

## Field Fuel Quality Study

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# Objectives

- How have changes over the past decade (ULS, Bioheat) impacted fuel quality?
- For future equipment development and certification, what should be the assumed “limit” fuel?

Group 1: B20 or greater, S15 (current New York State marketers using B20 or greater) (20 sites)

Group 2: B20 or greater, S500 (10 sites)

Group 3: <B5, S15 (10 sites)

# Sampling Plan

- 750 ml sample from bleeder
- 200 ml sample from tank bottom
- Take fuel filter with canister



# Analysis Plan

Test	Method
<b>Biodiesel Content</b>	D7371
<b>Acid No.</b>	D664
<b>Sulfur</b>	D5453
<b>Copper Corrosion</b>	D130
<b>Cold Filter Plugging Point</b>	D6371
<b>Cloud Point</b>	D2500
<b>Total Particulate</b>	D6217
<b>Biological Activity</b>	“LiquiCult”
<b>Oxidative Reserve</b>	EN 15751
<b>Storage Stability</b>	D4625

# Nominal Limits

Test	Units	ASTM D 6751	ASTM D 396
Acid No.	Mg KOH/g	0.5	0.3
Copper Corrosion	-	3	3
Oxidative Reserve	Hours	3	6



# Example – Low Biodiesel Home on Long Island

Test	Units	Result
<b>Biodiesel Content</b>	Vol %	4.7
<b>Acid No.</b>	Mg KOH/g	0.31
<b>Sulfur</b>	ppm	9
<b>Copper Corrosion</b>	-	1A
<b>Cold Filter Plugging Point</b>	F	3
<b>Cloud Point</b>	F	10
<b>Total Particulate</b>	mg/L	11
<b>Oxidative Reserve</b>	Hours	2.1

# Results – Long Island – Non-Bio User

Sample	Biodiesel	Acid No.	Sulfur	Oxidative Reserve	Cloud	CFPP	Particulates
	Vol %		ppm	hours	F	F	mg/L
1	0.	.01	10	4.3	16	9	10.2
2	1.0	.02	10	4.0	14	9	27.5
3	0.5	.04	10	8.8	14	9	4.5
4	0.0	.01	10	14.6	12	7	3.5
5	2.1	.02	10	16.0	14	9	2.0



# Results – Long Island – Biodiesel User (B-20 nominal)

Sample	Biodiesel Content (%)	Acid Number
1	26	0.22
2	20	0.21
3	20	0.20
4	20	0.21
5	6	0.08
6	25	0.20
7	21	0.20
8	30	0.10
9	25	0.28
10	19	0.37

# Results – Long Island – Biodiesel User (B-20 nominal)

Sample	Biodiesel Content	Oxidative Reserve
	vol %	hrs
2	20	0.5
5	6	6.7
8	30	8.6

# Samples from Eastern Pennsylvania High Biodiesel Blend

Sample No.	Biodiesel Content	Acid Number
1	38	0.22
2	33	0.28
3	41	0.28
4	50	0.41
5	26	0.30
6	32	0.42
7	35	0.37
8	36	0.32
9	36	0.38

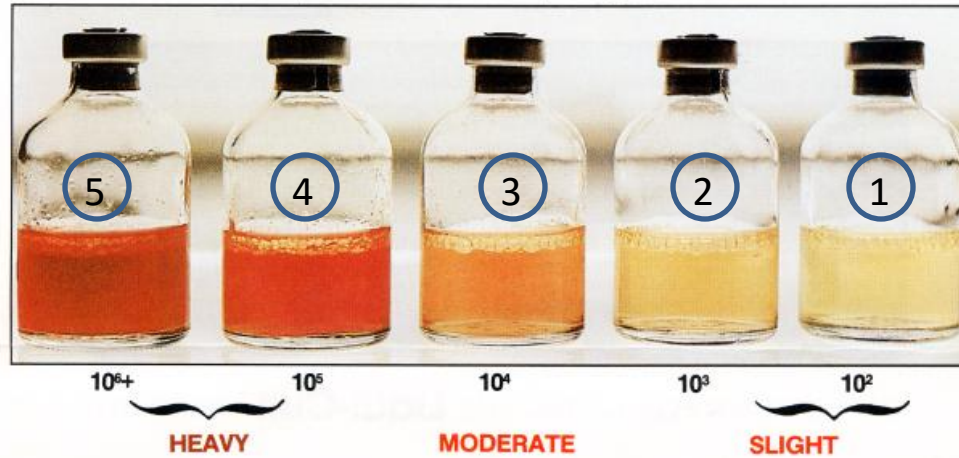
# Samples from Eastern Pennsylvania High Biodiesel Blend

Sample No.	Biodiesel Content	Oxidative Reserve
	vol %	hrs
1	38	2.8
4	50	7.2
7	35	>24

# Biologicals in Fuel – Report on a separate study

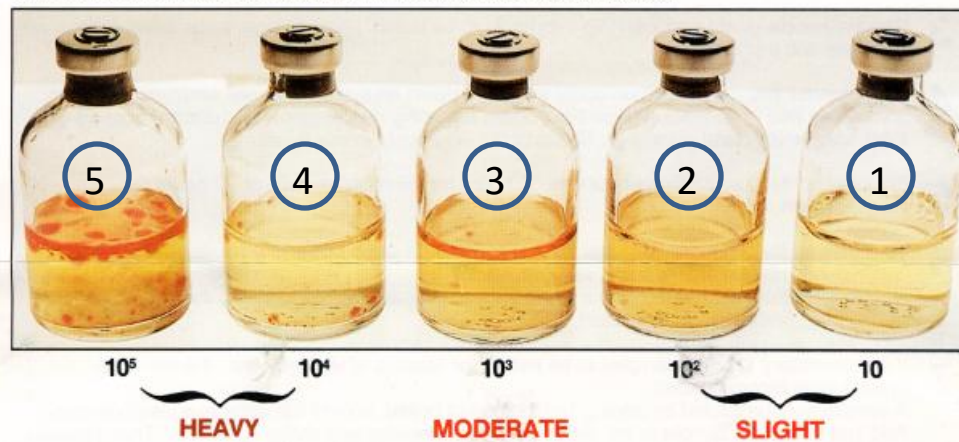
## BACTERIAL GROWTH:

This chart is to be used for comparison 30 hours after sample is injected.



## FUNGAL GROWTH:

This chart is to be used for comparison 72 hours after sample is injected.

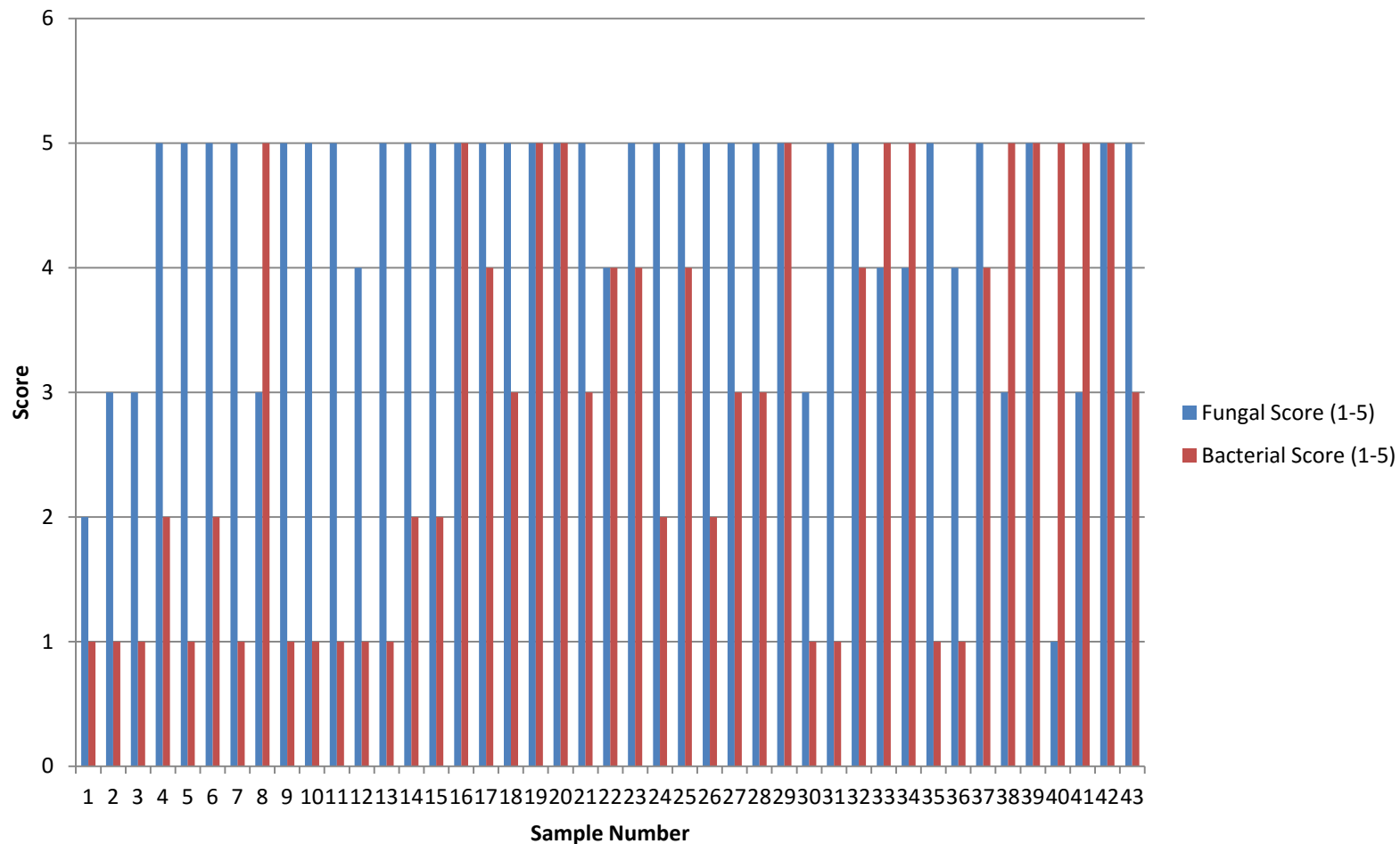


# Biologicals Study – Long Island

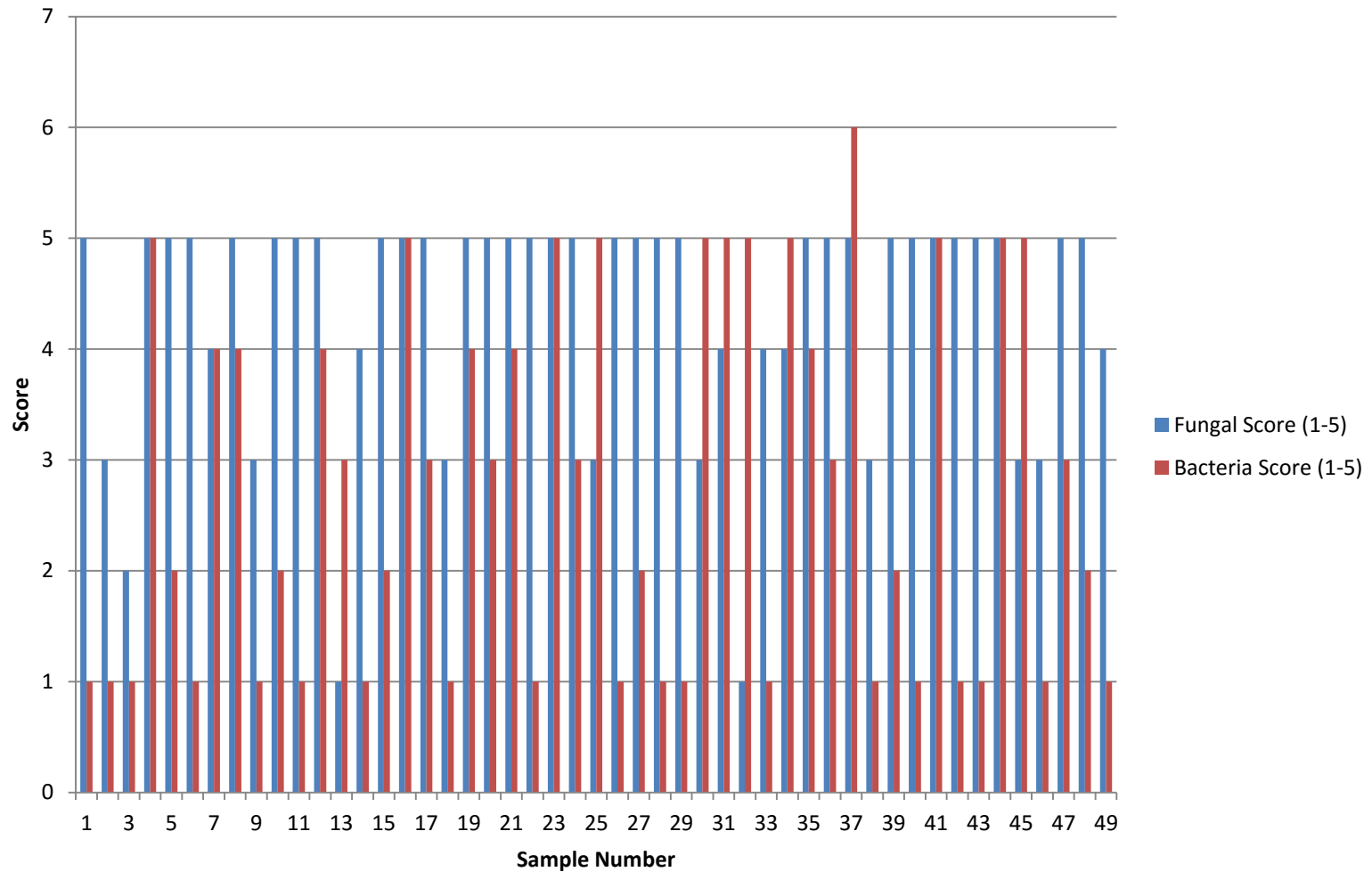
John Levey, Mark Stelmach



# Results – Set 1



# Results – Set 2





# Conclusions to date

- Biodiesel now commonly found in heating oil;
- Actual biodiesel level can vary considerably;
- In-field acid numbers not far from ASTM B-20 limit;
- Oxidative reserve of in-field samples can be lower than ASTM B-20 limit;
- Biologicals common in residential tanks