OPERATIONS PLAN
COLD WEATHER DECONTAMINATION AND TRIAGE

PURPOSE:
This operational guideline is intended to provide emergency responders with information that can be used to develop cold weather decontamination processes in the northern and arctic environments using readily accessible resources and equipment. Pre-placed decontamination equipment may not be available on the first response and in addition to the use of pre-placed equipment this guide is intended to provide information on alternative methods and resources that may be implemented immediately by first responders and/or civilian personnel.

PREFACE:
The 1997 Defense Authorization Bill funded the U.S. Domestic Preparedness initiative. Under this initiative, the Department of Defense (DoD) began a program to enhance the capability of the federal, state, and local emergency responders in chemical, biological and nuclear incidents involving terrorism.
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TABLE 1: SPECIAL RESOURCES:

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<tr>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three inflatable 4-shower decontamination shelters w/water heaters and space heaters capable of maintaining 75°F at temperatures of -20°F.</td>
<td>Fire Station 1</td>
</tr>
<tr>
<td>Two inflatable warming tents w/space heaters capable of maintaining 75°F at temperatures of -20°F.</td>
<td>Fire Station 1</td>
</tr>
<tr>
<td>50 Powered Air Respirators</td>
<td>Fire Station 1</td>
</tr>
<tr>
<td>VHF Radio Cache AFD Hazardous Materials Team maintains a cache of 18 VHF radios that can operate independently of the Municipal 800 trunked radio system in the event of a major communication failure.</td>
<td>Fire Station 1</td>
</tr>
<tr>
<td>Self-contained 4-shower decontamination trailer</td>
<td>Fire Station 3</td>
</tr>
<tr>
<td>Trailer with heaters, fiberboard shelters and temporary clothing</td>
<td>Fire Station 7</td>
</tr>
<tr>
<td>In addition, each apparatus carries two rolls of paper towels for use in dry decontamination.</td>
<td>All Stations</td>
</tr>
</tbody>
</table>

PURPOSE OF DECONTAMINATION
The purposes for decontamination are threefold:
1. To remove the agent from the victim’s skin and to reduce cross contamination
2. To protect emergency responders and medical personnel from cross contamination
3. To provide victims with psychological comfort

ASSUMPTIONS
This mass casualty decontamination plan is based on the following principles:
1. Expect at least a 5:1 ratio of unaffected to affected casualties
2. The most expeditious decontamination process based on temperature and available resources will be used.
3. Decontamination methods will vary depending on available resources near the incident site. It is imperative that response personnel have knowledge of available resources in their jurisdictions in order to effect the most expeditious decontamination possible.
4. Disrobing (head to toe) is decontamination; more removal is better.
5. Water flushing is generally the best mass decontamination method.

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2 “The most important and most effective decontamination of any chemical exposure is that decontamination done within the first minute after exposure.” USA Medical Research Institute for Chemical Defense. Medical Management of Chemical Casualties Handbook, 3d Ed., August 1999, Aberdeen Proving Ground, MD.
INITIAL ACTIONS
If there is reason to believe that a chemical or a biological event has occurred, first responders should implement the following procedures:
1. Roll windows up and lock doors when approaching the scene.
2. Have complete firefighting PPE ensemble on and operating upon exiting the vehicle.
3. Use vehicle public address systems or hand held units to instruct the crowd.
4. Assist injured ambulatory and incapacitated victims to an area of safe refuge.
5. Take steps to protect first responders from cross contamination such as using pike poles held horizontally for crowd control.
6. If unable to determine that an actual chemical agent exposure has occurred and no signs or symptoms are found, defer the initiation of decontamination until further investigation.
7. Once an assessment has determined that a chemical or biological event has occurred, use vehicle public address systems or hand held units to provide assurance, instruct victims to begin self decontamination by removing clothing and blotting any visible liquid from their skin. Direct them to the decontamination area. As an option a prerecorded message could be played over the PA system.
8. Establish control zones.
9. Responders must be vigilant for the presence of secondary devices and protect evidence in the process if removing and treating victims.

GROUP DECONTAMINATION PRIORITIES
1. Emergency Response Personnel
2. Victims directly encountered by emergency responders
3. Others as practical

INDIVIDUAL DECONTAMINATION PRIORITIZATION
When multiple patients are involved, the following priorities will apply:
1. Decontamination of ambulatory patients
2. Decontamination of conscious, non-ambulatory patients
3. Decontamination of unconscious, non-ambulatory patients
4. Decontamination of deceased victims

Ambulatory Casualty Prioritization
Highest Priority
1. Those closest to the point of release
2. Those reporting exposure to a vapor or aerosol
3. Those with evidence of liquid deposition on clothing or skin

Next highest Priority
Those symptomatic but who were not adjacent to the release
Lowest Priority
Those with injuries other than chemical, those who are asymptomatic and those who were far from the point of release.

Non-ambulatory Prioritization
Prioritization for non-ambulatory victims should be done by using the Simple Triage and Rapid Treatment (START) system.

FIGURE 1: START CATEGORIES

<table>
<thead>
<tr>
<th>START Category</th>
<th>Decon Priority</th>
<th>Classic Observations</th>
<th>Chemical Agent Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMMEDIATE</td>
<td>Red Tag</td>
<td>Respiration is present only after repositioning the airway. Applies to victims with respiratory rate &gt; 30. Capillary refill delayed more than 2 seconds. Significantly altered level of consciousness.</td>
<td>• Serious signs / symptoms&lt;br&gt;• Known liquid agent contamination</td>
</tr>
<tr>
<td>DELAYED</td>
<td>Yellow Tag</td>
<td>Victim displaying injuries that can be controlled or treated for a limited time in the field.</td>
<td>• Moderate to minimal signs / symptoms&lt;br&gt;• Known or suspected liquid agent contamination&lt;br&gt;• Known aerosol contamination&lt;br&gt;• Close to point of release</td>
</tr>
<tr>
<td>MINOR</td>
<td>Green Tag</td>
<td>Ambulatory, with or without minor traumatic injuries that do not require immediate or significant treatment</td>
<td>• Minimal signs / symptoms&lt;br&gt;• No known or suspected exposure to liquid, aerosol, or vapor</td>
</tr>
<tr>
<td>DECEASED / EXPECTANT</td>
<td>Black Tag</td>
<td>No spontaneous effective respiration present after an attempt to reposition the airway.</td>
<td>• Very serious signs / symptoms&lt;br&gt;• Grossly contaminated with liquid nerve agent&lt;br&gt;• Unresponsive to auto injectors</td>
</tr>
</tbody>
</table>

Highest Priority
Those tagged as IMMEDIATE
Responders may recategorize IMMEDIATE victims as DECEASED/EXPECTANT if they are suffering from nerve agent exposure and have not been treated with a Mark I kit or have been decontaminated within 5 minutes of exposure.

The Next Priority
Those tagged as DELAYED

The Next to Lowest Priority
Those tagged as MINOR
The Lowest Priority
Those tagged a DECEASED/EXPECTANT

TRIAGE PROCESS
Decontamination prioritization and triage can be performed simultaneously.

FIGURE 2: DECONTAMINATION PRIORITY ALGORITHM
DECONTAMINATION METHODS

The following four decontamination methods are intended to provide solutions for mass decontamination applicable to a wide range of temperatures.

DECONTAMINATION CONSIDERATIONS

Time is Critical: Decontamination method 4, Dry Decontamination, should be initiated immediately in most circumstances. This procedure is the first step for all other decontamination methods and must be accomplished at the beginning of the decontamination process.

Decontamination Solution: Soap and water is the preferred decontamination solution, however, do not delay the initiation of the decontamination process to obtain soap.

Decontamination after Vapor Exposure\(^3\): If a victim has been exposed to only vapor, wet decontamination is not as important if the victim has been exposed to clean air for at least 15 minutes. Responders must be sure that no liquid contamination has occurred.

Decontamination after some Liquid Exposures is more critical.\(^4\):

Liquid nerve (GA, GB, GD & VX) and mustard agents (H, HD, HS & HT) must be removed as soon as possible. According to Sidell, Mustard should not be decontaminated with water except for the eyes because it will spread the contamination.

Studies have shown that after exposure to liquid nerve and mustard agent:

- decontamination done within one minute prevented 80% of the damage that would have occurred without decontamination.
- decontamination done five minutes after exposure prevented 50% of the damage that would have occurred without decontamination.
- decontamination done 30 minutes after exposure prevented 7% of the damage that would have occurred without decontamination.

Cyanide can penetrate the skin but evaporates quickly unless it is absorbed into the clothing in which case the clothing should be cut away and removed.

Phosgene does not readily penetrate the skin but its vapors create a hazard. Wet spots in clothing should be cut away and removed.

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\(^3\) Frederic R. Sidell, M.D., 1995, *Management of Chemical Warfare Agent Casualties*, Bel Air, MD

Decontamination Solution and Runoff Containment: To the extent possible, decontamination solutions and runoff should be contained by the use of or creation of containment basins or by damming the runoff using available resources. Extended periods of sub-freezing temperatures will result in frozen ground that can prevent or reduce ground penetration of the runoff. Freezing conditions will limit the spread of the solution by freezing it in place. The resulting ice will result in other problems such as creating a slip and fall hazard and being difficult to remove. Plastic barriers may be placed on the ground to contain the runoff and the resulting ice. Wet plastic tarps may be slippery when wet or icy. Snow berms covered with plastic can be used to create containment basins.

Contact a Federal On-Scene Coordinator (FOSC) to determine applicable environmental regulations.

Cold Environment Decontamination (32˚C. to 20˚C. [89.6˚F -69˚F] ) and Extreme Cold Decontamination (20˚C. to-20˚C. [68˚F to -4˚F])
The primary concerns with cold weather decontamination are cold shock from the use of cold water and hypothermia from long-term exposure to the cold compounded by being wet. The time a victim is exposed to cool /cold temperatures and cool/cold water combine to create a condition in which the risk of cold shock and hypothermia become problematic and must be weighed against the decontamination needs.

Cold Weather Decontamination needs for the temperature range of 32˚C.to 20˚C. [89.6˚F to 69˚F] allow for the use of wet decontamination (water temperatures above 13˚C (55˚F) and limited time outside if ambient temperatures are below 18˚C (65˚F).

Very Cold Weather Decontamination needs for the temperature range of 20˚C. to -20˚C. [68˚F to -4˚F] require that the use of water be limited and possibly eliminated as the temperature drops below 18˚C (65˚F) and approaches freezing. The primary focus of very cold weather decontamination is to use dry decontamination methods until the victims can be relocated to a warm environment and warmer water can be obtained.

Decontamination in Rural Locations
Decontamination in a rural setting would begin with Method 4, Dry Decontamination, if victims began exhibiting signs and symptoms of a chemical agent. If no immediate symptoms are detected victims should be monitored and transported to a more suitable decontamination location.

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5 According to CERCLA Sec. 107 (d), when taking federally recommended action in response to a chemical terrorist incident, responders are protected under the law. Once the incident is stabilized responders should make every effort to prevent further migration of contamination into the environment.  
6 Under CERCLA, a FOSC can determine which applicable regulations are impracticable to achieve. By involving the FOSC, responders can reduce liability and obtain federal resources.
Considerations for warm decontamination and warming resources in rural locations may be the use of motor homes, automobiles or busses that could be used signally or in tandem.

**Decontamination at Sea**  
Conditions for decontamination aboard cruise ships will likely resemble those found in large land-based structures which include HVAC systems, and areas that can be isolated to create protective zones. There will likely be warm facilities for decontamination.

**Method 1: Standard Decontamination System (Temperature above ≥18°C [65°F])**  
This entire process is conducted outdoors. This process uses any of the many available large volume fire-fighting nozzles flowing low-pressure streams applied from overhead to create single or multiple shower corridors capable of decontaminating large numbers of ambulatory patients. Use wide spray patterns applied with ladder pipes or hand-lines suspended from ladder systems and use salvage covers to create corridors. Avoid cold shock by allowing patients to ease into the shower stream. In summer, Anchorage’s water system temperatures are often below 10°C (50°F). These cold temperatures can be difficult for many individuals to endure. *It is recognized that the cold shock will result in health problems and hesitation of the victims to proceed. We must consider that not all of these problems can be overcome and that this plan is intended to balance life safety against time and resources.*

The use of high volume nozzles will generate large quantities of runoff that should be contained if possible. Consider diverting the water into terrain that can be dammed to hold the runoff.

A separate corridor and system for non-ambulatory patients will be required to accommodate individual decontamination needs.
Method 2: Outdoor Wet Decontamination, then into Heated Enclosure—Outdoor (Temperature >35ºF)

This process uses an outdoor wet decontamination (Described in Method 1) near the entrance to a warm facility such as portable heated shelter, hotel, and hospitals. After decontamination, patients are moved inside for warmth. Consider the chemical agent, resource availability and delivery and setup time. If the needed resources are not arriving with the first response, consider methods 3 or 4.

Method 3: Indoor Decontamination (Temperature <35ºF)

Indoor decontamination resources may consist of but are not limited to the following examples:

1. Shower facilities in gymnasiums and sports facilities and recreation centers
2. Swimming pools in hotels, schools and recreation centers
3. Car washes
4. Use of fire protection sprinkler heads in warm facilities, consider possibility of cold shock due low water temperatures.
5. Heated portable shower units


According to Guidelines for Cold Weather Mass Decontamination During a Terrorist Chemical Agent Incident, (U.S. Army Soldier and Biological Chemical Command, Jan. 2002), approximately 800,000 people could be processed in an Olympic-sized swimming pool before the pool became ineffective for decontamination.
Instructions for personnel at alternative decontamination facilities

1. Implement decontamination Method 4, Dry Decontamination, if patients are presenting with signs and symptoms of exposure to a chemical agent. This alone will remove a majority of the contamination.
2. If possible, contact facility representative.
3. Evacuate the facility before contaminated victims arrive.
4. Control HVAC to prevent spread of contamination.
5. Request appropriately protected (PPE) personnel to provide security.
6. Segregate males and female disrobing areas.
7. Provide instructions using a PA system (consider needs of non-English speaking and hearing impaired victims).
8. If using a swimming pool:
   a. Identify non-swimmers before entering the pool.
   b. Pay close attention to victim status and preposition rescue equipment.
   c. Males and females should use opposite ends/sides of the pool to the extent possible.
9. After an appropriate time in the pool, minimum of 5 minutes, victims should shower with soap and water.
10. Decontamination team members should supervise the entire procedure.

NOTE: In selecting a site for indoor decontamination and warming as described in Methods 2 and 3 the potential for the facility to be rendered unusable or requiring it to undergo a costly decontamination process must be weighed against the risk of further injury and loss of life if decontamination is delayed.

Method 4: Dry Decontamination and Transport (Temperature <35ºF)

This involves removal of the outer layer of clothing and techniques such as blotting visible contamination with the inner surfaces of thicker clothing such as coats or using paper towels, pre-treated wipes, and newspapers. Under extreme circumstances when proper resources are not available, consideration for use of natural resources such as sand, dirt, grass, leaves and snow may be considered. The removal of the outer clothing alone will remove most of the contamination assuming winter dress.

Due to response time and the time required to set up decontamination facilities and equipment as described in Methods 1, 2, and 3, Dry Decontamination is the most readily available method to quickly reduce contamination and exposure. If, upon arrival victims are presenting symptomatic they must be directed by first responders to begin removing outer clothing and assisting each other as necessary in blotting visible agent.

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9 Snow may be used as a last resort for self-decontamination or by a first responder. Duration of skin contact must be minimized and consideration of the evaporative effects of the water left on the skin must be planned for. The victims must be protected from the cold by providing clean blankets or clothing and/or be moved to a warm facility. Washing one's hands with snow is a common outdoor practice that doesn’t result in great discomfort as long as the skin is dried and kept warm.

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Patients will then be moved to the nearest warm area available for wet decontamination (Methods 2 and 3). Consider the chemical agent and the necessity for rapid decontamination in addition to available resources when selecting the wet decontamination site.

**Anchorage Conditions**
When evaluating the four decontamination methods for use in Anchorage consideration should be given to the fact that temperatures for most of the year are below 65°F and Anchorage water systems temperatures are often 55°F or below. These conditions will rule out the use of Methods 1 and 2. Method 3 will likely be the primary method for decontamination in Anchorage conditions.

**Decon Gels**
Decontamination gels such as EasyDECON™ developed by Sandia National Laboratories (http://www.envirofoam.com/performance_data.html) and L-Gel developed by Lawrence Livermore Laboratories (http://www.llnl.gov/str/March02/Raber.html) are not approved for application to human skin for decontamination purposes.

**POST DECONTAMINATION**
1. Observe patients for signs of hypothermia, psychological stress
2. Provide risk information relating the incident including signs and symptoms of the chemical exposure and needed follow-up care.
Note: Anchorage water system temperatures and climatic conditions generally dictate use of methods 3 & 4.

OTHER CONSIDERATIONS

Communications Barriers
Solutions for communication barriers such as non-English speaking should be sought first from first responders, the crowd, or immediate vicinity due to the time-critical nature of the decontamination process. Most governmental jurisdictions have procedures in place to help with communication problems, however, a mass contamination event will likely not allow time to solicit help from local communications pools. Responders should rely on help within the immediate area. Another means of communication is to use English-speaking individuals to demonstrate the decontamination process.

Use of Signs
Communities should assess the local demographics in order to determine appropriate languages to use in creating signs for use in communication with non-English speaking victims. Suggested signage might be: “Men,” “Women,” “Disrobe,” “Proceed” and other signs as needed. The use of paper or adhesive backed signs that can be transferred to more ridged backing when needed may be considered.

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10 The appropriate decontamination method based on studies by U.S. Army Soldier Biological Chemical Command (SBCCOM) in which members of the Anchorage Fire Department participated. This table is taken from the resulting Guidelines for Cold Weather Mass Decontamination During a Terrorist Chemical Agent Incident, 2002.
**Collection and tagging of clothing and valuables**

It is desirable that the clothing and valuables be collected and tagged to show the owner. Due to the need to expedite the decontamination process, this may not always be possible. It must be anticipated that some individuals will be reluctant to part with some or all clothing and/or valuables. Responders must consider the chemical agent and exposure, the likelihood of the personal item being contaminated and the necessity to quickly accomplish the decontamination process. Plastic bags should be available for victims to place valuables. Large clear or transparent trash bags should be available collecting clothing.

**SCENE MANAGEMENT**

1. Establish decontamination corridor big enough to accommodate the number of exposed victims considering available resources.
2. Use decontamination shelters, warming shelters, salvage covers, vehicles, ladders and any other available resources to construct the decontamination corridor.
3. To the extent possible, provide separate corridors for men and women.
4. Obtain the necessary supplies including blankets, towels, biohazard bags and other equipment from the MMRS supply cache, hotels, gymnasiums, department stores or any immediately available resource.
5. Assign triage personnel to evaluate victims exiting the hot zone.
6. The level of PPE for decontamination personnel will be assigned by command, usually Level C or Level B.
7. Initiate the call for Municipal People Mover busses for transportation to secondary decontamination, if needed, and to hospitals or holding areas.
8. If secondary decontamination is needed, determine an appropriate heated facility taking into account the distance and accessibility. Consider swimming pools, carwashes, or other heated buildings or shelters with washing facilities. Staff with at least one paramedic.
9. Staff each bus with a driver and as a minimum an appropriately equipped EMT in appropriate CPC as determined by command.
10. Ensure adequate radio communication between busses and secondary decontamination or other places where people are being transported to as well as between secondary decontamination facilities and medical facilities.

**DECONTAMINATION AREA CONTROL**

1. Separate symptomatic from asymptomatic
2. Direct asymptomatic individuals to a secured area in the warm zone
3. Those presenting as symptomatic will be directed through the gross decontamination process.
4. Upon entering the appropriate corridor, victims will be asked to remove as much clothing and jewelry as possible and deposit them into a biohazard bag which should be tagged and marked.
5. Separate symptomatic ambulatory patients from non-ambulatory patients.
   a. Direct ambulatory patients to remove outer layers of contaminated clothing and use any uncontaminated portions of the inside of their
garments to blot any visible contaminants from unprotected skin. In addition, direct them to use available man-made or natural products to blot visible contaminants.

b. Direct ambulatory patients to assist each other in providing self-decontamination

6. Upon exiting decontamination, victims will be given temporary clothing such as Tyvek jump suits from the MMRS stockpile or use sheets or other available resources found nearby.

7. Keep children paired up with parents, teachers or known adults

8. If individuals are to be held for further examination, warm sheltering should be provided as necessary if temperatures drop below 10ºC (50ºF) degrees F.

FIRST RESPONDER DECONTAMINATION

It is anticipated that the initial first responders to a terrorist event will likely become contaminated. In order to maximize response capability and care for first responders a decontamination corridor will be established separate from the mass decontamination setup. This can be established by using mobile self-contained decontamination trailers, inflatable decontamination shelters or decontamination facilities constructed using fire apparatus and equipment such as ladders, nozzles and tarps. Decontamination methods 1 through 4 previously discussed will also apply. The first responder decontamination should be far enough away from the mass decontamination facility that civilian victims would not overwhelm the decontamination crewmembers. Security for this site will be needed.

First Responder Post Decontamination Return to Duty
Due to limited personnel resources, first responders may be evaluated by EMS personnel for return to duty after being provided a clean set of PPE.

SECONDARY DECONTAMINATION AREA CONTROL

1. If possible, segregate by sex.
2. Assess patients for capability to self-decontaminate, if not refer to EMS.
3. If using showers, have victims shower in warm water for at least 3 minutes.
4. Check post-decontamination patients for contamination using appropriate equipment and methods.
5. Provide temporary clothing and move to collection area for further medical treatment.

NON-AMBULATORY DECONTAMINATION

1. Secondary decontamination may be needed based on the patient’s condition, available resources and the number of casualties.
2. Two decontamination personnel will be needed per patient.
3. Remove victim’s clothing to the extent possible.
4. The patient and backboard will be supported above the floor of the containment basin using available resources such as saw horses, 5-gallon buckets, chairs, or milk crates.
5. Maintain the airway and administer oxygen if available.
6. Use soft bristle brushes or sponges to systematically wash the victim without abrading the skin.
7. If eye irrigation is necessary use normal saline if available.
8. After thoroughly cleaning the patient and backboard, wrap the victim in a blanket for movement into the cold zone. Seek warm shelter to house decontaminated patients.

**Considerations for Non-Ambulatory, Unconscious Victims**
- Protect face and airway
- Limit exposure to cold water to prevent injury
- Dry and apply blanket as soon as possible to conserve body heat.
- Move to a warm location as soon as possible

**RADIOLOGICAL DECONTAMINATION**
1. Radiological decontamination will most likely consist of removing outer layers of clothing to remove contaminants followed by wet decontamination.
2. Initial screening with radiological detection equipment will establish the need for decontamination.
3. If large populations are exposed, use public address systems to direct victims to appropriate areas to remove clothing and begin appropriate decontamination process determined by the temperature range.
4. Post decontamination operations should consist of using radiological survey instruments to survey each patient before releasing from the warm zone.
5. Do not subordinate the treatment of life threatening injuries to decontamination.
Note: Anchorage water system temperatures and climatic conditions generally dictate use of methods 3 & 4.