# Update of IMPROVE Carbon Analysis

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# Objectives

- Report status of IMPROVE carbon analyses
- Review multiple quality control checks
- Update calibrations for low carbon concentration

# Carbon Laboratory Operations

## (July 2018 to June 2019 samples)

- Model 2015 produced over ~140,000 multiwavelength sample analyses since May 2017
- Received ~1,500 samples per month (~0 to 3,161 samples each month)
- Maintained 24/7 through December; currently ~20 hours per day 5 days per week operation with 4 staff
- Analyzed ~18,000 IMPROVE samples (up to 2,400 per month)

DRI Model 2015 Multiwavelength Carbon Analyzers
(Magee Scientific, Berkeley, CA)

# IMPROVE_A Carbon Analyses

## (July 2018 to June 2019 samples)

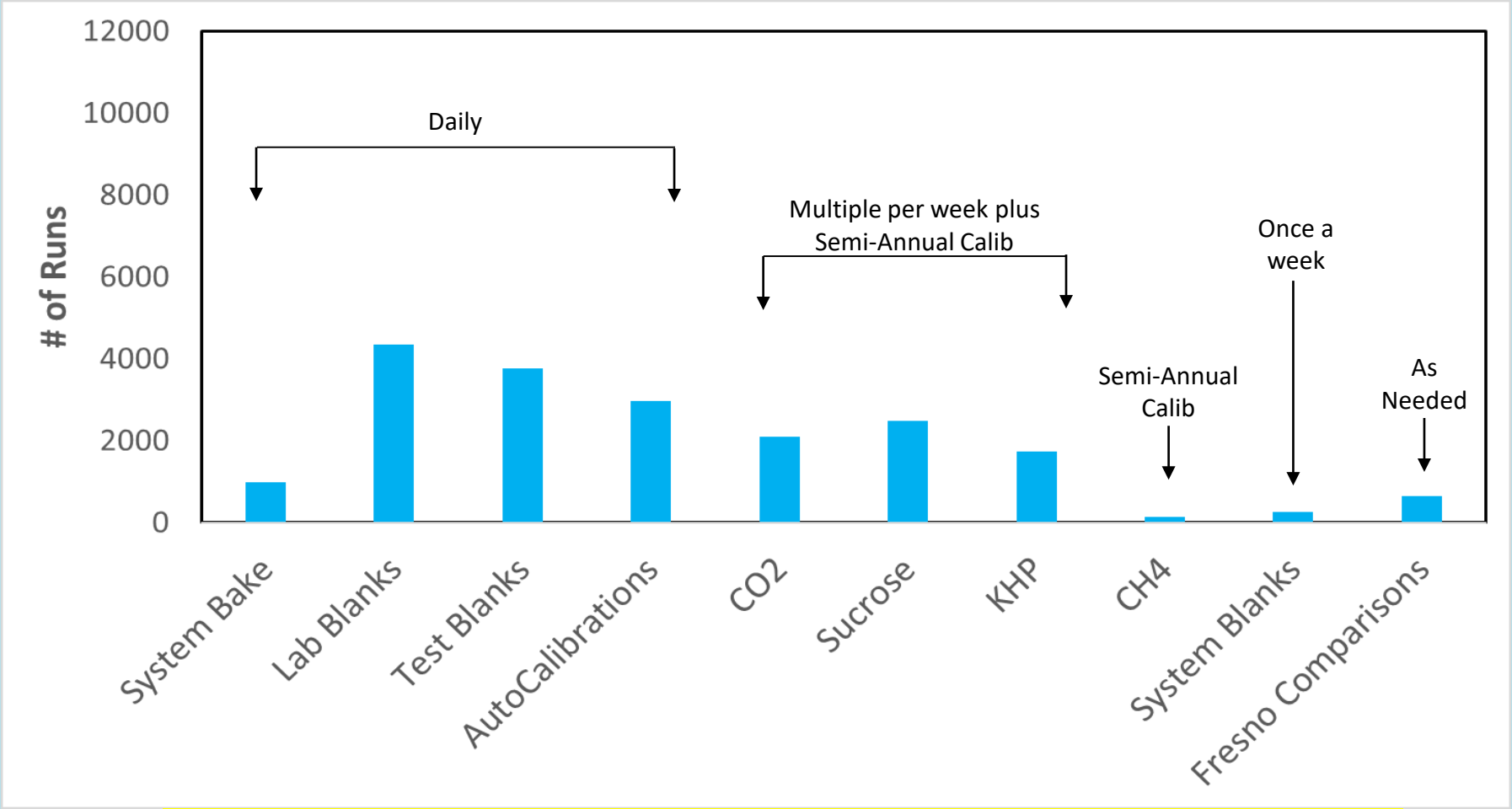
| Sampling Period | Samples Received | Analysis Completion Date |
|---|---|---|
| 7/1/18-12/31/18 | 10,400 | May 2019 |
| **1/1/19-6/30/19*** | 7,361 | Nov/Dec 2019 (Estimate) |

# Thirteen Model 2015 Multiwavelength Carbon Analyzers have been in operation since May 2017


(Magee Scientific, Berkeley, CA)

# Multiple quality control (QC) checks are implemented

## (Oct 2018-Sep 2019)

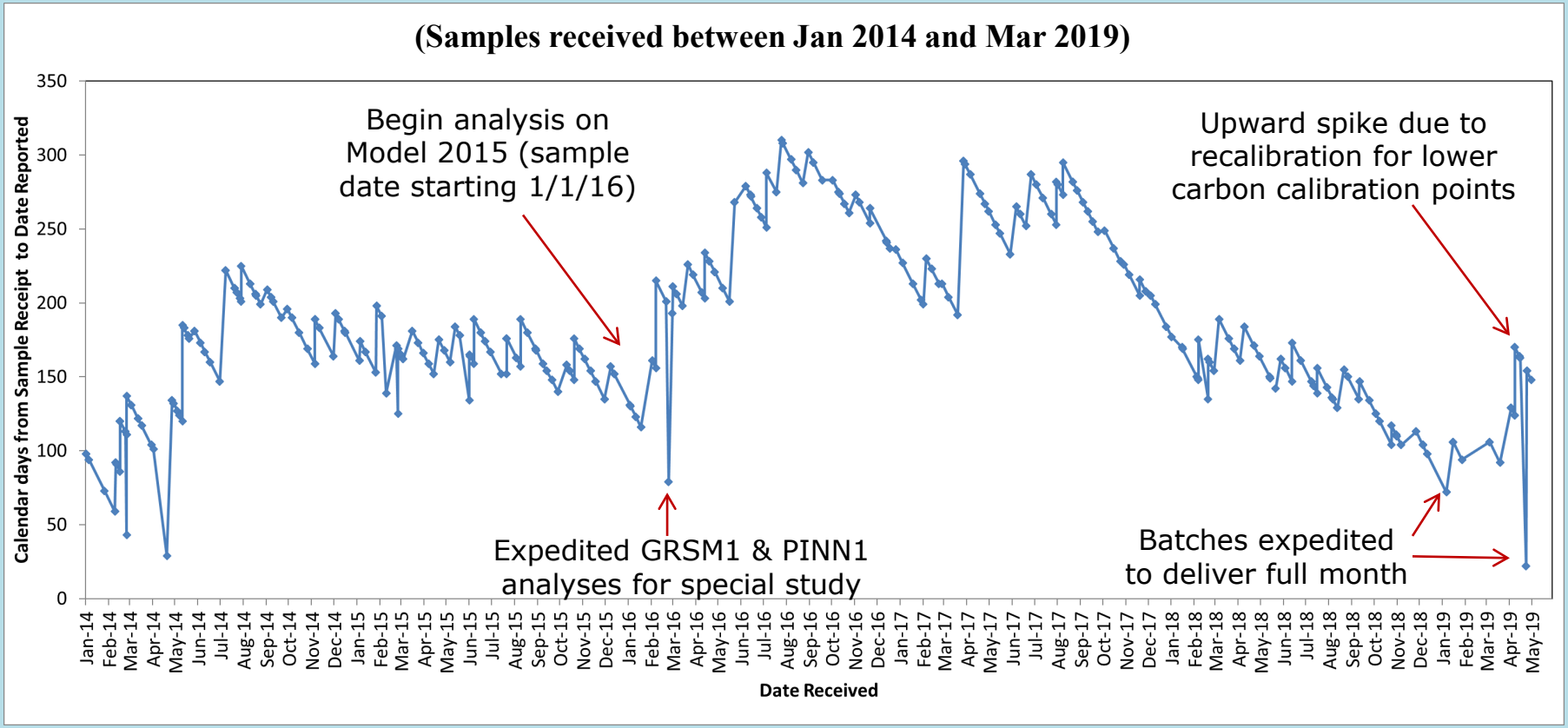



n=19,417 QC runs (average 53 per day for all instruments)

# IMPROVE carbon reporting time has continued to decrease

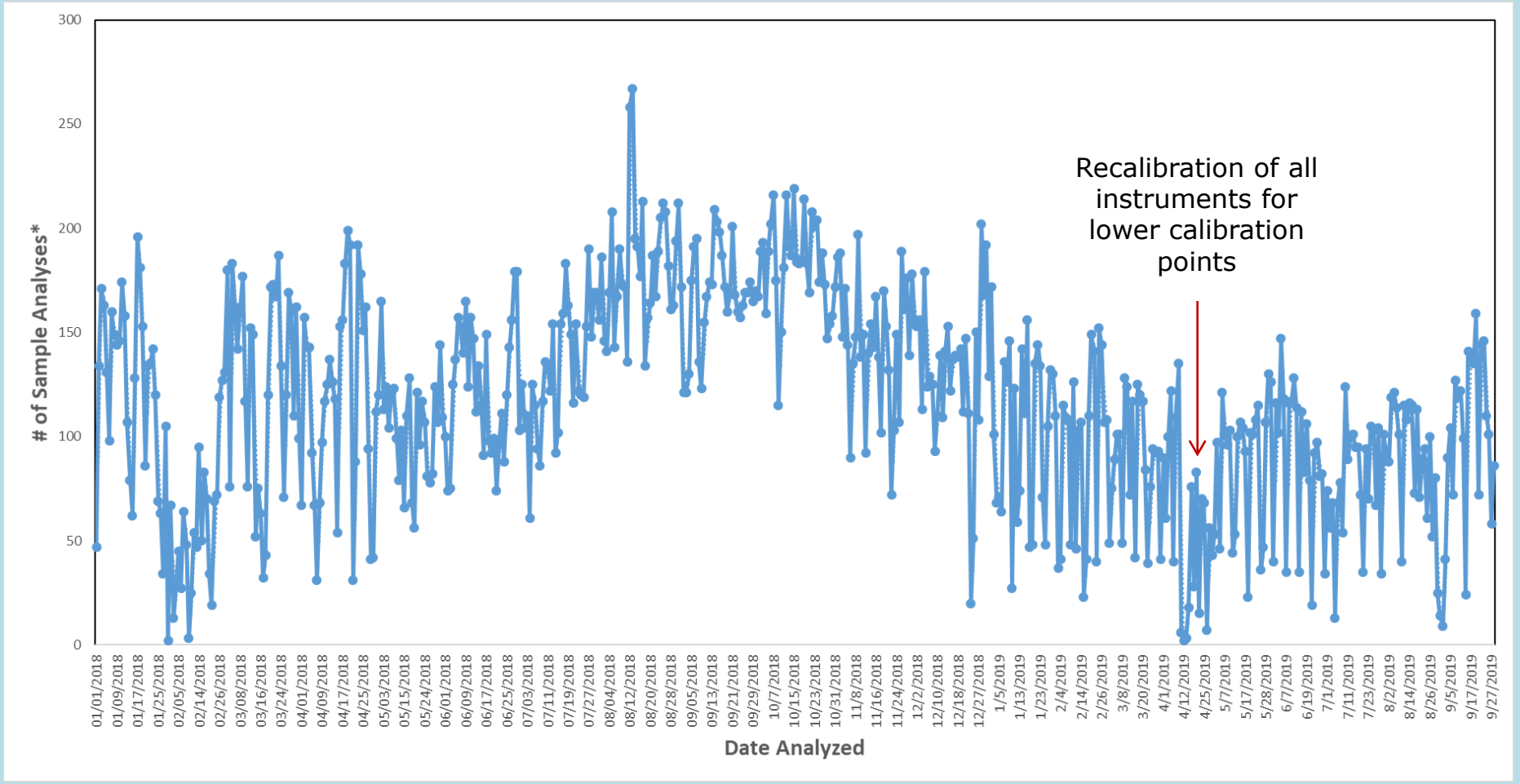
## (upward spiked during recalibration to lower carbon calibration standards on Model 2015)

**Days from Sample Receipt to Report**



# Carbon throughput averaged ~117 samples per day

## (Jan 2018 – Sep 2019)




*Does not include calibration runs

# NEW carbon calibration levels cover 10th-90th percentiles of IMPROVE and CSN samples

## (effective for Jan 2019 sample date)

| Distribution | 2016-2017 IMPROVE (µgC/punch) | 2016-2017 CSN (µgC/punch) | 2016-2017 IMPROVE & CSN (µgC/punch) | Current $CH_4$ & $CO_2$ (µgC/punch) | OLD sucrose & KHP (µgC/punch) | NEW sucrose & KHP (µgC/punch) |
|---|---|---|---|---|---|---|
| 10th Percentile | 1.5 | 4.1 | 1.9 | 4<br>10<br>15<br>20<br>(Keep) | 9<br>18<br>27<br>36 | 1.5, 3, 6, 12, and 24<br><br>**1200 ppmC solution**<br>• 20 µL -> 24 µgC<br>• 10 µL -> 12 µgC<br>• 5 µL -> 6 µgC<br><br>**150 ppmC solution**<br>• 20 µL -> 3 µgC<br>• 10 µL -> 1.5 µgC |
| 25th Percentile | 2.5 | 6.5 | 3.4 | | | |
| 50th Percentile | 4.3 | 10.0 | 6.4 | | | |
| 75th Percentile | 7.5 | 14.9 | 11.2 | | | |
| 90th Percentile | 12.4 | 21.6 | 17.6 | | | |
| Mean | 7.2 | 12.2 | 9.3 | | | |

Old Sucrose and KHP (µgC/punch) calibration points

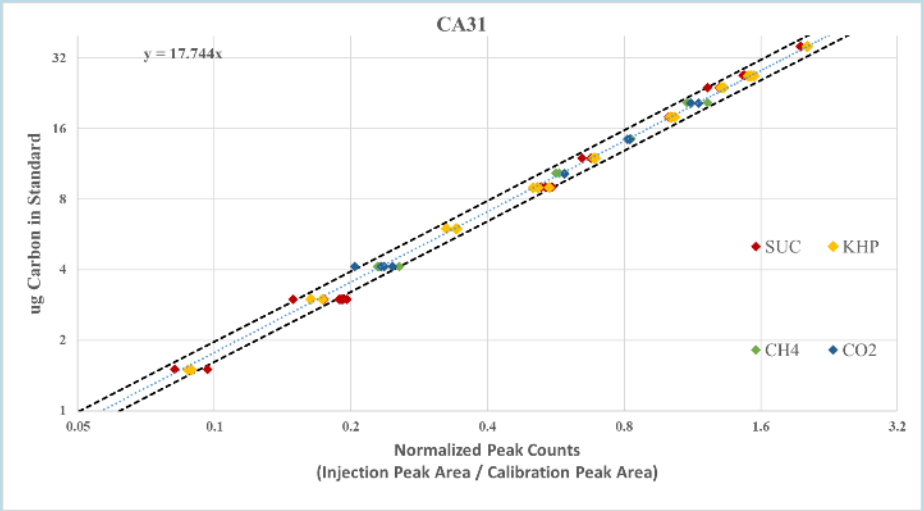
9 18 27 36

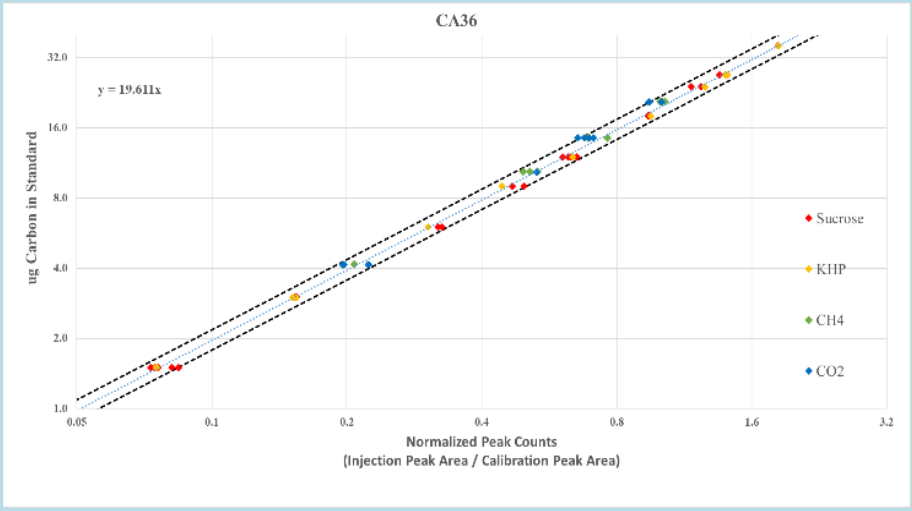
**NEW** Sucrose and KHP (µgC/punch) calibration points

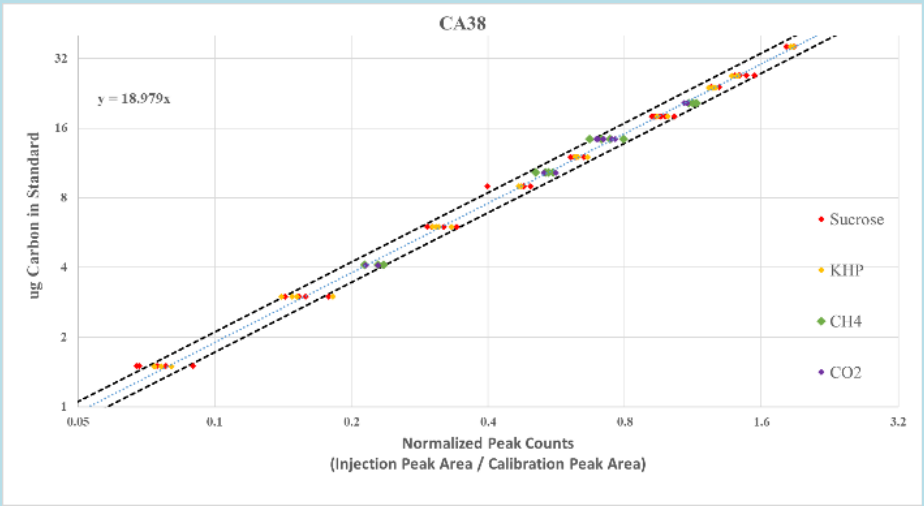
1.5 3 6 12 24

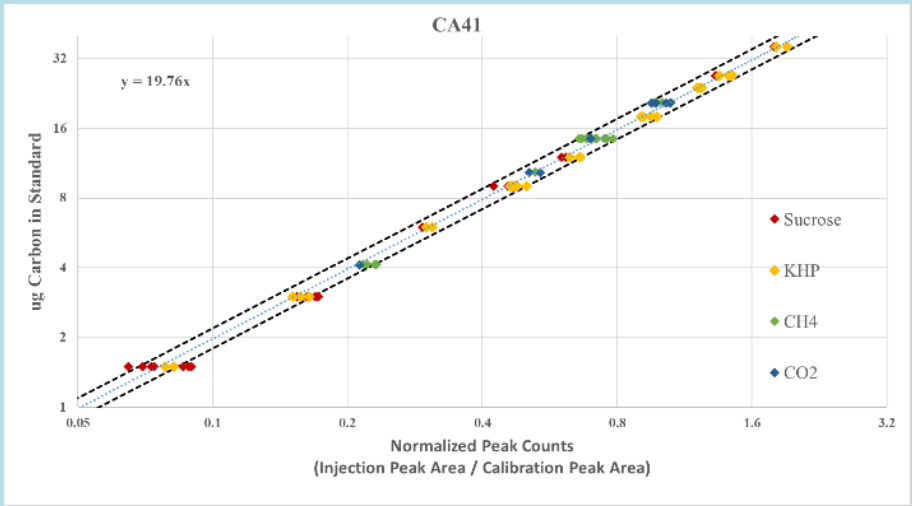
# Linear responses are achieved with low-concentration calibration standards

## (for sucrose, KHP, $CH_4$, and $CO_2$)



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