours for a hazardous waste hauler to arrive at the scene to pick up decontamination wastewater.
   c. If the decontamination wastewater is so toxic that permanent contamination of the truck results, there is a question of who will pay for the replacement of the truck.
   d. The safety of hauler employees is an important consideration. Employees should have received appropriate protection training to prevent personal injury and reduce the spread of contaminants. There can be air issues

when pumping toxic liquids from containers to the truck. How and where haulers clean their trucks after transport of decontamination wastewater can also be a concern.

e. Wastes contained in storage structures at POTW's can be a liability issue for the facility.

VI. Conveyance Methods of Decontamination Wastewater

Decontamination wastewater which is to be conveyed from the hospital decontamination tent to on-site storage options or an approved discharge to a sanitary sewer should consider these factors:

1. Measured distances and elevations from the tent site to discharge point(s) are needed to determine proper lengths of conveyance hoses. Long hoses and distance elevation changes can reduce the flow rate.
2. Number of quick connection adaptors needed.
3. The hospital tent sump pump may not shut-off automatically when the tent's containment basin is at capacity. Need to have someone observing levels of the water in the tent.
4. There may not be an on-off switch for the hospital tent sump pump. Emergency response staff may need to unplug/plug sump to ensure the sump pump doesn't burn out once the decontamination wastewater from the tent basin has been emptied.
5. POTW trucks with portable sump pumps may be used to convey decontamination wastewater from on-site storage options to the sanitary sewer (if it is an approved discharge).
6. Vacuum trucks can pump wastewater into a truck or bypass the truck and pump into the sanitary sewer (if it is an approved discharge).
7. Decontamination wastewater that is determined to be a hazardous waste should only be conveyed by a licensed hazardous waste hauler.
8. Avoid overland or uncontained flow of decontamination wastewater to a sanitary sewer or on-site containment to reduce tracking and the size of contaminated area.

VII. Decontamination Wastewater Spill Clean-up

Decontamination wastewater spills should be cleaned up as follows:

1. Isolate the spill areas to prevent tracking of decontamination wastewater outside of the hot zone.
2. Consider chlorinating or using other materials to deactivate biological agents which are suspected contaminants.
3. Storm drains are often located in low points on the site where uncontrolled decontamination wastewater may flow. Remove sewer inlet/catch basin covers and/or berms and use absorbents to soak up remaining water in the drain.
4. Use absorbent materials such as salts, kitty litter, and sawdust on spills.

APPENDIX A:

Hospital Decontamination Wastewater Management Technical Work Group 2006

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APPENDIX B:
Water Demand Requirements

The water supply to the decontamination tent requires a minimum of 11 gallons per minute at 40 pounds per square inch pressure (psi) for the tent system to work properly. The water connection is typically made through a flexible hose. The flexible hose should be connected to a dedicated hose connection provided with proper cross connection control. The flexible hose should be made of materials approved for potable water use.

The dedicated hose valve(s) must be installed by individuals licensed under s. Chapter 145.06 Wis. Statutes, (plumber). As per s. Comm. 82.21 of the Wis. Adm. Code, state level plan review is required for the installation of these dedicated hose valves.

Hospitals may wish to contact their local water utility to perform testing to determine if existing water\ pressure is sufficient to meet the pressure requirements of the decontamination tent.

APPENDIX C:

Sizing and Installation Guide for Decontamination Piping Systems

What is the recommended minimum size of a decontamination holding tank? The minimum sizing criteria should reflect the common sense economic principle of construction that if you are going to go through the calculations and expense of installing a containment tank, then install one that's conservatively large enough to accommodate the majority of situations. In general, the incremental cost for obtaining a larger tank may be minor relative to the fixed cost for the installation. It is generally recommended that a holding tank installed for containment of decontamination wastewater have a capacity of at least 1500 gallons. This can be accomplished with a series of tanks or barrels. Each installation should reflect local and possible regional concerns.

Holding Tank Sizing

The size of the decontamination holding tank should be based on calculations taking into account the number of showers to be taken, the gallon per minute of flow from the shower head or hose, and the time spent in the shower. This calculation should be considered the minimum amount of holding capacity available on site, be it one tank, or multiply tanks/barrels.

Calculations: Showers Taken X GPM of Shower Head X Time in Shower = Holding Capacity

Example/Scenario
Farm accident: Victim pinned under chemical spreader. On scene, First Responder, Sheriff's Deputy, and two Emergency Medical Technicians giving assistance. All on site have been exposed to chemicals. All involved at incident will be decontaminated at Hospital X. Hospital X has a decontamination room equipped with a single stand up shower and one drench hose that deliver 5.5 gpm. The decontamination room is served by one drain.

Calculation: 4 Stand up showers X 5.5 gpm head X 15 minutes = 330 gallons
1 Drench shower X 5.5 gpm head X 15 minutes = + 82.5 gallons
412.5 gallon containment tank(s)

The same calculations using a 20 gallon per minute deluge shower would require a minimum of a 1,500 gallon containment tank(s).

Holding Tank Installation

State Level Plan Review Required: Per s. Comm. 82.20 Wis. Adm. Code.
Installation: Per s. Comm. Chapters 82 and 84 Wis. Adm. Code
Containment Tank(s): Chemical resistant materials, water tight, and structurally sound and per Comm. 84.
Pump: Chemical resistant materials, explosion proof construction and connections. Pump capable of discharging input gpm with elevation loss.
Alarm: Provide high water alarm after one shower use. List instructions with shower time left before tank is full.
Venting: Shower drain(s) and tank vents to be an independent system and terminate in open air and sized per Comm. 82.31.
Pump Discharge: Terminate outside the building with a quick-disconnect coupler to match connection to waste hauler equipment. Vacuum pump on waste hauler equipment is not to be used to remove contaminated wastewater.
Drain Connection: Size of piping based on drainage fixture load of incoming fixture(s) Per Comm. 82.30. Minimum of 2-inch diameter. Drain piping to be valved (normally closed). The valve shall be a full diameter with no restriction created when fully open.
Test Port/Faucet: A means of taking a water sample shall be made available so that contained material can be analyzed prior to removal.

APPENDIX D:
WATER TIGHTNESS STANDARD FROM s. Comm 82.25(2):

Comm 84.25

(2) WATER TIGHTNESS. (a) General. Tank assemblies, including fittings and access openings, shall be manufactured to be water tight as required under this subsection.
(b) Concrete tanks. 1. Where concrete tanks are required to have covers, the tanks shall meet one of the following requirements:
a. Withstand a vacuum of at least 2 inches of mercury for 60 minutes, without loss of pressure.
b. Hold water for one hour, without leakage after the tank has been filled with water to the top of the cover and let stand for 24 hours, then refilled to the top of the cover.
2. Concrete tanks that are not required to have a cover shall hold water for one hour, without leakage after the tank has been filled with water and let stand for 24 hours, then refilled to the highest liquid level required to be held in the tank.
(c) Steel tanks. 1. Steel tanks that are required to have a cover shall be capable of withstanding one of the following requirements:
a. An internal air pressure of at least 5 psig for 15 minutes, without loss of pressure.
b. An internal water pressure of at least 5 psig for 60 minutes, without loss of pressure.
2. Steel tanks that are not required to have a cover shall be capable of holding water after being filled to their inlet or outlet, whichever is higher, for 24 hours without loss of water.
(d) Tanks constructed of materials other than concrete or steel.
1. Tanks constructed of materials other than concrete or steel that are required to have a cover shall be capable of withstanding one of the following requirements:
a. A vacuum of at least 2 inches of mercury for 60 minutes, without loss of pressure.
b. An internal air pressure of at least 5 psig for 15 minutes, without loss of pressure.
c. An internal water pressure of at least 5 psig for 60 minutes, without loss of pressure.
2. Tanks constructed of materials other than concrete or steel that are not required to have a cover shall be capable of holding water after being filled to their inlet or outlet, whichever is higher, for one hour without loss of water.

Table 1: Several Data Indicators for WI Hazardous Substance Releases

WI HSEES Data 1993-2004*		
Compound	# Decontaminated at Medical Facility	# Incidents
Dimethyl Ammonium Chloride	31	1
Chlorine	22	11
Sulfur Dioxide	21	2
Corrosive NOS	18	2
Paint NOS	16	2
Phenol	14	2
Ammonia	11	20
Sulfuric Acid	9	3
Phosphoric Acid	6	1
Mercury	2	7
Sodium Hydroxide	1	3
Base NOS	1	2
Hydrochloric Acid	1	2
Hydrogen Peroxide	1	2

Top 10 USEPA 2003 Toxic Release Inventory Point Source Air Emissions
Hydrochloric Acid
Methanol
Sulfuric Acid
Hydrogen Fluoride
Xylene
Styrene
Glycol Ethers
Toluene
Methyl Ethyl Ketone
Ammonia
Butyl Alcohol
Acetaldehyde
Trichloroethylene
Methyl Isobutyl Ketone

Top 10 USEPA 2003 Toxic Release Inventory Surface Water Discharges
Nitrate cmpds
Methanol
Manganese cmpds
Ammonia
Copper cmpds
Ethylene Glycol
Diethanolamine
Barium cmpds
Formaldehyde
Chlorine
Zinc cmpds
Acetaldehyde
Lead cmpds
Nickel cmpds

*WI Hazardous Substance Emergency Event Surveillance is a 15 state program run by ATSDR collecting data on event date, event city, event county, names and quantities of released substances, number of victims, types of injuries, and numbers of evacuations and evacuees. Data represent 154 of the 165 persons decontaminated at a medical facility during the reporting period.