



SIMPLICITY - SPEED - PRECISION

## Application Note

# Presumptive Identification to Combat Fentanyl and Fentanyl-Analog Threats

## Purpose

This application note describes how the **Serstech Arx mkII handheld Raman spectrometer** can be used by law enforcement, first responders, HAZMAT teams, and forensic units to **rapidly and safely presumptively identify fentanyl and fentanyl-related compounds in the field**, reduce responder exposure, speed operational decisions, and preserve evidence for confirmatory laboratory testing.

## Why Raman for Fentanyl Threats?

Fentanyl and many of its analogs are **extremely potent at microgram levels** and present an acute inhalation/contact hazard for unprotected personnel. The Arx mkII provides a non-contact, non-destructive means to screen powders, pills, residues, and some liquids **through clear or translucent packaging**, minimizing the need to open suspicious items and reducing direct handling risk. Results are produced in seconds and include digital spectral records for documentation.

## Key Arx mkII Capabilities Relevant to Fentanyl Response

- **Through-container analysis:** Enables identification through many plastics, glass vials, and bagged material—crucial for minimizing exposure.
- **Rapid presumptive IDs (<10 seconds):** Fast triage to inform scene control, medical needs, and evidence prioritization.
- **Comprehensive/customizable libraries:** Includes fentanyl and common analogs; libraries can be updated to include emerging threat signatures.
- **Rugged field design:** MIL-STD-810G and IP65 ratings for reliability in operational environments.
- **Automated metadata logging:** Each scan stores spectra, time/date, operator ID and GPS (if enabled) to support chain-of-custody and forensic workflows.



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- **Secure data export:** USB/Wi-Fi integration and ChemDash Cloud compatibility for centralized reporting and case management.
- **User-friendly operation:** Glove-compatible touchscreen and guided workflows that work while wearing PPE.

## Recommended Operational Practices (High Level)

### 1. Immediate Scene Safety

- Treat any suspected fentanyl-containing material as hazardous until proven otherwise. Restrict access and establish exclusion zones.
- Ensure naloxone (or other authorized opioid antagonists) and trained medical support are immediately available for responders and civilians if exposure occurs.

### 2. PPE & Exposure Minimization

- Follow agency protocols for respiratory and skin protection. Typical measures include gloves, eye protection, and NIOSH-approved respirators or equivalent for potential aerosol exposure. Use additional protection per HAZMAT/EOD guidance when required.
- Prefer **through-container** scanning; do not open packages or pour samples unless conducted by trained forensic/EOD personnel following controlled procedures.

### 3. Scanning Workflow

- Document item with photos and ID tags prior to scanning.
- Use through-container mode when possible. If a direct scan is required, only trained personnel in appropriate PPE should perform it.
- Record each scan and export spectral data immediately to centralized evidence systems.

### 4. Interpretation & Decision-Making

- Treat Arx mkII results as **presumptive**. A positive spectral match provides a high-confidence field indication but must be confirmed by a forensic

laboratory (GC-MS, LC-MS/MS, or equivalent) before prosecutorial or regulatory action.

- Use match quality indicators supplied by the instrument to gauge confidence. If match quality is low or sample is a mixture, prioritize laboratory confirmation.

#### 5. Evidence Handling & Chain-of-Custody

- Preserve items as evidence following agency SOPs. Ensure spectral files, photographs, and incident logs accompany physical evidence.
- Maintain controlled transfer of evidence to forensic labs; avoid decontamination procedures that might destroy material needed for confirmatory analysis.

#### 6. Decontamination & Post-Incident Procedures

- Use established decontamination protocols for equipment and personnel. When decontaminating the Arx mkII, follow Serstech cleaning instructions to avoid instrument damage while ensuring responder safety.
- Report exposures immediately and follow medical surveillance procedures.

#### Limitations & Important Considerations

- **Presumptive tool only:** Raman provides presumptive identifications. Forensics lab confirmation remains necessary for legal proceedings.
- **Mixtures & low concentration:** Complex mixtures, trace-level residues, or heavy cutting agents can mask fentanyl signatures and reduce match confidence.
- **Fluorescence & dark samples:** Certain materials may fluoresce or absorb the laser, limiting usable signal; alternate sampling or lab analysis may be required.
- **Operator competence:** Proper training is critical to recognize instrument indicators, limitations, and to correctly apply PPE and sampling protocols.

#### Training, SOPs & Policy Recommendations

- Develop specific SOPs that define when Arx mkII presumptive IDs are sufficient for operational actions (e.g., scene control, treatment decisions) vs. when confirmatory lab results are required for prosecution.



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- Train all potential users on safe sampling, through-container best practices, match-score interpretation, and evidence handling. Include scenario-based drills (overdose scenes, parcel/package screening, vehicle searches).
- Maintain a controlled process for library updates—coordinate updates through a technical point-of-contact to ensure only validated reference spectra are used.
- Implement a data-management policy to secure and centralize spectral data (logs, exports, metadata) for audit and forensic review.

### **Integration & Reporting**

- Use Serstech **ChemDash** (or agency data systems) to centralize results, push library updates, and share threat intelligence across jurisdictions.
- Integrate spectral exports into case management and forensic submission packages to accelerate confirmatory testing and preserve evidentiary continuity.

### **Conclusion**

The **Serstech Arx mkII** is a field-proven, force-multiplying tool for presumptive identification of fentanyl and related compounds. When used under proper PPE, trained SOPs, and with a clear workflow for laboratory confirmation and evidence handling, the Arx mkII helps reduce responder exposure, accelerate operational decision-making, and preserve critical forensic information—strengthening both public safety and prosecutorial outcomes.