

Analysis of 1,4-Dioxane by Extraction and Gas Chromatography/Mass Spectrometry

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Background

- 1,4-Dioxane Analysis
- Volatiles (VOA)
- Purge and Trap by GC/MS
- Internal Standard Procedure
- U.S. EPA SW-846 Method 8260B
- Contract Laboratory Program (CLP) Statement of Work (SOW) Organics Analysis SOM01.2
- High Contract Required Quantitation Limits (CRQLs)
 - Aqueous: 100 ug/L
 - Soil/Sediment: 100 ug/kg
- Poor Purging Efficiency
- Low ICAL and CCV RRF 0.0050

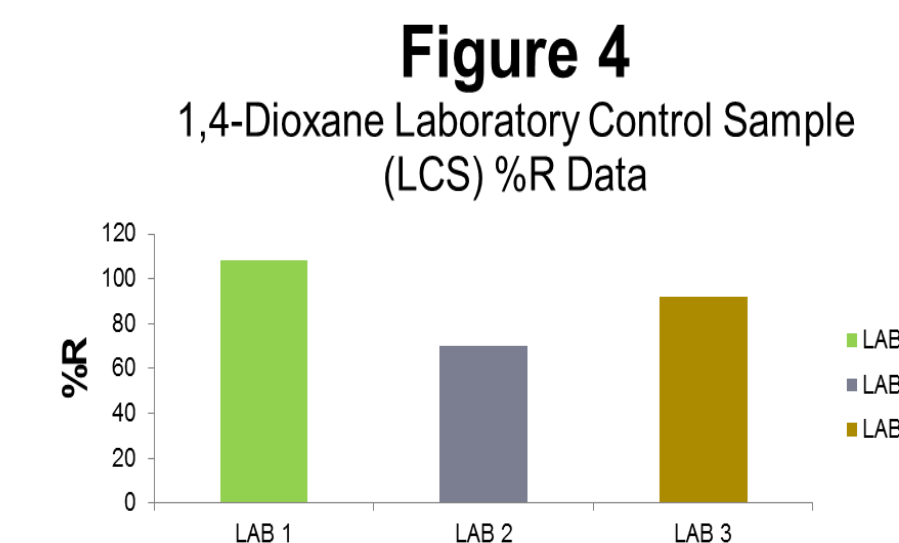
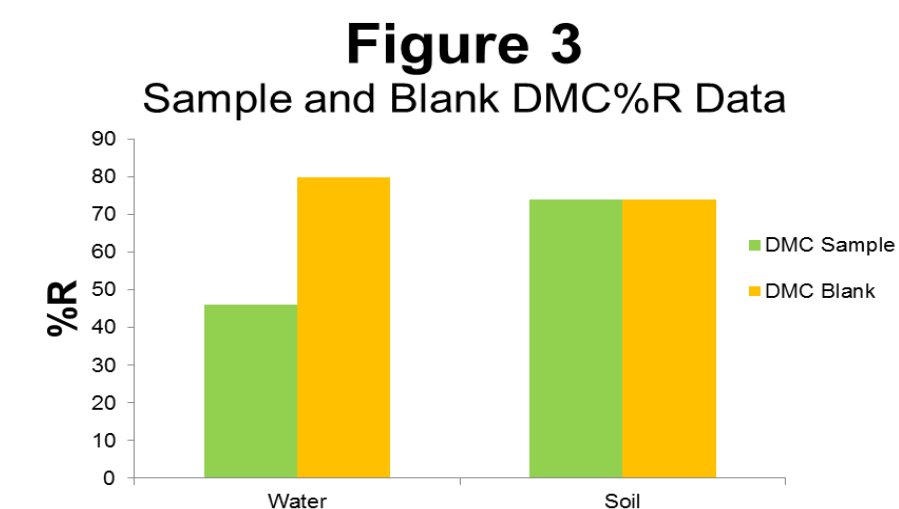
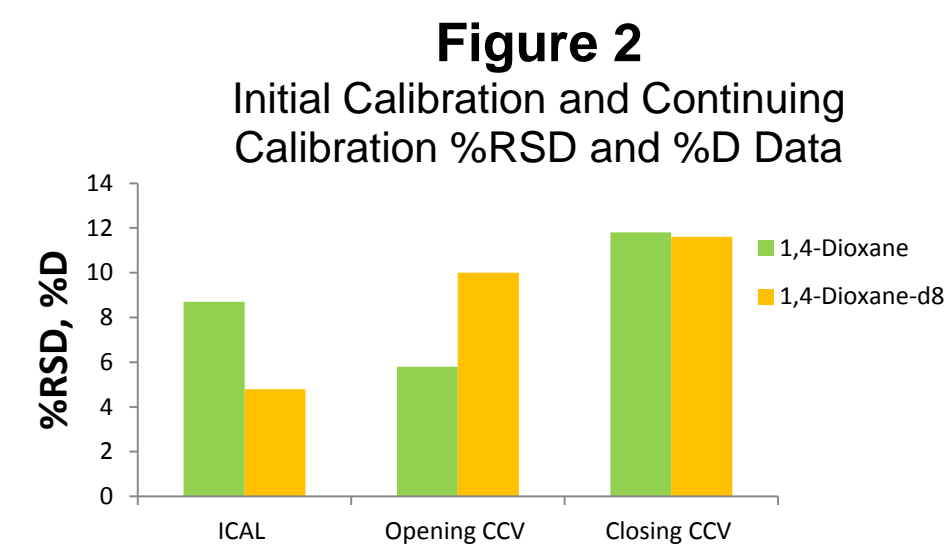
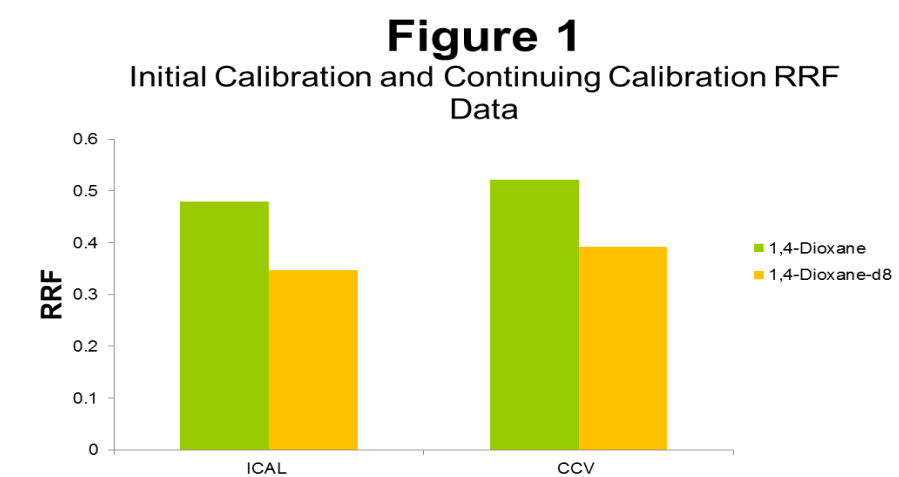
Introduction

- Modified Analysis (MA)
- Lower CRQLs
- Improvements in RRF, DMC %R
- Acceptable Data Usability
- Semivolatiles (SVOA)
- Extraction with DMC 1,4-Dioxane-d8
- Internal Standard Calibration Procedure
- Gas Chromatography/Mass Spectrometry (GC/MS)
- Site Data Study
- Program Wide Laboratory Data Analysis

Modified Analysis

- SVOA Extractions
- Aqueous: SW-846 Method 3520C Continuous Liquid-Liquid Extraction
- Soil/Sediment: SW-846 Methods 3541 Automated Soxhlet Extraction 3550C Ultrasonic Extraction
- CRQLs
 - Aqueous: 2.0 ug/L
 - Soil/Sediment: 67 ug/kg
- Site Data Study
 - Site A Sample Delivery Groups (SDGs):
 - 5 SDGs: 45 Water samples
 - 3 SDGs: 59 Soil samples
 - ICAL and CCV
 - 4 ICAL sets: 20 analyses
 - 25 CCV analyses
- Program Wide Laboratory Data Analysis
 - Sites/Regions: 114/8
 - Modified Analyses: 22
 - SDGs: 281
 - Laboratories: 7
 - Water/Soil Samples: 4389/794
 - Laboratory Control Samples: 17

Site & Program Data



Discussion

- Good RRF
 - Low Standard Deviation
- Low %RSD in ICAL
- Low %D in CCVs
 - Good Precision
- Lower Water Sample %R
 - Possible Matrix Effect
- Good Soil Sample %R
 - Low Standard Deviation
- Good Water and Soil Blank %R
 - Low Standard Deviation
- Acceptable Precisions between Laboratories

Conclusion

- 1,4-Dioxane Target Analyte in SVOA Analysis
- Extracted with DMC
- Data Usability Greatly Improved
 - No Unusable Data
- Technical Acceptance Criteria

Analyte	RRF	% RSD	Opening CCV %D	Closing CCV %D
1,4-Dioxane	0.010	40.0	± 40.0	± 50.0

DMC %R 40-110% (water and soil)

