

Utilization of Commercial Portable Instruments for Screening Hand Swabs for the Presence of Firearms Discharge Residue (FDR): Validation of Commercial IMS Instruments to Screen for FDR

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ABSTRACT

When a firearm is discharged, a rich source of physical and chemical evidence is created. To date, forensic analysis has focused on inorganic primer residues with relatively few studies published regarding organic components of FDR. In addition, few reliable screening techniques exist for preliminary identification of residues associated with discharge of a firearm. This project addressed both of these issues using hand swabs and ion mobility spectrometry (IMS). Several commercial instruments were evaluated and sample collection and storage protocols were developed and validated. Results are presented in two posters.

In this poster, the results of method validation studies using two commercial ion mobility spectrometers are presented and figures of merit provided. A method to utilize control charts to monitor instrument performance is discussed.

INSTRUMENTS



Smiths Detection Ionscan®



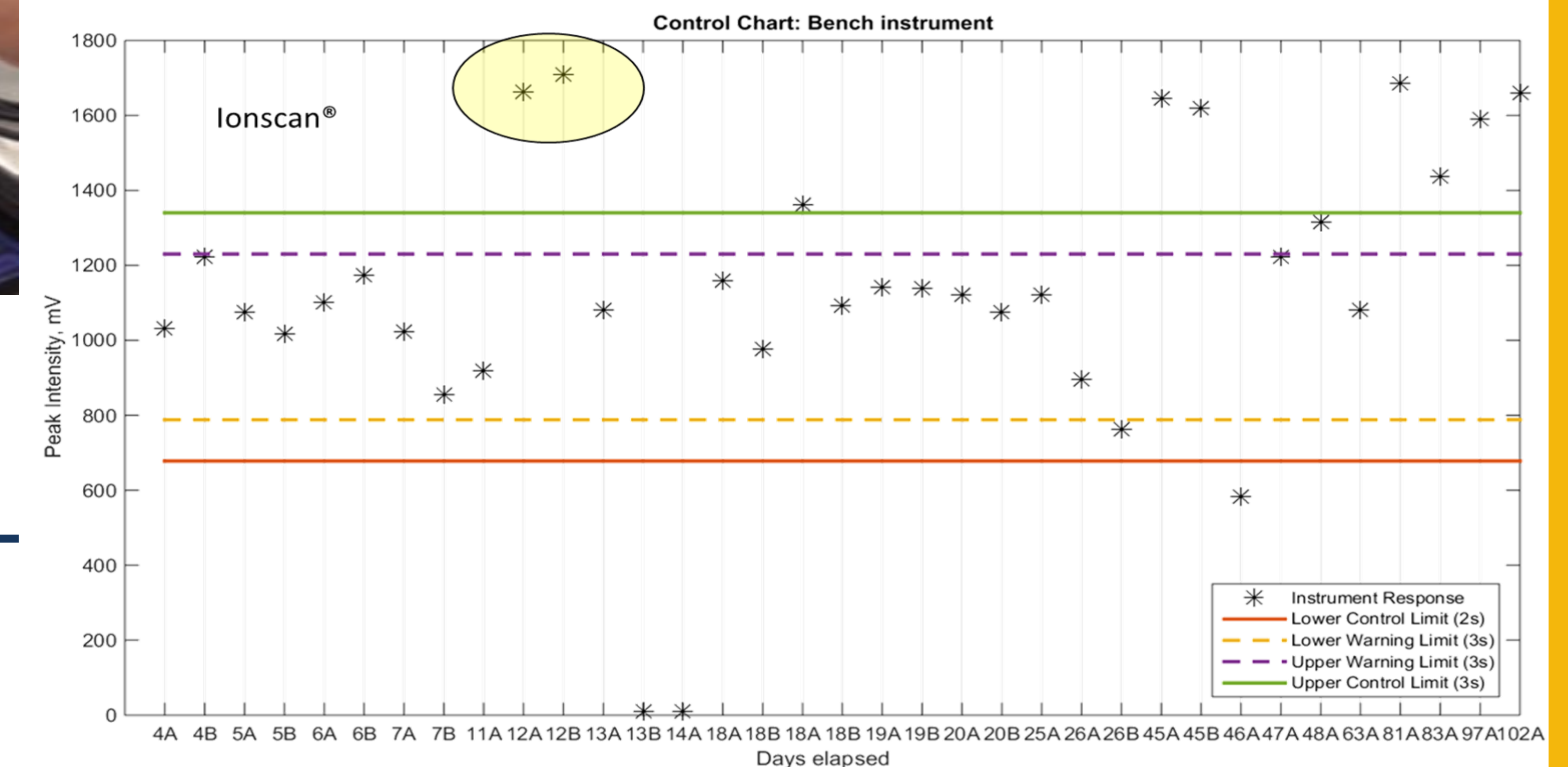
Smiths Detection Sabre®

LIMITS OF DETECTION

Compound	Ionscan	Sabre
Diphenylamine (DPA)	1.0 ug	50.0 ng
Dimethylphthalate (DMT)	0.5 ug	10.0 ng
Ethyl centralite (EC)	5.0 ng	1.0 ng
Methyl centralite (MC)	10.0 ng	5.0 ng

CONTROL CHART APPROACH

- Selected DtBP for instrument performance monitoring
- Analyze daily and chart peak intensity (area)
- Perform maintenance when control limits are exceeded



KEY FINDINGS

- A control chart is an effective tool for monitoring IMS instrument performance
- Not all IMS instruments are equally useful for screening hand swabs
- The LODs are equal to or below amounts of target compounds expected to be deposited during a typical firing event
- Signal/noise can be determined using blanks and portions of the mobility spectrum with drift times of < 7ms

Funding and Acknowledgements

This work was supported by the National Institute of Justice Forensic Technology Center of Excellence project and provide the award number is FY2011 Award #2011-DN-BX-K564.

