



# Summary

### U.S. Department of Homeland Security



System Assessment and Validation for Emergency Responders

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 operational tests 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, and operationally oriented assessments and validations of emergency responder equipment;
- 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-saving 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?"

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## Hand-Held Lights for Law Enforcement

*In order to provide emergency responders with information on currently available hand-held lights technologies, capabilities, and limitations, Science Applications International Corporation (SAIC) conducted a comparative assessment of hand-held lights for law enforcement applications for the SAVER Program in January 2008. Detailed findings are provided in the Assessment Report on Hand-Held Lights for Law Enforcement, which is available by request at <https://www.rkb.us/saver>.*

### Background

Hand-held lights are commonly used by law enforcement personnel to perform routine response activities in darkened and/or nighttime environments. Hand-held lights enable responders to illuminate darkened areas so that objects or subjects can be identified, tasks can be performed correctly, and civilians and officers can be protected.

### Assessment

Prior to the assessment, SAIC conducted a market survey in order to investigate currently available hand-held lights used for law enforcement applications. A focus group consisting of seven emergency response practitioners from various regions of the country met to identify equipment selection criteria for the assessment, determine evaluation criteria, and recommend assessment scenarios.

The focus group participants discussed the broad range of light configurations and the varying capabilities of each. They recommended that an assessment of rechargeable lights would be most beneficial to the law enforcement community. The focus group also recommended specific hand-held lights to be assessed. Based on the focus group recommendations and market survey research, four hand-held lights were selected and ordered for assessment. However, Pelican™ Products was unable to fulfill its order for the M9 Rechargeable 7050. Therefore, only three hand-held lights were evaluated. The following models were assessed as representative of the current marketplace of compact rechargeable hand-held lights:

- Mag Instrument, Inc. Mag Charger® Rechargeable Flashlight System
- Streamlight Stinger®
- SureFire 9AN Commander®.

Eight emergency response practitioners served as assessment evaluators. Each hand-held light was used to simulate law enforcement scenarios involving different search and seizure activities conducted at night. Evaluators conducted three rotations, and each rotation consisted of four stations: (1) vehicle stop, (2) railcar search, (3) woodland search, and (4) building clearance. The first station required evaluators to identify a suspect while performing a vehicle stop, as well as to use their hand-held lights to search for contraband or other hazards. The second station tasked evaluators with searching a derailed train car for trauma victims (see figure 1).

The third station required evaluators to conduct a woodland search to locate and apprehend a looting suspect that had fled from law enforcement officers during a hurricane. The final station required evaluators to perform search and clear operations of a multi-level building while encountering simulated smoke (i.e., theatrical smoke), darkened stairwells, hallways, and rooms. Each hand-held light was evaluated in the same manner, and the assessment conditions were controlled to make the evaluation of each light as similar as possible.



**Figure 1. Hand-held light being used during the railcar search**

## Assessment Results

Evaluators rated the hand-held lights based on the weighted evaluation criteria established by the hand-held lights for law enforcement focus group. Each criterion was prioritized within the five SAVER categories and assigned a weighting factor based on a 100-point scale. The SAVER category and composite scores are shown in table 1. Higher scores indicate better performance. To view how each light scored against each of the evaluation criteria assigned to the SAVER Program Categories, see table 2.

The following paragraphs provide a brief summary of the evaluator comments and feedback on each

### SAVER Program Category Definitions

**Affordability:** This category groups criteria related to life-cycle costs of a piece of equipment or system.

**Capability:** This category groups 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 responder-relevant tasks.

**Deployability:** This category groups 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:** This category groups criteria related to the maintenance and restoration of a piece of equipment or system to operational conditions by responders.

**Usability:** This category groups 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.

hand-held light used during the assessment. The hand-held light models are listed by highest to lowest composite score. The full report includes a breakdown of evaluator comments by individual criterion.

### Streamlight

The Streamlight received the highest composite score as well as the highest evaluator ratings in the usability, affordability, and deployability categories. The manufacturer's literature states the light can continuously operate up to 1.75 hours on high, 3.5 hours on medium, 6.75 hours on low, and 5.5 hours on strobe. The highest setting provides a very strong output, which enables users to temporarily blind assailants, and the strobe feature allows users to momentarily disorient their suspects.

**Table 1. Hand-Held Lights Assessment Results**

System	Composite Score	Affordability (10% Weighting)	Capability (30% Weighting)	Deployability (25% Weighting)	Maintainability (5% Weighting)	Usability (30% Weighting)
Streamlight	73.2	79	62	84	54	76
Mag	67.6	75	65	65	74	69
SureFire	61.6	58	55	70	57	64

Note: Scores contained in the complete assessment report may be listed in a different numerical scale. For the purposes of the SAVER Summary, SAVER category scores are normalized and rounded to the nearest whole number.

	 <b>Pros</b>	<ul style="list-style-type: none"> <li>Affordability</li> <li>Light durability</li> <li>Weight</li> <li>Size (i.e., length and diameter)</li> <li>One-hand operation</li> <li>Multiple intensity settings</li> <li>Easy-to-use momentary-on button</li> <li>Strobe light</li> <li>Optional lanyard</li> <li>Limited lifetime warranty</li> <li>Mountable charger</li> <li>Anti-roll option</li> </ul>
	 <b>Cons</b>	<ul style="list-style-type: none"> <li>Difficult operation of constant-on feature</li> <li>Sensitive control/accidental operation</li> <li>Shadows created by LED</li> </ul>
<b>Streamlight</b>		<b>Composite Assessment Score: 73.2</b>

The Streamlight uses commercially available 3-cell Nickel-Cadmium (Ni-Cd) replacement batteries, which can be recharged up to 1,000 times according to the manufacturer. The batteries provided sufficient power throughout the assessment, and the light was easily placed into and removed from the charger. Evaluators commented on the durability of the light, noting the sturdy construction of the bezel, lamp lens, and battery compartment. The Streamlight is lightweight and compact enough to be used in confined spaces, and the one-switch operation allowed evaluators to easily operate and focus the light using only one hand. The Streamlight is compatible with duty belts and its textured barrel allows it to be easily carried with a gloved hand. Evaluators agreed that the Streamlight is reasonably priced and the accessories appear consistent with the cost of the light. Terms and conditions of the limited lifetime warranty, as well as customer service information, were easily located.

One disadvantage of the Streamlight was a sensitive control button which caused accidental operation. Also, the constant-on feature was not easily operable.

### Mag

The Mag received the second highest composite score as well as the highest capability and maintainability scores. The Mag offers one intensity setting and adjustable beam widths. The light output was sufficient for performing all of the assessment tasks and was bright enough to temporarily blind an assailant if shined directly into his/her eyes. The Mag includes a halogen bulb (50-hour rating), and the end

	 <b>Pros</b>	<ul style="list-style-type: none"> <li>Adjustable beam width</li> <li>Good light penetration</li> <li>Three-position switch</li> <li>Water-resistant construction</li> <li>Mountable charger</li> <li>Spare bulb provided</li> <li>Affordability</li> <li>Limited lifetime warranty</li> </ul>
	 <b>Cons</b>	<ul style="list-style-type: none"> <li>Size (i.e., length/diameter)</li> <li>Weight/weight distribution</li> <li>Switch location</li> <li>Slippery grip when wet</li> <li>Difficulty locating switch with glove</li> <li>Drop durability of bulb</li> <li>Switch profile too low</li> <li>Spring assembly in end cap</li> </ul>
<b>Mag</b>		<b>Composite Assessment Score: 67.6</b>

cap can be easily removed to access the spare bulb. The light uses 5-cell Ni-Cd batteries, and the battery compartment can be easily accessed. The AC charger can be easily moved from place to place (e.g., inside a vehicle or home/office), and mounting brackets are provided. The Mag is constructed of anodized aluminum, is described by the manufacturer as corrosion-resistant, and appears sturdy and very durable. Evaluators agreed that the Mag and its accessories are reasonably priced. Terms and conditions of a 10-year limited lifetime warranty and customer service information were easily located.

Evaluators reported that the Mag is too large and heavy to be mounted on a firearm, and too long to be used in confined spaces. Other disadvantages include the drop durability of the bulb and difficulty locating the switch while wearing gloves.

### SureFire

The SureFire received the lowest composite score of the assessed lights, but some advantages were reported by the evaluators. The SureFire is constructed of anodized aluminum and is described as corrosion-resistant by the manufacturer. The light appears sturdy and well built, and both the bezel and battery compartment appear to be properly enclosed. The large end cap switch of the SureFire can be easily located and operated while wearing gloves, but the momentary-on feature creates minor thumb fatigue. The SureFire was easily transported on a duty belt, and it is lightweight enough to be carried in one's pocket during response operations. Manufacturer's literature states that the SureFire produces a light output of 20 lumens on low and 140 lumens on high.

	 <b>Pros</b>	<ul style="list-style-type: none"> <li>• End cap switch</li> <li>• Size</li> <li>• Light intensity/brightness</li> <li>• Shatterproof lens</li> <li>• Two rechargeable batteries</li> <li>• AC/DC chargers included</li> <li>• Water-resistant construction</li> <li>• Beveled edge</li> <li>• Limited lifetime warranty</li> </ul>
	 <b>Cons</b>	<ul style="list-style-type: none"> <li>• Weak low beam</li> <li>• Expensive</li> <li>• Two-hand operation</li> <li>• Charger not vehicle-mountable</li> <li>• External battery charge</li> <li>• Screwdriver required to replace lamp assembly</li> <li>• Short operating time</li> <li>• No adjustable beam</li> </ul>
<b>SureFire</b>	<b>Composite Assessment Score: 61.6</b>	

There was a drastic intensity change between the two settings; the high intensity is sufficient for performing assessment tasks, but the lower setting is better suited for paperwork. A list of accessories and spare parts was locatable on the Internet that included colored filters, leather holsters, a beam diffuser, and a traffic wand. Terms and conditions of the warranty, as well as customer service information, were easily found.

The SureFire beam width is not adjustable. While evaluators were able to change the intensity settings, adjusting the light intensity required two hands. The batteries provided a sufficient charge for the assessment tasks, but one of the teams was required to use its back-up battery to complete the last two scenarios. The SureFire is the most expensive light of the three assessed hand-held lights.

## Conclusion

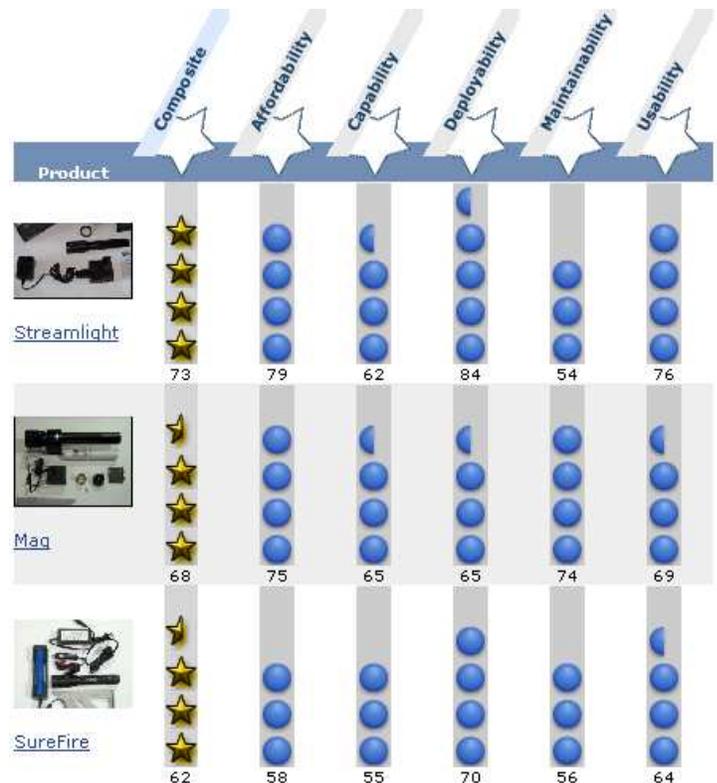
The purpose of this comparative assessment was to evaluate the effectiveness of hand-held lights used in law enforcement applications. During the assessment, the evaluators followed scenario-driven exercises that included common law enforcement response tasks.

Evaluators were able to successfully complete the assessment using each of the selected hand-held lights, but each light performed differently. The Streamlight received the highest composite score.

An analysis of evaluator comments and scores revealed these common observations concerning the assessed hand-held lights:

- Evaluators agreed that some manufacturers market “extra bells and whistles” to sell or promote their hand-held light as more desirable products. These extra features do not necessarily make their light a better choice.
- A wide variety of beam widths and intensities are favorable, as an assortment of widths and intensity settings provides added flexibility for emergency response applications.
- Hand-held lights that can be quickly and easily charged were preferred.
- Features such as textured grips, lanyards, and attachment accessories (e.g., rings, holsters) simplify transport. In addition, compact sizes allow practitioners to easily carry the light by hand or in a pocket.
- Lights that allow one-hand operations are preferable.
- Well-built, heavy-duty lights allow for repetitive emergency responder use.
- Operations manuals that include easy-to-follow instructions, detailed pictures, and exploded diagrams enhance user-friendliness.

## QuickLook Snapshot



Note: The SAVER QuickLook, available on the SAVER Web site, allows users to select the SAVER categories that are most important to their department and view results according to their specific needs.

**Table 2. SAVER Evaluation Criteria Scores**

KEY					
		Streamlight	Mag	SureFire	
Assessment Criteria	Affordability	Initial cost			
		Additional accessories			
		Warranty			
		Battery life expectancy			
	Capability	Operating time			
		Adjustable beam			
		Durability			
		Light intensity			
		Environmental conditions			
		Battery charger			
		Bulb or lamp type			
		Mounting capabilities			
	Deployability	Transportability			
		Ease of deployment			
		Attachment accessories			
		Battery change-out			
		Portable/mountable charger			
	Maintainability	Changing bulbs			
		Technical support			
		Availability of spare parts			
		Cleaning requirements			
	Usability	Ease of operation			
		Operational switch			
		Size			
		Ease of charging			
		Heat output			