



**Homeland
Security**

Science and Technology

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 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?"

To contact the SAVER Program Support Office

Telephone: 877-336-2752

E-mail: saver@dhs.gov

Visit the SAVER Web site:

<https://www.rkb.us/saver>

Reference herein to any specific commercial products, processes, or services by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement, recommendation, or favoring by the United States Government. Neither the United States Government nor any of its employees make any warranty, express or implied, including but not limited to the warranties of merchantability and fitness for a particular purpose for any specific commercial product, process, or service referenced herein.

Portable Radiation Portal Monitors

In order to provide emergency responders with information on currently available portable radiation portal monitor technologies, capabilities, and limitations, National Security Technologies, LLC (NSTec) conducted a comparative assessment of portal monitors for the SAVER Program in June 2008. Detailed findings are provided in the Assessment Report on Portable Radiation Portal Monitors, which is available by request at <https://www.rkb.us/saver>.

Background

Portal monitors enable first responders to perform rapid assessment of the contamination levels of individuals especially in a situation where a large number of people need to be surveyed. They are generally easily deployed systems that can be set up in an entry or exit point of a scene. Individuals approach the detection system and either wait inside or pass through at average walking speed. The operator of the detection system receives information from the portal monitor and advises individuals that either their contamination is below detection limits or that they must go on for further assessment. This process significantly reduces the survey time of potentially contaminated people.

Assessment

Prior to the assessment, NSTec conducted a market survey to investigate available portal monitors. A focus group of emergency responders met to develop evaluation criteria for the assessment and to recommend deployment situations and scenario activities to be used in portal monitor assessment plan development.

The focus group recommended that all currently available portal monitors be selected for assessment. Although seven basic portal monitors were identified from the Radiation Portal Monitors Market Survey Report, not all were evaluated. Only four portal monitors were available at the time of the evaluation due to procurement time constraints. The fourth portal monitor (Canberra MiniSentry) malfunctioned days before the evaluation and could not be replaced in time. Three portal monitors were assessed:

- Ludlum Measurements, Inc. 52-1-1
- WMB Johnson AM-801
- Thermo Fisher Scientific TPM-903A.

The group of evaluators consisted of a diverse group of 10 emergency responders from various backgrounds and jurisdictions. Each portal monitor was evaluated in the same manner and operational conditions were controlled to make the evaluation of each monitor as similar as possible. Detailed comments were captured by the data collectors during the assessment activities and these comments have been included in the full assessment report.

Assessment Results

Evaluators rated the portal monitors based on the weighted evaluation criteria established by the portal monitor 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 monitor scored against each of the evaluation criteria assigned to the SAVER Program categories, see table 2 (on page 5).

The following sections provide a brief summary of evaluator comments and feedback on each portal monitor used during the assessment. The portal monitor models are listed by highest to lowest composite scores. The full report includes a breakdown of evaluator comments by individual criterion.

Ludlum 52-1-1

The Ludlum 52-1-1 received the highest composite score. This device is well suited to the emergency response environment with its rugged construction, easy setup, and simple user interface. The Ludlum 52-1-1 is reasonably priced for the capabilities provided, and the evaluators felt that if something did go wrong with their system, it could be fixed inexpensively and without too much outside assistance.

The Ludlum 52-1-1 features a simple display, easy-to-use buttons, and can be operated while wearing gloves. The alarms are loud enough and long enough to be heard in a crowd. The Ludlum 52-1-1 is well balanced and would not have to be stabilized with sandbags or tent stakes. It performed well indoors and outdoors. Once it was taken outside, the light color of

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.

the metal casing kept the detector panels cool to the touch. The screen can be easily read in direct sunlight and returns to its normal operating mode within a reasonable amount of time after an alarm.

The Ludlum 52-1-1 is extremely rugged and easy to set up. On average it took a team of two evaluators less than five minutes to set up the system, and most did not need the manual for instructions. The case is sturdy, and evaluators had little difficulty replacing the individual pieces of the detectors into the case. Another advantage of the detector is the ability of the portal monitor to operate even when one or more of the detector panels malfunctions.

Table 1. Portable Radiation Portal Monitors Assessment Results¹

Portable Monitor	Composite Score	Affordability (28% Weighting)	Capability (14% Weighting)	Deployability (11% Weighting)	Maintainability (27% Weighting)	Usability (20% Weighting)
Ludlum 52-1-1	77	68	76	92	76	82
AM-801	62	60	62	50	62	70
TPM-903A	60	60	70	48	64	54

Note:

¹ Scores contained in the assessment report may be displayed differently. For the purposes of the SAVER Summary, all SAVER category scores are normalized using a 100-point scale and rounded to the nearest whole number.

	 Pros <ul style="list-style-type: none"> • Easy to use • Rugged design • Can be used outdoors easily • Can operate with less than four detectors • Simple calibration • Stable design—good for uneven surfaces or windy conditions
	 Cons <ul style="list-style-type: none"> • Cannot convert to vehicle surveying system
Ludlum 52-1-1	Composite Assessment Score: 77

Disadvantages to the Ludlum 52-1-1 included the inability of the system to be converted to a vehicle surveying monitor.

AM-801

The AM-801 received the second highest composite score. Its advantages include a touch screen and easy-to-use user interface. The initial cost of the unit and replacement costs are reasonable. The system features a single source for a quick operations check instead of a full calibration. The AM-801 is constructed in such a way that it has very few inlets and open areas for contamination problems, so if it were to get contaminated, it could be easily cleaned.

The AM-801 menu options are user-friendly and intuitive. Most evaluators were able to operate the detector and make necessary adjustments without the aid of the manual. The readout and display are both simple to understand. The most liked feature on the system is the alarm. The AM-801 not only has a beeping alarm sound, it also features an enunciator; the manufacturer states that the enunciator can be programmed to say almost any phrase the user may need. The monitor's screen is easily seen when taken outdoors and the panels do not get too hot in the sun to touch.

	 Pros <ul style="list-style-type: none"> • Intuitive menu options • Touch screen • Reasonable price • Enunciator included with alarms with specific instructions
	 Cons <ul style="list-style-type: none"> • Easily tipped over • Difficult to set up • Short battery life • Storage case hard to use
AM-801	Composite Assessment Score: 62

Some disadvantages of the AM-801 were noted. The setup is a bit labor intensive and confusing; evaluators had a difficult time setting up the portal monitor as well as tearing it down and putting it away. The storage case the manufacturer provides is not useful according to the evaluators because the handles are not in a good position, the storage configuration of the pieces is confusing, and the wheels are too small to support the weight of the portal monitor for long periods of time. Also, battery requirements and the short battery life are unacceptable. Finally, evaluators felt that the AM-801 is unstable and shaky, and could be easily tipped over.

TPM-903A

The TPM-903A portal monitor scored closely behind the AM-801. Advantages included reasonable regular maintenance and upkeep costs, and a system constructed in a manner that is fairly impervious to contamination.

The TPM-903A was the only assessed system that is able to survey a vehicle for contamination with standard equipment. Another advantage was that the display on the controller box could be easily read in direct sunlight. The TPM-903A was stable enough to stay upright even when jostled or subjected to moderately windy conditions. The evaluators also felt that the battery life is sufficient.

There were some disadvantages to the TPM-903A noted by evaluators. They reported difficulty setting the system up, and they stated that the system is not very user-friendly. Evaluators were often confused about the meaning of certain alarms and output. Also, the storage case was too heavy and difficult to maneuver during the assessment tasks. Finally, this was the most expensive device included in the assessment, and evaluators felt it was not well-priced for its functionality.

	 Pros <ul style="list-style-type: none"> • Vehicle monitoring available with standard equipment • Display easily read in sunlight • Stable design—good for uneven surfaces or windy conditions
	 Cons <ul style="list-style-type: none"> • Price • Not user-friendly • Confusing alarms and output • Difficult to set up • Storage case difficult to maneuver
TPM-903A	Composite Assessment Score: 60

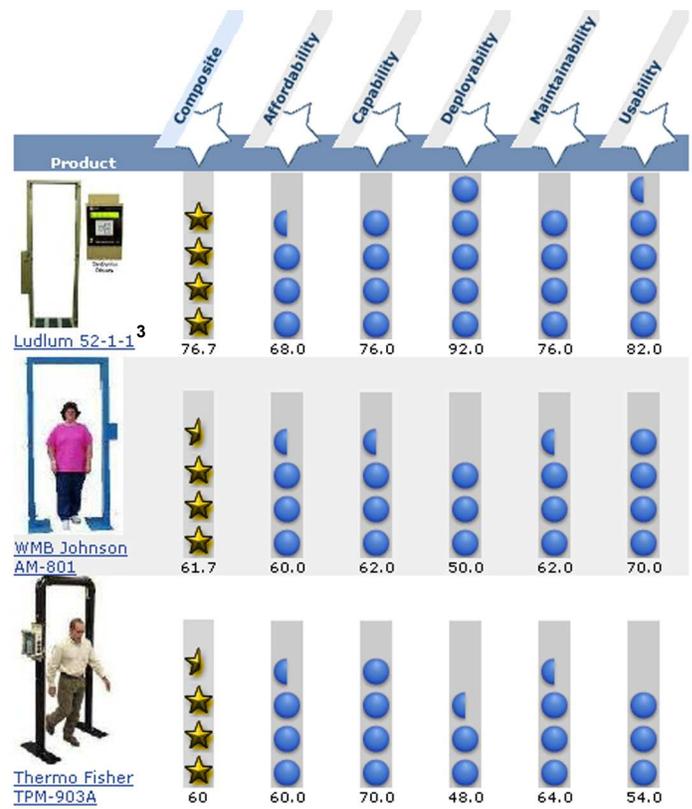
Conclusion

The purpose of this comparative assessment was to evaluate the effectiveness of selected portable radiation portal monitors used in emergency response operations. The assessment was based on setting up the portal monitors, carrying out scenario-driven exercises simulating environments that would require the use of portal monitors, and reviewing manufacturer specifications.

Evaluators were able to successfully complete the assessment tasks using each of the selected portal monitors. An analysis of evaluator comments and scores revealed these common observations concerning the assessed portal monitors:

- Monitors in a price range corresponding to the system’s capabilities are preferred.
- Easy-to-use systems with intuitive menu options and easy calibration meet the needs of the field.
- Evaluators expressed a preference for stable systems that will not tip over in wind or when set up on uneven surfaces.
- Durable and functional storage cases add to a system’s value.

QuickLook Snapshot²



Notes:

² 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.

³ Scores contained in the assessment report may be displayed differently. For purposes of the QuickLook, all SAVER category scores are normalized using a 100-point scale.

All reports in this series as well as reports on other technologies are available by request at <https://www.rkb.us/saver>.

Table 2. SAVER Category and Criteria Scores

KEY				
Least Favorable		Most Favorable		
				
		Ludlum 52-1-1	AM-801	TPM-903A
Assessment Criteria				
Affordability				
Calibration costs				
Repair costs				
Replacement costs				
Capability				
Use in outdoor environments				
Information transmission				
Throughput				
Flexibility of configuration				
Ability to subtract background				
Deployability				
Durability				
Power source				
Preparation time				
Manpower requirements				
Air transportation				
Case/storage				
Maintainability				
Cleaning/decontamination				
Routine maintenance				
Ease of calibration				
Usability				
Simplicity/user friendliness				
Display/readout				
Safety				
Buttons/switches				
Alarms				
Training time				