Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Reply to:

Scott Parke
ASTM Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206

October 20, 2006

To: Single Cylinder Diesel Surveillance Panel

Enclosed are the minutes of the SCOTE Surveillance panel teleconference held August 17, 2006. Please address any corrections during the time allotted for minutes approval at the next meeting.

Scott Parke
Secretary SCOTE Surveillance Panel

Attachments
cc: ftp://ftp.astmtmc.cmu.edu/docs/diesel/scote/minutes/TELECONFERENCE%202006-08-17.pdf

distribution: Email

<div align="center">**TELECONFERENCE MINUTES**</div>

<div align="center">SINGLE CYLINDER DIESEL SURVEILLANCE PANEL</div>

<div align="center">HELD AUGUST 17, 2006</div>

13:35cdt 1R LINER SUPPLY

Chairman Jim McCord (Southwest Research) called the teleconference to order at 13:35cdt. The participant list is shown as attachment 1.

Britt Pulley (Caterpillar) began the discussion by asking how many 1R tests are typically run. Jim Moritz (Intertek) replied that the last one was run in November 2005. Someone asked for confirmation of a rumored Subcommittee B ballot to allow a 1P test to substitute for a 1R test. The response was that such a ballot was indeed in the works.

Bob Campbell (Afton) asked if any decision on what to do for 1R testing can wait on resolution of the B ballot. Jim asked that the group consider extending references of active stands until November 16 as was done in 1P. Hind Abi-Akar (Caterpillar) asked if parts were available to last until November. Britt reported that no new liners would be available until the first quarter of 2007.

During the last teleconference it was determined that approximately 35 liners were available for testing and that approximately 25 per year have been consumed in recent history. Scott Parke asked whether there had been an appreciable consumption of the 35 available liners since the last teleconference. The panel replied that there has not been.

Jim Moritz moved the following:

> For all 1R stands calibrated as of May 8, 2006, extend the calibration period until November 16, 2006 or until the Subcommittee B ballot to allow 1P tests to substitute for 1R tests passes, whichever occurs first.

Mark Sutherland seconded the motion which then failed to garner sufficient support to be approved. The vote tally was 4 in favor (Afton, Intertek, ChevronTexaco, and Southwest Research), 4 opposed (Lubrizol, Caterpillar, Infineum, and TMC), and zero waives.

14:03cdt COMMUNICATION WITH ACC

Chris Castanien (Lubrizol/ACC chairman) reported that ACC has expressed concern regarding some recent surveillance panel actions that have impacted ACC and the LTMS. He said that it may become necessary for surveillance panel chairmen to provide ACC with some sort of written notification whenever their panels take action that directly impacts LTMS.

14:05cdt 1M-PC REDUCED-K

Jim Moritz expressed his company's desire to have reduced-K implemented for the 1M-PC test. The history of the introduction of the reduced-K concept was discussed. Scott Parke and Phil Scinto explained the basis for the various prerequisites required of stands before they are eligible for reduced-K calibration. Scott also explained that the current K value in 1M-PC was raised from its original value to address difficulty some labs had in passing reference tests when the 1Y3995 liner shifted TGF severe. He asked the group to keep that in mind as they considered what the correct reduced-K requirements should be. Jim was asked to put together specific wording for a reduced-K proposal and bring it to the next teleconference.

14:35cdt 1M-PC LINER AND FUEL ANALYSIS

Elisa Santos (Infineum) has completed her analysis of the available data to assess the impact of the 5H-5657 liner and SDTF2 fuel (attachment 2). Scott Parke pointed out that the decision whether or not to move to SDTF2 fuel was already made by the panel at the last teleconference without Elisa's analysis. Pat Fetterman (Infineum) asked Elisa to distill her analysis down to a thumbnail sketch. For the data available, Elisa found no SDTF2 fuel or 5H-5657 liner effect on WTD or TGF; 1Y3995 liners do show a significant severe shift from 1Y3590 liners on TGF.

14:48cdt 1P CALIBRATION EXTENSIONS

Given that the panel has now determined that there is no liner shortage for the 1R test, Jim McCord asked whether or not the panel felt they needed to re-evaluate their prior decision to extend 1P calibrations due to a shortage of the same parts. Bob Campbell said that he didn't think that would be a good idea.

The call concluded at 14:50cdt.

Attendance:

Representative	Organization
Jerry Brys	Lubrizol
Mike Griggs	Lubrizol
Chris Castanien	Lubrizol
Phil Scinto	Lubrizol
Bob Campbell	Afton Chemical
Jim Gutzwiller	Infineum
Elisa Santos	Infineum
Pat Fetterman	Infineum
Hind Abi-Akar	Caterpillar
Britt Pulley	Caterpillar
Jim Moritz	Intertek
John Haegelin	Intertek
Jim McCord	Southwest Research
Mark Sutherland	ChevronTexaco
Frank Farber	Test Monitoring Center
Scott Parke	Test Monitoring Center

1MPC Analysis   Elisa Santos   Elisa.Santos@Infineum.com

Data Source:

❑   432 test results (September 1993 to June 2006)
❑   Two tests (22026 and 22617) were eliminated because their liners were, respectively,
     1Y3587 and 3Y359

Number of tests by Liner & Fuel types

LTMSLAB	LINER	FUEL	N Rows
A	5H5657NEW	SDTF	1
A	5H5657NEW	SDTF2	3
A	5H5657OLD	SDTF	1
A	Y3590	SDTF	63
A	Y3995	SDTF	27
B	5H5657NEW	SDTF	2
B	5H5657OLD	SDTF	5
B	Y3590	SDTF	41
B	Y3995	SDTF	21
C	Y3590	SDTF	12
D	5H5657NEW	SDTF	1
D	5H5657NEW	SDTF2	1
D	5H5657OLD	SDTF	1
D	Y3590	SDTF	25
D	Y3995	SDTF	8
F	Y3590	SDTF	15
G	5H5657OLD	SDTF	1
G	Y3590	SDTF	127
G	Y3995	SDTF	31
G	Y3995	SDTF2	2
I	Y3590	SDTF	33
K	Y3590	SDTF	8
N	Y3590	SDTF	3

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Plots of the data by test parameter:

Chart for TGF: SDF2 seems lower than SDF
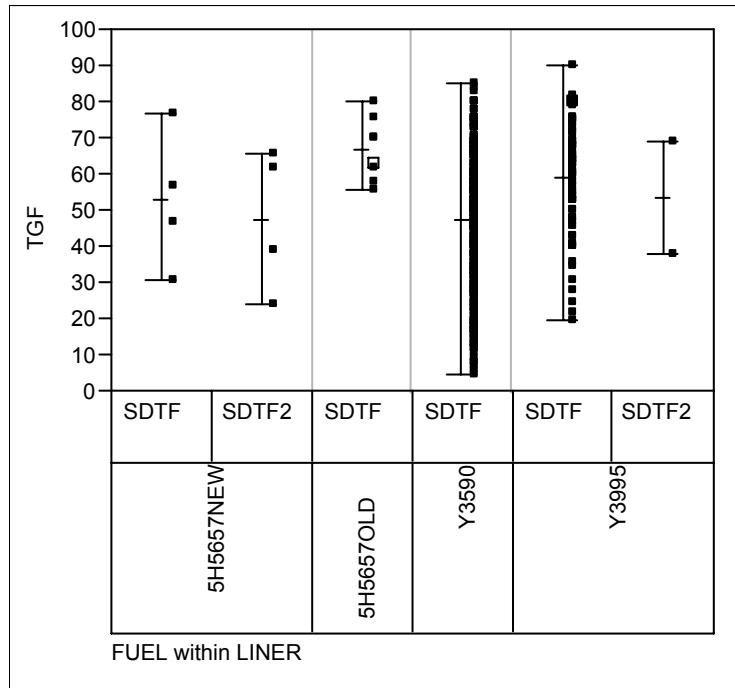

Chart for WTD: SDF2 seems lower than SDF
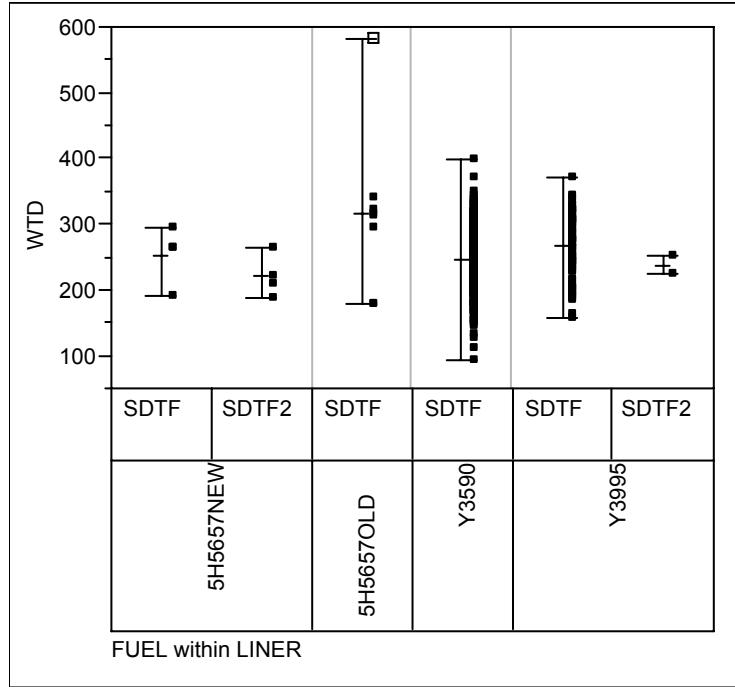
Additional plots of the data by test parameter:

Chart for TGF

Chart for WTD

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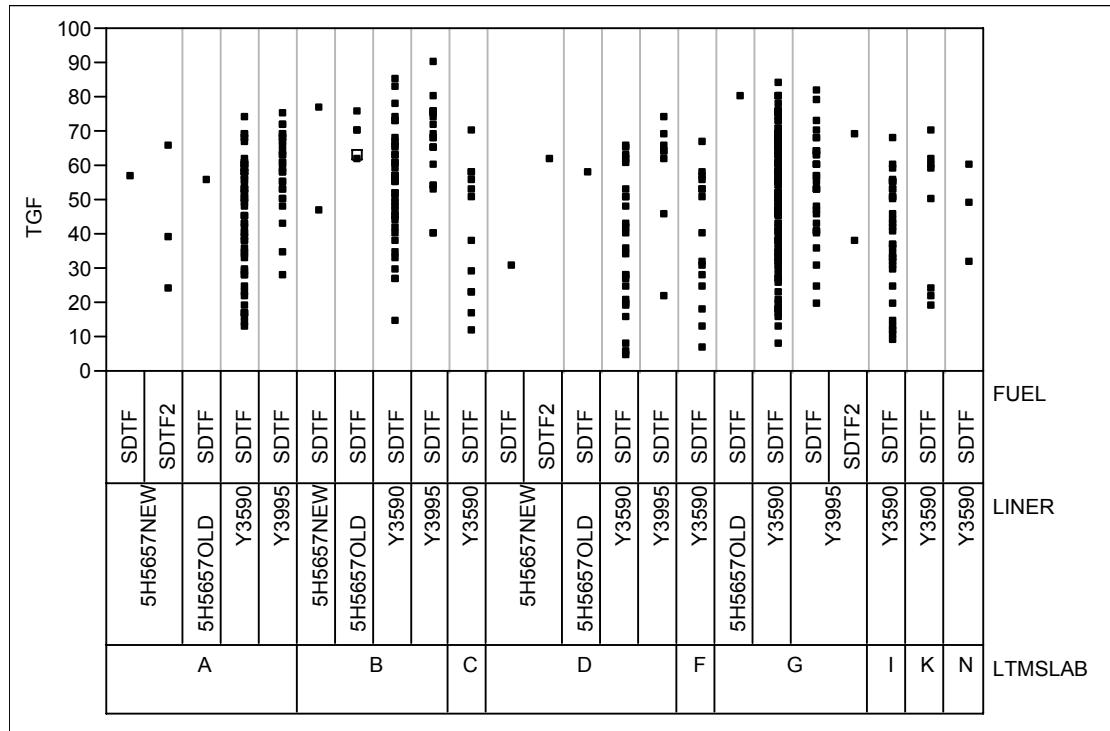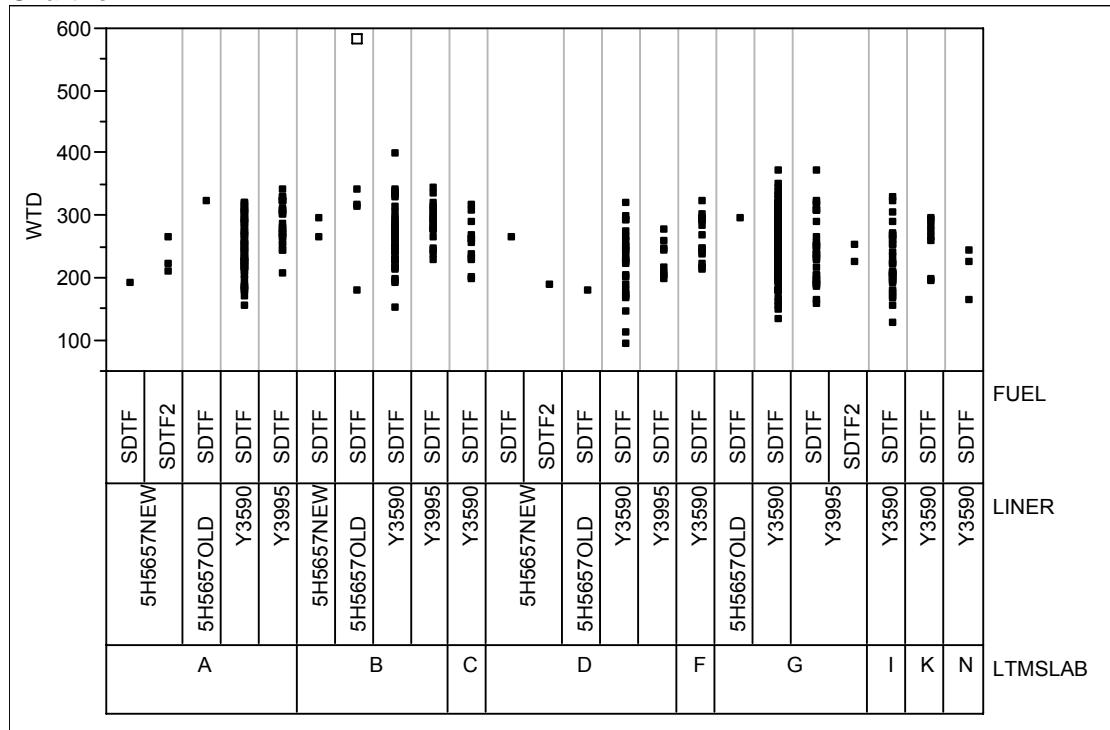
Summary:

TGF: 432 test results

Statistically significant effects for TGF: Lab, Stand within Lab and Liner.
- For Liner: There is evidence that Y3590 is different from Y3995.
- Fuel: There is no statistical evidence that the fuel types are different among themselves.

The estimated LSMEANS for each Liner type is presented below (table and plot).

TGF	Coefficients	Estimate	Differences wrt 3590
Intercept	53.43748759	-	-
Lab	0	-	-
Stand /Lab	0	-	-
3590	-7.6006058	45.836882	Base 45.83688179
3995	2.543006	55.980494	10.1436118
Old	8.76964	62.207128	16.3702458
New	-3.71204	49.725448	3.8885658

LSMEANS plot
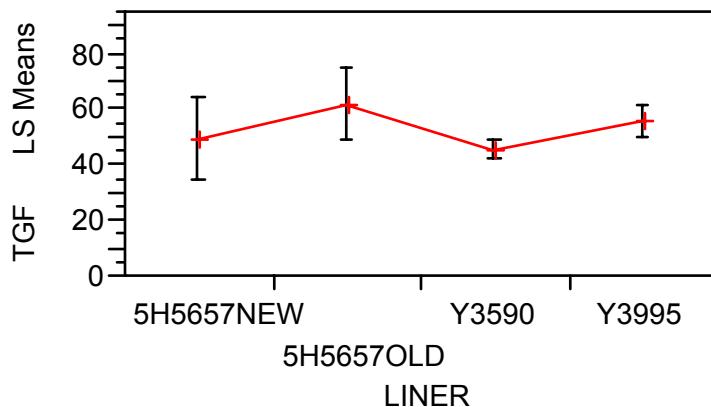
The estimated difference between OLD and 3590 is 16.3702 but the standard error of the difference is 6.55 and the 95 % confidence interval is [-0.52, 33.26].
Details for the TGF analysis are presented in the Appendix 1. The final model included Lab, Stand within Lab and Liner.

WDT: 431 test results (removing 55452)

Statistically significant effects for WTD: Lab, Stand within Lab
- Liner: There is no statistical evidence that the liners are different among themselves.
- Fuel: There is no statistical evidence that the fuel types are different among themselves.

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A chart showing WTD by Liner within Lab is shown below. The high WTD value for Lab B, Stand 8A with 5H5657OLD was removed from the analysis. A more detailed chart including the Stands follows. Details for the WTD analysis with 431 test results are presented in the Appendix 2. . The final model presented in Appendix 2 includes Lab, Stand within Lab, IND and Liner (with Liner being not statistically significant). The final model after eliminating Liner includes Lab and Stand within Lab.

Chart for WTD by Liner within Lab
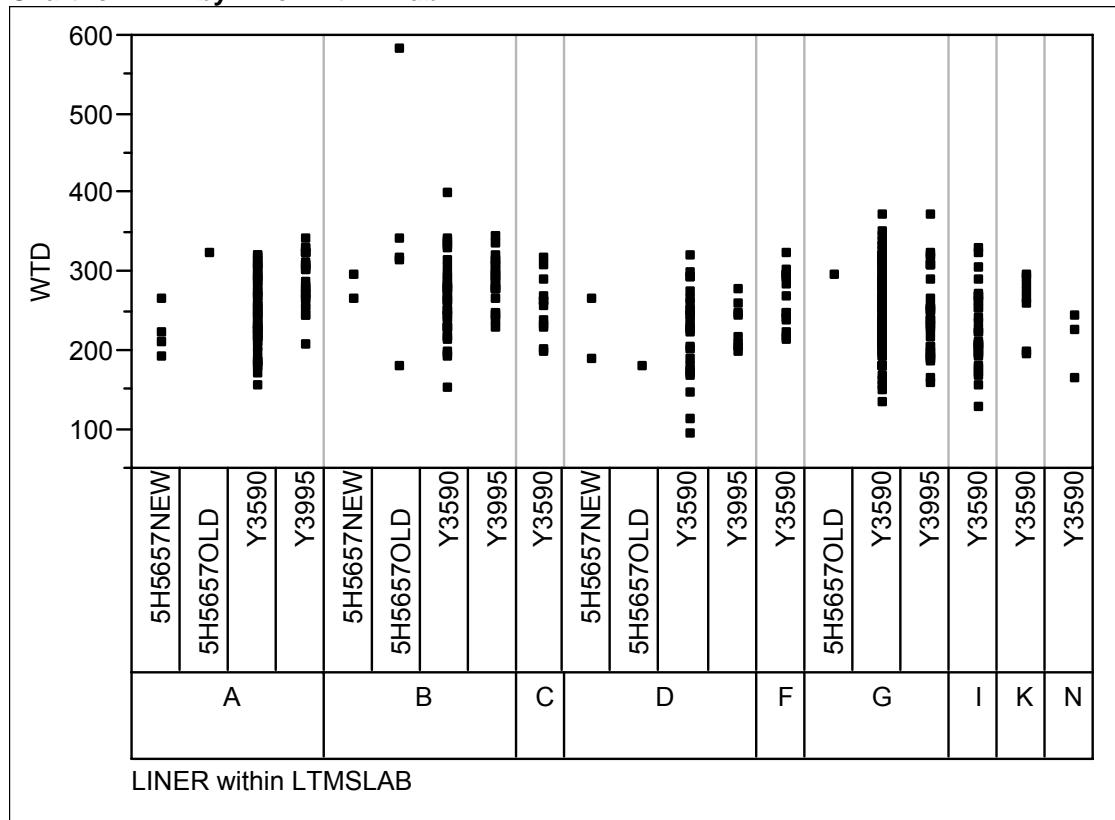
Chart for WTD by Liner within Stand within Lab

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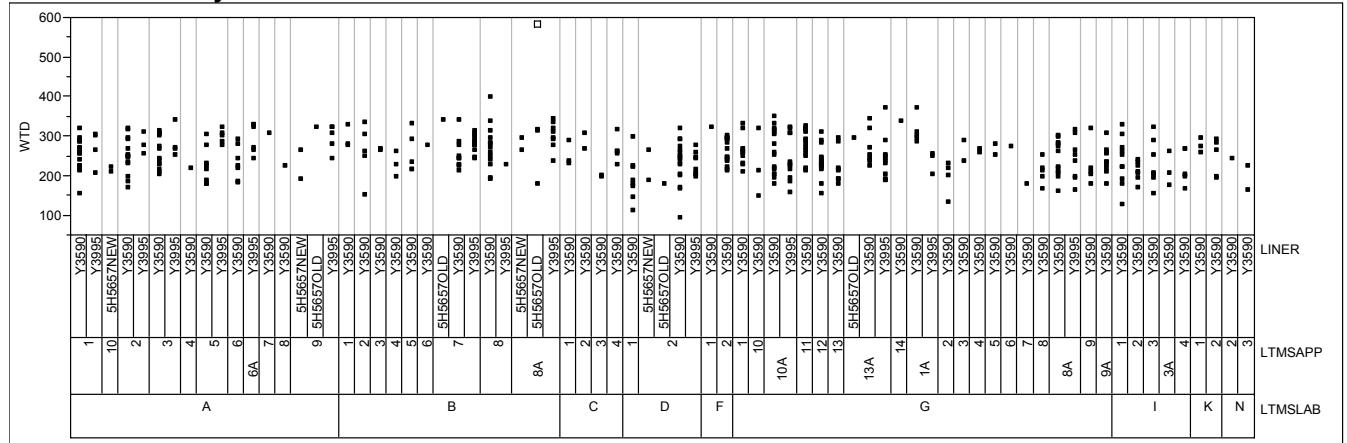
WDT: 432 test results

Statistically significant effects for WTD: Lab, Stand within Lab, IND and Liner.
- ❑ For Liner: There is evidence that Y3590 is different from 5H5657OLD.
- ❑ Fuel: There is no statistical evidence that the fuel types are different among themselves.

The estimated LSMEANS for each Liner type is presented below (table and plot).

WTD	Coefficients	Estimate	Differences wrt 3590
Intercept	255.5583335	-	-
Lab	0	-	-
Stand /Lab	0	-	-
IND	0	-	-
3590	-16.30407416	239.25426	Base 239.2542593
3995	-1.217242829	254.34109	15.08683134
Old	40.81870479	296.37704	57.12277895
New	-23.29738779	232.26095	-6.993313627

Details for the WTD analysis with 432 test results are presented in the Appendix 3. . The final model presented in Appendix 3 includes Lab, Stand within Lab, IND and Liner.

LSMEANS plot

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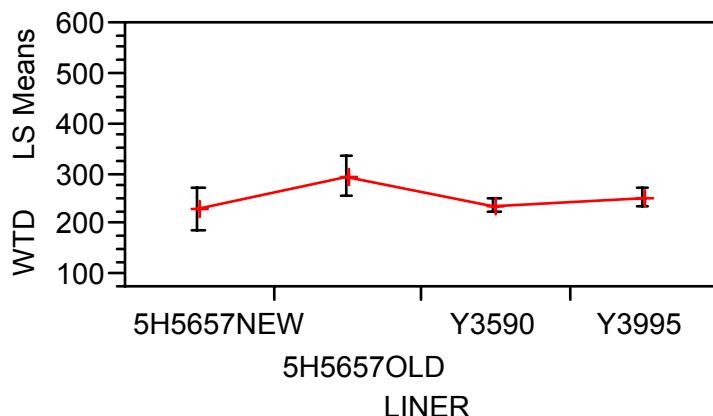
Appendix 1: TGF Analysis with 432 test results

Response TGF
Actual by Predicted Plot

TGF   Predicted P<.0001 RSq=0.30
RMSE=15.934
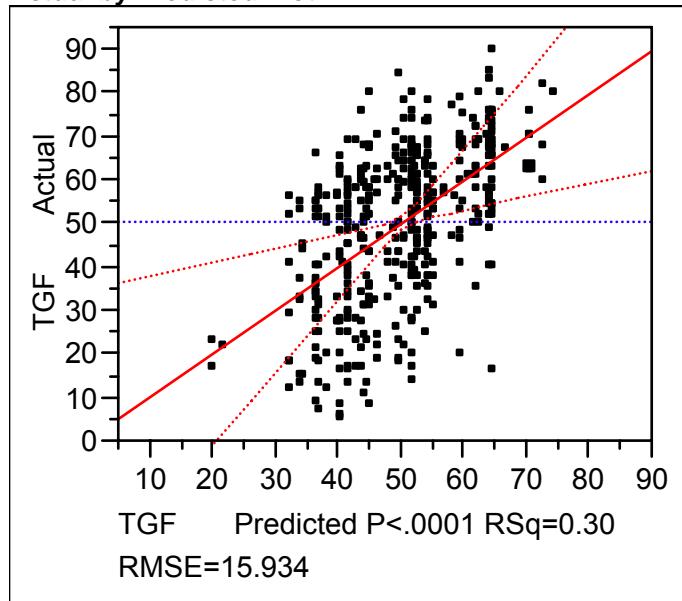
Summary of Fit

RSquare	0.30295
RSquare Adj	0.194562
Root Mean Square Error	15.93448
Mean of Response	50.28009
Observations (or Sum Wgts)	432

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	58	41161.61	709.683	2.7950
Error	373	94707.50	253.908	Prob > F
C. Total	431	135869.11		<.0001

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	16	3042.698	190.169	0.7406
Pure Error	357	91664.801	256.764	Prob > F
Total Error	373	94707.499		0.7519
				Max RSq
				0.3253

Parameter Estimates

| Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	53.437488	3.28567	16.26	<.0001
LTMSLAB [A]	0.343961	3.297201	0.10	0.9170
LTMSLAB [B]	6.361402	3.167433	2.01	0.0453
LTMSLAB [C]	-5.603548	4.714957	-1.19	0.2354
LTMSLAB [D]	-7.118958	3.354323	-2.12	0.0345
LTMSLAB [F]	6.3059754	7.496846	0.84	0.4008
LTMSLAB [G]	3.9580038	2.578574	1.53	0.1256
LTMSLAB [I]	-5.539739	3.209652	-1.73	0.0852
LTMSLAB [K]	-0.370215	5.443937	-0.07	0.9458
LTMSLAB [A]:LTMSAPP [1]	5.8394216	4.409887	1.32	0.1863
LTMSLAB [A]:LTMSAPP [10]	2.4305938	12.39809	0.20	0.8447
LTMSLAB [A]:LTMSAPP [2]	-4.26501	4.668938	-0.91	0.3616
LTMSLAB [A]:LTMSAPP [3]	-4.379423	4.587998	-0.95	0.3404
LTMSLAB [A]:LTMSAPP [4]	-24.18084	14.75908	-1.64	0.1022
LTMSLAB [A]:LTMSAPP [5]	3.6100756	5.044178	0.72	0.4746
LTMSLAB [A]:LTMSAPP [6]	-3.037986	6.305974	-0.48	0.6303
LTMSLAB [A]:LTMSAPP [6A]	6.0088782	6.842278	0.88	0.3804
LTMSLAB [A]:LTMSAPP [7]	6.8191572	14.75908	0.46	0.6443
LTMSLAB [A]:LTMSAPP [8]	14.819157	14.75908	1.00	0.3160

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Term	Estimate	Std Error	t Ratio	Prob>|t|
LTMSLAB [B]:LTMSAPP [1]	9.4683829	8.643814	1.10	0.2741
LTMSLAB [B]:LTMSAPP [2]	-12.19828	6.955887	-1.75	0.0803
LTMSLAB [B]:LTMSAPP [3]	0.3017163	10.37446	0.03	0.9768
LTMSLAB [B]:LTMSAPP [4]	-17.53162	8.643814	-2.03	0.0432
LTMSLAB [B]:LTMSAPP [5]	-1.398284	6.955887	-0.20	0.8408
LTMSLAB [B]:LTMSAPP [6]	4.8017163	14.36563	0.33	0.7384
LTMSLAB [B]:LTMSAPP [7]	2.2065528	4.317136	0.51	0.6096
LTMSLAB [B]:LTMSAPP [8]	12.291458	4.782934	2.57	0.0106
LTMSLAB [C]:LTMSAPP [1]	-7.9	8.163989	-0.97	0.3338
LTMSLAB [C]:LTMSAPP [2]	23.766667	9.370682	2.54	0.0116
LTMSLAB [C]:LTMSAPP [3]	-20.23333	9.370682	-2.16	0.0315
LTMSLAB [D]:LTMSAPP [1]	-1.842924	3.238659	-0.57	0.5697
LTMSLAB [F]:LTMSAPP [1]	14.857143	8.246874	1.80	0.0724
LTMSLAB [G]:LTMSAPP [1]	4.9051144	5.208709	0.94	0.3469
LTMSLAB [G]:LTMSAPP [10]	-5.128219	8.952061	-0.57	0.5671
LTMSLAB [G]:LTMSAPP [10A]	-4.56559	3.607448	-1.27	0.2064
LTMSLAB [G]:LTMSAPP [11]	3.1384477	4.422439	0.71	0.4784
LTMSLAB [G]:LTMSAPP [12]	14.910997	4.216178	3.54	0.0005
LTMSLAB [G]:LTMSAPP [13]	1.9551144	5.728015	0.34	0.7331
LTMSLAB [G]:LTMSAPP [13A]	-0.265937	4.252094	-0.06	0.9502
LTMSLAB [G]:LTMSAPP [14]	0.2051144	15.21818	0.01	0.9893
LTMSLAB [G]:LTMSAPP [1A]	12.65126	5.764973	2.19	0.0288
LTMSLAB [G]:LTMSAPP [2]	-17.54489	7.823535	-2.24	0.0255
LTMSLAB [G]:LTMSAPP [3]	3.2051144	10.86291	0.30	0.7681
LTMSLAB [G]:LTMSAPP [4]	-1.794886	10.86291	-0.17	0.8689
LTMSLAB [G]:LTMSAPP [5]	-0.794886	10.86291	-0.07	0.9417
LTMSLAB [G]:LTMSAPP [6]	-2.794886	15.21818	-0.18	0.8544
LTMSLAB [G]:LTMSAPP [7]	-8.794886	15.21818	-0.58	0.5637
LTMSLAB [G]:LTMSAPP [8]	0.0051144	7.06036	0.00	0.9994
LTMSLAB [G]:LTMSAPP [8A]	-5.802331	4.035504	-1.44	0.1513
LTMSLAB [G]:LTMSAPP [9]	2.0051144	7.06036	0.28	0.7766
LTMSLAB [I]:LTMSAPP [1]	-3.597143	4.922401	-0.73	0.4654
LTMSLAB [I]:LTMSAPP [2]	3.9885714	5.546087	0.72	0.4725
LTMSLAB [I]:LTMSAPP [3]	-6.297143	5.546087	-1.14	0.2569
LTMSLAB [I]:LTMSAPP [3A]	7.7028571	7.731564	1.00	0.3198
LTMSLAB [K]:LTMSAPP [1]	-1.133333	5.818448	-0.19	0.8457
LTMSLAB [N]:LTMSAPP [2]	1.5	9.757833	0.15	0.8779
LINER[5H5657NEW]	-3.712042	5.363858	-0.69	0.4893
LINER[5H5657OLD]	8.7696417	4.78397	1.83	0.0676
LINER[Y3590]	-7.600606	2.973967	-2.56	0.0110

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LTMSLAB	8	8	4687.832	2.3078	0.0200
LTMSAPP [LTMSLAB]	47	47	18606.214	1.5591	0.0139
LINER	3	3	4927.512	6.4689	0.0003

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Residual by Predicted Plot
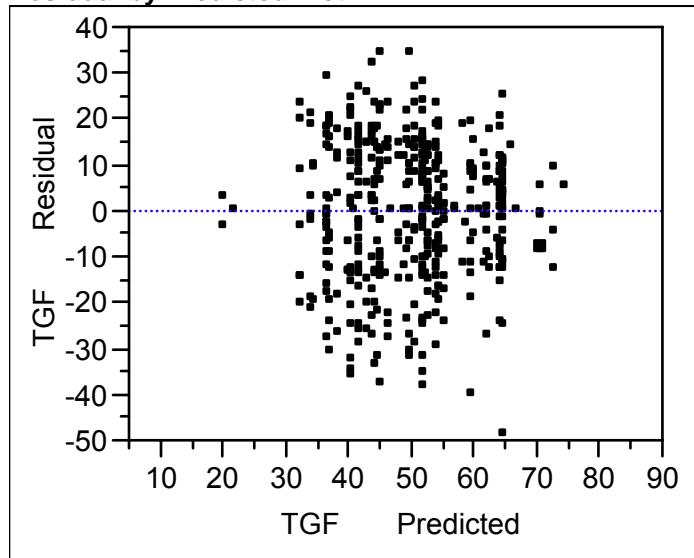
LTMSLAB Leverage Plot
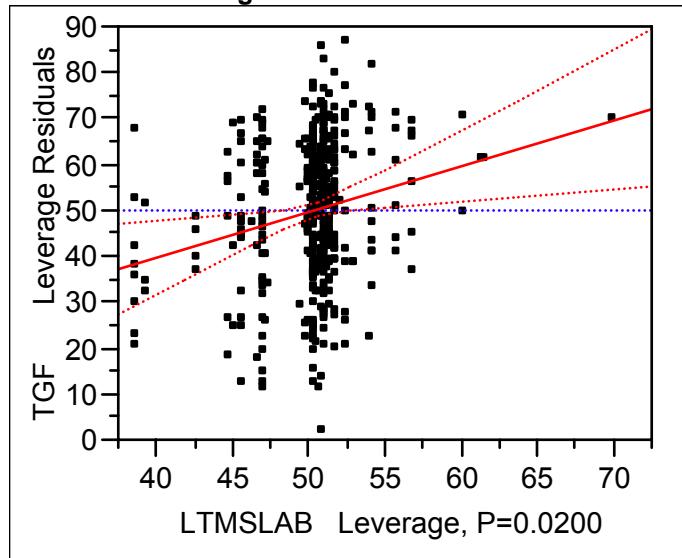
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
A	53.781449	3.594520	49.4632
B	59.798890	3.890716	58.9420
C	47.833939	5.759972	40.6667
D	46.318530	4.064415	42.6667
F	59.743463	8.766722	39.2667
G	57.395491	3.534086	53.0745
I	47.897749	4.223750	39.0909
K	53.067273	6.534433	45.7500
N	55.100606	10.200970	47.0000

LSMeans Differences Tukey HSD

Alpha=0.050   Q=3.12011

LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	A	B	C	D	F	G	I	K	N
A	0	-6.0174	5.94751	7.46292	-5.962	-3.614	5.8837	0.71418	-1.3192
	0	4.24507	5.86691	4.40359	8.83735	3.75791	4.36845	6.62889	10.2617

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	A	B	C	D	F	G	I	K	N
	0	-19.263	-12.358	-6.2768	-33.536	-15.339	-7.7464	-19.969	-33.337
	0	7.22765	24.2529	21.2026	21.6115	8.11105	19.5138	21.397	30.6986
B	6.01744	0	11.965	13.4804	0.05543	2.4034	11.9011	6.73162	4.69828
	4.24507	0	5.76372	4.34366	8.76918	3.61894	4.22886	6.53773	10.2031
	-7.2276	0	-6.0185	-0.0723	-27.305	-8.8881	-1.2934	-13.667	-27.136
	19.2625	0	29.9484	27.0331	27.4163	13.6949	25.0956	27.1301	36.5331
C	-5.9475	-11.965	0	1.51541	-11.91	-9.5616	-0.0638	-5.2333	-7.2667
	5.86691	5.76372	0	5.90099	9.60957	5.36147	5.77307	7.62805	10.9338
	-24.253	-29.948	0	-16.896	-41.892	-26.29	-18.076	-29.034	-41.381
	12.3579	6.0185	0	19.9272	18.0734	7.16685	17.9488	18.567	26.848
D	-7.4629	-13.48	-1.5154	0	-13.425	-11.077	-1.5792	-6.7487	-8.7821
	4.40359	4.34366	5.90099	0	8.86001	3.83263	4.41412	6.65907	10.2813
	-21.203	-27.033	-19.927	0	-41.069	-23.035	-15.352	-27.526	-40.861
	6.27677	0.07235	16.8964	0	14.2193	0.88127	12.1933	14.0283	23.2966
F	5.96201	-0.0554	11.9095	13.4249	0	2.34797	11.8457	6.67619	4.64286
	8.83735	8.76918	9.60957	8.86001	0	8.5102	8.77534	10.0928	12.776
	-21.612	-27.416	-18.073	-14.219	0	-24.205	-15.534	-24.815	-35.22
	33.5355	27.3054	41.8924	41.0692	0	28.9008	39.2257	38.167	44.5054
G	3.61404	-2.4034	9.56155	11.077	-2.348	0	9.49774	4.32822	2.29489
	3.75791	3.61894	5.36147	3.83263	8.5102	0	3.66172	6.18603	9.98138
	-8.1111	-13.695	-7.1669	-0.8813	-28.901	0	-1.9272	-14.973	-28.848
	15.3391	8.88809	26.29	23.0352	24.2048	0	20.9227	23.6293	33.4379
I	-5.8837	-11.901	0.06381	1.57922	-11.846	-9.4977	0	-5.1695	-7.2029
	4.36845	4.22886	5.77307	4.41412	8.77534	3.66172	0	6.54598	10.2084
	-19.514	-25.096	-17.949	-12.193	-39.226	-20.923	0	-25.594	-39.054
	7.74637	1.29337	18.0764	15.3518	15.5343	1.92723	0	15.2547	24.6484
K	-0.7142	-6.7316	5.23333	6.74874	-6.6762	-4.3282	5.16952	0	-2.0333
	6.62889	6.53773	7.62805	6.65907	10.0928	6.18603	6.54598	0	11.3609
	-21.397	-27.13	-18.567	-14.028	-38.167	-23.629	-15.255	0	-37.481
	19.9687	13.6669	29.0337	27.5258	24.8146	14.9729	25.5937	0	33.4139
N	1.31916	-4.6983	7.26667	8.78208	-4.6429	-2.2949	7.20286	2.03333	0
	10.2617	10.2031	10.9338	10.2813	12.776	9.98138	10.2084	11.3609	0
	-30.699	-36.533	-26.848	-23.297	-44.505	-33.438	-24.648	-33.414	0
	33.3369	27.1365	41.3814	40.8608	35.2197	28.8481	39.0541	37.4806	0

Level		Least Sq Mean
B	A	59.798890
F	A	59.743463
G	A	57.395491
N	A	55.100606
A	A	53.781449
K	A	53.067273
I	A	47.897749
C	A	47.833939
D	A	46.318530

Levels not connected by same letter are significantly different

LS Means Plot

10

LTMSAPP [LTMSLAB] Leverage Plot

LTMSAPP [LTMSLAB] Leverage,
P=0.0139

LINER Leverage Plot

LINER Leverage, P=0.0003
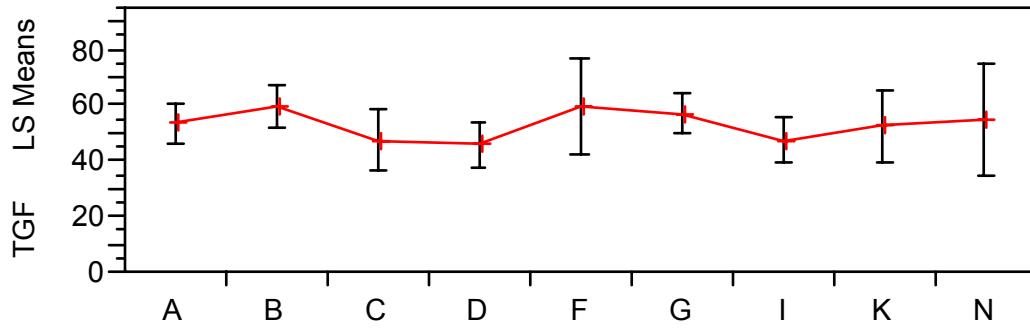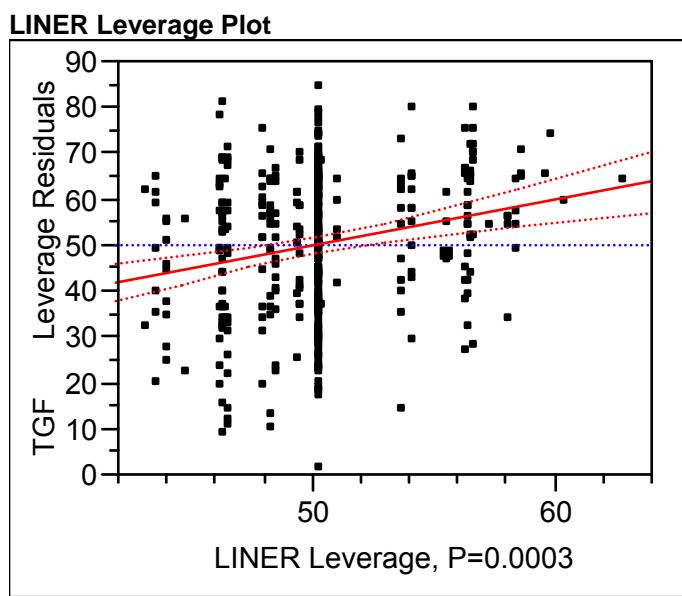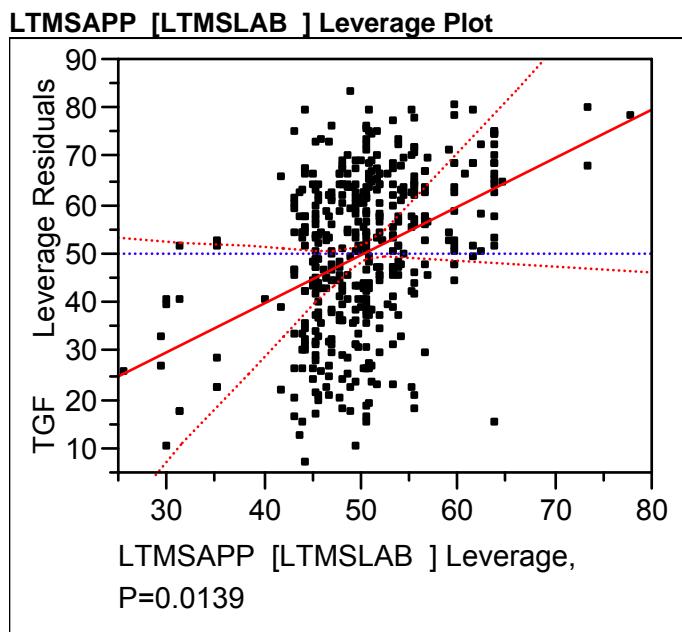
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
5H5657NEW	49.725445	7.4142720	50.3750
5H5657OLD	62.207129	6.6715415	66.8750
Y3590	45.836882	1.8180497	47.5443
Y3995	55.980494	2.8849206	58.8315

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LSMeans Differences Tukey HSD

Alpha=0.050   Q=2.58068

LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	5H5657NEW	5H5657OLD	Y3590	Y3995
5H5657NEW	0 0 0 0	-12.482 8.76556 -35.103 10.1394	3.88856 7.37575 -15.146 22.923	-6.255 7.1954 -24.824 12.314
5H5657OLD	12.4817 8.76556 -10.139 35.1028	0 0 0 0	16.3702 6.54555 -0.5217 33.2622	6.22664 6.30815 -10.053 22.506
Y3590	-3.8886 7.37575 -22.923 15.1459	-16.37 6.54555 -33.262 0.52175	0 0 0 0	-10.144 2.4614 -16.496 -3.7915
Y3995	6.25505 7.1954 -12.314 24.8241	-6.2266 6.30815 -22.506 10.0527	10.1436 2.4614 3.79151 16.4957	0 0 0 0

Level			Least Sq Mean
5H5657OLD	A	B	62.207129
Y3995	A		55.980494
5H5657NEW	A	B	49.725445
Y3590		B	45.836882

Levels not connected by same letter are significantly different

LS Means Plot
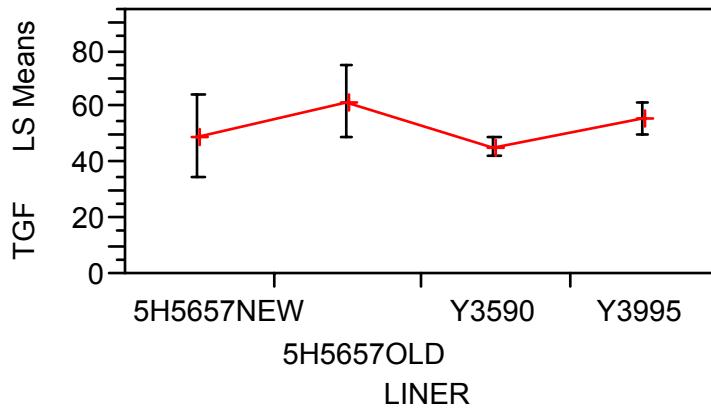
Appendix 2: WTD Analysis with 431 test results (55452 removed)

Response WTD
Actual by Predicted Plot

WTD   Predicted P<.0001 RSq=0.26
RMSE=45.35
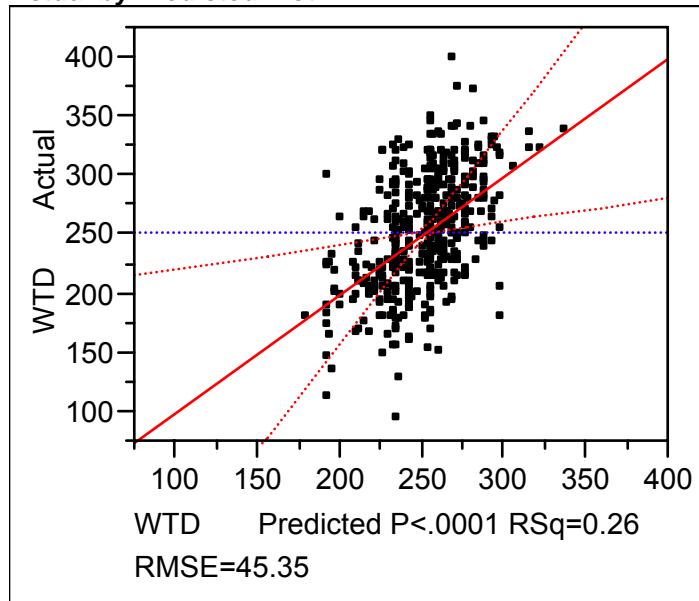
Summary of Fit

RSquare	0.256011
RSquare Adj	0.135365
Root Mean Square Error	45.34956
Mean of Response	252.1998
Observations (or Sum Wgts)	431

Analysis of Variance

| Source	DF	Sum of Squares	Mean Square	F Ratio
Model	60	261842.9	4364.05	2.1220
Error	370	760935.4	2056.58	Prob > F
C. Total	430	1022778.3		<.0001

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	45	98756.44	2194.59	1.0771
Pure Error	325	662178.98	2037.47	Prob > F
Total Error	370	760935.43		0.3485
				Max RSq
				0.3526

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	248.87752	9.606902	25.91	<.0001
LTMSLAB [A]	11.558696	9.451525	1.22	0.2221
LTMSLAB [B]	21.032116	9.125333	2.30	0.0217
LTMSLAB [C]	3.2196237	13.66871	0.24	0.8139
LTMSLAB [D]	-35.82665	10.00018	-3.58	0.0004
LTMSLAB [F]	43.609294	21.53341	2.03	0.0436
LTMSLAB [G]	-0.609494	7.404195	-0.08	0.9344
LTMSLAB [I]	-26.43861	9.238448	-2.86	0.0045
LTMSLAB [K]	13.173939	15.49698	0.85	0.3958
LTMSLAB [A]:LTMSAPP [1]	-6.935878	12.82471	-0.54	0.5890
LTMSLAB [A]:LTMSAPP [10]	-11.22655	35.4008	-0.32	0.7513
LTMSLAB [A]:LTMSAPP [2]	-5.990371	13.45157	-0.45	0.6563
LTMSLAB [A]:LTMSAPP [3]	3.2244107	13.25221	0.24	0.8079
LTMSLAB [A]:LTMSAPP [4]	-37.85515	42.77975	-0.88	0.3768
LTMSLAB [A]:LTMSAPP [5]	-8.58399	14.47728	-0.59	0.5536
LTMSLAB [A]:LTMSAPP [6]	-27.82222	17.9997	-1.55	0.1230
LTMSLAB [A]:LTMSAPP [6A]	45.401667	20.19289	2.25	0.0251
LTMSLAB [A]:LTMSAPP [7]	48.644846	42.77975	1.14	0.2562
LTMSLAB [A]:LTMSAPP [8]	-36.40007	42.08215	-0.86	0.3876

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Term	Estimate	Std Error	t Ratio	Prob>|t|
LTMSLAB [B]:LTMSAPP [1]	27.623122	25.16464	1.10	0.2731
LTMSLAB [B]:LTMSAPP [2]	-9.824505	19.80553	-0.50	0.6202
LTMSLAB [B]:LTMSAPP [3]	-2.60103	29.74228	-0.09	0.9304
LTMSLAB [B]:LTMSAPP [4]	-41.14015	24.6559	-1.67	0.0960
LTMSLAB [B]:LTMSAPP [5]	-12.59349	19.8655	-0.63	0.5265
LTMSLAB [B]:LTMSAPP [6]	8.0265126	40.91808	0.20	0.8446
LTMSLAB [B]:LTMSAPP [7]	2.2551646	12.38311	0.18	0.8556
LTMSLAB [B]:LTMSAPP [8]	-1.932361	13.72098	-0.14	0.8881
LTMSLAB [C]:LTMSAPP [1]	1.5356142	23.27067	0.07	0.9474
LTMSLAB [C]:LTMSAPP [2]	37.533919	27.08696	1.39	0.1667
LTMSLAB [C]:LTMSAPP [3]	-52.18854	26.67246	-1.96	0.0511
LTMSLAB [D]:LTMSAPP [1]	-20.45222	9.227871	-2.22	0.0273
LTMSLAB [F]:LTMSAPP [1]	32.294249	23.88547	1.35	0.1772
LTMSLAB [G]:LTMSAPP [1]	13.787105	14.82422	0.93	0.3530
LTMSLAB [G]:LTMSAPP [10]	-21.76521	25.55892	-0.85	0.3950
LTMSLAB [G]:LTMSAPP [10A]	6.4322863	10.44915	0.62	0.5386
LTMSLAB [G]:LTMSAPP [11]	27.488122	12.7501	2.16	0.0317
LTMSLAB [G]:LTMSAPP [12]	-13.90835	12.17098	-1.14	0.2539
LTMSLAB [G]:LTMSAPP [13]	-24.53188	16.42876	-1.49	0.1362
LTMSLAB [G]:LTMSAPP [13A]	7.6544306	12.32035	0.62	0.5348
LTMSLAB [G]:LTMSAPP [14]	88.368122	43.35887	2.04	0.0423
LTMSLAB [G]:LTMSAPP [1A]	33.358113	16.52811	2.02	0.0443
LTMSLAB [G]:LTMSAPP [2]	-51.15942	22.48555	-2.28	0.0235
LTMSLAB [G]:LTMSAPP [3]	17.563036	32.01231	0.55	0.5836
LTMSLAB [G]:LTMSAPP [4]	16.340170	31.07451	0.53	0.5993
LTMSLAB [G]:LTMSAPP [5]	19.940579	31.07451	0.64	0.5215
LTMSLAB [G]:LTMSAPP [6]	26.813036	44.10032	0.61	0.5436
LTMSLAB [G]:LTMSAPP [7]	-68.83188	43.35887	-1.59	0.1133
LTMSLAB [G]:LTMSAPP [8]	-38.73188	20.19682	-1.92	0.0559
LTMSLAB [G]:LTMSAPP [8A]	-6.823045	11.6504	-0.59	0.5585
LTMSLAB [G]:LTMSAPP [9]	-22.35188	20.19682	-1.11	0.2691
LTMSLAB [I]:LTMSAPP [1]	13.54622	14.01557	0.97	0.3344
LTMSLAB [I]:LTMSAPP [2]	-10.8185	15.83845	-0.68	0.4950
LTMSLAB [I]:LTMSAPP [3]	9.8036538	15.78507	0.62	0.5349
LTMSLAB [I]:LTMSAPP [3A]	-7.469429	22.06545	-0.34	0.7352
LTMSLAB [K]:LTMSAPP [1]	14.766328	16.57366	0.89	0.3735
LTMSLAB [N]:LTMSAPP [2]	25.822457	28.24815	0.91	0.3612
IND [873]	7.7009365	7.761614	0.99	0.3218
IND [873-1]	10.44585	4.900166	2.13	0.0337
LINER[5H5657NEW]	-13.81288	15.56558	-0.89	0.3754
LINER[5H5657OLD]	17.152643	14.54056	1.18	0.2389
LINER[Y3590]	-9.482	9.940558	-0.95	0.3408

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LTMSLAB	8	8	74961.26	4.5562	<.0001
LTMSAPP [LTMSLAB]	47	47	136858.63	1.4159	0.0433
IND	2	2	15333.14	3.7278	0.0250
LINER	3	3	10171.97	1.6487	0.1778

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Residual by Predicted Plot
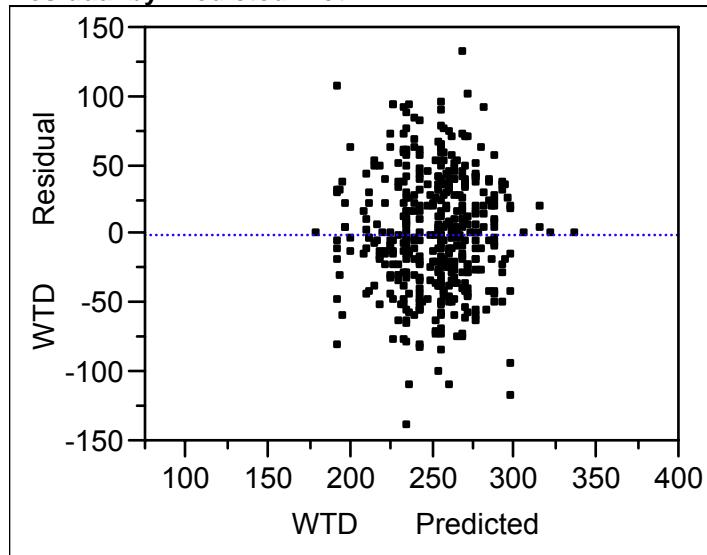
LTMSLAB Leverage Plot
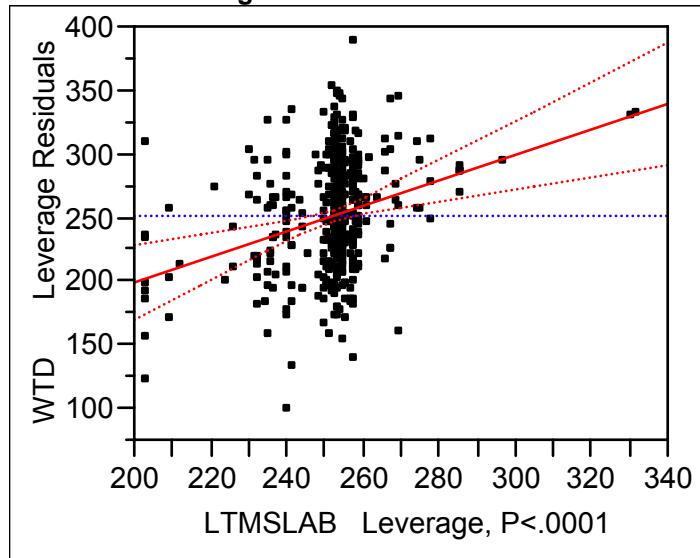
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
A	260.43622	10.716368	260.021
B	269.90964	11.486888	273.728
C	252.09715	16.625937	255.325
D	213.05087	12.317490	222.994
F	292.48682	25.130171	264.913
G	248.26803	10.372504	249.596
I	222.43891	12.331570	225.194
K	262.05146	18.715956	258.637
N	219.15861	29.137908	210.600

LSMeans Differences Tukey HSD

Alpha=0.050   Q=3.12026
LSMean[i] By LSMean[j]

Mean[i]-Mean[j] / Std Err Dif / Lower CL Dif / Upper CL Dif	A	B	C	D	F	G	I	K	N
A	0	-9.4734	8.33907	47.3853	-32.051	12.1682	37.9973	-1.6152	41.2776
	0	12.129	17.0543	12.7538	25.4314	10.7476	12.4988	18.9032	29.3654
	0	-47.319	-44.875	7.59022	-111.4	-21.367	-1.0023	-60.598	-50.35
	0	28.3724	61.5531	87.1805	47.3019	45.7035	76.9969	57.3677	132.905
B	9.47342	0	17.8125	56.8588	-22.577	21.6416	47.4707	7.85818	50.751
	12.129	0	16.8869	12.4651	25.3278	10.3136	12.0415	18.6458	29.2582
	-28.372	0	-34.879	17.9644	-101.61	-10.539	9.89801	-50.322	-40.542
	47.3192	0	70.5039	95.7531	56.4523	53.8226	85.0434	66.0379	142.044
C	-8.3391	-17.812	0	39.0463	-40.39	3.82912	29.6582	-9.9543	32.9385
	17.0543	16.8869	0	17.6967	27.3506	15.6701	16.9	21.895	31.1206
	-61.553	-70.504	0	-16.172	-125.73	-45.066	-23.074	-78.272	-64.166
	44.875	34.8789	0	94.2648	44.9513	52.7239	82.3906	58.3637	130.043
D	-47.385	-56.859	-39.046	0	-79.436	-35.217	-9.388	-49.001	-6.1077
	12.7538	12.4651	17.6967	0	25.8935	11.0949	12.6724	19.1507	29.7102
	-87.18	-95.753	-94.265	0	-160.23	-69.836	-48.929	-108.76	-98.811
	-7.5902	-17.964	16.1722	0	1.35863	-0.5983	30.1531	10.7546	86.5959
F	32.0506	22.5772	40.3897	79.4359	0	44.2188	70.0479	30.4354	73.3282
	25.4314	25.3278	27.3506	25.8935	0	24.528	25.3362	28.8966	36.368
	-47.302	-56.452	-44.951	-1.3586	0	-32.315	-9.0076	-59.73	-40.15
	111.403	101.607	125.731	160.231	0	120.753	149.103	120.6	186.806
G	-12.168	-21.642	-3.8291	35.2172	-44.219	0	25.8291	-13.783	29.1094
	10.7476	10.3136	15.6701	11.0949	24.528	0	10.4289	17.6204	28.5796
	-45.704	-53.823	-52.724	0.59826	-120.75	0	-6.7117	-68.764	-60.066
	21.3672	10.5394	45.0657	69.8361	32.315	0	58.3699	41.1968	118.285
I	-37.997	-47.471	-29.658	9.38804	-70.048	-25.829	0	-39.613	3.28031
	12.4988	12.0415	16.9	12.6724	25.3362	10.4289	0	18.6631	29.2663
	-76.997	-85.043	-82.391	-30.153	-149.1	-58.37	0	-97.846	-88.038
	1.00233	-9.898	23.0741	48.9291	9.00757	6.71165	0	18.6212	94.5987
K	1.61524	-7.8582	9.95432	49.0006	-30.435	13.7834	39.6125	0	42.8929
	18.9032	18.6458	21.895	19.1507	28.8966	17.6204	18.6631	0	32.423
	-57.368	-66.038	-58.364	-10.755	-120.6	-41.197	-18.621	0	-58.275
	60.5981	50.3216	78.2723	108.756	59.7297	68.7637	97.8463	0	144.061
N	-41.278	-50.751	-32.939	6.10774	-73.328	-29.109	-3.2803	-42.893	0
	29.3654	29.2582	31.1206	29.7102	36.368	28.5796	29.2663	32.423	0
	-132.91	-142.04	-130.04	-86.596	-186.81	-118.29	-94.599	-144.06	0
	50.3502	40.5421	64.166	98.8114	40.1496	60.0664	88.0381	58.2755	0

Level				Least Sq Mean
F	A	B	C	292.48682
B	A			269.90964
K	A	B	C	262.05146
A	A	B		260.43622
C	A	B	C	252.09715
G	A	B		248.26803
I		B	C	222.43891
N	A	B	C	219.15861
D			C	213.05087

Levels not connected by same letter are significantly different
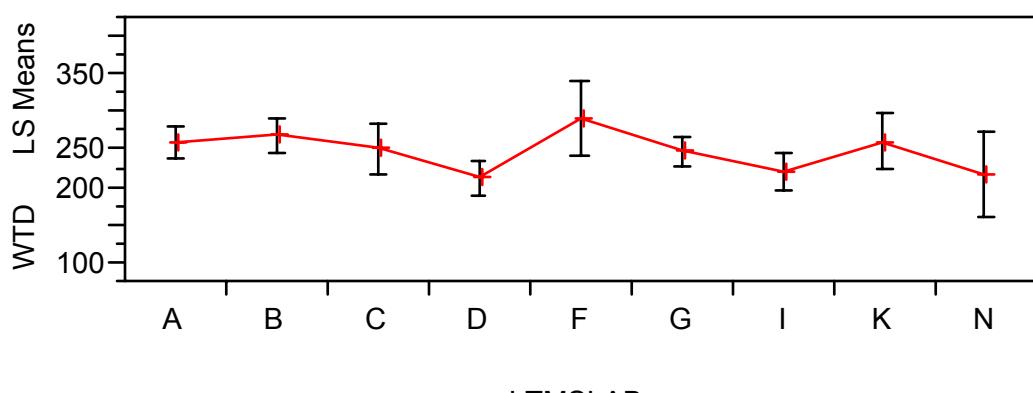
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LS Means Plot

LTMSAPP [LTMSLAB] Leverage Plot

LTMSAPP [LTMSLAB] Leverage,
P=0.0433

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IND   Leverage Plot
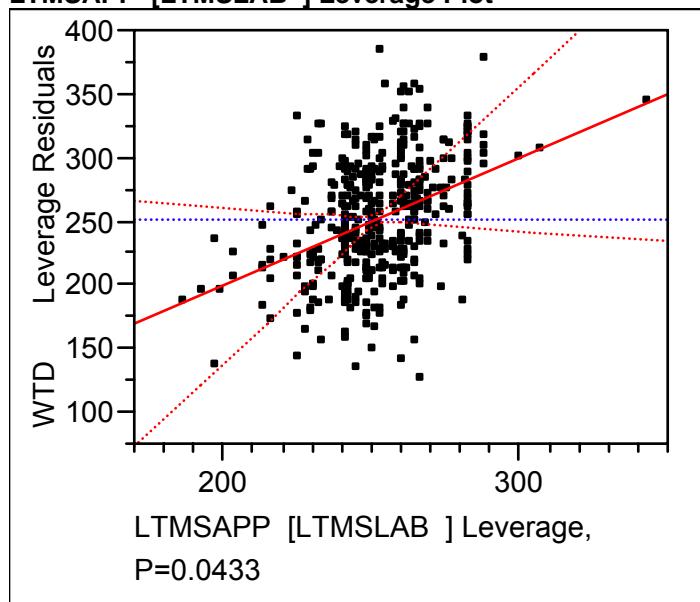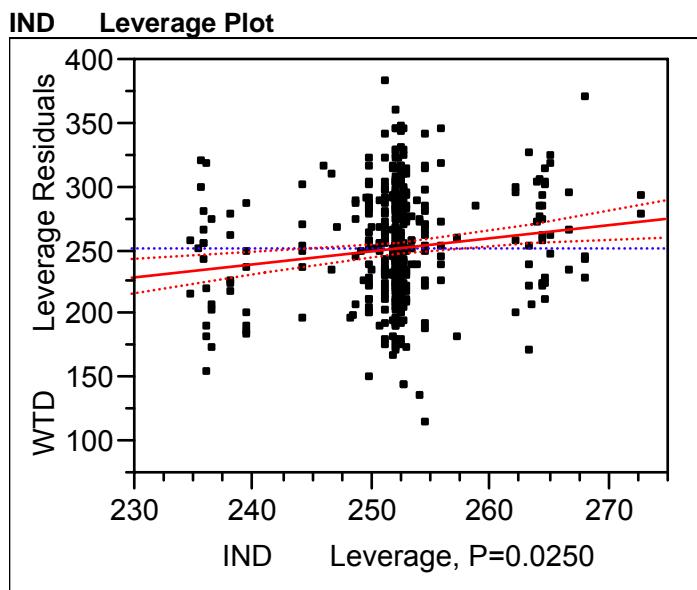
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
873	256.57846	13.169038	252.641
873-1	259.32337	11.171967	250.996
873-2	230.73073	11.155482	258.263

LSMeans Differences Tukey HSD

Alpha=0.050   Q=2.35318
LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	873	873-1	873-2
873	0 0 0 0	-2.7449 10.3421 -27.082 21.592	25.8477 14.818 -9.0217 60.7171
873-1	2.74491 10.3421 -21.592 27.0818	0 0 0 0	28.5926 10.5299 3.81382 53.3715
873-2	-25.848 14.818 -60.717 9.02167	-28.593 10.5299 -53.371 -3.8138	0 0 0 0

| Level			Least Sq Mean
873-1	A		259.32337
873	A	B	256.57846
873-2		B	230.73073

Levels not connected by same letter are significantly different
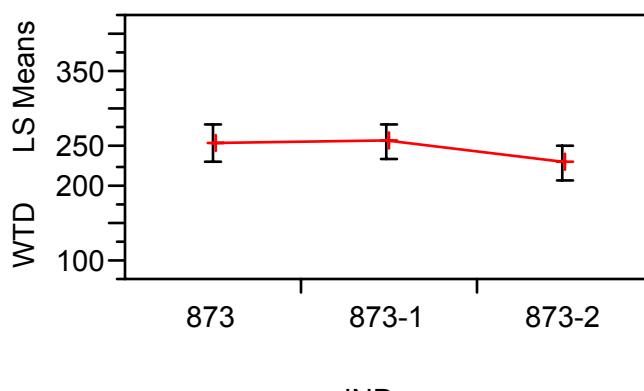
LS Means Plot

LINER Leverage Plot
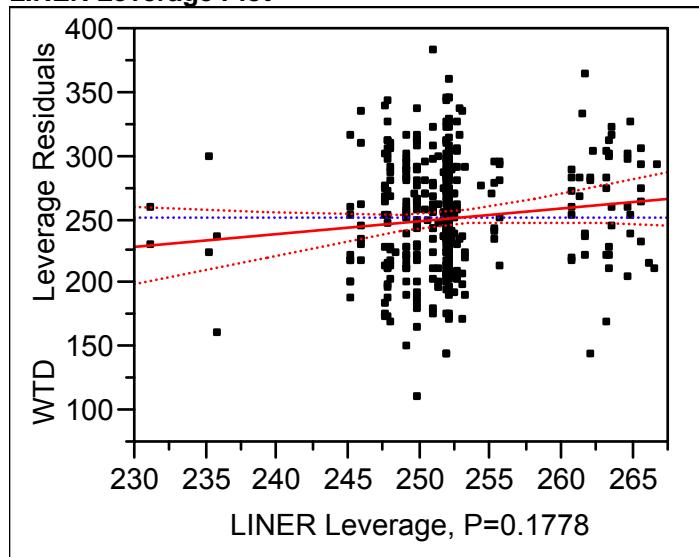
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
5H5657NEW	235.06464	21.557923	238.237
5H5657OLD	266.03016	20.292649	278.986
Y3590	239.39552	6.148975	248.083
Y3995	255.01976	8.331454	266.473

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LSMeans Differences Tukey HSD

Alpha=0.050   Q=2.58078

LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	5H5657NEW	5H5657OLD	Y3590	Y3995
5H5657NEW	0	-30.966	-4.3309	-19.955
	0	25.5996	22.3436	20.7162
	0	-97.032	-61.995	-73.419
	0	35.1014	53.3329	33.5087
5H5657OLD	30.9655	0	26.6346	11.0104
	25.5996	0	20.9989	19.0789
	-35.101	0	-27.559	-38.228
	97.0325	0	80.8281	60.2488
Y3590	4.33088	-26.635	0	-15.624
	22.3436	20.9989	0	8.34614
	-53.333	-80.828	0	-37.164
	61.9947	27.5588	0	5.9153
Y3995	19.9551	-11.01	15.6242	0
	20.7162	19.0789	8.34614	0
	-33.509	-60.249	-5.9153	0
	73.419	38.228	37.1638	0

| Level		Least Sq Mean
5H5657OLD	A	266.03016
Y3995	A	255.01976
Y3590	A	239.39552
5H5657NEW	A	235.06464

Levels not connected by same letter are significantly different

LS Means Plot

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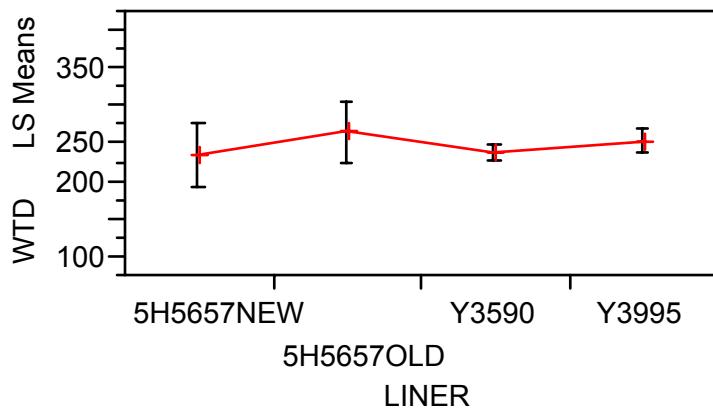
Appendix 3: Analysis of WTD with 432 test results

Response WTD
Actual by Predicted Plot

WTD   Predicted P<.0001 RSq=0.27
RMSE=47.297
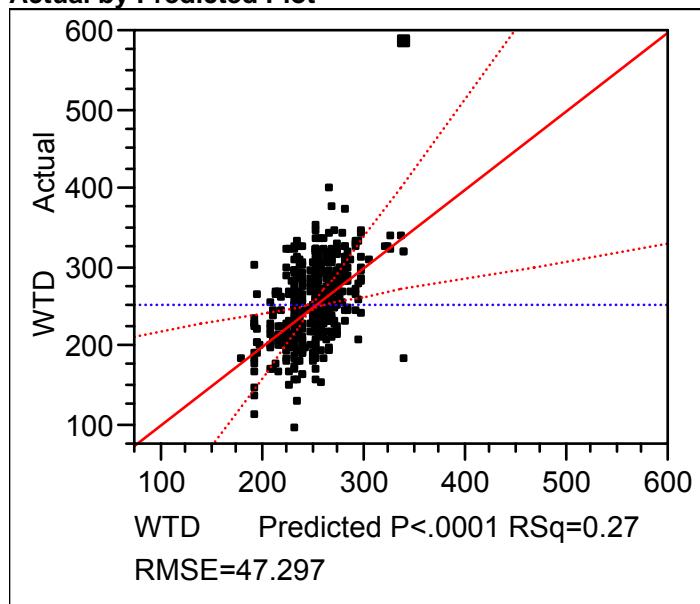
Summary of Fit

RSquare	0.267234
RSquare Adj	0.148727
Root Mean Square Error	47.29735
Mean of Response	252.9678
Observations (or Sum Wgts)	432

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	60	302673.3	5044.55	2.2550
Error	371	829941.6	2237.04	Prob > F
C. Total	431	1132614.9		<.0001

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	45	94426.70	2098.37	0.9301
Pure Error	326	735514.95	2256.18	Prob > F
Total Error	371	829941.65		0.6033
				Max RSq
				0.3506

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	255.55833	9.947059	25.69	<.0001
LTMSLAB [A]	11.745202	9.857417	1.19	0.2342
LTMSLAB [B]	22.228426	9.514835	2.34	0.0200
LTMSLAB [C]	3.0641603	14.25577	0.21	0.8299
LTMSLAB [D]	-36.24558	10.42942	-3.48	0.0006
LTMSLAB [F]	43.455019	22.45827	1.93	0.0538
LTMSLAB [G]	-0.769324	7.722157	-0.10	0.9207
LTMSLAB [I]	-26.60935	9.635197	-2.76	0.0060
LTMSLAB [K]	13.007494	16.16256	0.80	0.4215
LTMSLAB [A]:LTMSAPP [1]	-7.195214	13.37545	-0.54	0.5909
LTMSLAB [A]:LTMSAPP [10]	-8.012583	36.91676	-0.22	0.8283
LTMSLAB [A]:LTMSAPP [2]	-6.202954	14.02928	-0.44	0.6586
LTMSLAB [A]:LTMSAPP [3]	3.0332931	13.82136	0.22	0.8264
LTMSLAB [A]:LTMSAPP [4]	-38.17882	44.61713	-0.86	0.3927
LTMSLAB [A]:LTMSAPP [5]	-8.597034	15.09909	-0.57	0.5694
LTMSLAB [A]:LTMSAPP [6]	-28.18012	18.77269	-1.50	0.1342
LTMSLAB [A]:LTMSAPP [6A]	46.490605	21.05928	2.21	0.0279
LTMSLAB [A]:LTMSAPP [7]	48.32118	44.61713	1.08	0.2795
LTMSLAB [A]:LTMSAPP [8]	-36.76367	43.88956	-0.84	0.4028

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Term	Estimate	Std Error	t Ratio	Prob>|t|
LTMSLAB [B]:LTMSAPP [1]	26.276341	26.24436	1.00	0.3174
LTMSLAB [B]:LTMSAPP [2]	-11.18992	20.65472	-0.54	0.5883
LTMSLAB [B]:LTMSAPP [3]	-3.954467	31.01878	-0.13	0.8986
LTMSLAB [B]:LTMSAPP [4]	-42.51356	25.71369	-1.65	0.0991
LTMSLAB [B]:LTMSAPP [5]	-13.96689	20.71726	-0.67	0.5006
LTMSLAB [B]:LTMSAPP [6]	6.6531092	42.67482	0.16	0.8762
LTMSLAB [B]:LTMSAPP [7]	0.0386487	12.90881	0.00	0.9976
LTMSLAB [B]:LTMSAPP [8]	-3.267379	14.30829	-0.23	0.8195
LTMSLAB [C]:LTMSAPP [1]	1.5406059	24.27016	0.06	0.9494
LTMSLAB [C]:LTMSAPP [2]	37.552222	28.25037	1.33	0.1846
LTMSLAB [C]:LTMSAPP [3]	-52.1902	27.81807	-1.88	0.0614
LTMSLAB [D]:LTMSAPP [1]	-20.21038	9.624117	-2.10	0.0364
LTMSLAB [F]:LTMSAPP [1]	32.311363	24.91137	1.30	0.1954
LTMSLAB [G]:LTMSAPP [1]	13.777828	15.46093	0.89	0.3734
LTMSLAB [G]:LTMSAPP [10]	-21.78247	26.65669	-0.82	0.4144
LTMSLAB [G]:LTMSAPP [10A]	6.7895626	10.89776	0.62	0.5337
LTMSLAB [G]:LTMSAPP [11]	27.470859	13.29772	2.07	0.0395
LTMSLAB [G]:LTMSAPP [12]	-13.92561	12.69373	-1.10	0.2733
LTMSLAB [G]:LTMSAPP [13]	-24.54914	17.13439	-1.43	0.1528
LTMSLAB [G]:LTMSAPP [13A]	6.7289767	12.84844	0.52	0.6008
LTMSLAB [G]:LTMSAPP [14]	88.350859	45.22116	1.95	0.0515
LTMSLAB [G]:LTMSAPP [1A]	33.656768	17.23792	1.95	0.0516
LTMSLAB [G]:LTMSAPP [2]	-51.15672	23.45132	-2.18	0.0298
LTMSLAB [G]:LTMSAPP [3]	17.585706	33.38726	0.53	0.5987
LTMSLAB [G]:LTMSAPP [4]	16.343282	32.40918	0.50	0.6144
LTMSLAB [G]:LTMSAPP [5]	19.943282	32.40918	0.62	0.5387
LTMSLAB [G]:LTMSAPP [6]	26.835706	45.99445	0.58	0.5599
LTMSLAB [G]:LTMSAPP [7]	-68.84914	45.22116	-1.52	0.1287
LTMSLAB [G]:LTMSAPP [8]	-38.74914	21.06429	-1.84	0.0666
LTMSLAB [G]:LTMSAPP [8A]	-6.44232	12.1506	-0.53	0.5963
LTMSLAB [G]:LTMSAPP [9]	-22.36914	21.06429	-1.06	0.2890
LTMSLAB [I]:LTMSAPP [1]	13.547856	14.61754	0.93	0.3546
LTMSLAB [I]:LTMSAPP [2]	-10.81344	16.51872	-0.65	0.5131
LTMSLAB [I]:LTMSAPP [3]	9.8030072	16.46305	0.60	0.5519
LTMSLAB [I]:LTMSAPP [3A]	-7.47578	23.01317	-0.32	0.7455
LTMSLAB [K]:LTMSAPP [1]	14.76899	17.28551	0.85	0.3934
LTMSLAB [N]:LTMSAPP [2]	25.842424	29.46143	0.88	0.3810
IND [873]	7.9793587	8.094825	0.99	0.3249
IND [873-1]	10.764206	5.11031	2.11	0.0358
LINER[5H5657NEW]	-23.29739	16.14406	-1.44	0.1498
LINER[5H5657OLD]	40.818705	14.55415	2.80	0.0053
LINER[Y3590]	-16.30407	10.29449	-1.58	0.1141

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LTMSLAB	8	8	77616.24	4.3370	<.0001
LTMSAPP [LTMSLAB]	47	47	142908.66	1.3592	0.0653
IND	2	2	16328.43	3.6496	0.0269
LINER	3	3	21826.04	3.2522	0.0219

Residual by Predicted Plot
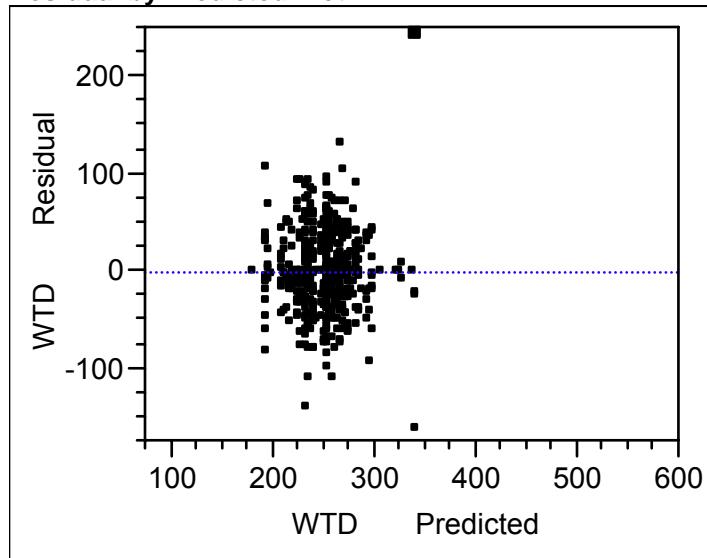
LTMSLAB Leverage Plot
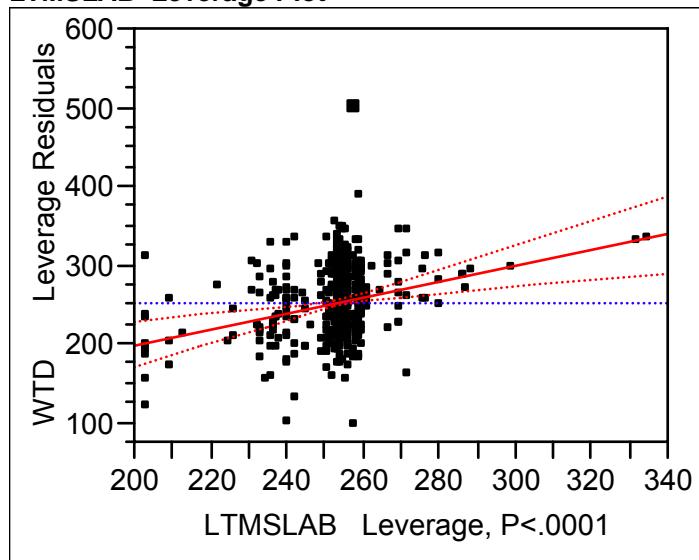
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
A	267.30354	11.108039	260.021
B	277.78676	11.896011	278.225
C	258.62249	17.300185	255.325
D	219.31275	12.796966	222.994
F	299.01335	26.183174	264.913
G	254.78901	10.754108	249.596
I	228.94898	12.807696	225.194
K	268.56583	19.484548	258.637
N	225.68229	30.366694	210.600

LSMeans Differences Tukey HSD

Alpha=0.050   Q=3.12021

LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	A	B	C	D	F	G	I	K	N
A	0	-10.483	8.68104	47.9908	-31.71	12.5145	38.3546	-1.2623	41.6212
	0	12.6487	17.7867	13.3011	26.5236	11.2091	13.0355	19.715	30.6266
	0	-49.95	-46.817	6.48849	-114.47	-22.46	-2.319	-62.777	-53.94
	0	28.9834	64.1794	89.4931	51.0494	47.4891	79.0281	60.2527	137.183
B	10.4832	0	19.1643	58.474	-21.227	22.9977	48.8378	9.22093	52.1045
	12.6487	0	17.6105	12.9972	26.4146	10.7538	12.5563	19.4451	30.5138
	-28.983	0	-35.784	17.9199	-103.65	-10.556	9.65945	-51.452	-43.105
	49.9498	0	74.1127	99.0281	61.1925	56.5518	88.0161	69.8937	147.314
C	-8.681	-19.164	0	39.3097	-40.391	3.83348	29.6735	-9.9433	32.9402
	17.7867	17.6105	0	18.4568	28.5253	16.3431	17.6259	22.8354	32.4573
	-64.179	-74.113	0	-18.279	-129.4	-47.161	-25.323	-81.194	-68.333
	46.8173	35.7841	0	96.8988	48.6141	54.8275	84.6699	61.3078	134.214
D	-47.991	-58.474	-39.31	0	-79.701	-35.476	-9.6362	-49.253	-6.3695
	13.3011	12.9972	18.4568	0	27.0056	11.5713	13.2166	19.9732	30.9862
	-89.493	-99.028	-96.899	0	-163.96	-71.581	-50.875	-111.57	-103.05
	-6.4885	-17.92	18.2793	0	4.56267	0.62867	31.6023	13.0675	90.3141
F	31.7098	21.2266	40.3909	79.7006	0	44.2243	70.0644	30.4475	73.3311
	26.5236	26.4146	28.5253	27.0056	0	25.5815	26.4244	30.1378	37.9301
	-51.049	-61.192	-48.614	-4.5627	0	-35.595	-12.385	-63.589	-45.019
	114.469	103.646	129.396	163.964	0	124.044	152.514	124.484	191.681
G	-12.515	-22.998	-3.8335	35.4763	-44.224	0	25.84	-13.777	29.1067
	11.2091	10.7538	16.3431	11.5713	25.5815	0	10.8768	18.3772	29.8071
	-47.489	-56.552	-54.828	-0.6287	-124.04	0	-8.0978	-71.118	-63.898
	22.4601	10.5563	47.1605	71.5812	35.5953	0	59.7779	43.564	122.111
I	-38.355	-48.838	-29.674	9.63623	-70.064	-25.84	0	-39.617	3.26669
	13.0355	12.5563	17.6259	13.2166	26.4244	10.8768	0	19.4647	30.5233
	-79.028	-88.016	-84.67	-31.602	-152.51	-59.778	0	-100.35	-91.972
	2.319	-9.6594	25.3229	50.8748	12.3853	8.09784	0	21.1171	98.5057
K	1.26229	-9.2209	9.94333	49.2531	-30.448	13.7768	39.6168	0	42.8835
	19.715	19.4451	22.8354	19.9732	30.1378	18.3772	19.4647	0	33.8156
	-60.253	-69.894	-61.308	-13.067	-124.48	-43.564	-21.117	0	-62.628
	62.7772	51.4519	81.1946	111.574	63.5887	71.1176	100.351	0	148.395
N	-41.621	-52.104	-32.94	6.36954	-73.331	-29.107	-3.2667	-42.884	0
	30.6266	30.5138	32.4573	30.9862	37.9301	29.8071	30.5233	33.8156	0
	-137.18	-147.31	-134.21	-90.314	-191.68	-122.11	-98.506	-148.4	0
	53.9403	43.1052	68.3334	103.053	45.0188	63.8978	91.9724	62.6284	0

Level				Least Sq Mean
F	A	B	C	299.01335
B	A			277.78676
K	A	B	C	268.56583
A	A	B		267.30354
C	A	B	C	258.62249
G	A	B	C	254.78901
I		B	C	228.94898
N	A	B	C	225.68229
D			C	219.31275

Levels not connected by same letter are significantly different
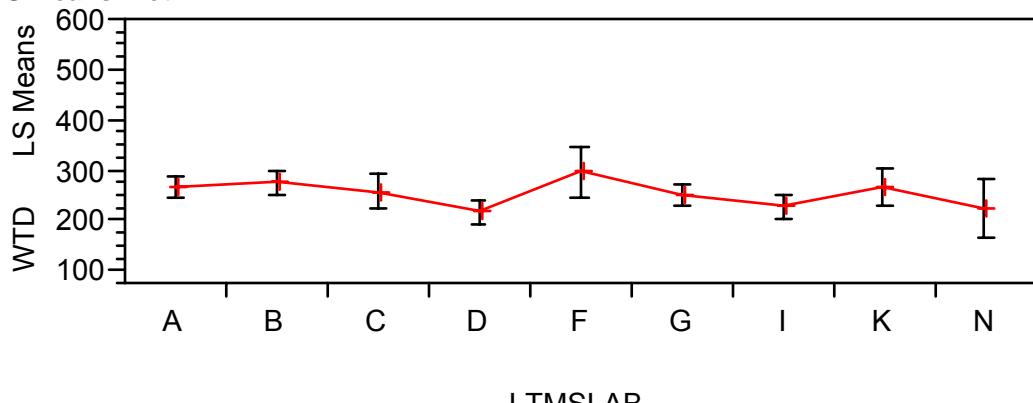
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LS Means Plot

LTMSAPP [LTMSLAB] Leverage Plot

LTMSAPP [LTMSLAB] Leverage,
P=0.0653

IND Leverage Plot
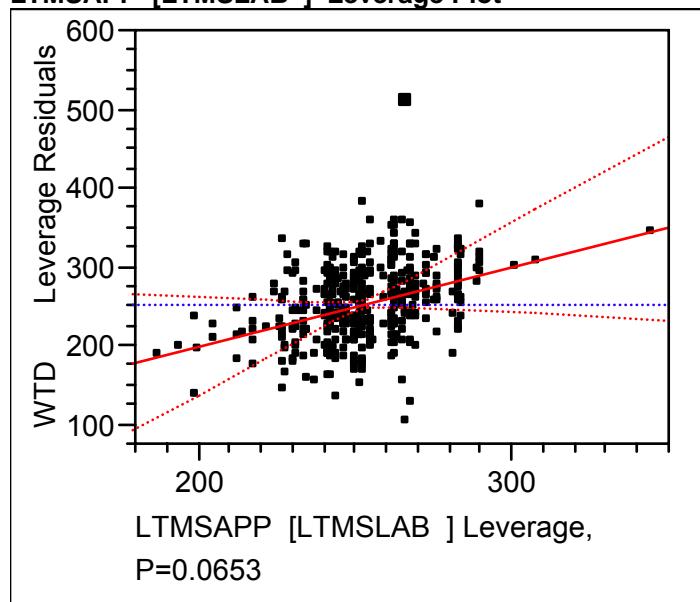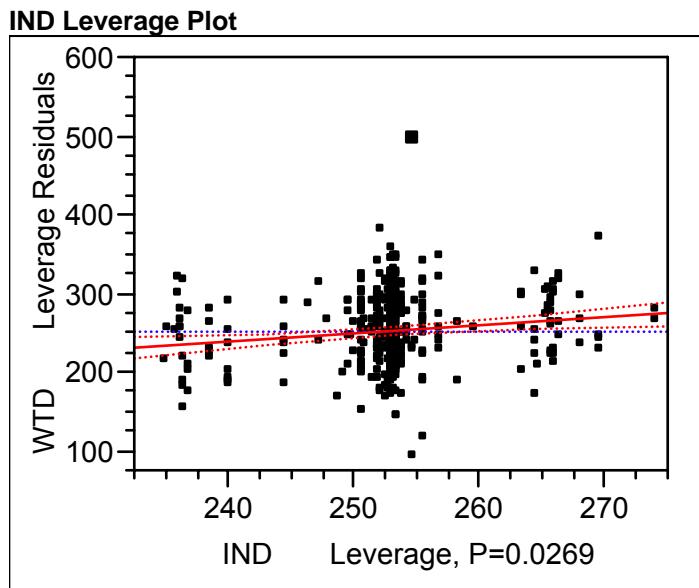
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
873	263.53769	13.677382	252.641
873-1	266.32254	11.583462	250.996
873-2	236.81477	11.582934	263.353

LSMeans Differences Tukey HSD

Alpha=0.050   Q=2.35316

LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	873	873-1	873-2
873	0	-2.7848	26.7229
	0	10.7863	15.4536
	0	-28.167	-9.6419
	0	22.5971	63.0877
873-1	2.78485	0	29.5078
	10.7863	0	10.9809
	-22.597	0	3.66788
	28.1668	0	55.3477
873-2	-26.723	-29.508	0
	15.4536	10.9809	0
	-63.088	-55.348	0
	9.64185	-3.6679	0

Level			Least Sq Mean
873-1	A		266.32254
873	A	B	263.53769
873-2		B	236.81477

Levels not connected by same letter are significantly different
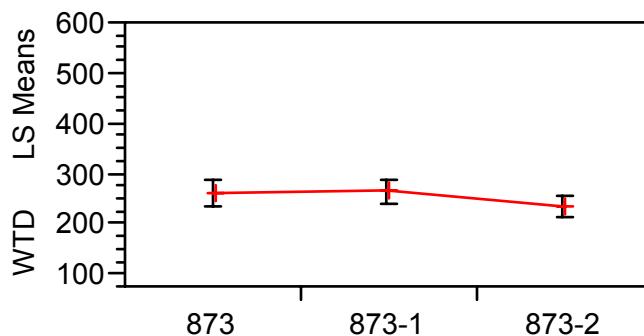
LSMEANS plot

LINER Leverage Plot
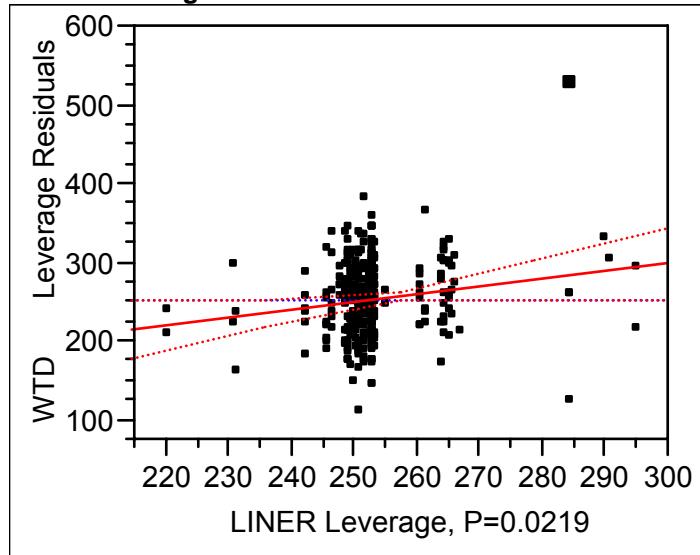
Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
5H5657NEW	232.26095	22.478184	238.237
5H5657OLD	296.37704	20.446760	317.112
Y3590	239.25426	6.413028	248.083
Y3995	254.34109	8.688437	266.473

LSMeans Differences Tukey HSD
Alpha=0.050   Q=2.58075
LSMean[i] By LSMean[j]

Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	5H5657NEW	5H5657OLD	Y3590	Y3995
5H5657NEW	0 0 0 0	-64.116 26.0234 -131.28 3.04378	-6.9933 23.2983 -67.12 53.1337	-22.08 21.6026 -77.831 33.6706
5H5657OLD	64.1161 26.0234 -3.0438 131.276	0 0 0 0	57.1228 21.2017 2.40655 111.839	42.0359 19.0982 -7.2515 91.3234
Y3590	6.99331 23.2983 -53.134 67.1203	-57.123 21.2017 -111.84 -2.4066	0 0 0 0	-15.087 8.70408 -37.55 7.37618
Y3995	22.0801 21.6026 -33.671 77.8309	-42.036 19.0982 -91.323 7.25154	15.0868 8.70408 -7.3762 37.5498	0 0 0 0

Level			Least Sq Mean
5H5657OLD	A		296.37704
Y3995	A	B	254.34109
Y3590		B	239.25426
5H5657NEW	A	B	232.26095

Levels not connected by same letter are significantly different

LS Means Plot

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