From: Zaiontz, Mike [mike.zaiontz@perkinelmer.com]
Sent: Tuesday, June 05, 2001 3:46 PM
To: bob_campbell@ethyl.com; charlie_passut@ethyl.com; cstephens@ashland.com; deburne@ppco.com; gomezriv@pdvsa.com; hahn_al_c@cat.com; jaru@chevron.com; Jim Gutzwiller; JMcCord@swri.edu; Jon Carlson; mawc@chevron.com; Mike Griggs (LZ); nycz_david_s@cat.com; Pat Fetterman; prs@lubrizol.com; rbuck@testeng.com; rhrumford@haltermann-usa.com; sdp@tmc.astm.cmri.cmu.edu; steven.kennedy@exxonmobil.com; tharpde@cat.com; Thomas W. Hitchner; Wim vanDam; Stacy Bond
Subject: Cat Conference Call 06/05/01 Summary

Caterpillar SP Conference Call Summary
June 5, 2001

The motion format is For/Against/Waive.

Motions:
1. Based upon the review of the reference oil data, the performance of the
"new" liner (1Y3995) is equivalent to the "old" liner (1Y3950).
Motion passed 7/0/0

2. Cat 1MPC non-calibration tests started on January 1, 2002, or later,
shall use the 1Y3995 cylinder liner.
Motion passed 7/0/0

3. Cat 1MPC calibration tests started on June 5, 2001, or later, shall use
the 1Y3995 cylinder liner.
Motion passed 6/0/1

Action Item:
1. To address the severity trend since February 1998, the SP will consider
implementing an industry correction or revised SA calculations. The TMC was
requested to review the calibration data, separating TGF and WTD, to
determine if the trend is lab influenced or industry. The SP will discuss
the issue after the TMC has concluded the study and has distributed the
analysis.

Mike Griggs,
Please compile and mail the minutes from this meeting.
Include the data from Scott as an attachment.
I'll send you my notes.

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A Caterpillar Surveillance Panel teleconference was held 6-05-01 at 1:00pm
CST to discuss the results of the 1M-PC 1Y3995 liner acceptance testing.
The
following panel members participated in the teleconference: Jim McCord
(SWRI), Bob Campbell (Ethyl), Jim Gutzwiller (Infinium), Mike Zaiontz
(PE),
Steve Knight (TEI), Scott Parke (TMC), Roger Riviere (Cat), Al Hahn
(Cat),
Mike Griggs (Lubrizol). The attached pdf document is Scott Parke's
analysis
of the liner acceptance test results.
Scott analysis concluded that the 1Y3995 liners were equivalent to the
old
liners. The panel unanimously agreed on TMC's conclusion and passed the
following motion:

Based upon the review of the reference oil data, the
performance of the "new" liner (1Y3995) is equivalent to the "old" liner
(1Y3950). Motion passed 7/0/0

The panel further agreed that the definition of equivalency included the
provision to allow a lab to reference on a either liner and run
candidates
on
old or new liners within the same stand.

Scott Parke reviewed some of the history regarding 1M-PC severity. TGF
was
identified as trending severe in 1997. At that time the Surveillance
panel
agreed to let severity adjustments handle lab severity. Bob Campbell
suggested that an industry correction factor should be applied. He
commented
that severity adjustments often take excessive time to correct for
severity.
Scott commented that an industry correction factor cannot be applied to
correct severity when the reason for the severity is unknown. After
lengthy
discussion regarding correction factors, the following action item was
identified:

To address the severity trend since February 1998, the
SP
will consider implementing an industry correction or revised SA
calculations. The TMC was requested to review the calibration data,
separating TGF and WTD, to determine if the trend is lab influenced or

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industry. The SP will discuss the issue after the TMC has concluded the study and has distributed the analysis.

Al Hahn expressed a desire to put a time limit on the continued use of 1Y3950 liners. This was in keeping with the "first in-first out" parts usage
philosophy. The panel agreed on the following motions:

Cat 1MPC non-calibration tests started on January 1, 2002, or later, shall
use the 1Y3995 cylinder liner. Motion passed 7/0/0

    Cat 1MPC calibration tests started on June 5, 2001, or later, shall
use the 1Y3995 cylinder liner. Motion passed 6/0/1

Scott Parke advised the panel that he will be issuing calibration "extension" (labs may gain or lose time in their reference periods) letters
to each lab. A
copy of the letter is to be attached to each candidate run test report.

Scott mentioned that 3 of 11 tests were not accepted for calibration. Two
were severe on TGF and the remaining test was severe on WTD. Labs are to

Apply the most current severity adjustment based on test completion date/time.

 <<1m_new_liner_summary.pdf>>
I will follow up this e-mail with hard copy minutes in ASTM format.

Mike Griggs
Secretary, SCOTE Surveillance Panel

recipient, please notify the sender immediately and permanently
delete the original message from your e-mail system.

Analysis of 1Y3995 Liner Data

All of the 1M-PC 1Y3995 liner runs are now completed and the data has been reported to TMC. The data from all runs is available on the TMC web site (presently, the 1Y3995 liner runs are distinguished from the other runs by a validity code of "PC"). Following is a report of the analysis of this data.

The question to be answered by these runs was, Are the 1Y3995 liners different from the 1Y3590 liners? Applying General Linear Model (GLM) analysis tools to all operationally valid 1M-PC data indicates no difference in TGF by liner (see callout 1 on attachment 1). The mean of WTD results for the 328 old liners is 247.8 versus 276.7 for the 11 new (callout 2). The standard deviations for the two liner groups are nearly equal at 48.5 and 48.2, respectively, and comparable to the LTMS test target standard deviation of 50.5. Strictly speaking, difference between the WTD means is not statistically significant either, however the p-value is uncomfortably close to the 0.05 limit thus warranting the additional investigation.

Can factors other than liner be playing a role in the WTD difference? The WTD industry control chart has been indicating a severe trend since February of 1998 (see attachment 2). This could cause *any* random group of 11 *current* tests to appear different from historic data. I removed all data before February, 1998, from the dataset and repeated the analysis. In other words, the question above was narrowed to, Are the 1Y3995 liners different form the *recent* data produced on 1Y3590 liners? For the 98 old-liner runs completed after February, 1998, the mean of WTD results is 273.7; the standard deviation is 44.1. These numbers *do not* differ significantly from the 11 new-liner runs (callout 3 on attachment 1).

Because only labs A, B, D, and G are represented in the new-liner data, it would be possible for old-liner data from other labs to obscure a new-liner/old-liner difference. To eliminate this possibility, I removed all labs but A, B, D, and G from the data and repeated the analysis. The two rightmost columns of attachment 1 show the analysis results under these conditions. These results are not substantially different from those obtained using all labs (i.e. no WTD or TGF difference when consideration is restricted to recent test history).

To thoroughly understand potentially confounding lab influence, I also investigated lab differences. Using *all* data, both TGF and WTD show lab differences (p=0.0001 and p=0.0011, respectively). When restricted to recent data, the WTD difference disappears. The TGF difference, however remains. Further paring down of the data to recent data from labs A, B, D, and G still shows a lab difference but the greater variability of lab D's data causes this test to fail Levene's test for equal variance. After correcting this fault by removing lab D there is still a lab difference on TGF. This is basically the same conclusion reached by the analysis presented to the Surveillance Panel February 9 and 19, 1998 during the investigation into TGF severity.

To summarize, then: the data thus far reported on 1Y3995 liners shows no significant difference from the data reported on 1Y3590 liners since February, 1998.

Summary of GLM analysis for 1Y3995 liner

③
②
①

	All labs — All data			All labs — Recent data			A,B,D,&G — All data			A,B,D,&G — Recent data		
WTD vs Liner	p = 0.0512			p = 0.8348			p = 0.0690			p = 0.8863		
	n	x	Std	n	x	Std	n	x	Std	n	x	Std
New	11	276.7	48.5	11	276.7	48.5	11	276.7	48.5	11	276.7	48.5
Old	328	247.8	48.2	98	273.7	44.1	256	249.2	48.8	91	274.6	45.0
TGF vs Liner	p = 0.2691			p = 0.3548			p = 0.4417			p = 0.4403		
	n	x	Std	n	x	Std	n	x	Std	n	x	Std
New	11	53.6	19.1	11	53.6	19.1	11	53.6	19.1	11	53.6	19.1
Old	328	47.5	17.9	98	48.1	18.7	256	49.4	17.6	91	49.1	18.3
WTD vs Lab	p = 0.0011			p = 0.7183			p = 0.0056			p = 0.5149		
	n	x	Std	n	x	Std	n	x	Std	n	x	Std
A	67	253.0	44.6	30	273.8	48.7	67	252.97	44.59	30	273.8	48.7
B	43	263.5	48.0	14	283.7	50.8	43	263.46	47.96	14	283.7	50.8
C	12	255.3	37.9	1	263.8	.						
D	26	221.3	56.6	10	256.4	37.4	26	221.26	56.56	10	256.4	37.4
F	15	264.9	35.5	6	262.0	32.3						
G	131	250.5	48.2	48	276.8	42.8	131	250.51	48.19	48	276.8	42.8
I	33	225.2	48.0									
K	9	262.6	38.8									
N	3	210.6	41.9									
TGF vs Lab	p = 0.0001			p = 0.0166			p = 0.0001			p = 0.0422*		
	n	x	Std	n	x	Std	n	x	Std	n	x	Std
A	67	46.2	16.4	30	45.5	17.5	67	46.17	16.40	30	45.5	17.5
B	43	54.6	15.8	14	58.9	13.3	43	54.58	15.81	14	58.9	13.3
C	12	40.7	19.3	1	58.0	.						
D	26	38.0	19.9	10	40.5	24.8	26	37.96	19.89	10	40.5	24.8
F	15	39.3	18.6	6	31.2	20.5						
G	131	52.1	17.2	48	51.3	17.6	131	52.06	17.22	48	51.3	17.6
I	33	39.1	16.0									
K	9	47.8	20.3									
N	3	47.0	14.1									
TGF vs Lab (D removed)				p = 0.0126						p = 0.0499		
				n	x	Std				n	x	Std
A				30	45.5	17.5				30	45.5	17.5
B				14	58.9	13.3				14	58.9	13.3
C				1	58.0	.						
F				6	31.2	20.5						
G				48	51.3	17.6				48	51.3	17.6

*Failed Levene's test for equal variance

CATERPILLAR 1M–PC INDUSTRY OPERATIONALLY VALID DATA

Weighted Total Demerits

LTMS Severity Analysis

LTMS Precision Analysis

CUSUM Severity Analysis

TMC 04JUN01:10:18