



*System Assessment and Validation for Emergency Responders (SAVER)*

# General Purpose Outer Work Gloves Focus Group Report

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System Assessment and Validation for Emergency Responders

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## FOREWORD

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The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems, and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL). The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency responder equipment; and
- Providing information that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.

Information provided by the SAVER Program will be shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: “What equipment is available?” and “How does it perform?”

As a SAVER Program Technical Agent, the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC) has been tasked to provide expertise and analysis on key subject areas. In support of this tasking, NSRDEC conducted a focus group on general purpose outer work gloves, which fall under AEL reference number 01ZA-02-GLVW titled, Gloves, Outer, Work. The following report presents criteria identified by the focus group as important to consider when making a purchase.

Visit the SAVER Web site at [www.dhs.gov/science-and-technology/SAVER](http://www.dhs.gov/science-and-technology/SAVER) for more information on the SAVER Program or to view additional reports on outer work gloves and other technologies.

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## 1. INTRODUCTION

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The System Assessment and Validation for Emergency Responders (SAVER) Program conducted a focus group to help identify criteria important to the emergency responder community when purchasing general purpose outer work gloves (which fall under the U.S. Department of Homeland Security [DHS] Authorized Equipment List [AEL] Number 01ZA-02-GLVW). The focus group addressed possible usage scenarios and covered the five SAVER categories: affordability, capability, deployability, maintainability, and usability.

For the purpose of this report, the discussion was limited to general purpose outer work gloves (hereinafter referred to as work gloves). There are numerous benefits to using work gloves for personal protection, including both safety and comfort. They are needed and used in everyday assignments for almost all operations. For the majority of emergency responders, more than one type of work glove is carried. Some responders may carry three to five depending on the individual's job function (e.g., one glove for environmental, another for tactical, and yet another for pathogen protection, etc.).

## 2. FOCUS GROUP PARTICIPANTS

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Eleven emergency response personnel were chosen from various jurisdictions to participate in the focus group. The small size of the group provided for constructive interaction and dialogue, which resulted in stimulating and productive discussions throughout the day. All of the participants possessed strong backgrounds within fire, law enforcement, or emergency medical service agencies, as well as specialized fields such as Special Weapons and Tactics (SWAT). The participants represented a broad range of geographic regions and environments.

All of the participants acknowledged they did not have an employment or financial relationship that could create a potential conflict of interest with the work to be performed by the SAVER Program. Participants signed a nondisclosure agreement and a conflict of interest statement.

Information regarding the individuals who participated in the focus group is shown in table 2.1.

**Table 2.1 Focus Group Participant Demographics**

<b>Practitioner</b>	<b>Years of Experience</b>	<b>Home State</b>
Lieutenant, Police Department	33	CO
Captain, Emergency Medical Services Senior Liaison	32	MA
Captain, Special Services Division (SWAT, K-9, Narcotics, and Homeland Security)	32	NV
Lieutenant, SWAT Team Commander	32	PA
Chief, Fire Department	30	NC
Captain, Division Commander, Patrol and SWAT	29	AZ
Battalion Chief, Fire and Emergency Medical Services, Homeland Security/Special Operations	27	DC
Lieutenant, State Police	24	NM
Battalion Chief, Urban Search and Rescue Program Coordinator, Fire Department	23	NC
Sergeant, Sheriff’s Office, Emergency Response Team and Special Response Team	23	FL
Assistant Chief, Firefighting/Emergency Medical Technician-Basic	12	KY

### 3. FOCUS GROUP METHODOLOGY

The focus group began with a briefing that explained the purpose of the SAVER Program and outlined the focus group objectives. The focus group participants were provided a definition of outer work gloves as “A glove shell that shall be a four finger and thumb design which may be used alone and can possibly be compatible with a glove liner. The glove shall provide protection to the wearer from physical harm caused by one or more of the following: pathogens, flame, heat, cold, or sharp objects, while still providing adequate dexterity, tactility, and grip to perform the necessary task of the wearer.” The discussion was limited to general purpose outer work gloves, which have a common purpose across the emergency responder community.

#### 3.1 Operational Environments

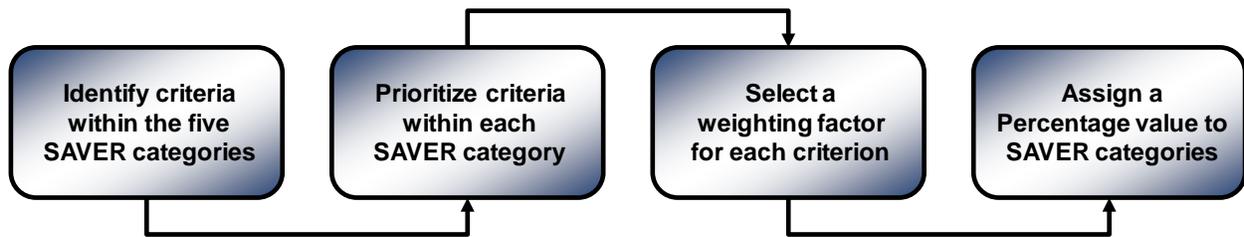
The participants discussed various operational environments/mission areas where work gloves improve emergency responder safety. The following were determined the most relevant:

- Performing extrication and rescue of trapped and/or injured people;
- Emergency medical procedures;

- Firing weapons;
- High temperature environments;
- Use with ropes;
- Situations where there are threats from sharp objects, needle punctures, or pathogens;
- Cold/wet weather conditions; and
- Motorcycle or marine patrol.

### 3.2 Criteria Identification Process

The participants recommended criteria important to consider when procuring work gloves using a process (figure 3.1) that included prioritizing each criterion under a SAVER category, and then assigning those criteria a weighting factor (out of 100 percent total) for importance. Finally, the SAVER categories were assigned a percentage value (out of 100 percent total) to identify the importance of each category in relation to procurement decisions.



**Figure 3.1 Criteria Identification Process**

The SAVER categories are defined as:

- Affordability – Criteria related to life-cycle costs of a piece of equipment or system;
- Capability – Criteria related to the power, capacity, or features available for a piece of equipment or system to perform or assist the responder in performing one or more relevant tasks;
- Deployability – Criteria related to the movement, installation, or implementation of a piece of equipment or system by responders at the site of its intended use;
- Maintainability – Criteria related to the maintenance and restoration of a piece of equipment or system to operational conditions by responders; and
- Usability – Criteria related to the quality of the responders’ experience with the operational employment of a piece of equipment or system. This includes the relative ease of use, efficiency, and overall satisfaction of the responders with the equipment or system.

4. FOCUS GROUP RECOMMENDATIONS

Table 4.1 reflects the procurement criteria recommendations and weighting factors assigned by the focus group. Although the work gloves provide protection from similar hazards across the emergency responder community, and the group agreed on the weightings assigned to most of the criteria and SAVER categories, they could not reach a consensus on individual criterion weightings for the capability category. As such, the weighting for that area is broken out by the three disciplines: Law Enforcement, Firefighters, and Emergency Medical Services.

**Table 4.1 Procurement Criteria**

SAVER CATEGORIES				
Capability	Usability	Affordability	Maintainability	Deployability
Overall Weight 30 %	Overall Weight 30 %	Overall Weight 20 %	Overall Weight 15 %	Overall Weight 5 %
<b>Cut Resistant</b> Weight: *15% / 15% / 15%	<b>Dexterity</b> Weight: 35%	<b>Price</b> Weight: 60%	<b>Easy to Launder</b> Weight: 30%	<b>Donning &amp; Doffing</b> Weight: 70%
<b>Stab/Puncture Resistant</b> Weight: *15% / 8% / 15%	<b>Tactility</b> Weight: 30%	<b>Availability</b> Weight: 40%	<b>Liners</b> Weight: 20%	<b>Training</b> Weight: 15%
<b>Impact Resistant</b> Weight: *15% / 15% / 1%	<b>Durability</b> Weight: 30%		<b>Shrinkage</b> Weight: 20%	<b>Availability</b> Weight: 15%
<b>Dexterity</b> Weight: *15% / 15% / 15%	<b>Integration</b> Weight: 5%		<b>Chemical Degradation</b> Weight: 20%	
<b>Pathogen Protection</b> Weight: *10% / 15% / 20%			<b>Mildew Resistant</b> Weight: 5%	
<b>Moisture Wicking</b> Weight: *5% / 4% / 1%			<b>Storage</b> Weight: 5%	
<b>Fire Resistant</b> Weight: *5% / 8% / 8%				
<b>Decontamination</b> Weight: *5% / 4% / 8%				
<b>Sizing</b> Weight: *5% / 8% / 15%				
<b>Water Repellant</b> Weight: *5% / 4% / 1%				
<b>Heat/Cold Protection</b> Weight: *5% / 4% / 1%				

\* Weight factors for: Law Enforcement / Firefighters / EMS (different weights due to different discipline priorities)

## 4.1 Capability

Eleven capability criteria were identified and defined by the focus group.

**Cut Resistant** refers to protection from direct contact with sharp edges such as glass, metal, ceramics, and other materials.

**Stab/Puncture Resistant** refers to protection from direct contact with sharp points such as knives and needles.

**Impact Resistant** refers to the ability to withstand the force of a sudden impact.

**Dexterity** refers to the ease of physical movement for the manipulation of objects.

**Pathogen Protection** refers to protection from direct exposure to blood and other potentially infectious materials.

**Moisture Wicking** refers to the movement of moisture within a fabric away from the skin and to the surface.

**Fire Resistant** refers to the ability to withstand fire and retard its spread.

**Decontamination** refers to the ability to be cleansed of a hazardous material without being damaged.

**Sizing** refers to availability of differing sizes.

**Water Repellant** refers to being resistant to penetration by water.

**Heat/Cold Protection** refers to insulation from discomfort in extremely hot or cold environments.

## 4.2 Usability

Four usability criteria were identified and defined by the focus group.

**Dexterity** refers to the ease of physical movement for the manipulation of objects.

**Tactility** refers to the ability to feel objects. This is important for tasks such as pulling flash bang pins, firing weapons, typing, and using touch screens.

**Durability** refers to having a long useful life.

**Integration** refers to combining well with duty uniforms and specialized duty gear.

### 4.3 Affordability

Two affordability criteria were identified and defined by the focus group.

**Price** refers to the actual cost of the item. Participants felt the current pricing for most work gloves is reasonable; however, with the need to purchase different work gloves for different purposes, the combined cost becomes expensive. If emergency responders could find a work glove that was higher priced, but combined the capabilities of multiple work gloves (e.g., environmental, tactical, pathogen protection, etc.), they would consider purchasing the more expensive multi-purpose glove.

**Availability** refers to being easily located or obtained and readily available for purchase in the marketplace. The focus group mentioned that work gloves are not as readily available off-the-shelf as they once were. Often departments order work gloves and then have to wait for delivery. This is especially true for items such as medical gloves. During a national event or incident, such as the Gulf oil spill, all of the available supply can be exhausted thereby leaving the rest of the emergency response community without adequate stock.

### 4.4 Maintainability

Six maintainability criteria were identified and defined by the focus group.

**Easy to Launder** refers to being easy to wash and dry (i.e., no dry cleaning or special handling), or at a minimum rinsed. Water and moisture can affect the life of some work gloves (i.e., liners can deteriorate, and shrinkage or stiffness may occur once the glove is dried).

The participants mentioned that some departments have scheduled cleanings using a commercial vendor. For situations involving contact with hazardous materials, sometimes disposable gloves are used, and other times the work gloves are decontaminated and re-used.

**Liners** refer to the lifespan of the liners in the work gloves. Some glove liners wear out quickly and are hard to maintain.

**Shrinkage** refers to the work gloves retaining their size and shape after getting wet or laundering.

**Chemical Degradation** refers to loss of physical properties due to a chemical reaction.

**Mildew Resistant** refers to the suppression of mildew growth if stored for an extended time period between uses.

**Storage** refers to the ability to be stored for long periods of time without loss of performance.

## 4.5 Deployability

Three deployability criteria were identified and defined by the focus group.

**Donning and Doffing** refers to the ease of putting on or taking off.

**Training** refers to practicing a skill with the glove. Some departments, depending on the type of glove, conduct internal evaluations where they decide which work gloves work best for which tasks, as well as the interoperability with required gear and equipment. The responders are then required to train with the work gloves using that gear and equipment.

**Availability** refers to being easily located or obtained and readily available for purchase in the marketplace. It was mentioned that work gloves are not as readily available off-the-shelf as they once were. Often departments need to order the work gloves and then wait for delivery. This is especially true for items such as medical gloves. During a national event or incident, such as the Gulf oil spill, all of the available supply can be purchased thereby leaving the rest of the emergency response community without adequate stock.

## 5. FUTURE ACTIONS

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The focus group recommendations will be used to guide the development of a market survey report. The report will provide a snapshot of the current commercial marketplace, including manufacturers, contact information, and salient technical characteristics. Once the *General Purpose Outer Work Gloves Market Survey Report* is complete, it will be available in the SAVER section of the RKB Web site, <https://www.rkb.us/saver>.

## 6. CONCLUSIONS

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The emergency response community has a common need for general purpose outer work gloves; however, there is no one-glove-fits-all solution. Emergency responders have a need for basic protection from cut, stab, puncture, impact, pathogens, flame, water, heat, and cold. They also require dexterity, tactility, and durability. Responders consider work gloves an important piece of personal protective equipment, and most find it necessary to carry more than one pair to meet their needs.

The advancements in technology, such as touch screens, have increased the need for higher levels of dexterity and tactility, and many companies are continuing research in this area. Emergency response personnel and agencies have similar needs when it comes to affordability, deployability, and maintainability. The work gloves need to be priced affordably, easily donned and doffed, and easy to maintain by being able to be washed, or at least rinsed whenever needed.

## 7. ACKNOWLEDGEMENTS

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The SAVER Program would like to thank the focus group members for their thorough deliberations and recommendations. We would also like to thank the home jurisdictions involved for providing the opportunity to their responders to participate in the SAVER Program. Their collective assistance allowed for the gathering of meaningful information that will be provided to Federal, state, local, and tribal agencies to better equip our Nation's emergency responders.