# ARA, Inc. - Manportable CBRNE Detection System

## GENERAL DESCRIPTION:

The Manportable CBRNE Detection System is a backpack-style field instrument intended for first responders and other users. It is intended for many different types of samples from environmental through industrial, and has been shown adaptable to many matrices. A unique feature is that the analysis is usually conducted in situ; i.e., without taking samples or preparing material. The system is comprised of a backpack and a handheld optical probe. Detections of threat and non-threat materials are reported to the operator on a display within about 2 seconds in a user-friendly format. Dozens of distinct materials, including nuclear, radiological, explosive materials and bacterial strains, have been detected with this instrument. When nuclear material is detected, an attachment can be quickly connected to enable the fast determination of isotopic enrichment of the material. This rugged instrument is currently at the TRL-6 level, and has undergone extensive testing.

**MPCDS**

## TECHNICAL DESCRIPTION:

The Manportable CBRNE Detection System is based on laser-induced breakdown spectroscopy (LIBS). Miniaturized components permit adaptation to a compact, backpack-style system. In LIBS, a laser pulse is used to create a spark on a material surface. Optical emission from this spark is analyzed using a compact spectrometer. This spectrum is automatically processed using an on-board micro-computer to generate a report of materials detected. Dozens of threat and non-threat materials have been detected with this system, including uranium, plutonium, specific explosives, and bacterial strains. The use of advanced chemometric techniques permits identification of a wide range of complex materials. High-resolution spectroscopy is conducted using a compact attachment on nuclear materials, enabling isotopic ratios to be determined quickly in the field.

## Tier Selection

Final tier assignment is based on overall product score.

- 🟢 Top Tier
- 🟢 Second Tier
- ⚪ Third Tier
- 🔴 Fourth Tier
- 🔴 Bottom Tier

### RANKINGS

| | Biological | Chemical | Radiological |
|---|---|---|---|
| **FIELD USE** System | Top Tier | Top Tier | Top Tier |
| **MOBILE** Laboratory | Top Tier | Top Tier | Second Tier |
| **DIAGNOSTIC** Laboratory | Second Tier | Top Tier | Second Tier |
| **ANALYTICAL** Laboratory | Second Tier | Second Tier | Second Tier |

## Survey Source
Vendor Supplied Information

## CONTACT INFORMATION
ARA, Inc.
4300 San Mateo Blvd NE
Albuquerque, NM 87110
POC: Randy Jones
505-881-8074

## COST
- $70,000 - $140,000/system
- $0/analysis

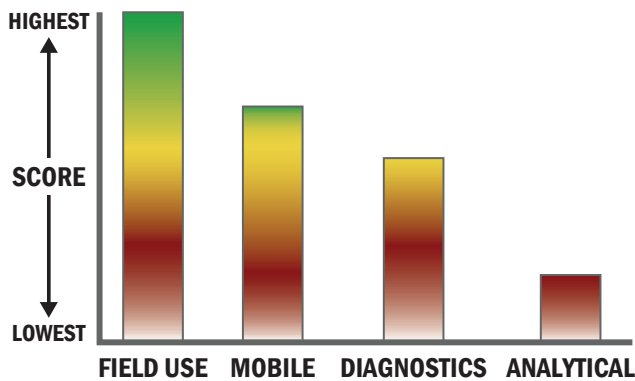## Scoring Analysis

System scores are compared across the four scenarios and ranked from highest to lowest.



## Impact Chart

The Impact Chart is a spider graph representing specific categories and designed to give the reader a visual depiction of how a particular system is expected to operate across the four different scenarios. The score for each of the seven categories is presented as the percentage of the total possible score. Higher category scores extend the spokes of a graphic toward the outer edge of the chart. The area graphed for each of the four scenarios relates to how well the system performed in that scenario. Graphics for each of the four scenarios are super-imposed for ease of comparison.
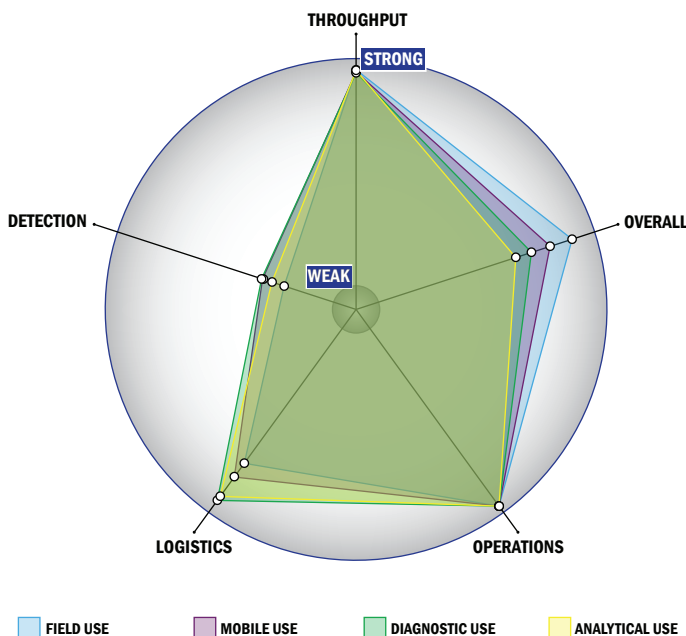


## Evaluation Criteria

### Throughput:
- Detection is instantaneous
- Continuous operation with no defined runs
- System is continuous and provides real time analysis with no defined tests/samples
- The system or device is currently semi-automated
- Device or system is intended for multiple detection assays
- 0-1 solutions, buffer, eluents, and/or reagents
- 0 components
- Less than 5 minutes is required for set-up
- 1-2 steps are required for detection

### Logistics:
- Very brief (minutes-hours) training and minimal technical skills
- Approximately the size of a carry-on luggage suitcase
- Between 5 and 25 kg
- Wireless and wired connections are available
- System or device uses batteries
- 4-8 hours battery life



MOST MATURE ◄——— LEAST MATURE
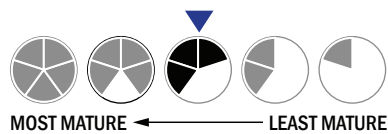
### Operations:
- Can be used from -21°C to 41°C
- Performance is not influenced by relative humidity
- Greater than 3 years shelf life
- 3-5 years expected life
- Results can be viewed in real-time
- The system or device is currently fully autonomous
- The system software is open and available for modification
- The system hardware is open and available for modification

### Detection:
- Possible the system could receive 510K clearance, no current efforts at this time
- Possible the system could receive FDA approval, no current efforts at this time
- Less than 50 µL
- Excellent specificity. System has occasional false alarms under certain conditions (<2%)
- Possible the system could identify liquid chemical agent
- System is used for surveying