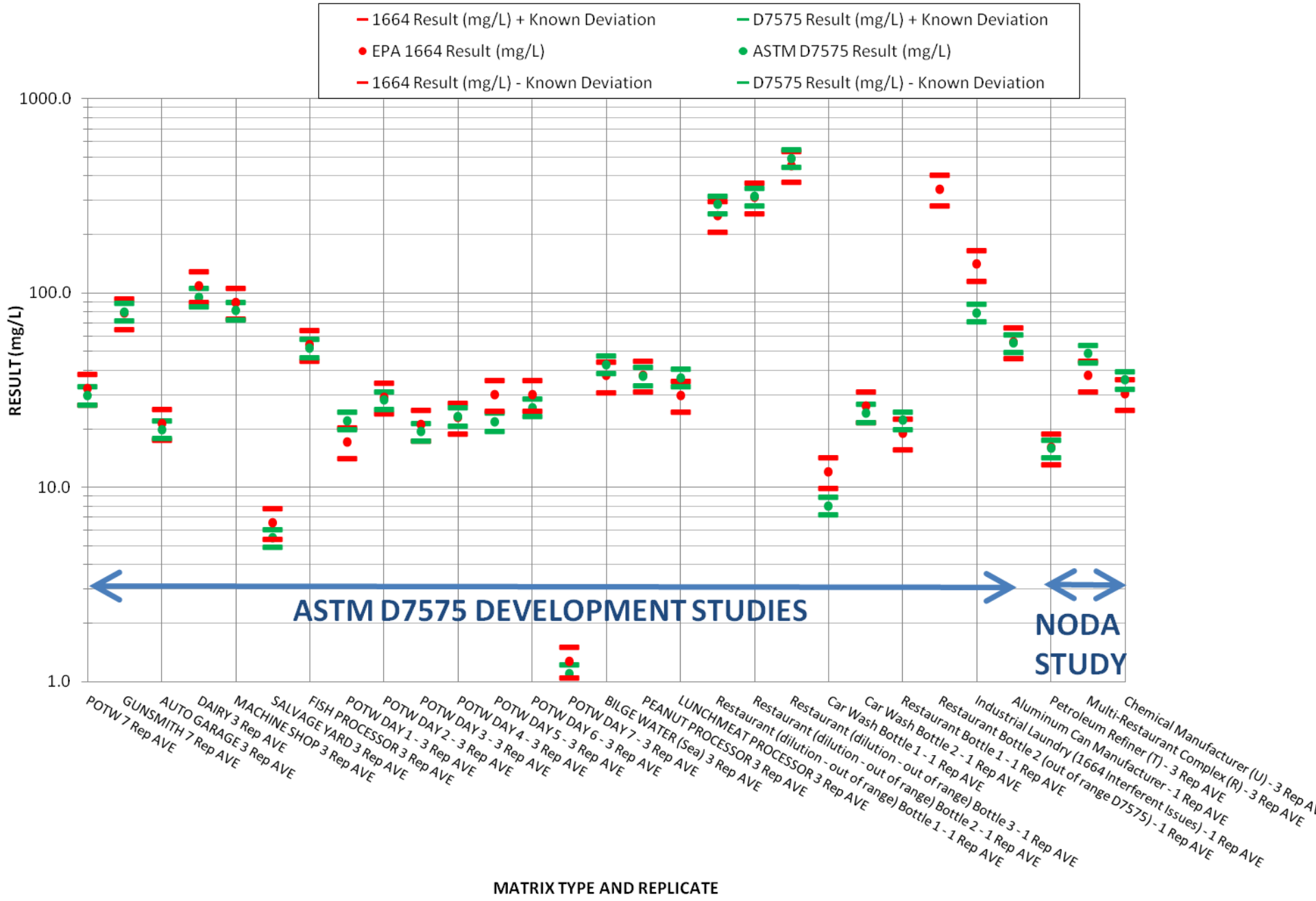
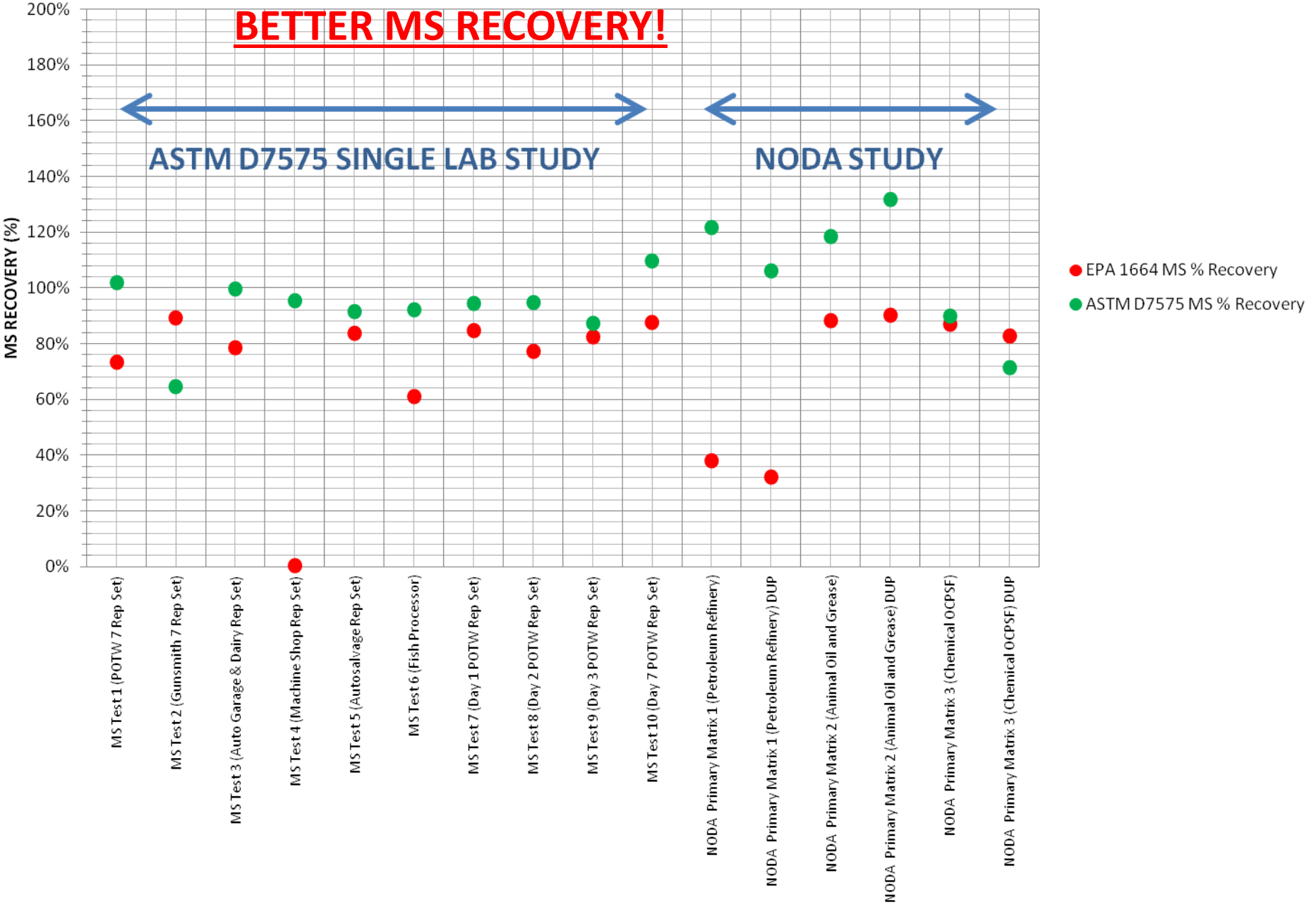
ALL COMPARATIVE STUDIES: D7575 vs. EPA 1664 Results

(showing known deviations) NOTE: DATA RANGES OVERLAP!



ASTM D7575 vs EPA 1664 Comparative Study Matrix Spike Recovery

ASTM D7575 (ave=98% recovery) >> EPA 1664 (ave=71% recovery)



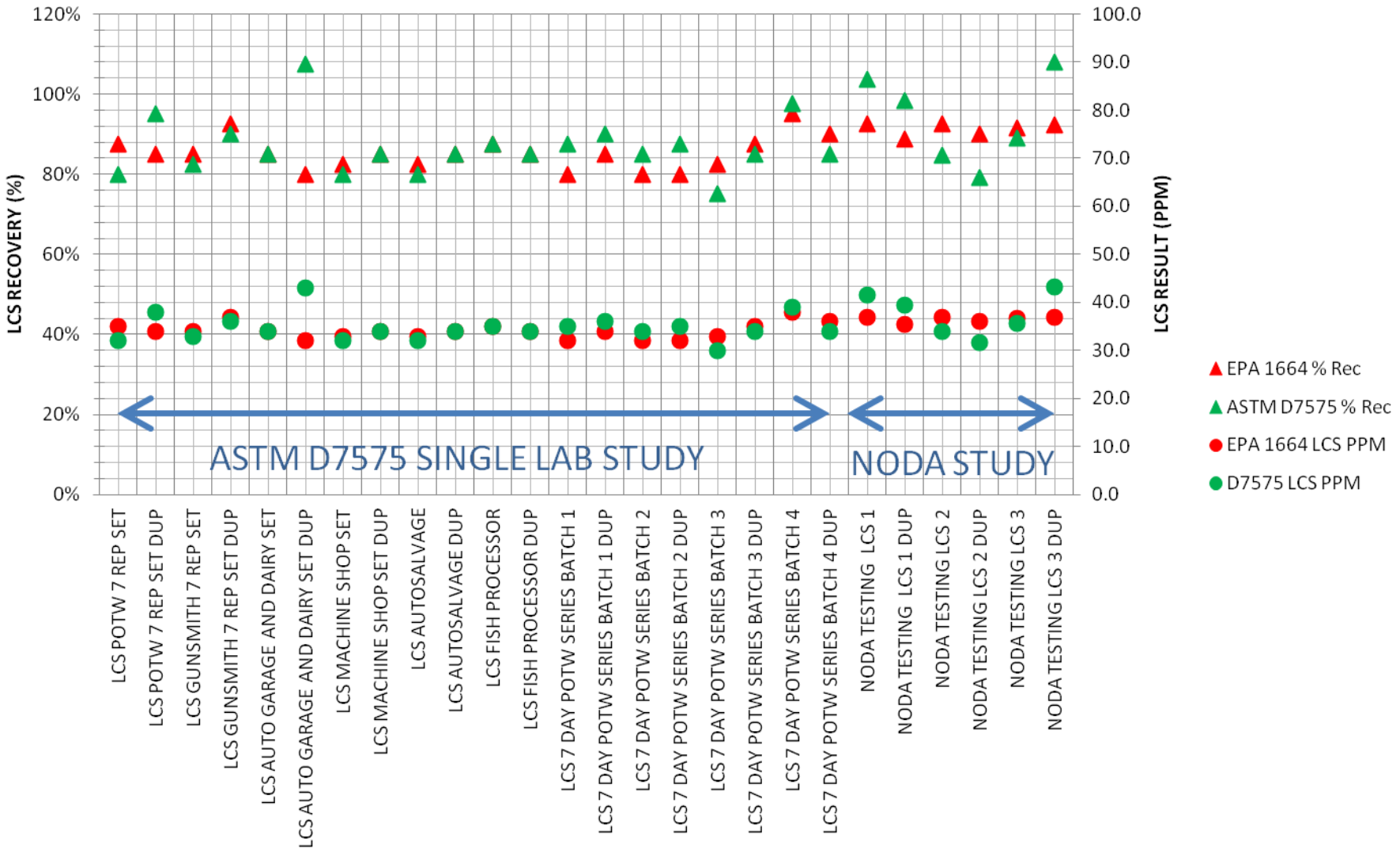
ASTM D7575 vs EPA 1664 Comparative Study

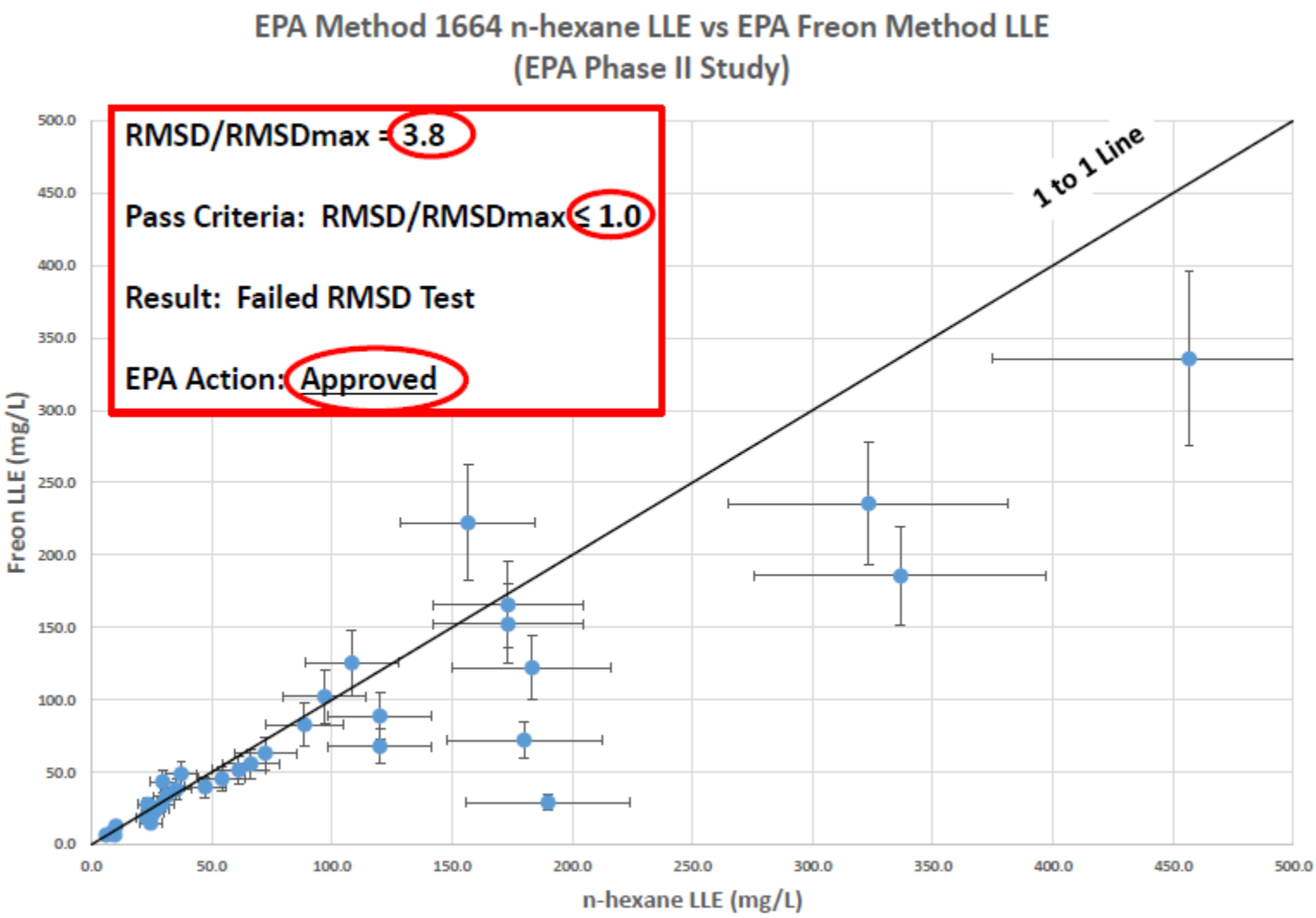
Laboratory Control Samples

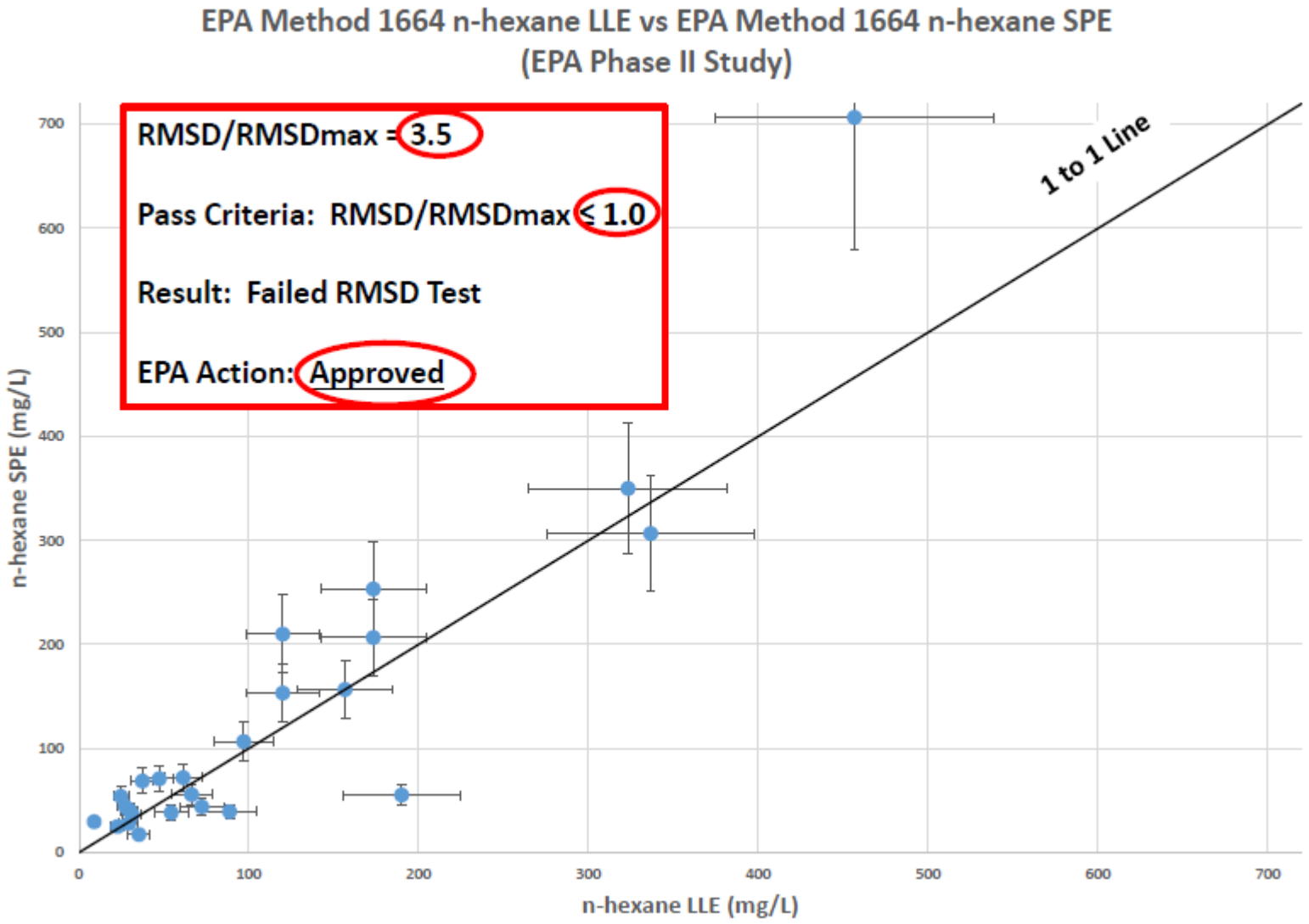
BETTER LCS RECOVERY!

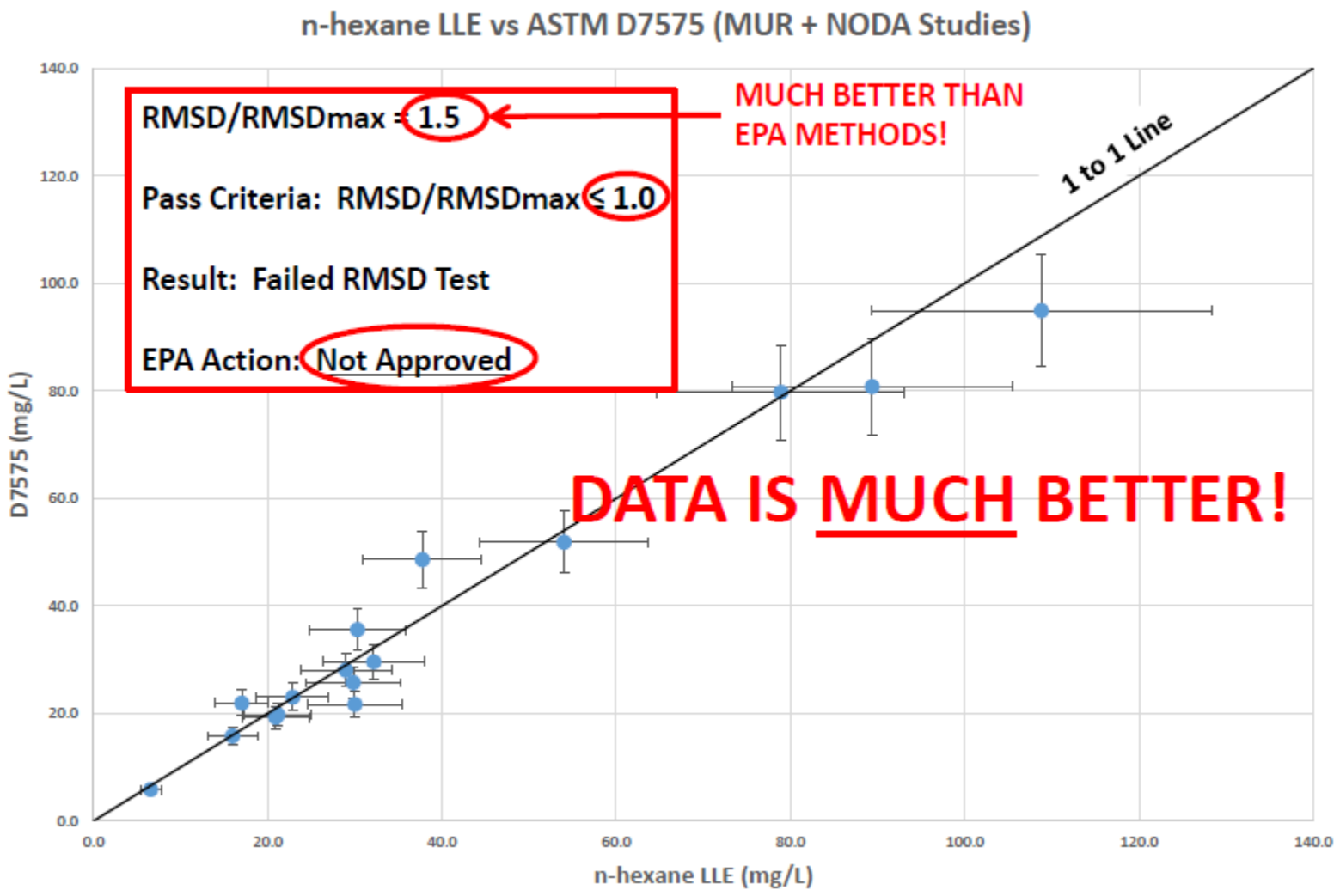
ASTM D7575 (ave=88.4% recovery)

EPA 1664 (ave=86.5% recovery)




EPA Method 1664 n-hexane LLE vs EPA Freon Method LLE
(EPA Phase II Study)
RMSD/RMSDmax = 3.8
Pass Criteria: RMSD/RMSDmax ≤ 1.0
Result: Failed RMSD Test
EPA Action: Approved
1 to 1 Line
Freon LLE (mg/L)
n-hexane LLE (mg/L)
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0


EPA Method 1664 n-hexane LLE vs EPA Method 1664 n-hexane SPE
(EPA Phase II Study)
RMSD/RMSDmax = 3.5
Pass Criteria: RMSD/RMSDmax ≤ 1.0
Result: Failed RMSD Test
EPA Action: Approved
1 to 1 Line
n-hexane SPE (mg/L)
n-hexane LLE (mg/L)
0
100
200
300
400
500
600
700


n-hexane LLE vs ASTM D7575 (MUR + NODA Studies)
RMSD/RMSDmax = 1.5
Pass Criteria: RMSD/RMSDmax ≤ 1.0
Result: Failed RMSD Test
EPA Action: Not Approved
MUCH BETTER THAN EPA METHODS!
1 to 1 Line
DATA IS MUCH BETTER!
D7575 (mg/L)
n-hexane LLE (mg/L)
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0

ASTM D7575 – Green!

(this matrix developed with Richard Engler USEPA Green Chemistry Office)

EPA's 12 Principles of Green Chemistry	OSS Extractor	Note
1) Prevention	**YES**	No waste to treat/clean
2) Atom economy	N/A	
3) Less hazardous chem. synthesis	N/A	
4) Designing safer chemicals	**YES**	Non-toxic extractor design
5) Safer solvents and auxiliaries	**YES**	**Solventless!!**
6) Design for energy efficiency	**YES**	Minimal energy use, no fume hoods, no evaporators, no large quantities of hazmat materials to transport
7) Use renewable feedstock	**YES**	Uses small amount of plastic and metal material that can be reused/recycled
8) Reduce derivatives	N/A	
9) Catalysis	N/A	
10) Design for degradation	N/A	Uses small amounts of plastic and metal materials that may be reused / recycled.
11) Analyze in real time to prevent pollution	**YES**	Analysis can be performed on-site and in real-time, portable technology
12) Inherently safer chemistry for accident prevention	**YES**	No solvents or hazardous materials, safe analysis process minimal potential of chemical accident