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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

Issued: August 05, 2010
Reissued: August 17, 2010

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These are unapproved minutes of the 08.05.2010 Sequence VI Surveillance Panel conference call.

The meeting was called to order at 1:00 PM by Chairman Charlie Leverett.

Agenda

1.) **Roll Call**, any proxies or membership changes? Jason Bowden will vote for OHT.
Quorum was achieved with 9 members. Others joined the call in progress.
Attendance is included as Attachment 1.

2.) **Approval of minutes** from May 13th meeting and June 22nd conference call.
Accepted unanimous.

3.) **Action Items**:

3.1 Form a task force to develop a recommendation to the surveillance panel for adopting LTMS 2nd Edition to the Sequence VID. Task force to report to surveillance panel within six weeks of May 13th meeting. ***Open, we will discuss later in the old business.***

3.2 Refine the procedure for the system time response measurement, add MAP, and repeat at the laboratories, comments in 5/13/10 minutes:

* There was discussion on load cell power supplies and temperature variations.
* Data for the labs was supplied.
* That data is not meaningful.

I'd like a small Task Force to better define the procedure and then have all labs repeat the study using the procedure from the task force. I assume all Labs and TMC will participate in this task force?

George Szappanos will chair a Task Force for this data.

3.3 Laboratories to provide their dyno excitation power supply temperature coefficient specification for each VID test stand. George Szappanos and Rich Grundza to work on the dyno excitation power supply issue and report to the surveillance panel. This survey is Attachment 2.

Load Cell Power Supply Study.ppt

Rich Grundza: Survey of labs and their drift specifications. Rich came up with a drift range, and determined % error. There is minimal % error based on data. Worst case was 14 °C, and should not cause test error. Recommend no further action on this issue, other than to continue to monitor.

George Szappanos: Background was to ensure power supplies were appropriate for conditions. Might want a specification on sensitivity, but 15 ppm appears sufficient.

MOTION: Load cell power supply should not exceed 15 ppm variation.
George Szappanos, Dave Glaenzer second. Approved unanimous.

Dave Glaenzer: Issue came from load cell excitation was added to report. Will this parameter continued to be monitored?

MOTION: Remove requirement to record load cell excitation voltage and delta % from report on forms 16, 17 and 18.
Dave Glaenzer, George Szappanos, second. Approved unanimous.

Dave Glaenzer: Load cell temperature power supply should remain and is still important to record.

3.4 Dave Glaenzer will supply information on the software package to monitor the GM 3.6L engine sensors. **Completed**

3.5 George Szappanos will supply information on wiring in the "check engine" light. **Completed**

3.6 OHT to report VID engine usage and expected depletion date at all surveillance panel meetings. **On-Going**

3.6 Sid Clark to inquire with GM if information they may release GM's opinions on oil consumption and if this may be shared with the surveillance panel. Last information I received was that the engine had not been sent to GM, yet. Any update?
Engine is at GM for analysis.

3.7 Correct sourcing information for the load cell in appendix of the VID test procedure.
Rich will confirm this is in the latest Information Letter.

4.) **New Business**:

4.1 Introduction of new reference oil, what are our options?
There was discussion on how to implement the new reference oil for the VID test.
Charlie Leverett: For IIIG each lab will donate a test and will get one test extension. This must be run in a calibrated stand. SA's would apply from previous test. Will labs run those tests?
Rich Grundza: Oil will be available mid-September.
AFTON: Yes, want a range of engine ages.
LZ: Yes
SwRI: Yes
EM: Yes
IAR: Yes

4.2 Review of BL-3 verification data
Rich Grundza: There seemed to be some lab differences in fuel consumed. However that range already exists on current data. One engine was at 1300, one at 4000. Fuel used goes down with age. BL3 is slightly less fuel efficient. The presentation is Attachment 3.
Charlie Leveritt: BL3 must be introduced with calibration run and that stand/engine must continue to be used in that stand.
MOTION: Approve BL3 for use. It must be run with calibration and that stand/engine would continue to run BL3.
Rich Grundza, Charlie Leverett, second 11 yes, one waive

4.3 Limits for the VID to license GF-4 oils, request from PCEOCP:

*API will continue to license GF-4 until **September 30, 2011** and there are currently no plans to obsolete API SM / Energy Conserving so we are still very much interested in Sequence VID equivalent limits for these specifications.*

Charlie Leverett: He notifed Pass Car Panel and API that VIB would be available until 2015. This will stay in old business.
Mike McMillan: Do these groups know VIB is available.
Charlie Leverett: Yes.

One independent lab reported they could run this test for some time, I have asked it they could run through Sept. 30, 2011, if they can we do not have an issue and I will make the PCEOCP aware of the outcome.

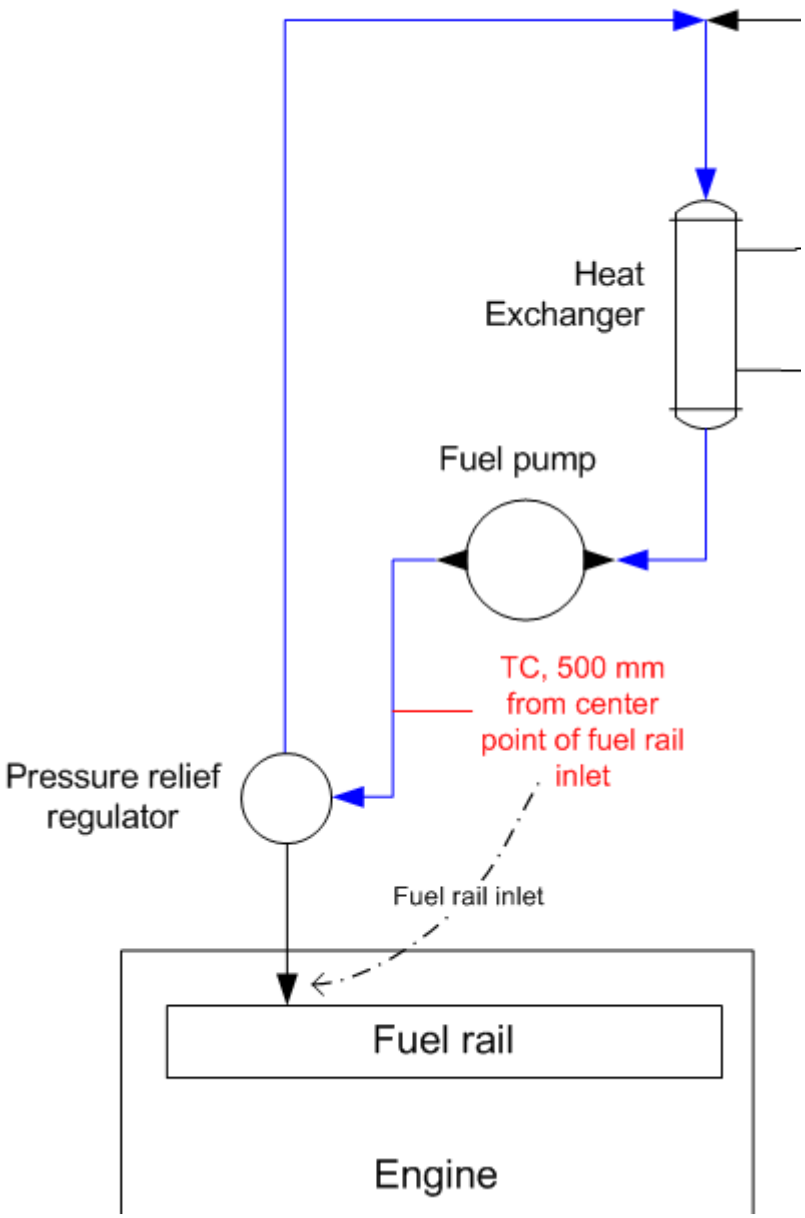
4.4 One item I'd like to add to the Agenda is regarding the TC used to measure the fuel rail temperature. I would like to see the specification changed to "less than 550 mm". Lubrizol happens to have our TC located a bit closer and the discrepancy was recently discovered during a TMC lab visit. There's no practical value to fixing the thermocouple to an absolute location, and certainly not farther from the inlet. What's important is that the temp stays constant so as to provide stable fuel consumption measurement.

Reference:

6.9.5.7 *Fuel to Engine Fuel Rail*—Insert the thermocouple into the center of a tee or cross fitting and locate it from the center point of the fuel rail inlet (500 ± 50 mm).

George Szappanos: One stand does not meet fuel rail specification above. Recommend no greater than 550 mm.

MOTION: Thermocouple location not to exceed 550 mm.
George Szappanos, Dave Glaenzer, second Approved unanimous.



5.) Old Business:

Lubrizol engine failure:

We recently pulled a VID engine from service at 3700 hrs due to what was later determined to be failed rod bearings. It's a bit puzzling, and I thought I'd share the details with you in case there have been similar failures.

- Noticed both Oberg oil filters had significant amount of aluminum debris after last test
- BL fuel consumption shifted up by about 1% for all phases (BLB1 and 2, and BLA); the implication is the issue occurred BETWEEN the last test and previous test
- No discernable change in oil pressure
- ALL (6) rod bearings were damaged with a groove worn in the center

- Main bearings and cam bearings were perfect; crankshaft not damaged; oil pump was fine as well
- We cannot determine any operational anomaly that would be responsible for it (no shutdowns or faults out of the ordinary)
- The engine is 5C, which is a hand built version

George Szappanos: There was rod bearing damage on one engine. This appears to be oil starvation, but engine did not run low on oil.
Mark Mosher: They experienced valve spring failure on one intake valve.
Bruce Matthews: SwRI spring failure was inclusion, which is rare but does happen.
Rich Grundza: Ultrasonic or X-Ray would be the only thing that might find this.
Jason Bowden: Which engine failed, and does GM need the engine or just the spring?
Bruce Matthews: Only the spring should be returned.
Mark Mosher: There were 2800 hours on the engine.
Dave Glaenzer: Engine 13C retired at 3600 hours and noise inside front cover. Pin on oil plunger broke. He will take pictures and send parts to GM.
Jason Bowden: Are there service issues with springs on this engine?
Bruce Matthews: No.

5.1 LTMS V2 - Who would like to participate in this task force and what is a more reasonable date to report to the SP, I would suggest no later than November 2010?

Members to date:
Jim Rutherford
Martin Chadwick

This group is waiting for IIIG to review the document. Art Andrews, Rich Grundza, Bruce Matthews, Todd Dvorak, Janet Buckingham, and Ron Romano will be on Task Force.
Chris Castanien: How will Diesel and Gasoline reviews be coordinated?
Jim Rutherford: Diesel has completed review and moving to a template. Those changes have been shared. Part 2 would apply to the VID as an engine based system.

6.) Next Meeting

At the call of the Chairman

7.) Adjournment

Meeting adjourned at 2:00 PM.

Load Cell Power Supply Study

Sequence VI Surveillance Panel

7/20/2010

Study Methodology

- Survey Labs to determine drift spec
- Determine Load Cell power supply high and low temperatures
- Determine highest deviation between high and low by lab.
- Determine the percent error attributable to load cell temperature differences.

% error attributable to Load Cell Power Supply Delta

	Reported accuracy (per °C)	Converted to ppm at labs' excitation voltage	Max temp delta	% error
Lab A	1 µV	0.2 ppm	13.7°C	0.0003%
Lab B	5 ppm	5 ppm	10°C	0.005%
Lab D	15 ppm	15 ppm	7.3°C	0.011%
Lab F	0.066 mV	6.6 ppm	4.3°C	0.003%
Lab G	5 ppm	5 ppm	12°C	0.006%

Conclusions

- Though the potential for error can be large, laboratories which have large temperature deviations (10-14 ºC) have chosen equipment which minimizes % error
- Laboratories with higher/larger drift specs have lower temperature variations
- Overall, error attributable to load cell temperature fluctuations is small.

I would like to acknowledge George Szappanos for his help in methodology and other assistance in conducting this study.

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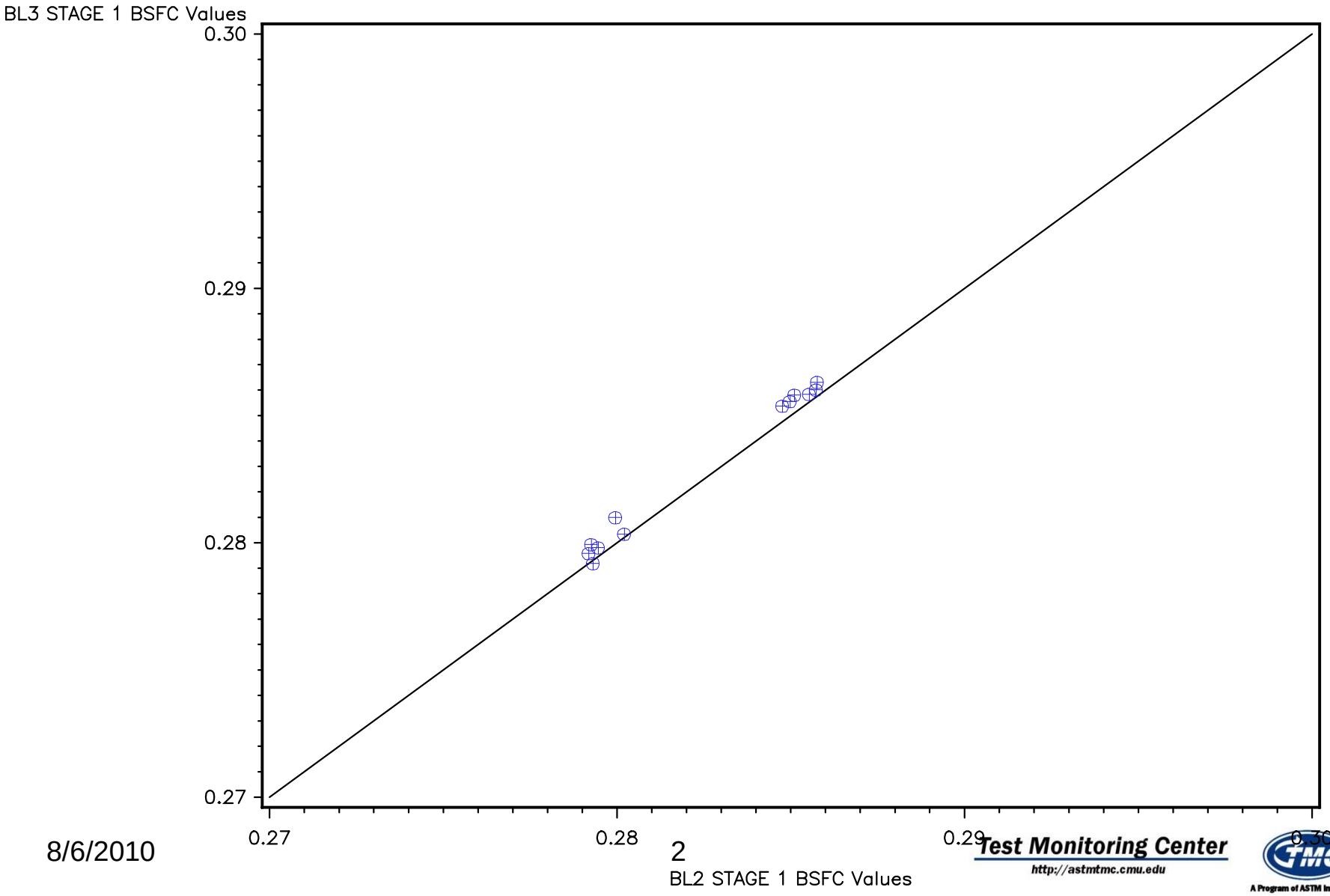
BL-3 Approval Results

SEQUENCE VID BL3 VERIFICATION

Comparison of measured BSFC Values
Reference Line = 1:1 Relationship



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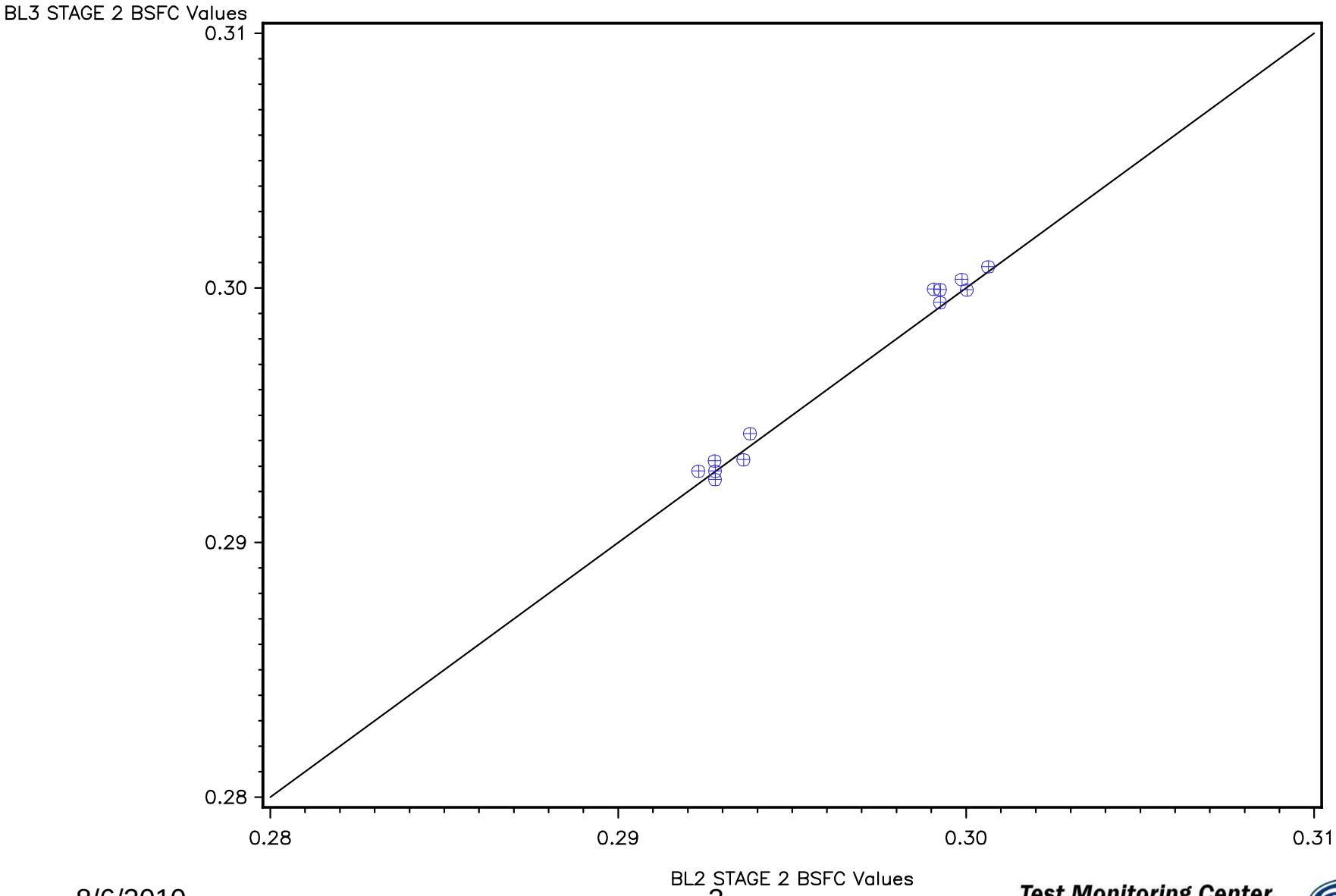

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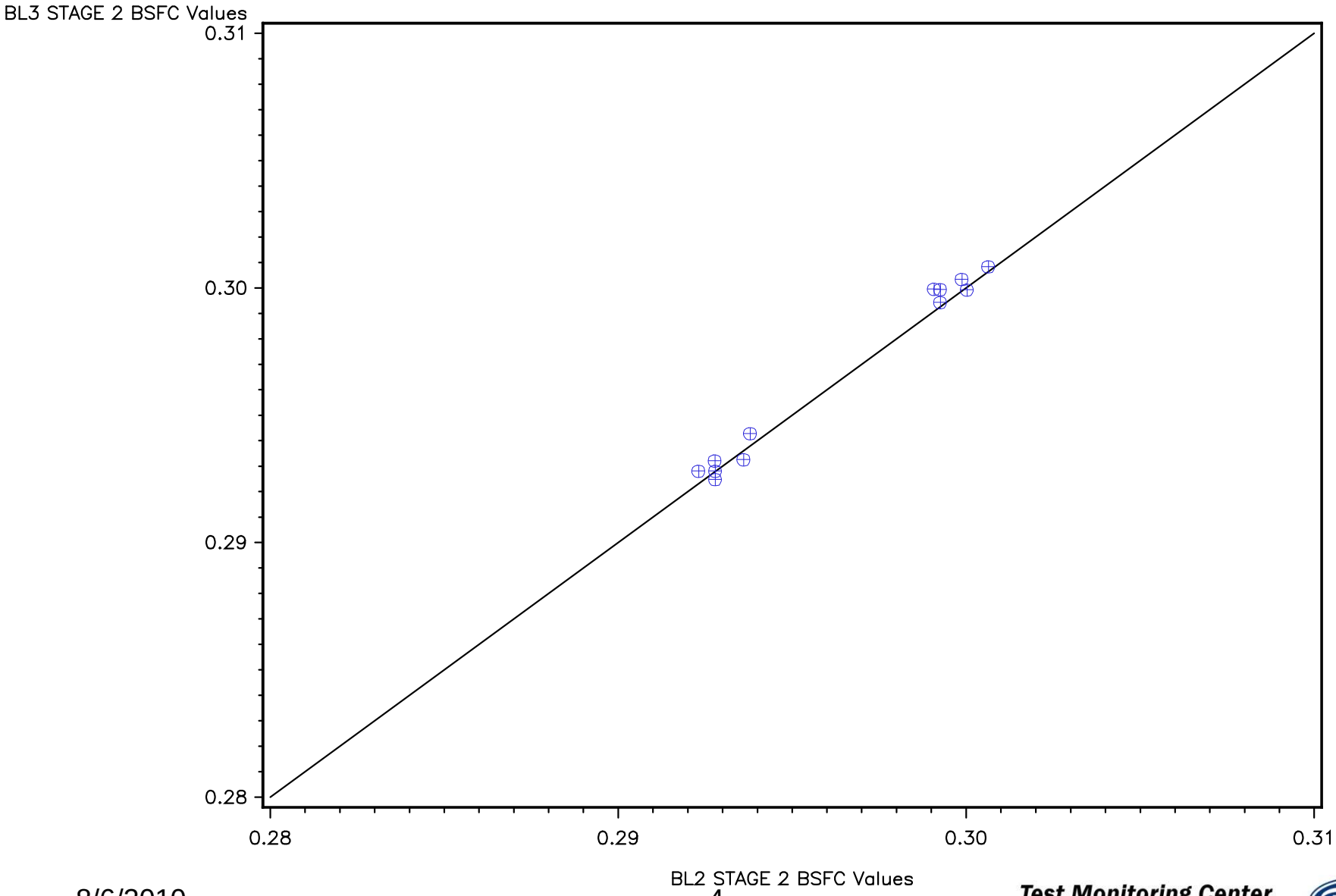

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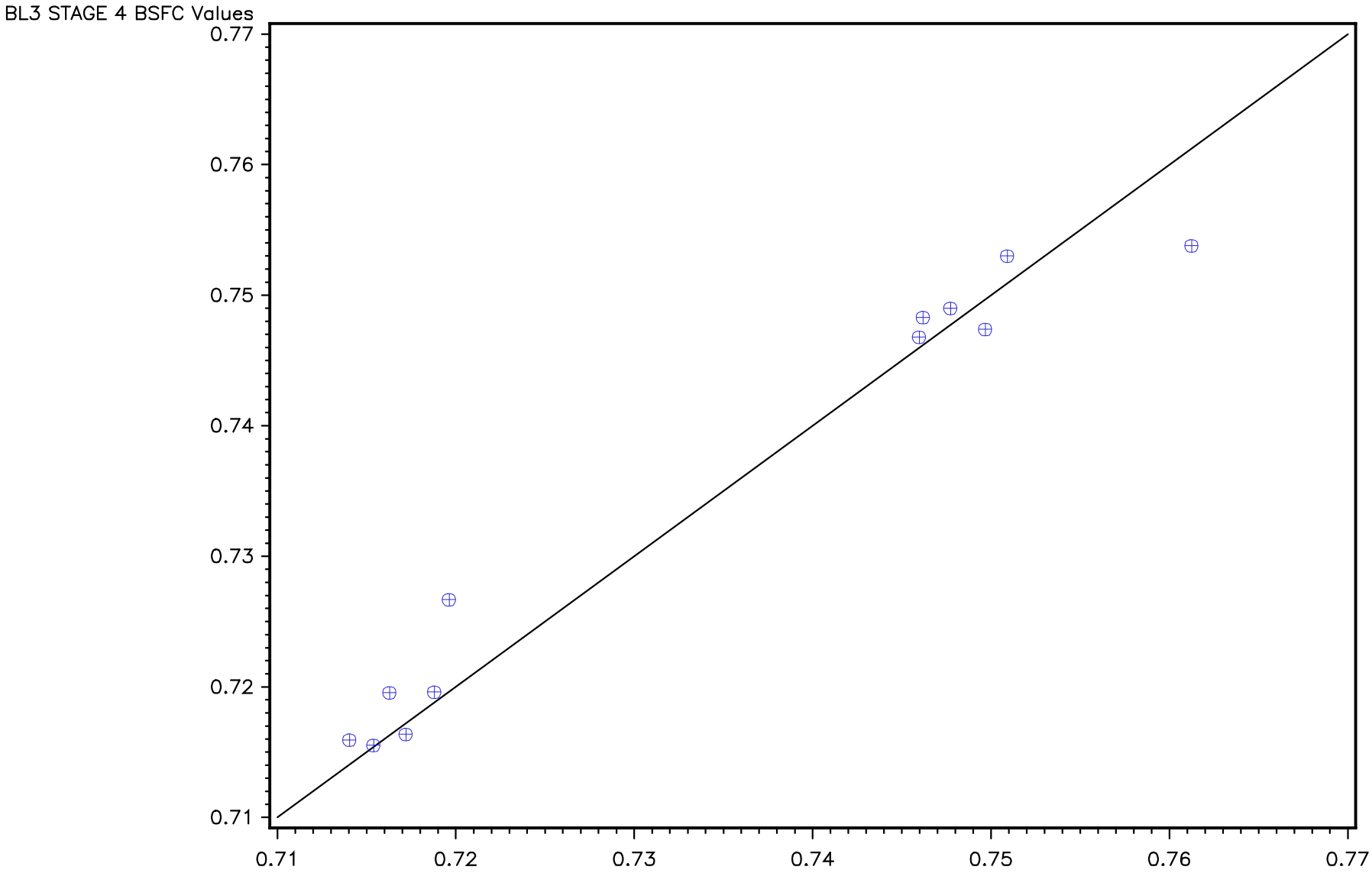

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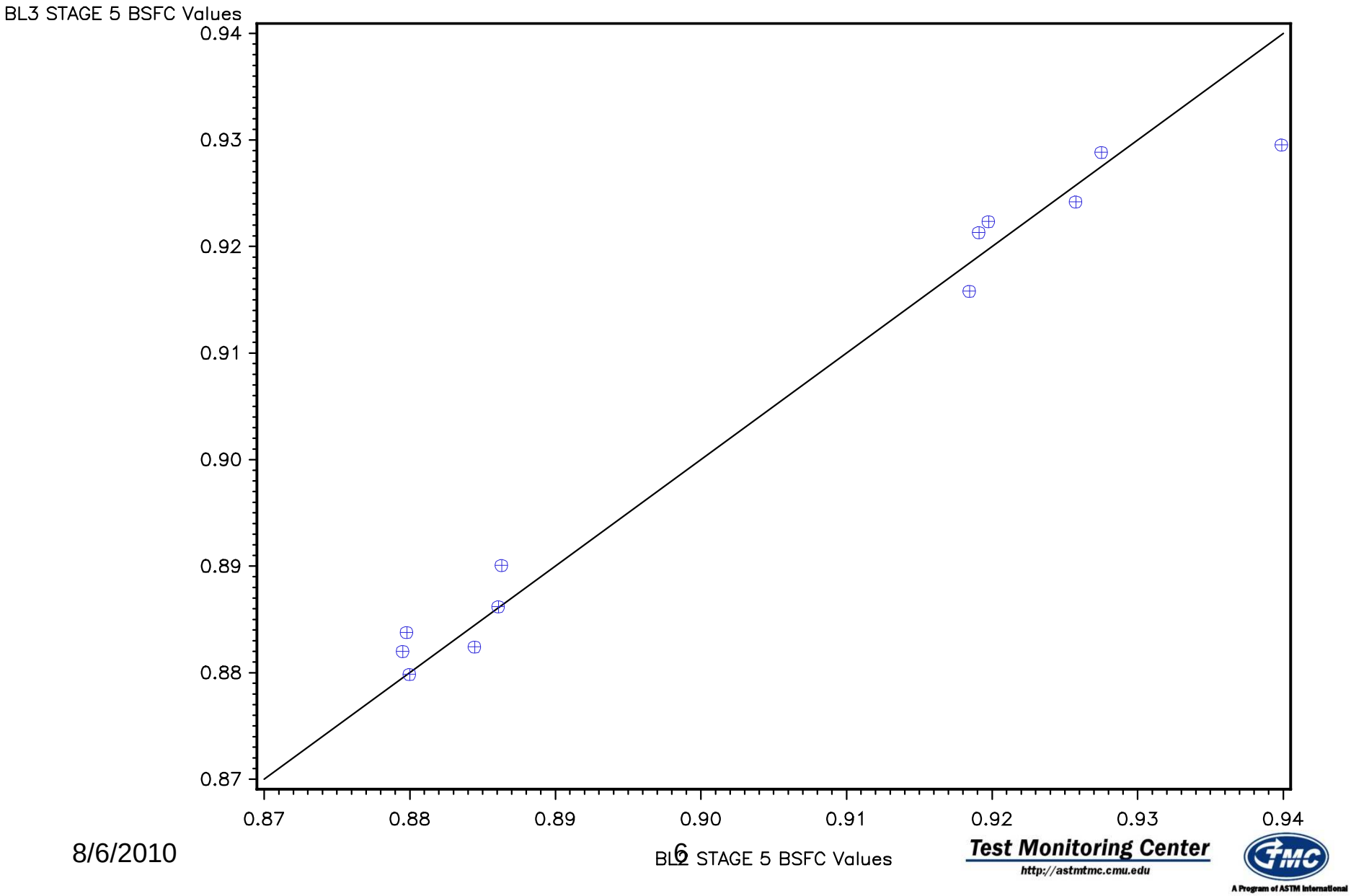

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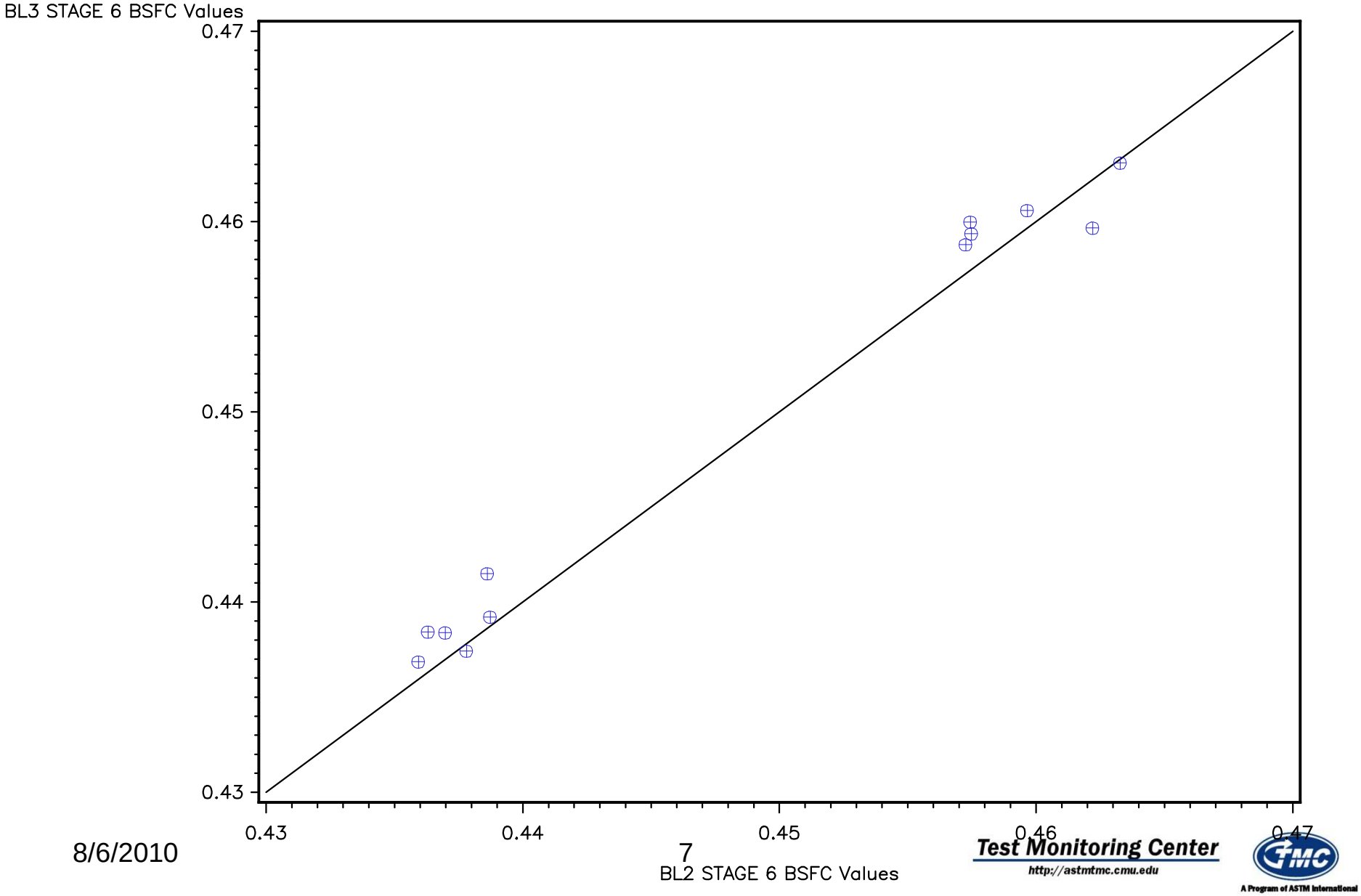

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Summary of Results

SEQUENCE VID BL3 VERIFICATION DATA

	STAGE 1 BSFC DATA				STAGE 2 BSFC DATA				STAGE 3 BSFC DATA		
Lab	BL2	BL3	BL2-BL3	Lab	BL2	BL3	BL2-BL3	Lab	BL2	BL3	BL2-BL3
G	0.28575	0.28630	-0.00055	G	0.30063	0.30083	-0.00020	G	0.28377	0.28470	-0.00093
G	0.28510	0.28580	-0.00070	G	0.29987	0.30033	-0.00046	G	0.28395	0.28463	-0.00068
G	0.28475	0.28537	-0.00062	G	0.29907	0.29995	-0.00088	G	0.28357	0.28422	-0.00065
G	0.28497	0.28555	-0.00058	G	0.29925	0.29942	-0.00017	G	0.28355	0.28380	-0.00025
G	0.28572	0.28600	-0.00028	G	0.30002	0.29992	0.00010	G	0.28415	0.28477	-0.00062
G	0.28552	0.28583	-0.00031	G	0.29925	0.29993	-0.00068	G	0.28427	0.28415	0.00012
A	0.27995	0.28098	-0.00103	A	0.29379	0.29428	-0.00049	A	0.28142	0.28207	-0.00065
A	0.28020	0.28033	-0.00013	A	0.29360	0.29325	0.00035	A	0.28165	0.28150	0.00015
A	0.27945	0.27980	-0.00035	A	0.29278	0.29280	-0.00002	A	0.28102	0.28160	-0.00058
A	0.27918	0.27957	-0.00039	A	0.29230	0.29280	-0.00050	A	0.28067	0.28168	-0.00101
A	0.27930	0.27918	0.00012	A	0.29278	0.29247	0.00031	A	0.28102	0.28130	-0.00028
A	0.27925	0.27992	-0.00067	A	0.29277	0.29320	-0.00043	A	0.28113	0.28165	-0.00052
	Average		-0.00046		Average		-0.00026		Average		-0.00049
	Std. Dev		0.00030		Std. Dev		0.00039		Std. Dev		0.00036

Summary of Results

	SEQUENCE VID BL3 VERIFICATION DATA										
	STAGE 4 BSFC DATA				STAGE 5 BSFC DATA				STAGE 6 BSFC DATA		
Lab	BL2	BL3	BL2-BL3	Lab	BL2	BL3	BL2-BL3	Lab	BL2	BL3	BL2-BL3
G	0.76123	0.75377	0.00746	G	0.93987	0.92953	0.01034	G	0.46327	0.46307	0.00020
G	0.75090	0.75298	-0.00208	G	0.92750	0.92883	-0.00133	G	0.46220	0.45965	0.00255
G	0.74967	0.74737	0.00230	G	0.92573	0.92417	0.00156	G	0.45743	0.45997	-0.00254
G	0.74618	0.74828	-0.00210	G	0.91843	0.91580	0.00263	G	0.45725	0.45877	-0.00152
G	0.74772	0.74898	-0.00126	G	0.91908	0.92130	-0.00222	G	0.45965	0.46057	-0.00092
G	0.74597	0.74678	-0.00081	G	0.91975	0.92233	-0.00258	G	0.45747	0.45935	-0.00188
A	0.71961	0.72666	-0.00705	A	0.88629	0.89006	-0.00377	A	0.43861	0.44148	-0.00287
A	0.71878	0.71958	-0.00080	A	0.88445	0.88240	0.00205	A	0.43872	0.43920	-0.00048
A	0.71627	0.71953	-0.00326	A	0.88607	0.88618	-0.00011	A	0.43630	0.43842	-0.00212
A	0.71718	0.71635	0.00083	A	0.87950	0.88198	-0.00248	A	0.43697	0.43838	-0.00141
A	0.71538	0.7155	-0.00012	A	0.87997	0.87983	0.00014	A	0.43780	0.43742	0.00038
A	0.71403	0.71592	-0.00189	A	0.87978	0.88377	-0.00399	A	0.43593	0.43685	-0.00092
	Average		-0.00073		Average		0.00002		Average		-0.00096
	Std. Dev		0.00345		Std. Dev		0.00393		Std. Dev		0.00149

TMC Analysis

- TMC estimated the average difference between BL-2 and BL-3 (BL-2 minus BL-3) as -0.0116 for Total fuel consumed, while weighted fuel consumed showed a difference of -0.0028.
- This analysis did show significant order effects, further investigation indicated that the order effects are primarily present in stages 1, 2, 3 & 6.

TMC Analysis (cont.)

- BC-2 versus BC-3 (BC-2 minus BC-3) -0.0003
- BC-2 versus BC-4 (BC-2 minus BC-4) +0.0003
- BC-2 versus BC-5 (BC-2 minus BC-5) -0.0005
- BC-2 versus BC-6 (BC-2 minus BC-6) -0.0004
- BL-2 versus BL-3 (BL-2 minus BL-3) -0.0028

Blend less fuel efficient than BL-2.

Average difference between BL-2 and BL-3, in terms of total fuel consumed is -0.0116 kg or 11.6 grams of fuel

In terms of Weighted fuel consumed, -0.0028

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