

# RTI International - MicroPEM Personal Exposure Monitor



## GENERAL DESCRIPTION:

A miniature low burden (240g; adds < 2 dBA noise) personal exposure monitor for sized aerosols that is worn near the breathing zone to capture particles on a Teflon filter for post analyses and simultaneously provides estimates of real-time mass concentration using nephelometry. Sizing for either PM2.5 (deep lung) or PM10 (thoracic) fractions are possible. Enhanced power management allows the unit to operate continuously for up to 40 hrs on a set of 3 AA alkaline batteries, or cycle ON/OFF to extend the sampling period to up to 1 week. Post analyses for the filter collections provide referee particle mass (PM), black carbon, and SHS levels, plus a wide range of chemical and biological species. An extremely wide aerosol concentration response range extends to 10,000 micrograms/cubic meter, with a detection limit of < 5 micrograms/cubic meter. An on-board accelerometer is provides both wearing compliance and estimated ventilation rate from which potential dose is computed. QC data needed to validate the filter and real-time data is stored on-board and downloaded simultaneously with the aerosol data. A low turbulence flow system design results in minimal internal deposition, providing extended optical bench performance with long servicing intervals (30+ days). Very low face velocity filtration provides minimal loss of volatiles prior to post analyses. Robust user interface software and self-contained operation allows simple setup and deployments by modestly trained personnel to provide high data capture rates. A smaller, cellphone-like version is under development for demanding personal applications.



## TECHNICAL DESCRIPTION:

Aerosol sizing is by dual-sequential impaction onto oil wicking surface to provide sharp EPA-comparable cut points for extended sampling with minimal servicing. Real-time aerosol detection in the model v3.2 is by light scattering (side-only) at 780 nm (laser diode), with sensing by a tiny high-sensitivity Optodiode photometer that includes its own pre-amplifier to minimize the possibility of stray signal interferences. A new v4.0 version currently under development will add a UV laser wavelength plus forward scattering to better sense black carbon and biological aerosol content.

## 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
<b>FIELD USE System</b>			
<b>MOBILE Laboratory</b>			
<b>DIAGNOSTIC Laboratory</b>			
<b>ANALYTICAL Laboratory</b>			

## CONTACT INFORMATION

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## COST

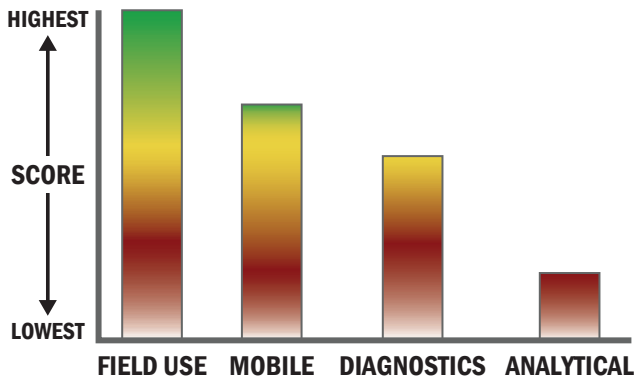
- \$1,990/system
- N/A/analysis

## Survey Source

Vendor Supplied Information

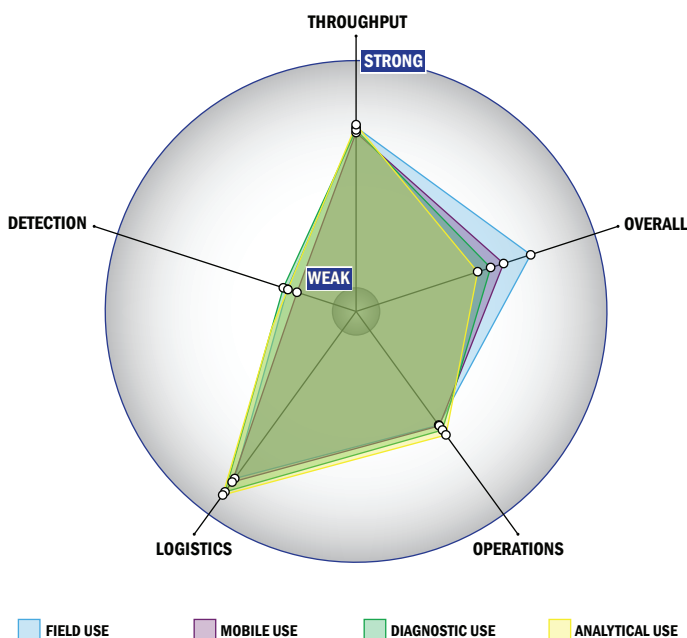
## Scoring Analysis

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.



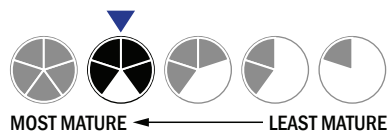
## Evaluation Criteria

### Throughput:

- Detection is instantaneous
- 1 sample, >10 tests/sample per run
- 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
- 1 component
- Less than 5 minutes is required for set-up
- 3-5 steps are required for detection

### Logistics:

- Very brief (minutes-hours) training and minimal technical skills
- Approximately the size of a soda can
- Less than 1 kg
- This system is not capable of transmitting data
- System or device uses batteries
- 4-8 hours battery life



### Operations:

- Can be used from 4 °C to 41 °C
- Components must be stored at 4 °C
- Device or system has peak performance at normal relative humidity conditions
- Between 1 to 6 months shelf life
- 3-5 years expected life
- Results cannot be viewed in real-time
- The system or device is currently fully autonomous
- The system software is open but modification requires licensing
- The system hardware is open but modification requires licensing

### 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
- This system does not test liquids
- Good specificity. System has a consistently low level of false alarms (2-5%)
- Manual kit not integrated with the system handles spore lysis. System currently can identify aerosolized chemical agent
- System is used for personnel detection

