

*Accelerating  
Environmental  
Analysis with  
the ASXpress  
Plus*



# Introduction to the ASXpress Plus

- ICP-OES and ICP-MS Accessory that enables faster sample uptake times and eliminates rinse times to allow more samples to be analyzed per day
- ASXpress has its own software separate from the instrument to specify operating conditions
- Minimal method development is required – delete flush and rinse times, adjust sample uptake time



# Rapid Sample Introduction System

## Valve Pump Module

- Contains metal free multiport valve and inert high speed liquid pump
- Pump is used to quickly load sample loop, reducing uptake time
- Valve allows for simultaneous analysis and rinsing, improving sample throughput



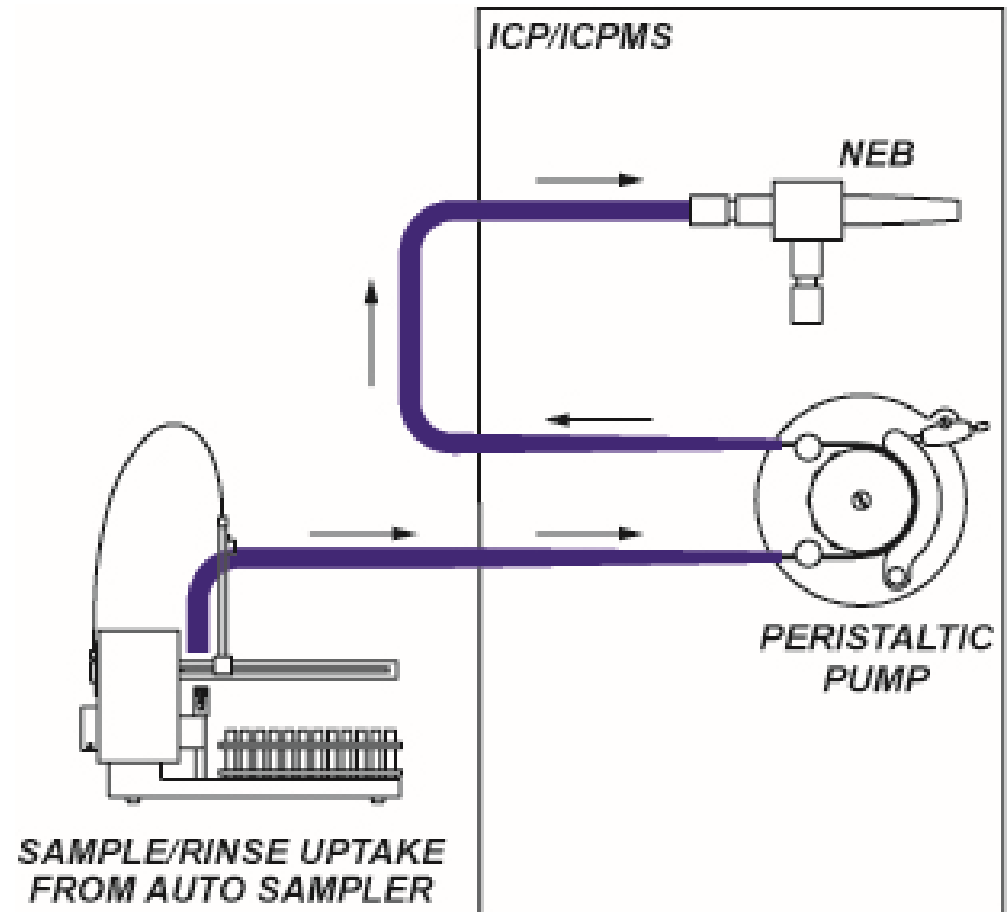
## Electronics Module

- Handles all Communication to the autosampler and valve pump module
- Programmable to meet user needs
- “Invisible” to ICP software, handles all commands without directly communicating with the analyzer software.



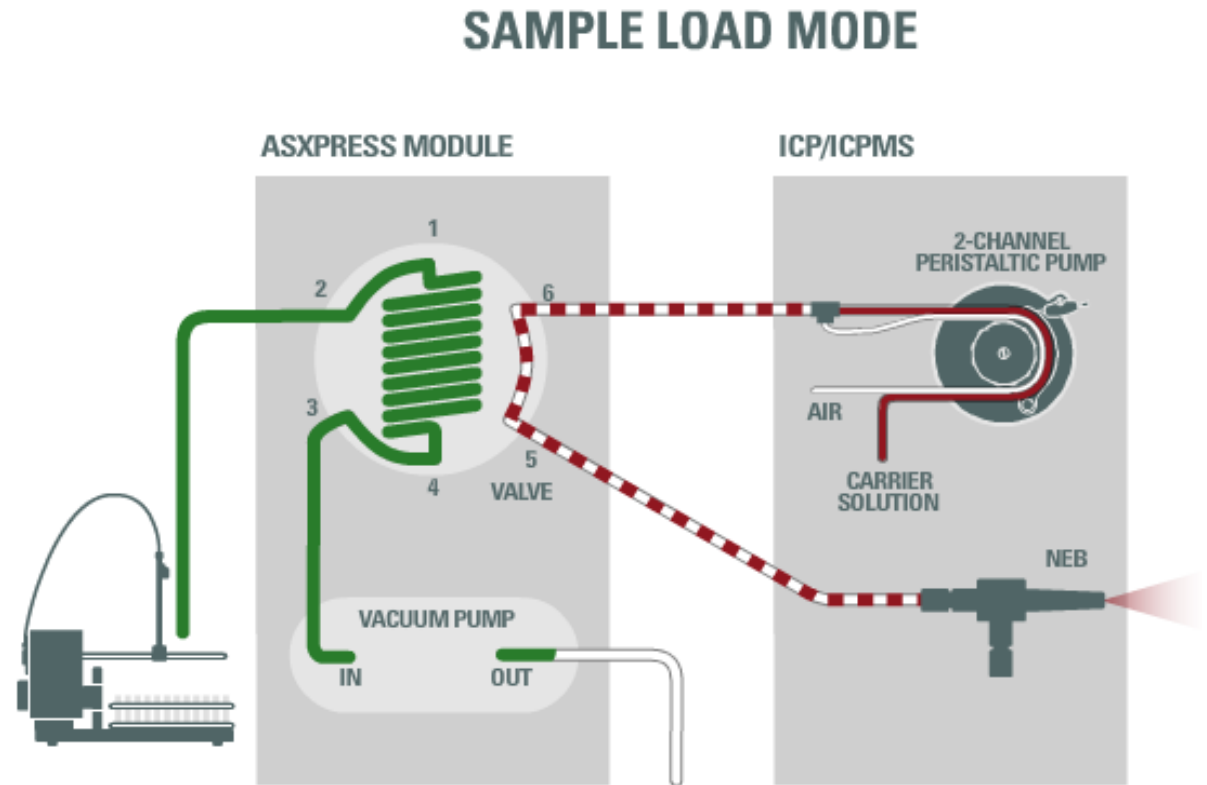
## Traditional sample introduction

Peristaltic pump introduces sample from probe to nebulizer



## How do valve systems work?

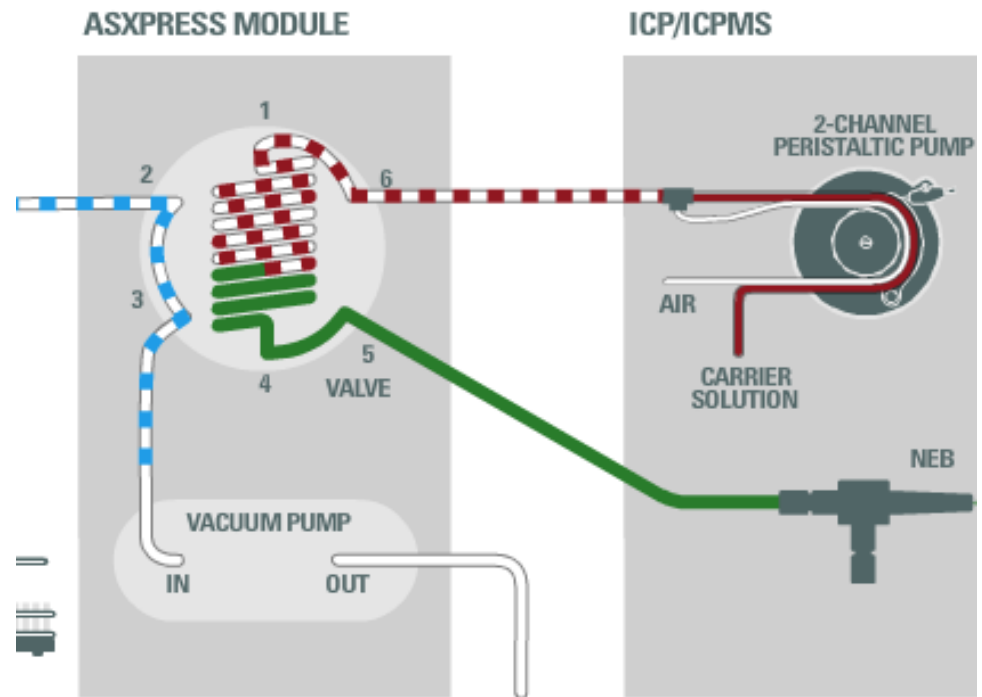
A high-speed pump is used to rapidly load an inert fixed-volume sample loop.



## ASXpress+ Overview

The loaded loop contents are then introduced into the ICP nebulizer while the uptake path is simultaneously washed with a carrier stream.

### RINSE/INJECT MODE

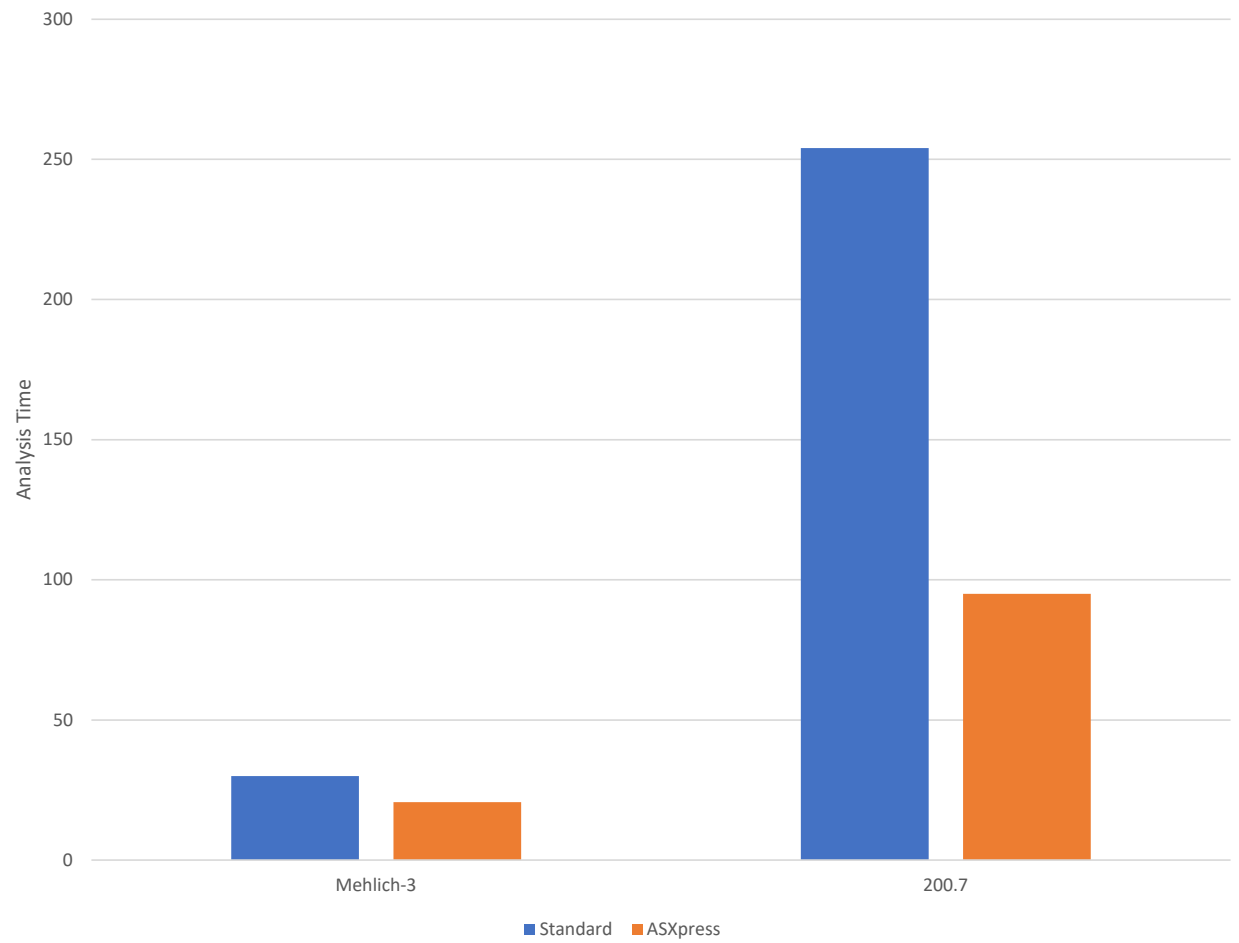


# Applications

Soils – Speed is most important

EPA 200.7 – Speed and accuracy must be well balanced

# Time Savings





# Mehlich-3 Extracts



No promulgated method



Soil samples collected from farms are extracted with a solution appropriate to their soil type



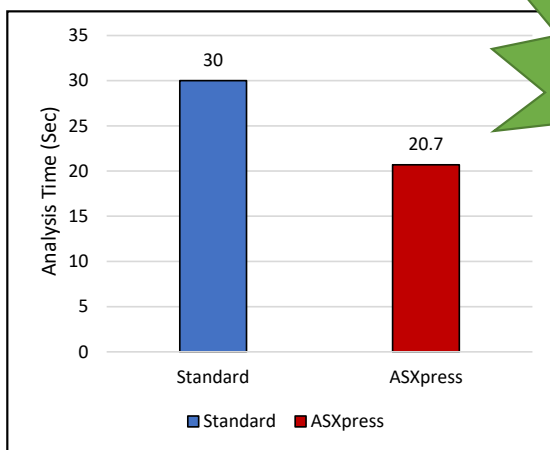
Results are compared to a range to determine fertilizer application.



Speed is much more important than accuracy.

# Instrument Settings

Parameter	Setting Standard Run	Setting Xpress Run
Pump Speed	3.0mL/min	2.5mL/min
Read delay	20 secs	8 secs
Replicates	2	



Time Savings= 30%

47% Decrease in Non-Analysis Time

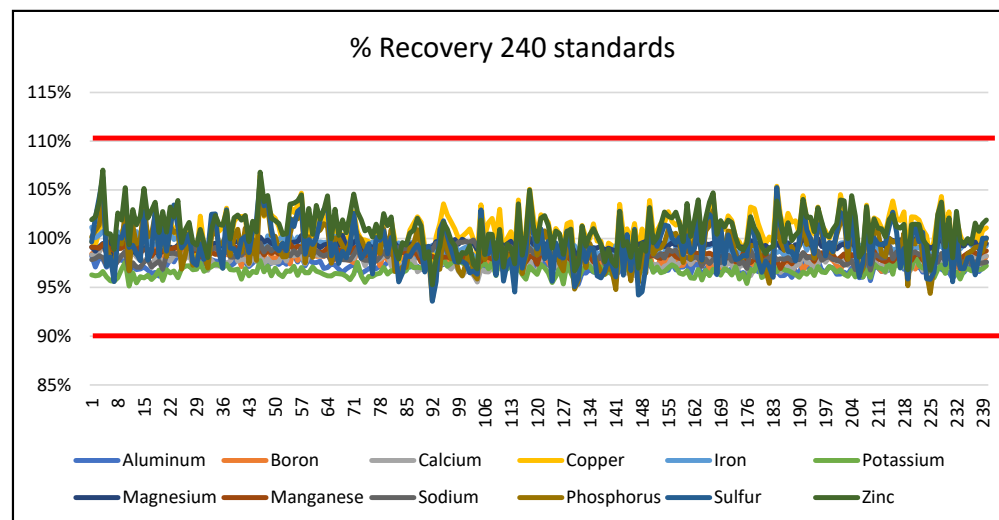
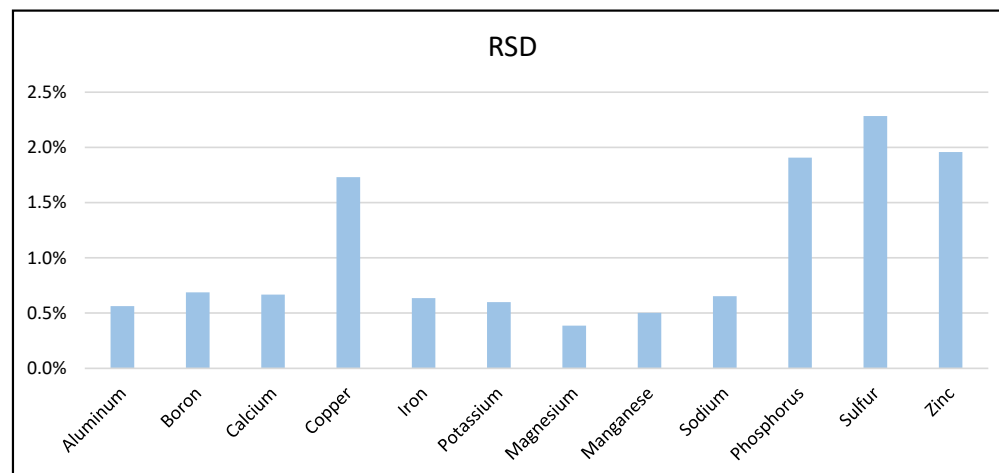
1.45x Sample Throughput

431 additional samples per 8 hour shift



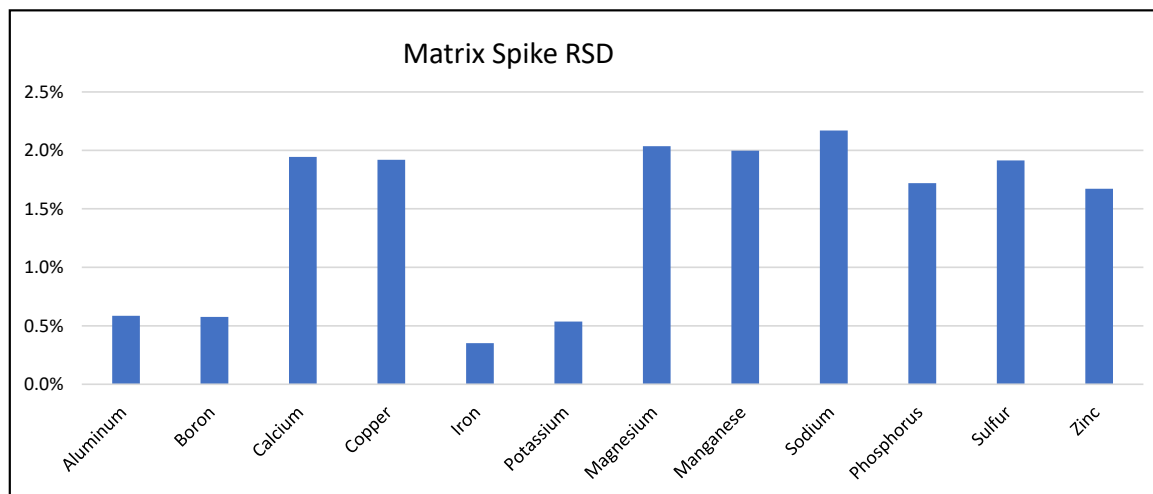
# Analysis 240 aliquots

Element	mg/L
Aluminum	50.0
Boron	5.0
Calcium	50.0
Copper	0.5
Iron	5.0
Potassium	20.0
Magnesium	50.0
Manganese	2.0
Sodium	20.0
Phosphorus	5.0
Sulfur	2.0
Zinc	2.0

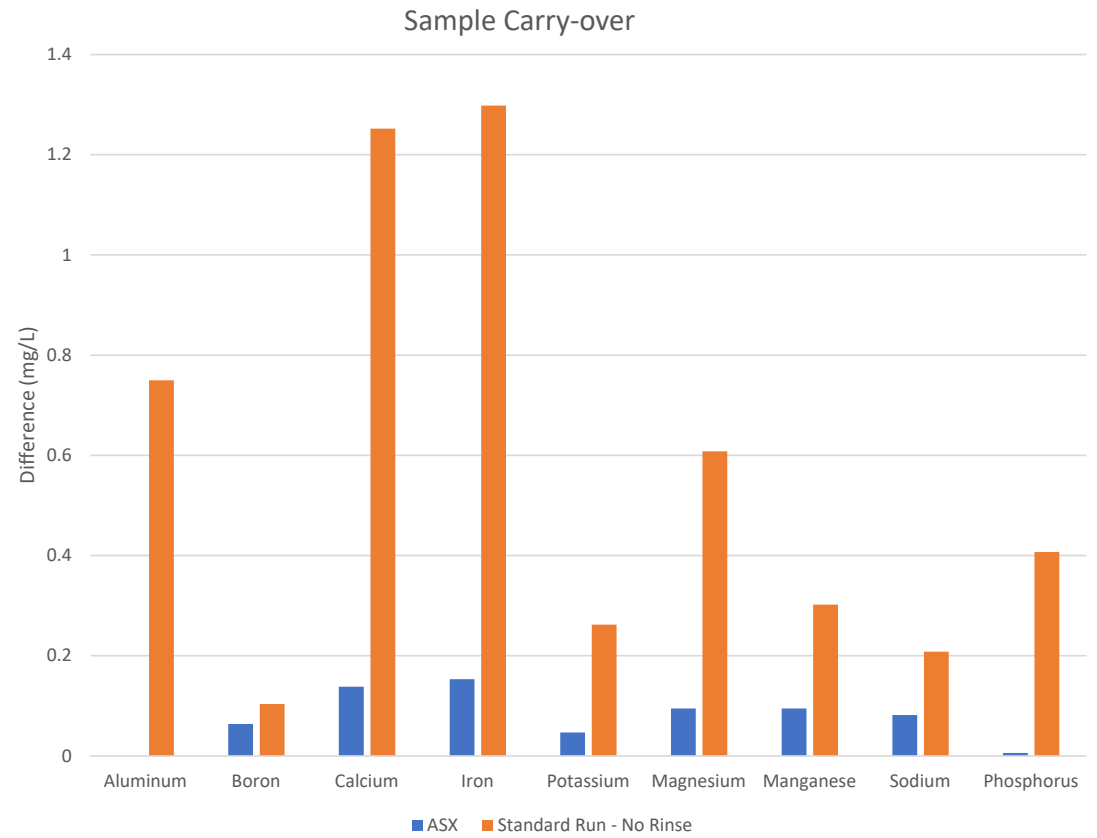


# 10 Analyses sample matrix spike

Element	Result (mg/L)
Aluminum	180
Boron	9.2
Calcium	320
Copper	1.1
Iron	63
Potassium	51
Magnesium	110
Manganese	90
Sodium	41
Phosphorus	11
Sulfur	23
Zinc	5.6



# Importance of Rinse



# Every Second Counts!

- Time is limited during the busy season
- Labs must adapt prep to match local soil conditions
- Turnaround time is critical!
- ASXpress Plus maintains or improves data quality for ICP analysis
- Uptake time is reduced by 47%
- Carryover is improved without sacrificing time
- Performance is maintained over many samples

Time per sample reduced by 30%

An 8 hour shift allows for:

960 samples by standard method

OR 1391 samples with ASXpress Plus

**431** more  
Samples!

EPA 200.7

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Drinking water and  
Wastewater Samples

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QC requirements strictly  
regulated

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Balance accuracy and  
speed

# Instrument Settings

Parameter	Setting Standard Run	Setting Xpress Run
Pump Speed	1.0mL/min	1.5mL/min
Read delay	30 secs	15 secs
Flush speed	3.0mL/min	-
Flush time	30 secs	-
Rinse time	SmartRinse®	-
Replicates		3

75%+ Decrease in  
Non-Analysis Time

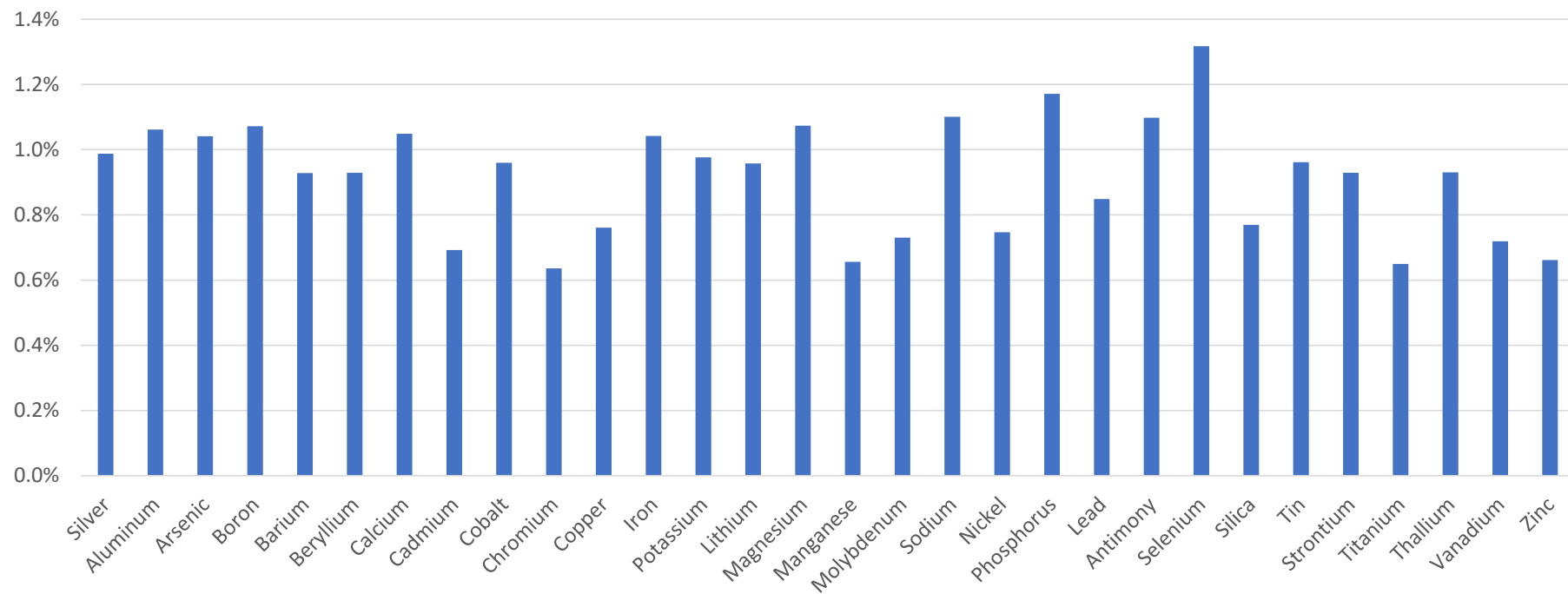


# Time Measurement

## Batch

- Blank
- LCS
- Stream
- Stream MS
- Stream MSD
- Influent
- Influent MS
- Influent MSD

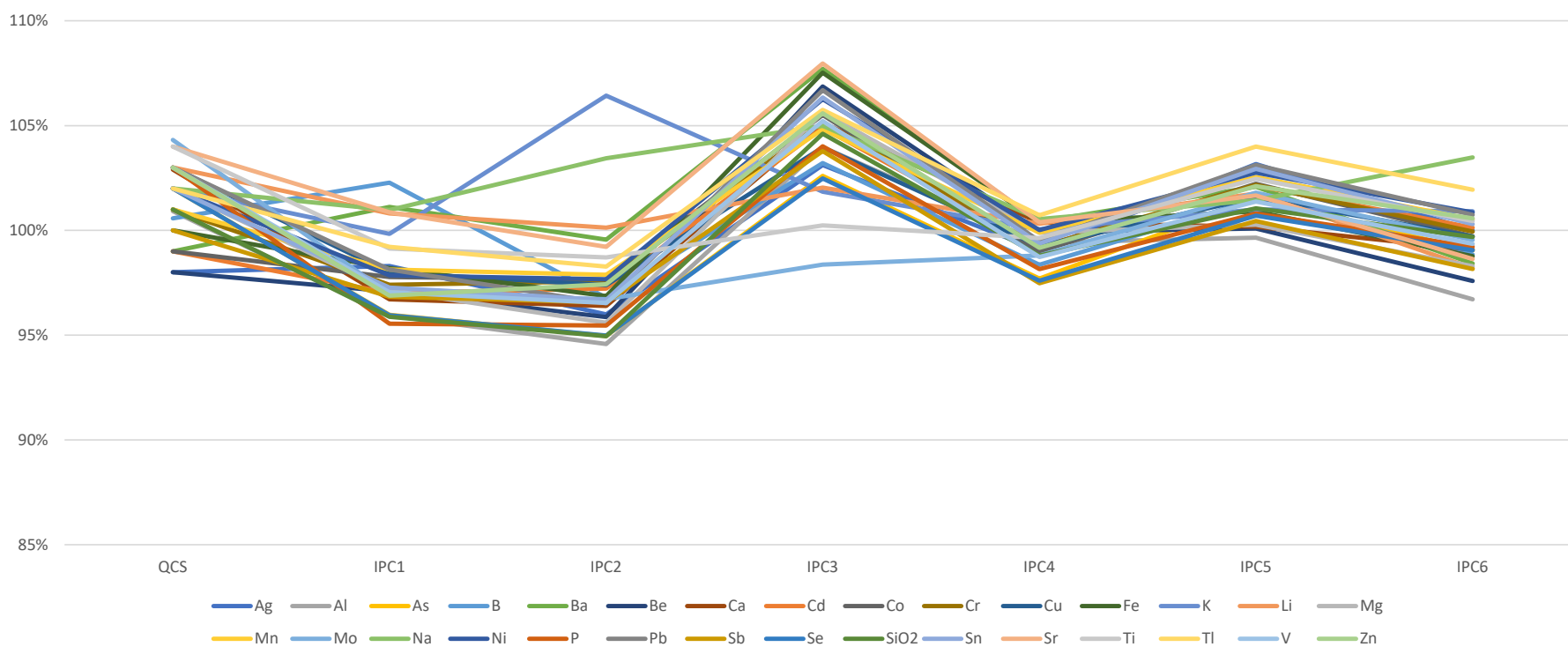




## Instrument Performance Check (IPC) RSD



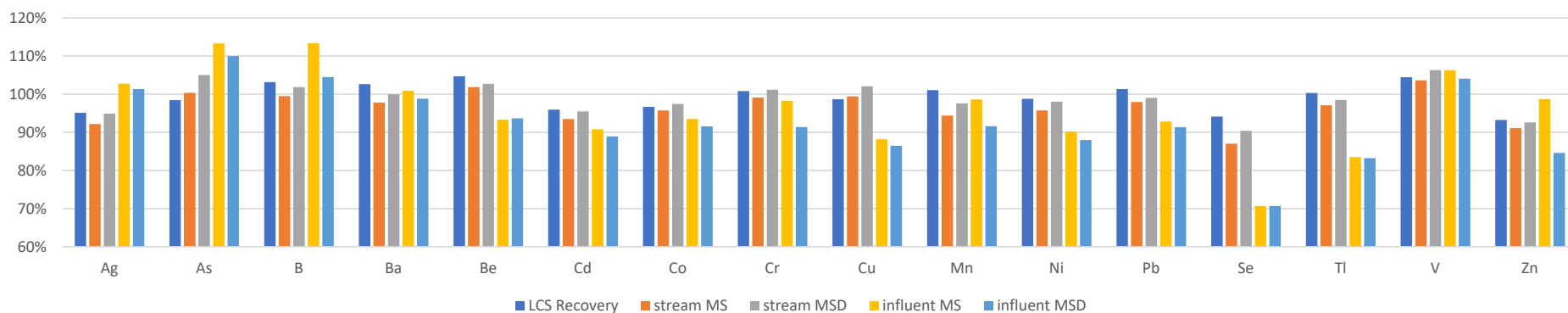
# Instrument QC Recoveries



- NIST Certified Standards
- 1640a – Trace Elements in Natural Water
- 1643f- Trace Elements in Water

	1640a			1643f		
	True Value (µg/L)	Measured (µg/L)	% Recovery	True Value (µg/L)	Measured (µg/L)	% Recovery
<b>Ag</b>	8.081	7.414	91.7	0.9606	1.001	104.2
<b>Al</b>	53.0	51.0	96.3	132.5	129.8	97.0
<b>As</b>	8.075	8.101	100.3	56.85	62.56	109.0
<b>B</b>	303.1	314.1	103.6	150.8	160.6	105.4
<b>Ba</b>	151.8	151.3	99.7	513.1	525.6	101.4
<b>Be</b>	3.026	3.078	101.7	13.53	14.09	103.1
<b>Ca</b>	5,615	5,563	99.1	29,140	28,859	98.1
<b>Cd</b>	3.992	3.694	92.5	5.83	6.27	106.1
<b>Co</b>	20.24	19.08	94.2	25.05	24.16	95.5
<b>Cr</b>	40.54	39.20	96.7	18.32	19.11	103.3
<b>Cu</b>	85.75	83.47	97.3	21.44	21.10	97.4
<b>Fe</b>	36.8	38.4	104.3	92.51	98.56	105.5
<b>K</b>	579.9	596	102.8	1,913.3	2,079	107.6
<b>Li</b>	-	-	-	16.42	17.75	107.0
<b>Mg</b>	1,058.6	1,072	101.3	7,380	7,594	101.9
<b>Mn</b>	40.39	40.68	100.7	36.77	37.73	101.6
<b>Mo</b>	45.6	44.7	98.0	114.2	121.3	105.2
<b>Na</b>	3,137	3,183	101.5	18,640	19,763	105.0
<b>Ni</b>	25.32	23.88	94.3	59.2	57.0	95.2
<b>Pb</b>	12.101	12.693	104.9	18.303	19.987	108.1
<b>Sb</b>	5.105	4.782	93.7	54.90	55.38	99.9
<b>Se</b>	20.13	18.53	92.0	-	-	-
<b>SiO<sub>2</sub></b>	5,210	4,757	91.3	-	-	-
<b>Sr</b>	126.03	125.61	99.7	311	327	104.2
<b>Tl</b>	-	-	-	6.823	6.644	96.4
<b>V</b>	15.05	14.590	96.9	35.71	37.98	105.0
<b>Zn</b>	55.64	54.461	97.9	73.7	77.3	103.9

	Ag	As	B	Ba	Be	Cd	Co	Cr	Cu	Mn	Ni	Pb	Se	Tl	V	Zn	
LCS		95%	98%	103%	103%	105%	96%	97%	101%	99%	101%	99%	101%	94%	100%	104%	93%
Stream MS		92%	100%	99%	98%	102%	93%	96%	99%	99%	94%	96%	98%	87%	97%	104%	91%
Stream MSD		95%	105%	102%	100%	103%	95%	97%	101%	102%	98%	98%	99%	90%	98%	106%	93%
Influent MS		103%	113%	113%	101%	93%	91%	93%	98%	88%	99%	90%	93%	71%	83%	106%	99%
Influent MSD		101%	110%	104%	99%	94%	89%	92%	91%	86%	92%	88%	91%	71%	83%	104%	85%
Stream spike RPD		3%	5%	2%	1%	1%	2%	2%	2%	2%	2%	2%	1%	4%	1%	2%	1%
Inf spike RPD		1%	3%	4%	2%	0%	2%	2%	4%	1%	4%	2%	2%	0%	0%	2%	6%



# Sample Spike Recoveries

# Satisfy Stringent Requirments, Improve your Workflow

- EPA tightly regulates high standards of performance
- Sample volume is high
- Price per sample is low

- ASXpress Plus maintains or improves data quality for ICP analysis
- QCS, IPCs and Matrix Spikes all pass
- Instrument drift is minimized allowing more samples between calibrations

Time per sample reduced by 62%  
An 8 hour shift allows for:  
113 samples by standard method  
OR 303 samples with ASXpress Plus

**2.7X as  
many  
Samples!**

# ASXpress Plus Rapid Sample Introduction System

Accurate	Maintain the highest standard of performance for your ICP/ICP-MS
Fast	Decrease sample to sample times by as much as 70%
Clean	Reduce carryover between samples by rinsing during analysis
More	Run more samples per day and more samples per calibration





A top-down view of a desk with a laptop, a cup of coffee, a pen, and glasses. The laptop is silver and open, showing the keyboard. A white cup of black coffee is to the left of the laptop. A gold pen and a pair of black-rimmed glasses are on a white notepad in the bottom right corner. A small green plant is visible near the top right of the laptop.

Application Notes:

<http://www.teledynacetac.com/resource-center/application-technical-notes>

Any Questions?