100 Barr Harbor Drive ■ PO Box C700 ■ West Conshohocken, PA 19428-2959
Telephone: 610-832-9500 ■ Fax: 610-832-9555 ■ e-mail: service@astm.org ■ Website: www.astm.org

Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

Chairman: W. JAMES BOVER, ExxonMobil Biomedical Sciences Inc, 1545 Route 22 East, PO Box 971, Annandale, NJ 08801-0971, (908) 730-1048, FAX: 908-730-1197, EMail: wjbover@erenj.com
First Vice Chairman: KENNETH O. HENDERSON, Cannon Instrument Co, PO Box 16, State College, PA 16804, (814) 353-8000, Ext: 0265, FAX: 814-353-8007, EMail: kenohenderson@worldnet.att.net
Second Vice Chairman: SALVATORE J. RAND, 221 Flamingo Drive, Fort Myers, FL 33908, (941) 481-4729, FAX: 941-481-4729
Secretary: MICHAEL A. COLLIER, Petroleum Analyzer Co LP, PO Box 206, Wilmington, IL 60481, (815) 458-0216, FAX: 815-458-0217, EMail: macvarlen@aol.com
Assistant Secretary: JANET L. LANE, ExxonMobil Research and Engineering, 600 Billingsport Rd, PO Box 480, Paulsboro, NJ 08066-0480, (856) 224-3302, FAX: 856-224-3616, EMail: janet_l_lane@email.mobil.com
Staff Manager: DAVID R. BRADLEY, (610) 832-9681, EMail: dbradley@astm.org

June 3, 2002

Reply to: Michael T. Kasimirsky
ASTM Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206
Phone: 412-365-1033
Fax: 412-365-1047
Email: mtk@astmtmc.cmu.edu

Unapproved Minutes of the May 15, 2002
Sequence VG Surveillance Panel Meeting
Held in Detroit, Michigan

Chairman Farnsworth called the meeting to order at 9:00am. The chairman took a moment to thank Southwest Research Institute, OH Technologies, PerkinElmer Automotive Research, and Test Engineering for sponsoring the meeting room and lunches for the week. The agenda was reviewed. *{The Agenda is shown in Attachment 1.}*

Motion & Action Item Recorder – Ben Weber is the Motion & Action Item recorder for this meeting.

Approval of 11/14/01 Meeting Minutes – The minutes for the 11/14/01 meeting were approved unanimously and without comment.

Membership Changes – Tim Caudille is replacing Carl Stephens as the Ashland member. Jim Carter is replacing Gil Clark as the Haltermann Products member. *{A Membership list, which was circulated at the meeting, is shown in Attachment 2.}*

Action Items Review – The action items from the last meeting were reviewed. All six action items from the last meeting have been completed. *{The Action Items from last meeting are shown in Attachment 3.}*

TMC Report – Rich Grundza presented the TMC report. He noted that the address for the TMC web page has changed and the new address is:
http://www.astmtmc.cmu.edu/.
His report can be found on the TMC website at:
http://www.astmtmc.cmu.edu/docs/gas/sequencev/semiannualreports/VG-04-2002.pdf
His report was accepted unanimously and without comment. *{Copies of his presentation materials are shown in Attachment 4.}*

Introduction of GF-3 Category Reference Oil, reference oil 1009 – The panel then discussed the introduction of reference oil 1009. The supplier had two Sequence VG results on this oil, which the panel reviewed. Dave Glaenzer proposed that the laboratories conduct a donated test immediately following the last test of a reference period. The panel then discussed several other options to bring this oil into the system.

Motion (Gordon Farnsworth/Bill Buscher) Conduct a donated test on reference oil 1009 and then extend the calibration period of the stand in question by 15 days and one run to compensate for the donated test. The motion was withdrawn after some discussion.

Motion (Bill Buscher/Dwight Bowden) All five calibrated laboratories shall conduct a reference oil test on reference oil 1009 beginning on July 1, 2002 or thereabouts. These five tests will be used to generate test targets and then these targets will be used to evaluate the calibration status of these five runs. The motion passed 11-0-0.

RSI Report – Rick Oliver presented the RSI report for the period. There were 84 candidate oil starts for the period. There were seven lost tests for the period. His report can be found at the RSI website. His report was accepted unanimously and without comment. *{A copy of his report is shown in Attachment 5.}*

Fuel Supplier Report – Jim Carter presented the Fuel Supplier report. He presented the latest analytical results on the current batch of fuel. There was some discussion of the latest specifications and the fuel supplier will review the data and update it, if necessary, for the minutes. The current inventory of fuel at Haltermann products is 485,752 gallons or a 31-month supply. The current usage rate is approximately 15,790 gallons/month. *{The Fuel Supplier report, with the fuel specifications presented at the meeting, is shown in Attachment 6. At the time of publication of these minutes, the Fuel Supplier has provided no changes or updated materials to the Secretary.}*

Test Developer Report – Barry Jecewski presented the Test Developer Report. *{A copy of his report is included as Attachment 7.}* He noted that Ford Motor Co. had built 2000 units of MY2000 4.6L-2V Romeo engines. As of 6/1/01, Ford had received orders for 10% of those engines. Due to lack of industry demand, Ford Power Products has sold 1500 of those 2000 engines. The remaining engines must be sold to the participating labs ASAP. Ford can no longer be responsible for all the overhead costs of maintaining that inventory. The panel must work to improve the process for acquiring test engines for future Sequence tests. Ford Motor Co. can no longer solely bear the financial responsibility for test engine support. Lastly, Ford will continue to support the design verification process related to engine testing for transition to the MY2000 Romeo engines. In addition to the eight engines previously donated, Ford will donate eight more engines for matrix testing.

The discussion then moved on to future engine procurement methods. Chairman Farnsworth noted that it would be beneficial to the industry if the engines could be built without the accessories that

the industry has no use for. A Task Force was formed to investigate other options on this issue and Mr. Jecewski agreed to act as the Chairman of this Task Force. Chairman Farnsworth asked that the purchasers of these engines be involved in this Task Force activity and that it begin it's work ASAP to address this situation. He also asked one or both of the CPD's in the Sequence VG test to be involved in this activity. Chairman Farnsworth asked that the membership email him and Mr. Jecewski when they return from this meeting if they would like to join this Task Force activity.

Mr. Jecewski then moved on to discuss the proposed ILSAC GF-4 standard for engine wear limits in the Sequence VG test. Currently cylinders 1 and 8 are measured using a radial bore method as a rate & report parameter. This type of measurement does not take into account engine core shift or bore shift, causing positive numbers to be reported for bore wear, i.e. the engine bores got smaller. In order to get a more precise measurement, Ford is requesting that the current measurement procedure be discontinued and be replaced with a bore wear profile of the top ring travel. This method will allow OEM's to quantify bore wear vs. oil type and allow for an informed decision on the relevance of wear limits in the future. He handed out a copy of an inspection report from a machine that Ford uses for this measurement. *{The inspection report is shown in Attachment 8.}* There was some discussion on how to validate the usefulness of this measurement. Mr. Jecewski offered to have Ford measure the engines and then ship them back to the laboratories. Daryl Baumgartner noted that this is an excellent activity for the O&H Subpanel to take on and fully develop. Dan Worcester, the O&H Subpanel Chairman, agreed to assist in coordinating this activity as well. Chairman Farnsworth noted that he did not want to see this added to the test procedure unless it was going to be a permanent, useful part of the test. The test laboratories agreed that shipping engines to Ford for this measurement was not an issue. The test labs agreed to send all future reference oil test engines to Ford for this measurement investigation.

Motion (Barry Jecewski/John Moffa) Eliminate the current bore wear measurement procedure from the Sequence VG test procedure. This change is effective on 5/15/02. The motion passed 11-0-0.

The panel also asked Mr. Jecewski to review the pin wear and ring wear measurement requirements currently listed in the Sequence VG test for the November 2002 meeting. At that time, these requirements will be dropped unless Ford has data justifying the usefulness of this data.

O&H Subpanel Report – Dan Worcester presented the O&H Subpanel report. *{A copy of the report is included in Attachment 9.}* He reviewed the industry supply of AER engines and the projected life of the current engines. He then discussed the status of the Romeo engine matrix tests. The hardware modifications on the Romeo engines, compared to current AER engines, were discussed. The data from the Romeo engine matrix was then reviewed. Dan Worcester then proposed several alternate solutions to bring the Romeo hardware into line with the AER hardware in regards to test severity. Bill Buscher also added his comments on SR's experiences with these Romeo matrix runs. Several other panel members' added comments on past experiences with the Sequence V test and the effect of Mr. Worcester's proposed alternate solutions on Romeo engine results.

Mr. Worcester then proposed a plan for an industry matrix to continue this investigation. In his plan, Ford would donate the test hardware. The labs would donate two engine tests and also procure the necessary parts (gaskets, etc.) and tools for the engine builds. The industry would conduct an Engine Build Workshop prior to the matrix start. The tests would then be run to an extended test length with 24-hour (or more frequent) top end inspections. Finally, regular conference calls would be conducted to keep everyone advised on the progress of the matrix. Daryl Baumgartner suggested that an O&H Subpanel meeting be held prior to conducting this activity as a "brainstorming" activity. Mr. Worcester commented that an O&H Subpanel meeting would take place in conjunction with the Engine Build Workshop to address his concerns. There was some discussion as to the time frame in which to complete this activity and the general consensus was for this activity to be completed in the

next six to 12 months. Chairman Farnsworth commented that, barring any objections, this is the direction the panel would follow on this activity since a plan and funding for it is in place. There were no objections by the membership so the panel will go forth with this plan.

Light Duty Rating Task Force – Frank Farber presented the LDRTF report. Scott Parke will be taking over as LDRTF chairman as former Chairman Zack Bishop has moved on to pursue retirement activities full-time. A Light Duty Rating Workshop will be planned for first quarter 2003. *{A copy of his presentation is shown in Attachment 10.}*

Sequence VE Resources Survey as requested by ILSAC/Oil – Chairman Farnsworth presented the results of the survey requested by ILSAC/Oil on the availability of the Sequence VE test. This was conducted in case the IIIG test is not available or acceptable for GF-4 and the Sequence VE test was needed as an alternate. To get an estimate of the number of Sequence VE tests needed, a review of VG data showed 191 reference oil tests and 505 candidate tests (registered) over the last 2.25 years. Rich Grundza conducted a survey of industry and found roughly 600 VE engine builds and 22,500 gallons of Phillips J fuel currently available at this time. In early 2001, there were only two VE stands running near target level performance based upon reference oil data. The last VE calibration test was conducted on February 8, 2001.

Chairman Farnsworth summarized what would be required to resurrect the Sequence VE test. The industry would need to establish a future supply of engine kits, reblend and approve a new fuel batch, conduct a precision/severity matrix to reestablish and demonstrate industry VE testing competence, and also establish minimum "new" stand calibration requirements. The time required for completing this activity was discussed and the consensus of the panel was that this process would take 9-12 months to complete, at minimum. The consensus of the panel was that this plan was technically feasible, with a maximum of 600 tests, but not reasonable to do. The panel agreed to take no actions on this topic at this time, pending resolution of the IIIG issue in GF-4. *{A copy of his presentation is included as Attachment 11.}*

Scope & Objectives – The Sequence VG Surveillance Panel Scope & Objectives were reviewed. The date for establishing a VG fuel reblend confirmation trial timing was set at May 2003. The date for approval testing of the next Sequence VG fuel reblend was set at November 2003. The date for new engine batch equivalency testing was set at November 2002. The date for introduction of reference oil 1009 was set at August 2002. The Cylinder Bore Measurement Task Force activity initiated at this meeting was added as an objective for May 2003. The Rate & Report review activity, also added at this meeting, was set for November 2002. Future Engine Supply was also added as an objective for November 2002. Current Engine Distribution was added as an objective for July 2002.

Old Business – There was no old business.

New Business – Dan Worcester presented three proposed changes to the Sequence VG test.

Motion (Dan Worcester/Bill Buscher) Laboratory may change entire laboratory to lambda meter AFR measurement following one valid, acceptable reference oil test in the lab. This change is effective 5/14/02. The motion passed 9-0-1. *{A copy of this motion is included in Attachment 12.}*

Motion (Dan Worcester/Dwight Bowden) Change 7.10.4.2 to allow the use of either a battery or a 12V power supply to power the EEC and lambda meter. This change is effective 5/14/02. The motion passed 10-0-1. *{A copy of this motion is included in Attachment 13.}*

Mr. Worcester presented a proposal to revise the AEV rating procedures and rate the cam baffle instead of the rocker arm cover as part of AEV ratings. Daryl Baumgartner asked if there was any data on this modification. Rich Grundza presented some data on this modification and his analysis of this change showed very little difference in the AEV results as a result of this change. *{A copy of Mr. Grundza's analysis is included as Attachment 14.}*

Motion (Dan Worcester/Dave Glaenzer) Change the varnish rating sites from the current rocker cover to the rocker cover baffle. The current AEV targets will be maintained. This change is effective 8/1/02. The motion passed 8-0-4. *{A copy of this motion is included in Attachment 15.}*

Bill Buscher then presented his experiences with older jacketed rocker covers and cracking of the welds. These cracks have resulted in two lost tests recently at SR. OH Technologies has worked with Mr. Buscher on this item and has developed a reworking procedure for these materials to prevent this problem in the future. Mr. Buscher presented a photograph of one of these reworked valve covers. *{A copy of this photograph is included as Attachment 16.}*

The next meeting is at the call of the chairman.

The meeting was adjourned at 11:58am.

Attachment	1
Page	1
Reference	

Agenda

Sequence VG Surveillance Panel
May 15, 2002
9:00AM – 12:00PM
Detroit, Michigan

1. Chairman comments	
2. Motion and Action recorders	
3. Approval of minutes for November 14, 2001 meeting	
4. Membership changes	
5. Review action Items from last meeting	G. Farnsworth
6. TMC Reference Oil Report (VG)	R. Grundza
7. Introduction of "GF-3" category oil 1009	All
8. RSI Candidate Status & Precision Report for VG	C. R. Oliver
9. Fuels supply and reblend status (VG) - Status of mini batch reblend	Worcester/Rumford
10. VG Test Developer Report - Status of Romeo (2000 model) hardware Supplies (volume adjustment)	Barry Jecewski
11. VG O&H Report - Status of Romeo engine matrix tests	D. Worcester

Attachment	1
Page	2
Reference	

Agenda - continued
Sequence VG Surveillance Panel
May 15, 2002
9:00AM – Noon
Detroit, Michigan

12. Light Duty Rating Task Force	F. Farber
13. Sequence VE resources survey requested by ILSAC/Oil	Rich Grundza
14. Scope and Objectives	All
15. Old Business	
16. New Business	
Motions on Lambda meters use and power supply Motion on varnish rating sites	Dan Worcester
17. Adjourn	

Sequence VG

Attachment 2
Page 1
Reference

Name	Company	
Gordon Farnsworth	Infineum	Gordon.Farnsworth@Infineum.co
FRANK FARBER	TMC	fmf@astmtmc.cmu.edu
Rich Grundza	TMC	rcg@astmtmc.cmu.edu
Michael Kasimirsky	TMC	mtk@astmtmc.cmu.edu
Barry JecewsKi	Ford	BJECEWSK@Ford.com
Jennifer Van Mullekom	Lubrizol	jwhf@lubrizol.com
RICK OLIVER	SSI	crickoliver@attbi.com
Bill Buscher	SWRI	wbuscher@swri.edu
DAN WORCESTER	PERL	DAN.WORCESTER@PERKINELMER.COM
JERRY BRYS	LUBRIZOL	jabs@lubrizol.com
DARYL BAUMGARTNER	LUBRIZOL	DBAU@Lubrizol.com
DWIGHT BOWDEN	OHT	DHBOWDEN@OHTECH.COM
DAVID GLAENZER	ETHYL	DAVE_GLAENZER@ETHYL.COM
Jason Bowden	OHT	Jhbowden@ohtech.com
Sid Clark	GM	Sidney.L.Clark@GM.com
Beto ARAIZA	T.E.I.	BARAIZA@TEI-NET.COM
Bob Rumford	Haltermann Products	rarumford@dow.com
Timothy CAUDILL	ASHLAND INC.	TLCAUDILL@ASHLAND.COM
JIM CARTER	HALTERMANN PRODUCTS	JECARTER@dow.com
JOHN MOFFA	CASTROL INTERNATIONAL	moffaj@Castrol.com

Attachment	2
Page	2
Reference	

Name	Company	Email
Jo Martinez	Chevron Oronite Co.	Jogm@chevrontexaco.com (Please include me in the email list. Thanks!)
Alfredo Montez	Chevron Oronite	amnn@chevron.com
Frank Fernandez	Chevron Oronite	ffer@chevrontexaco.com
Ben Weber	SwRI	BWeber@SwRI.edu
Vic Kersey	Valvoline	VLKERSEY@Ashland.com

Attachment	3
Page	1
Reference	

Action Items Review

1.) TMC to create new data files with CVS extensions so reference oil information can be easily down loaded to excel. Status: Done

2.) TMC create a data file that contains all VG reference oil tests and identifies validity status. Status: Done

3.) Issue an info letter dropping requirement for used oil pentane insolubles, TBN, vis @ 100. Status: Done

4.) O&H panel to determine what data dictionary fields should be include in TMC web site data. Status: Done

5.) Issue info letter with TGC recommended wording regarding consensus ratings. Status: Done

6.) Issue info letter to cease requirement for periodic benzene analysis on fuel stored at laboratories. Status: Done

Attachment	4
Page	1
Reference	

Sequence VG Meeting

May 15, 2002
Detroit, MI

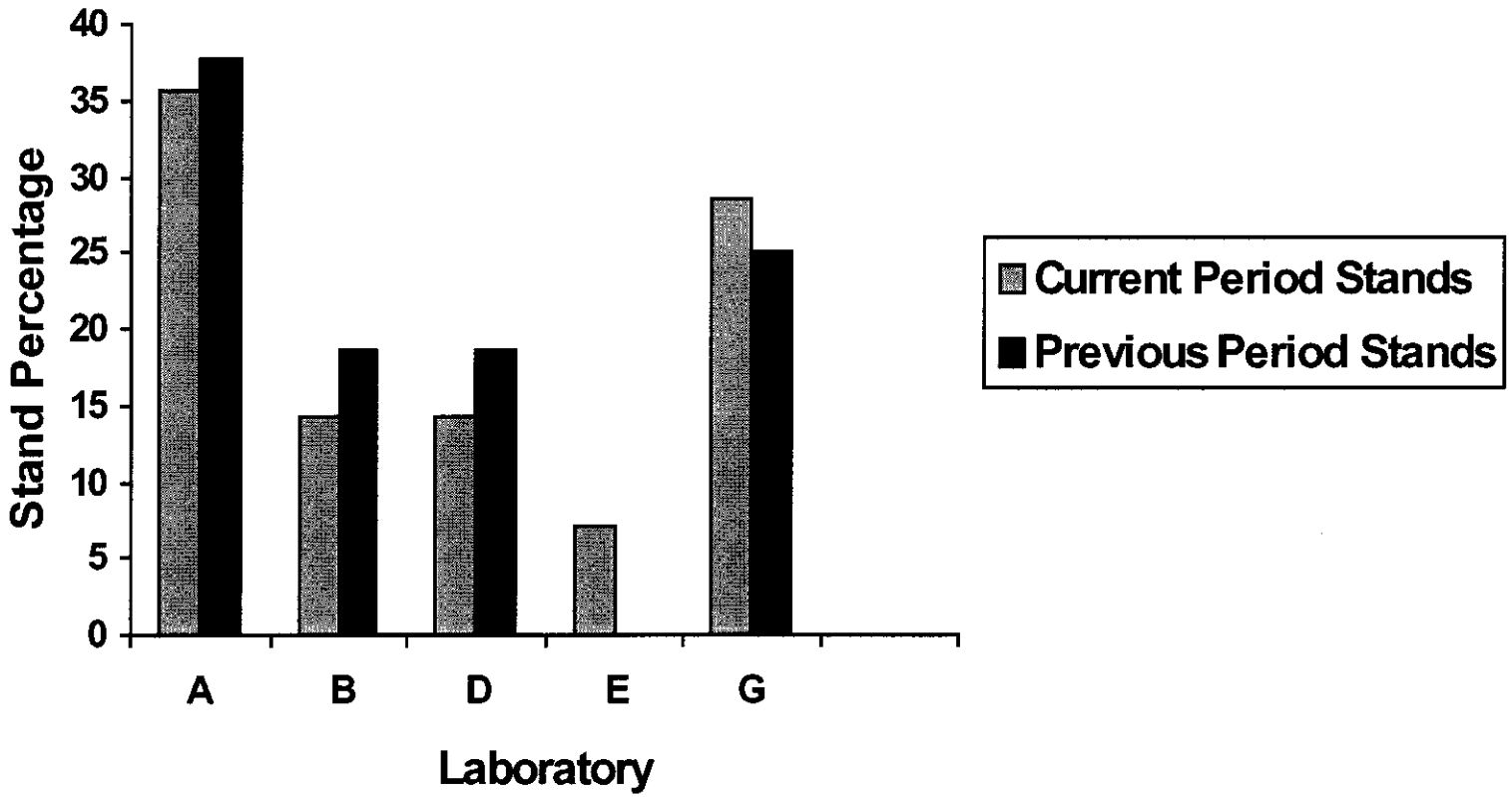
This report can be found on the TMC web site at

//www.tmc.astm.cmri.cmu.edu/docs/gas/sequencev/semiannualreports/vg-04-2002.pdf

Sequence VG Semiannual Report

	Reporting Data	Calibrated as of 3/31/02
Number of Laboratories	5	5
Number of Stands	14	12

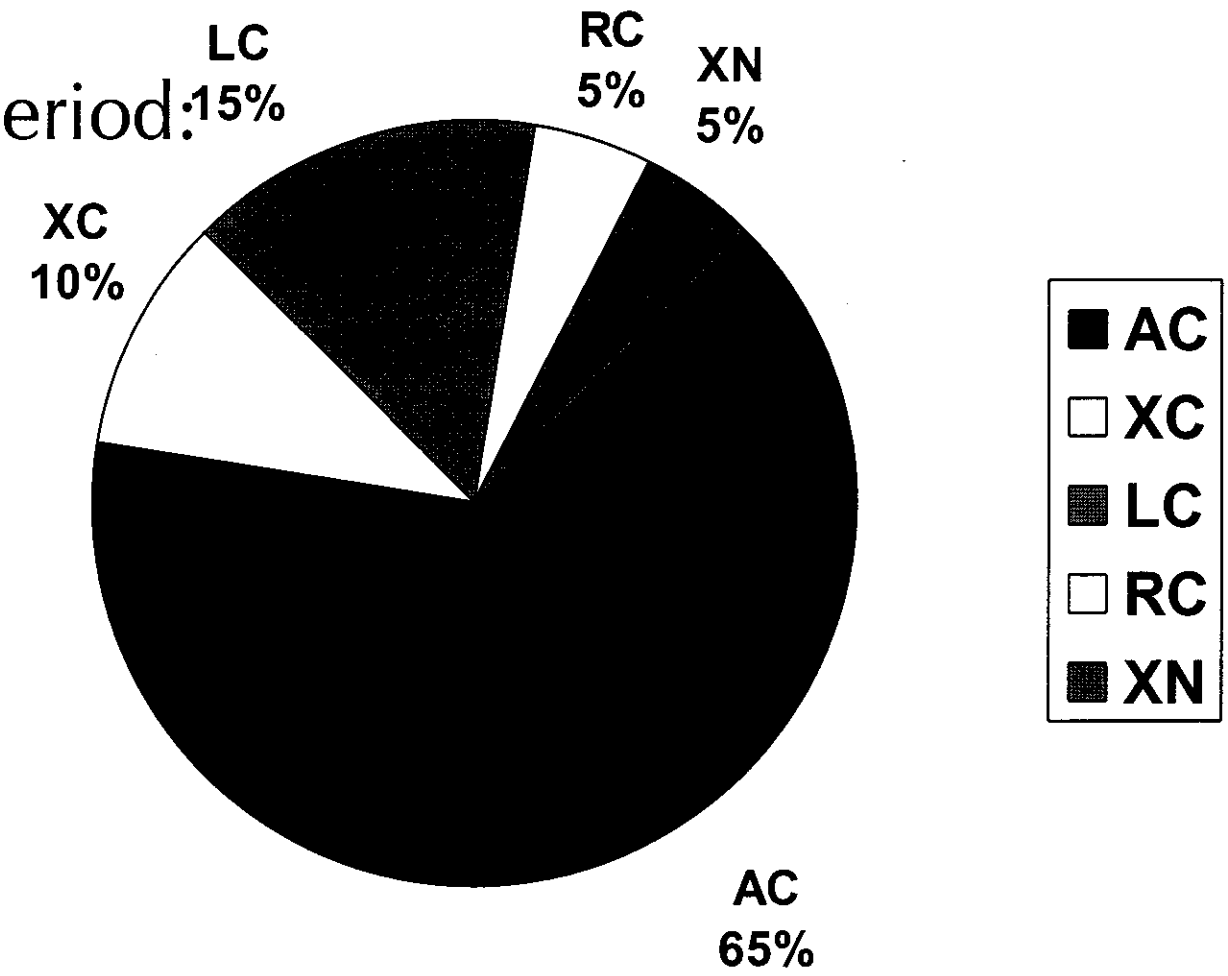
Laboratory/Stand Distribution



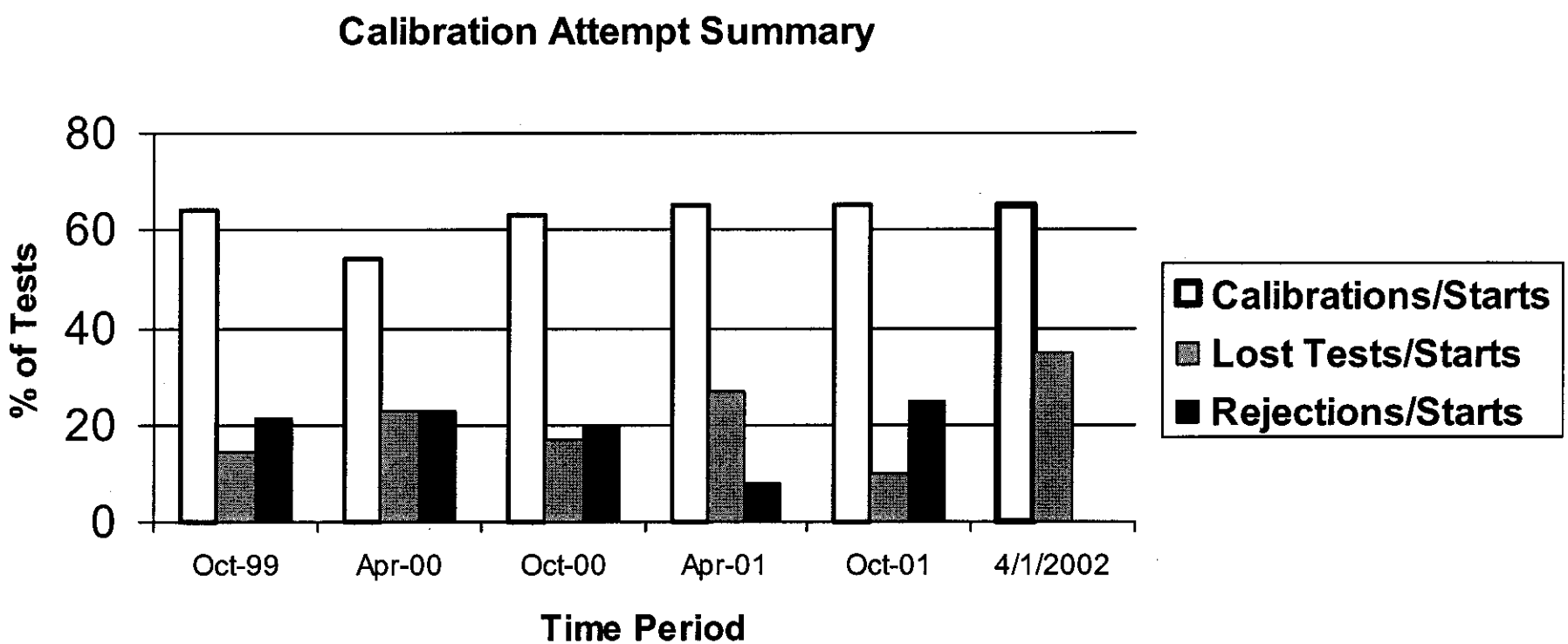
Attachment 4
Page 3
Reference

Reference Starts

- Total Starts this Period: 20



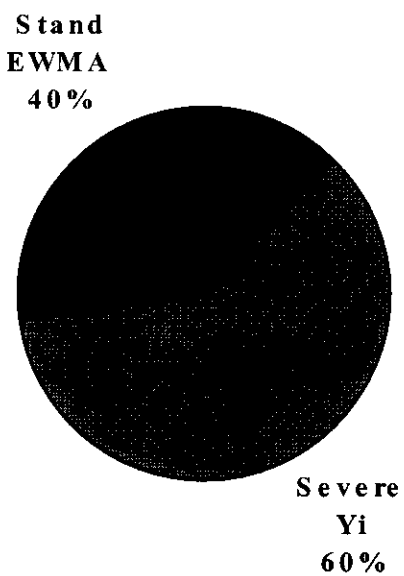
Comparison of Calibration per Start, Lost Test and Rejected Test per Start Rates for the Period Ending April 2002 with Previous ASTM Periods



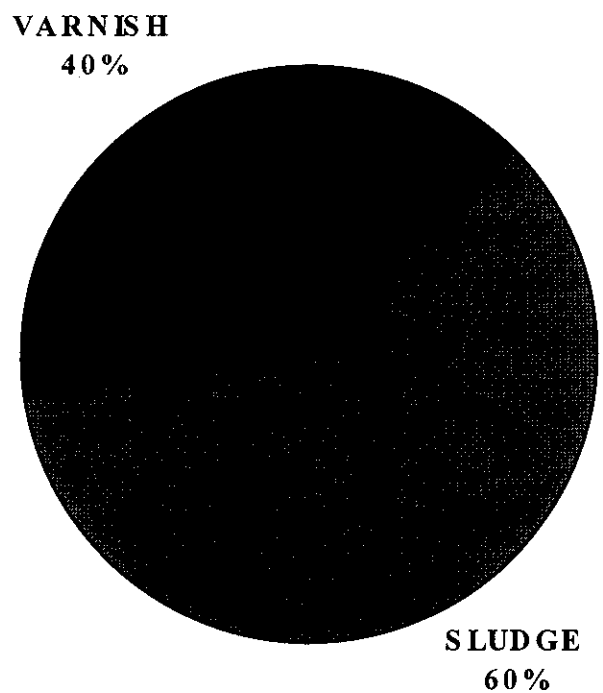
Summary of Tests Which Were Statistically Invalid

Attachment	4
Page	6
Reference	

Distribution of LTMS Stand Alarms



Distribution of Stand Alarms by Parameter

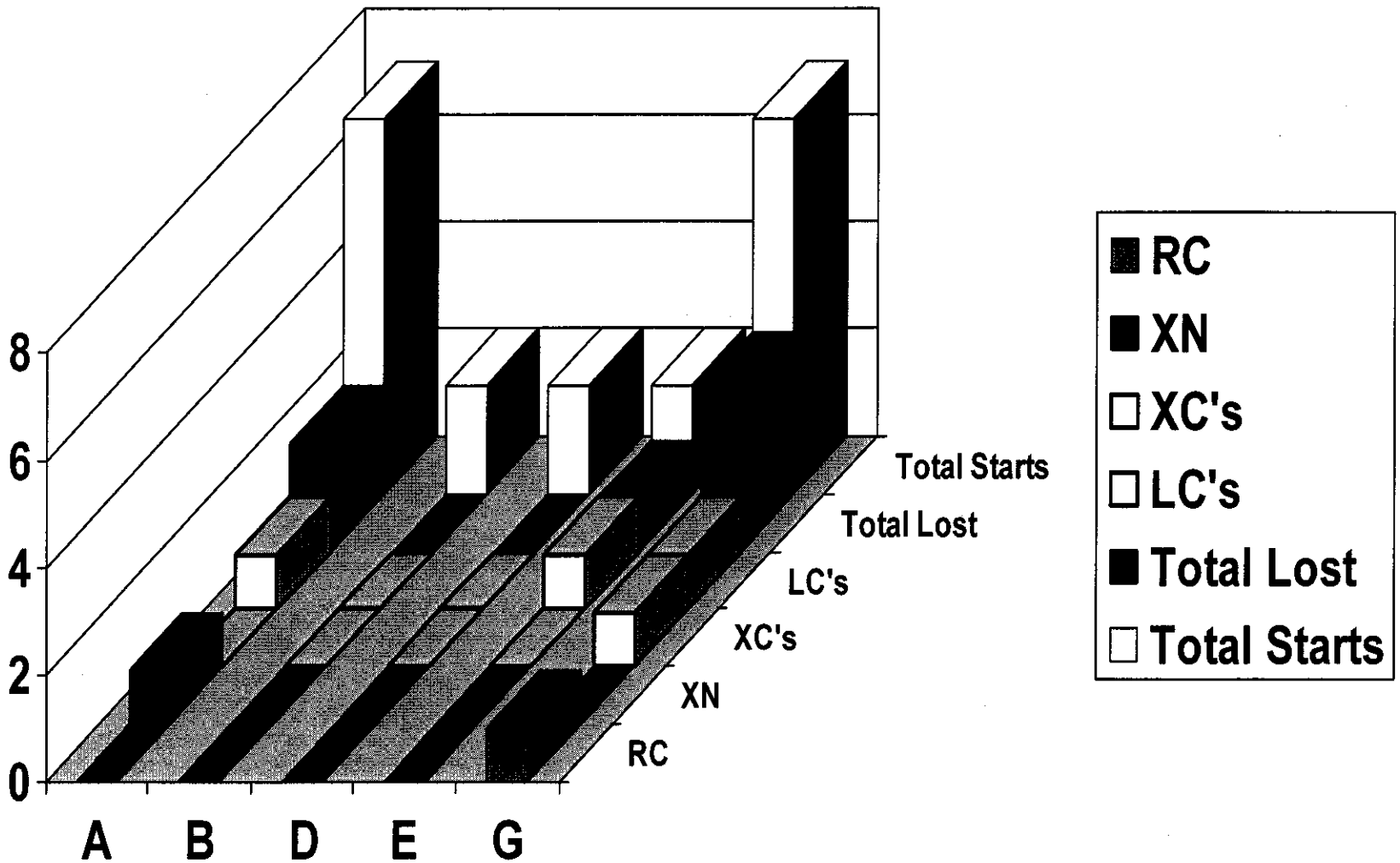


Attachment	4
Page	7
Reference	

Lost Test Summary

• Rocker Arm Cover Temperature Control Problems	1	
• Lost Test Data, Excessive Shutdowns		1
• Cam Timing Problems and Excessive Shutdowns		1
• MAP Control Problems		1
• Damaged Oberg Filter		1
• Oil Contamination		1
• Rocker Arm Cover Cracked, Lost Coolant	1	
• Dynamometer Failure		1

Laboratory Lost Test Rate



Industry Severity Summary

Variable	Pooled s All Oils	Mean Delta/s	Confidence Interval	Based on	Delta in Reported Units
RAC	0.250	-0.124	7.73 - 8.03	8.0	-0.03
AES	0.390	0.355	7.92 – 8.39	7.8	0.14
APV	0.180	-0.222	7.17 – 7.39	7.5	-0.04
AEV	0.090	0.044	8.86 – 9.00	8.9	0.00
OSCR	0.850	-0.594	6.7 - 21.4	20	9.0

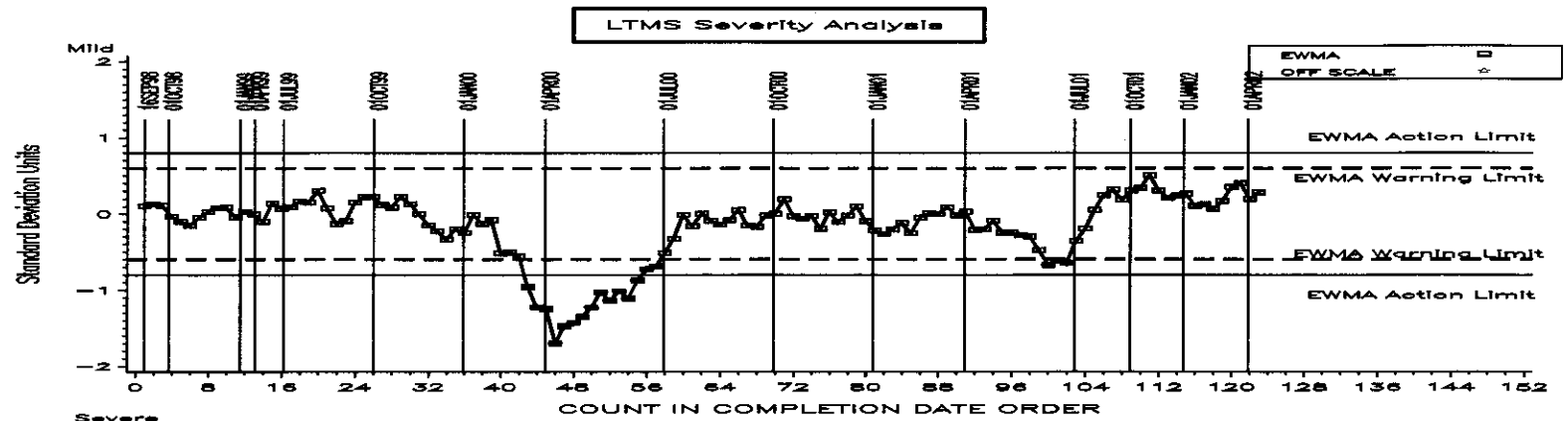
Average Δ/s By Laboratory

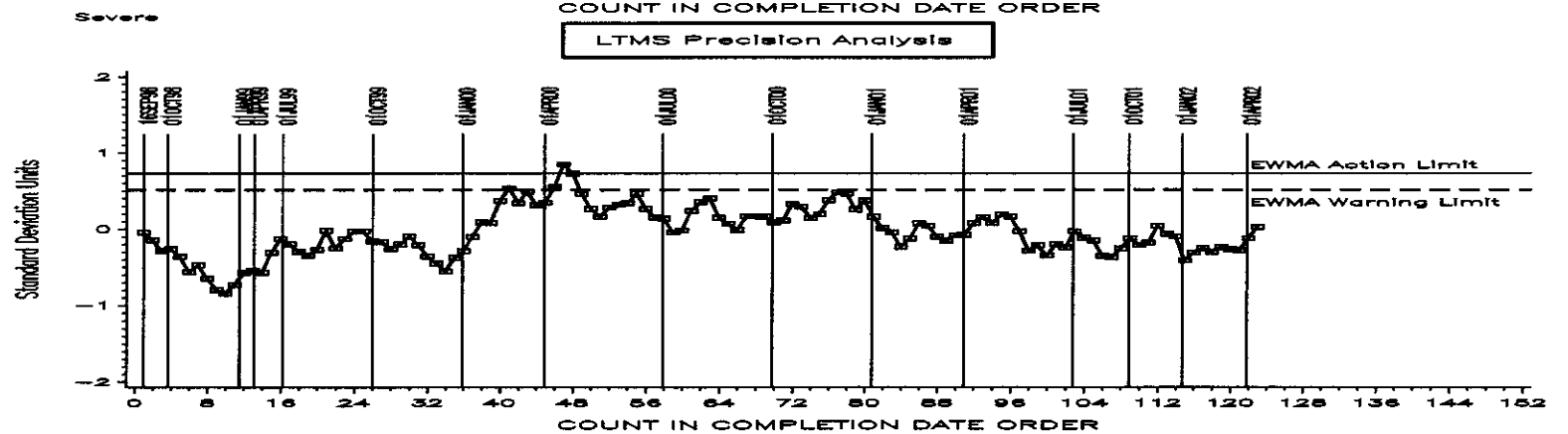
Laboratory	AES	OSCR	AEV	RAC	APV
A	0.56	-0.99	0.59	0.09	-0.46
B	-0.54	0.87	0.45	-0.28	0.58
D	-0.21	-0.81	0.10	-0.80	0.19
E	0.25	0.66	-1.70	0.70	0.11
G	0.91	-1.14	-0.30	-0.13	0.70

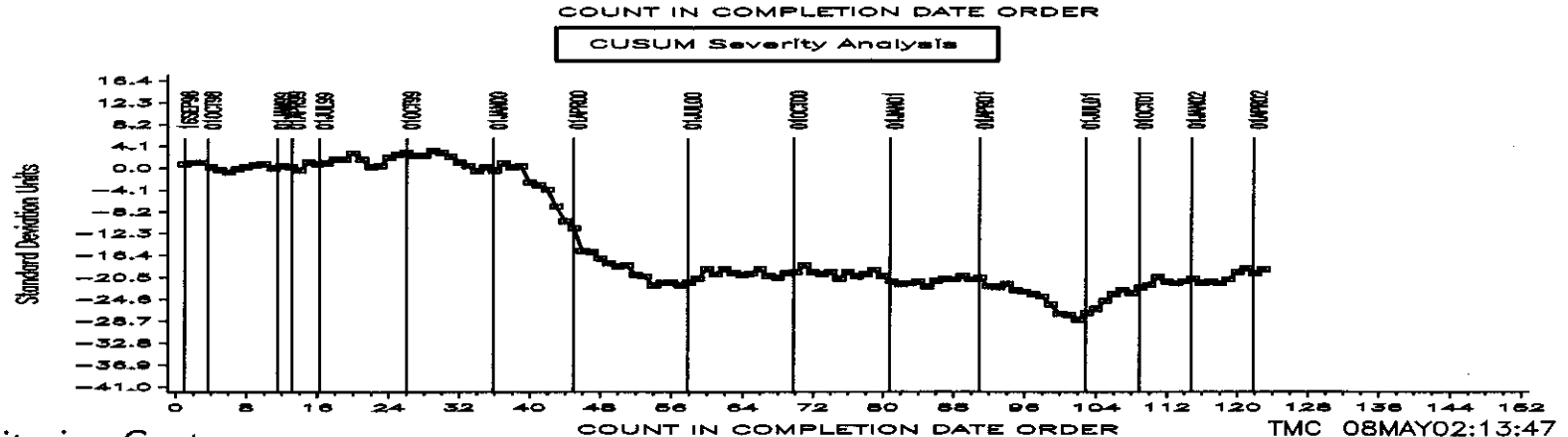
Attachment	4
Page	12
Reference	

VG INDUSTRY OPERATIONALLY VALID DATA

AVERAGE ENGINE SLUDGE







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TMC 08MAY02:13:47

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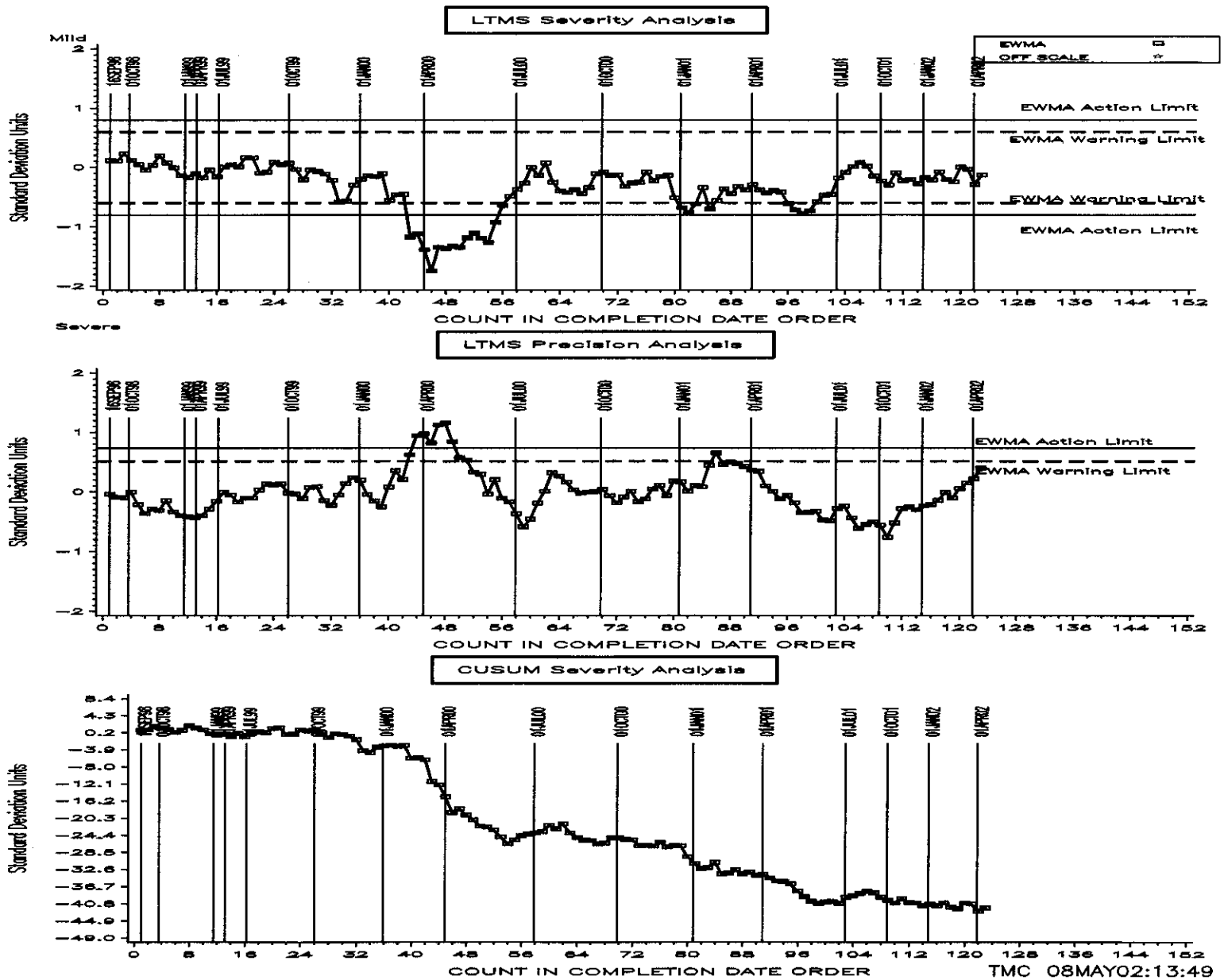
Attachment	4
Page	13
Reference	

VG INDUSTRY OPERATIONALLY VALID DATA

AVERAGE ROCKER COVER SLUDGE



Test Monitoring Center

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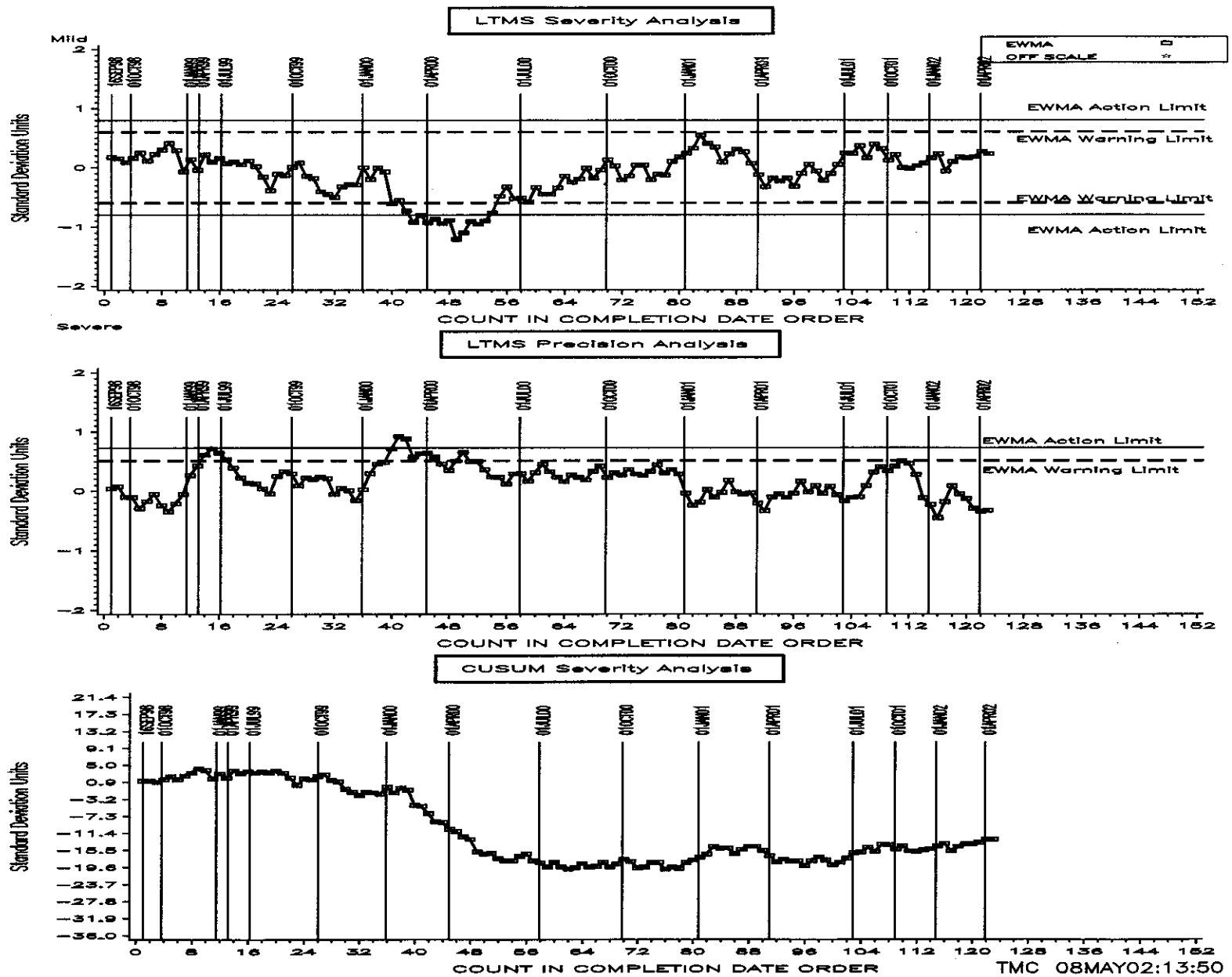
Attachment	4
Page	14
Reference	

VG INDUSTRY OPERATIONALLY VALID DATA

AVERAGE ENGINE VARNISH 3—PART FINAL RESULT



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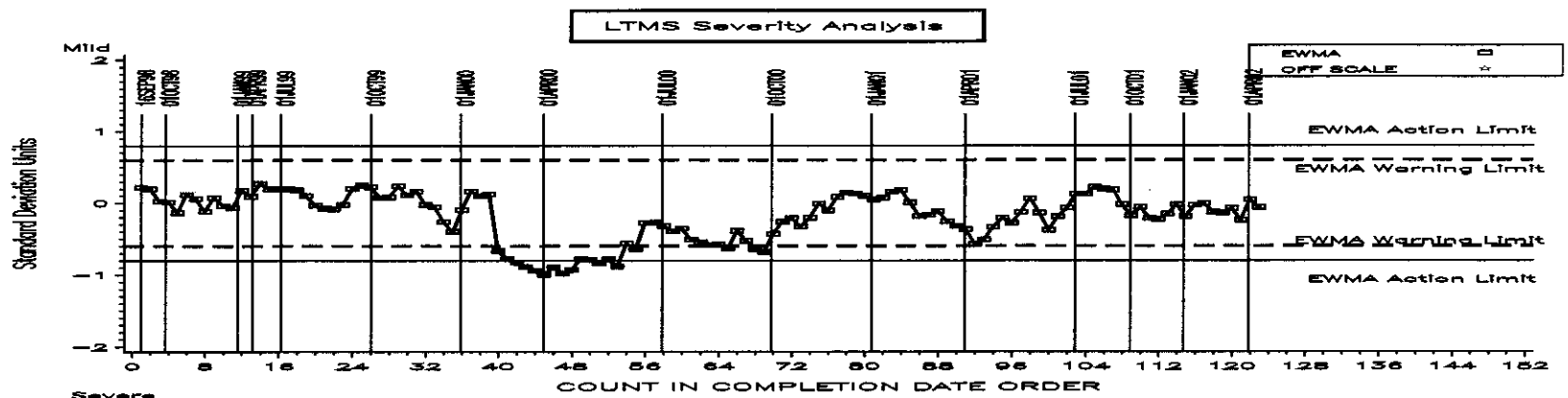
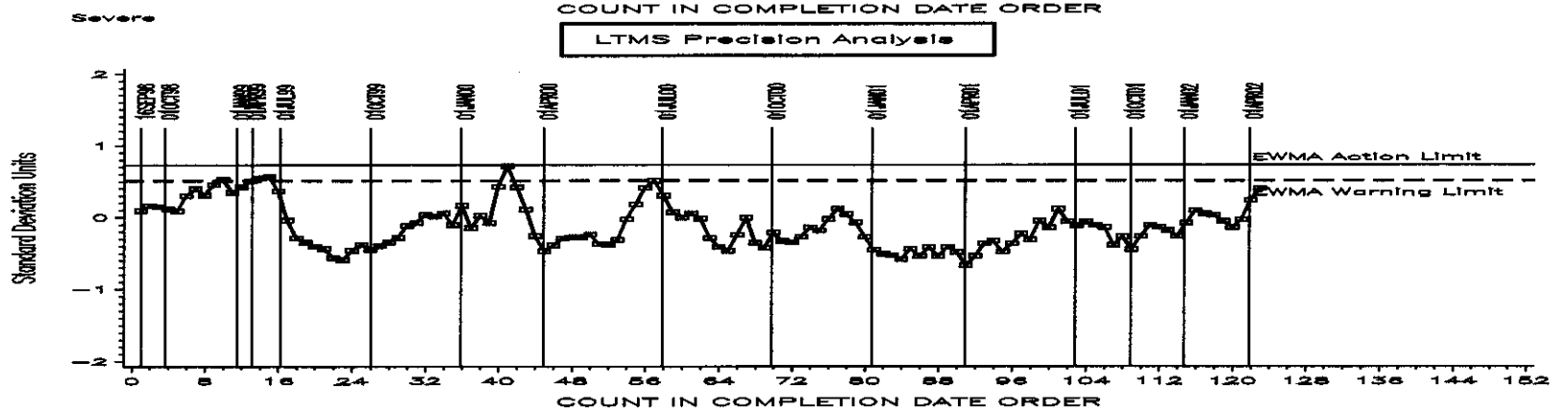
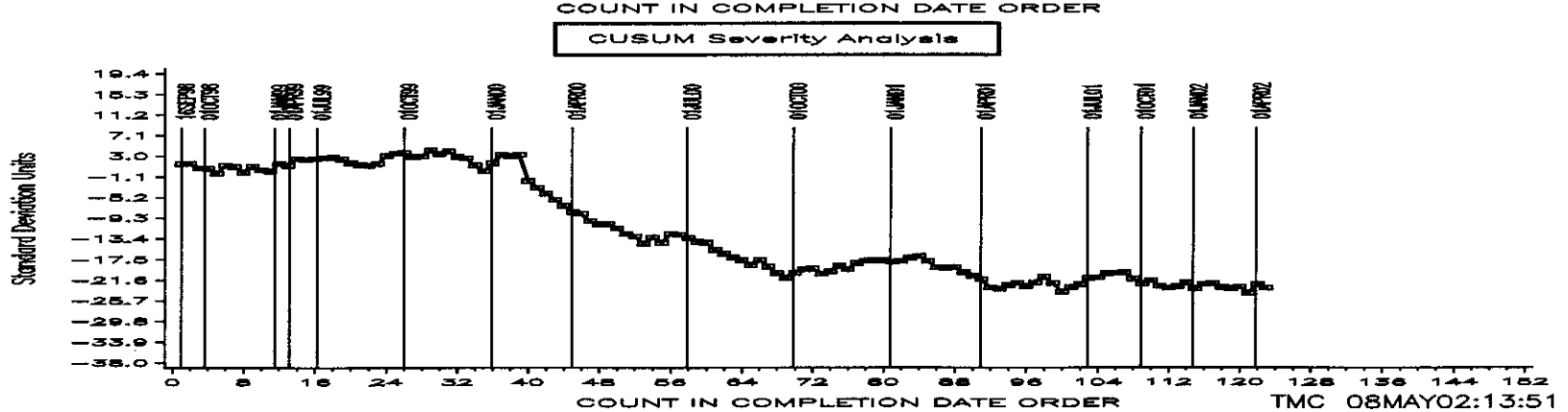
Attachment	4
Page	15
Reference	

VG INDUSTRY OPERATIONALLY VALID DATA

AVG PISTON SKIRT RATING







TMC 08MAY02:13:51

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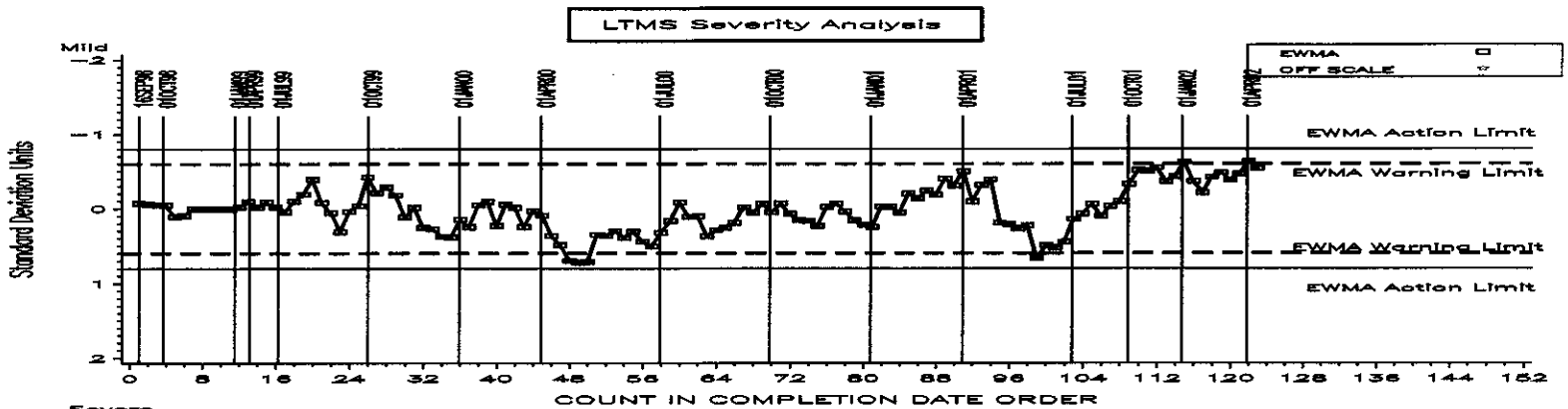
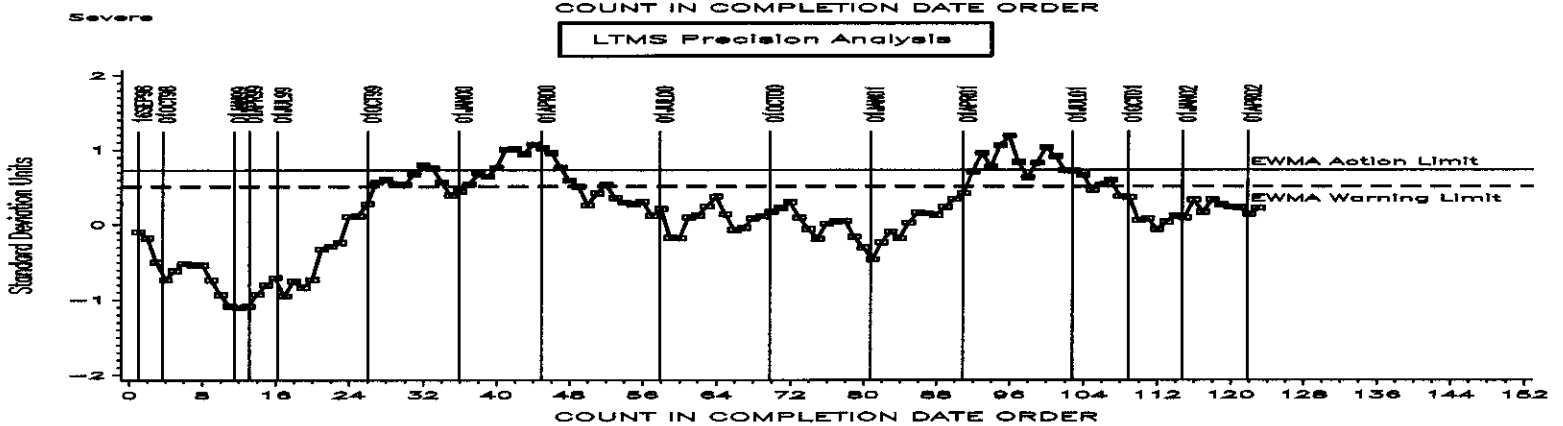
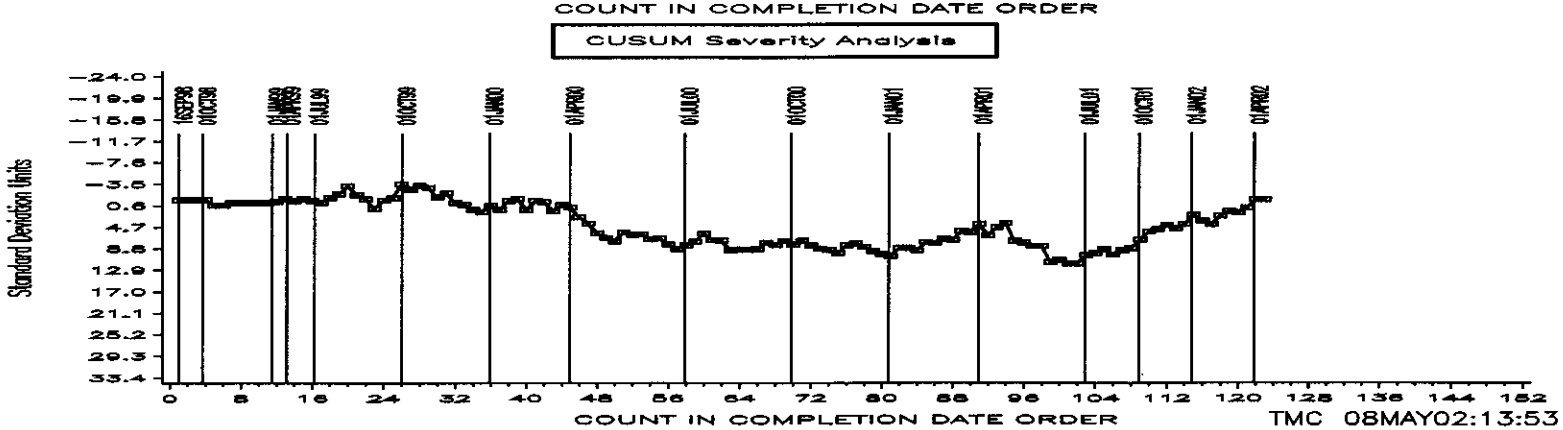
Attachment	4
Page	16
Reference	

VG INDUSTRY OPERATIONALLY VALID DATA

OIL SCREEN SLUDGE







TMC 08MAY02:13:53

Test Monitoring Center

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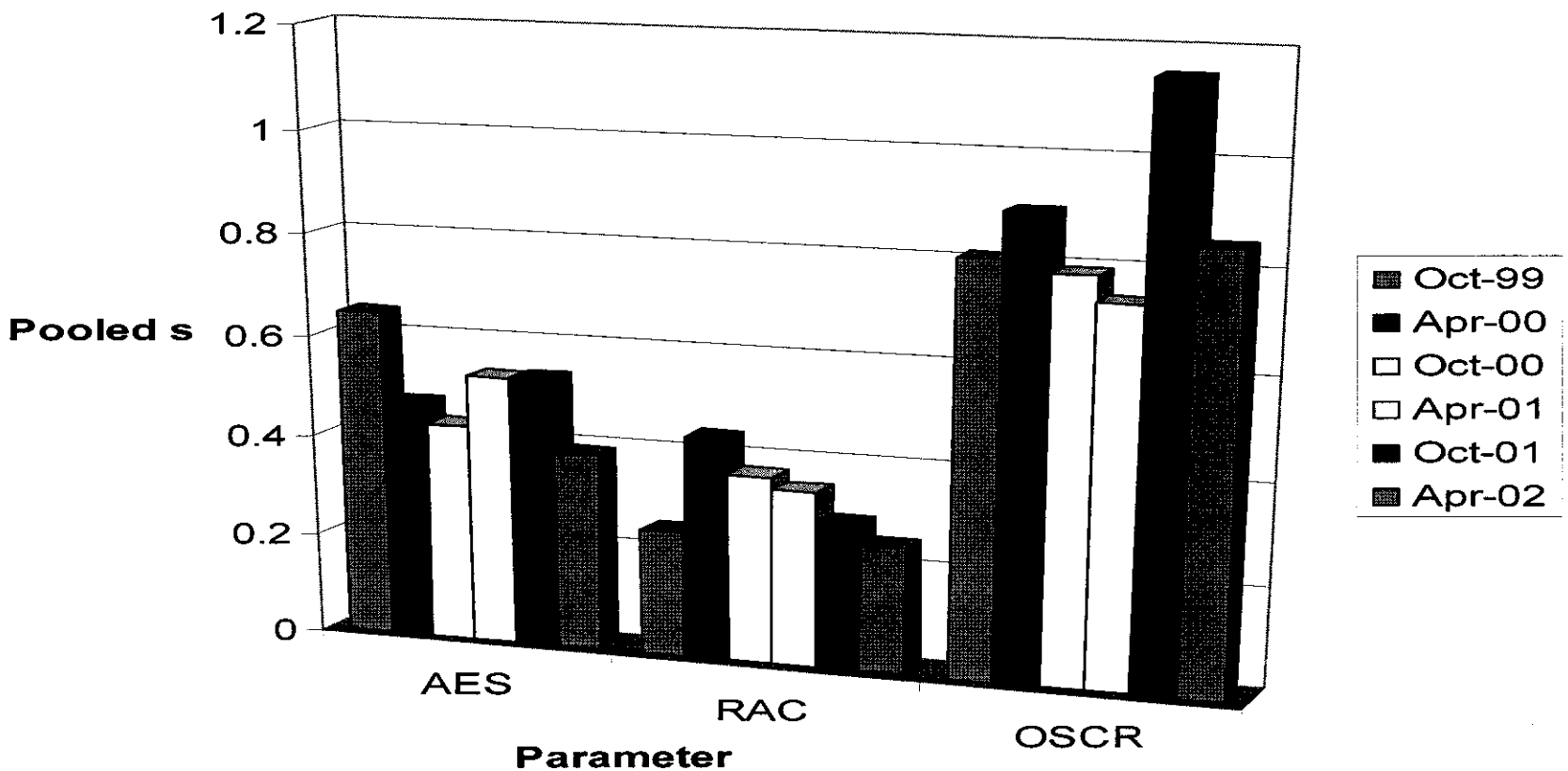
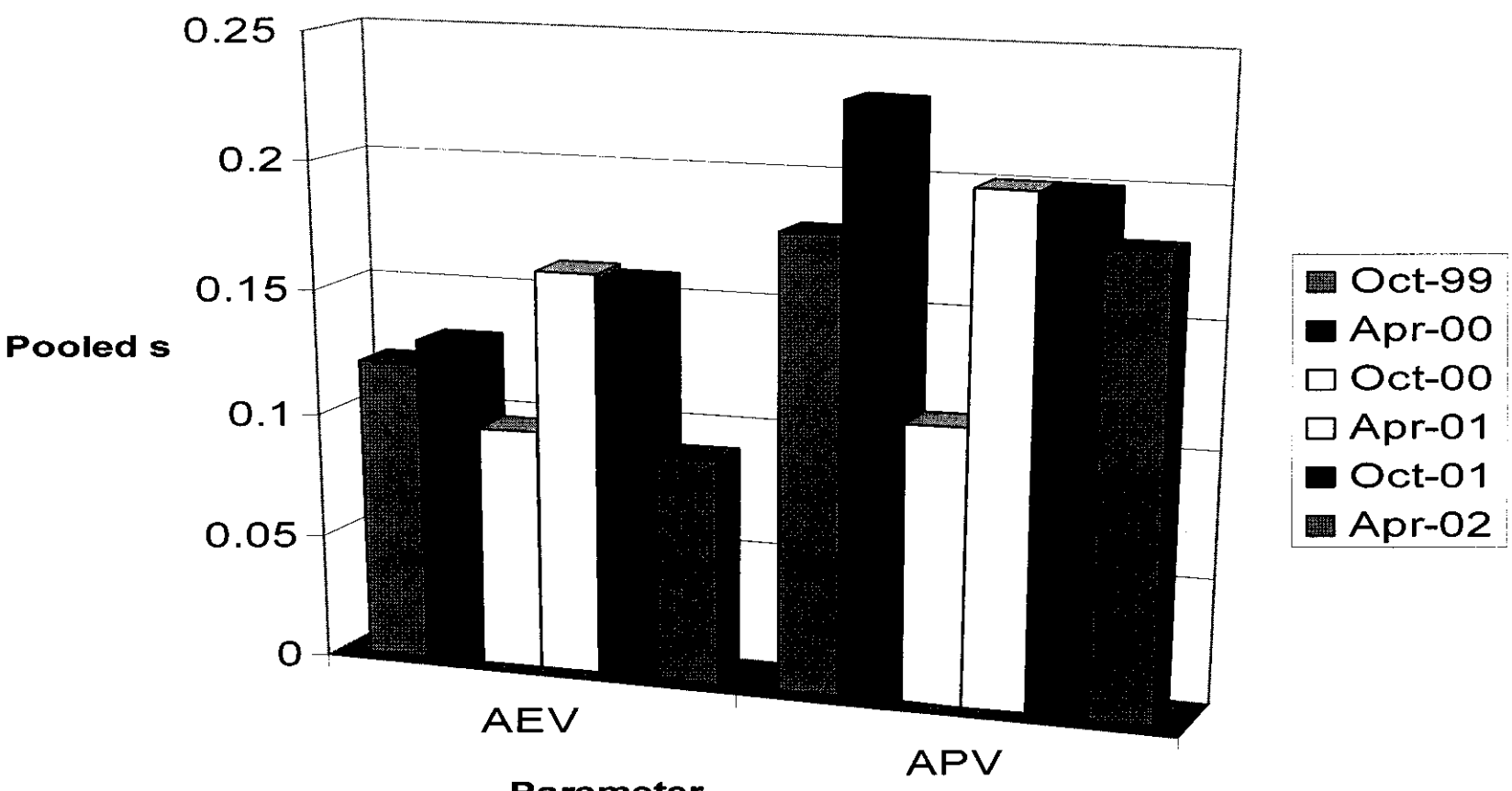
Comparison of Pooled Precision Estimates By ASTM Report Period



Attachment	4
Page	18
Reference	

Comparison of Pooled Precision Estimates By ASTM Report Period



Attachment	9
Page	19
Reference	

Information Letters

- Information Letter 02-1 was issued on January 8, 2002. This information letter deleted the requirement to monitor power QI and NOx, accomplished some rating changes recommended by LDRTF and allows blowby rework up to the 1st 48 hours of the test.

Attachment	4
Page	20
Reference	

Information Letters (cont.)

- Information Letter 02-2 issued 2/7/02. Dropped CO, CO2 and O2 and replaced with Lambda
- Information Letter 02-3 issued 4/8/02. Replaced reference to CRC Manuals 12 and 14 with CRC Manual 20

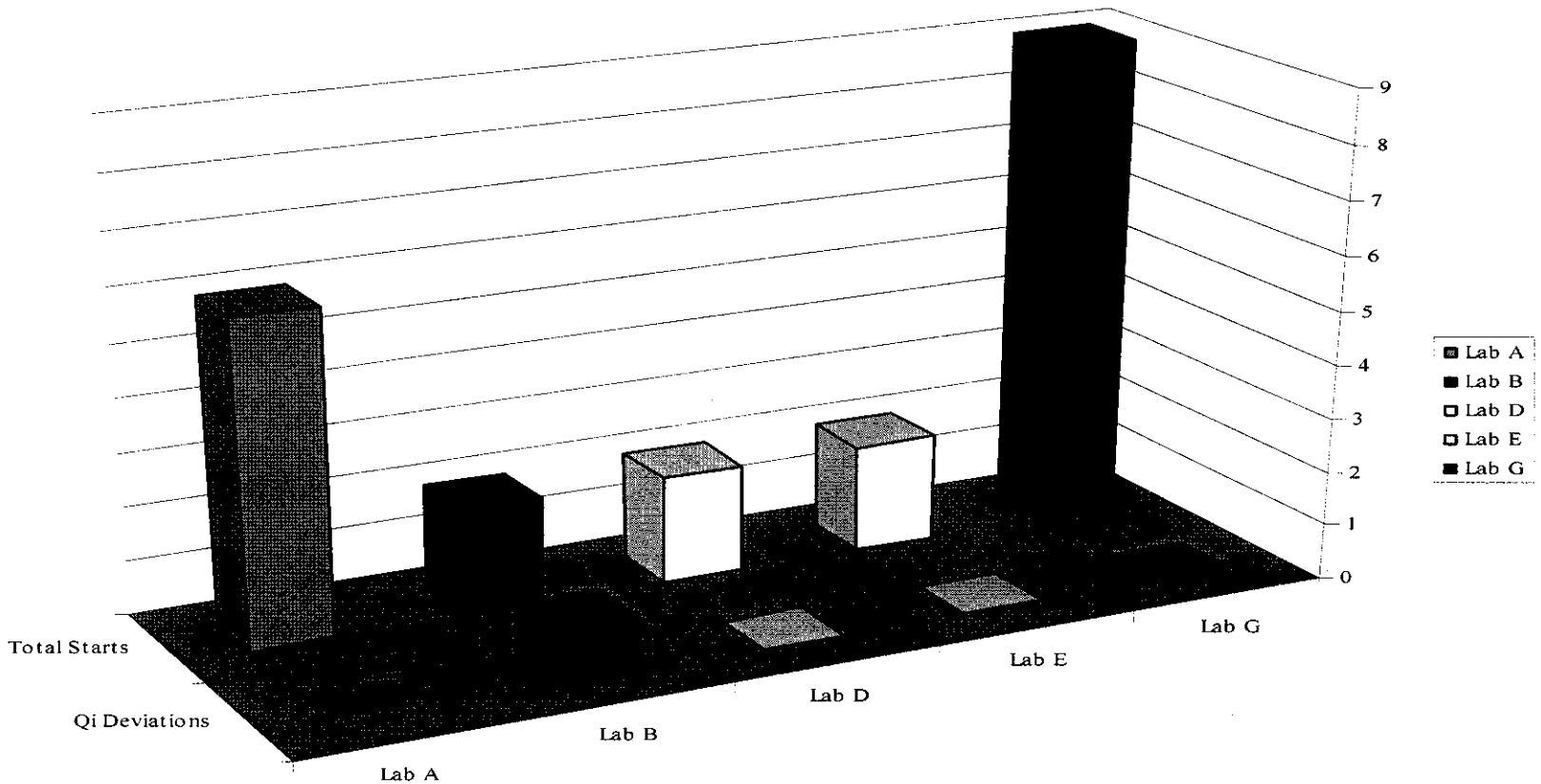
Industry Reference Oil Inventory
Number of Tests, by Oil at Lab and TMC

Oil	TMC Inventory, in gallons	TMC Inventory, in tests	Laboratory Inventory, in tests	Estimated life
925-3	174	58	10	3+ years
1006	0	0	9	< 1 year
1006-2	5246	1748	3	3+ years
1007	507	169	2	~18 months
1009	2750	818	0	3+ years

Reference Oils 1006. 1007 and 1009 are used across multiple test areas, TMC inventory represents total amount of that oil on hand.

Attachment	4
Page	22
Reference	

Summary of QI Deviations



Parameter	Number of Tests
Manifold Absolute Pressure (MAP)	1

Attachment	4
Page	23
Reference	

Summary

- Calibrations per start compares well with the previous period and historical rates, while the lost test per start rate has increased with respect to the previous period. There where no rejected tests this period.
- APV and RACS where severe and AES and OSCR were mild for the period. AEV was on or near target.
- Precision for all parameters compare well with previous period and historical estimates.

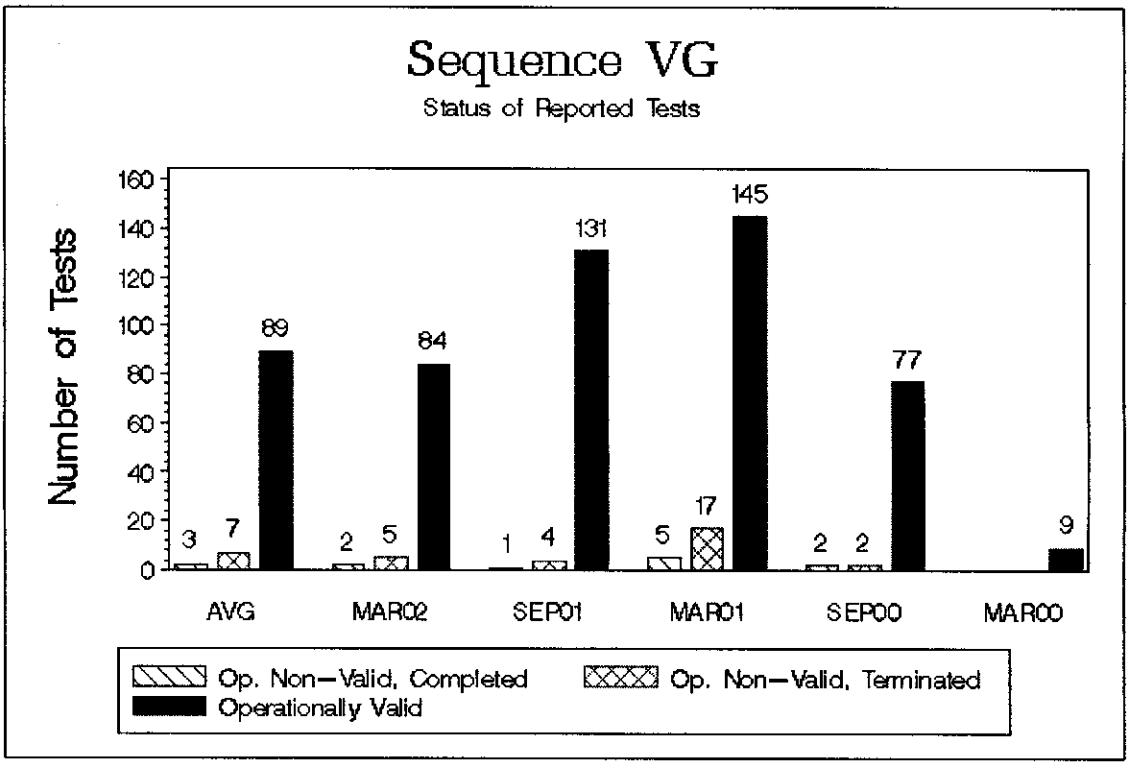
Attachment 5
Page 1
Reference

RSI Sequence VG Semi-Annual Report
Six-Month Period Ending March 31, 2002

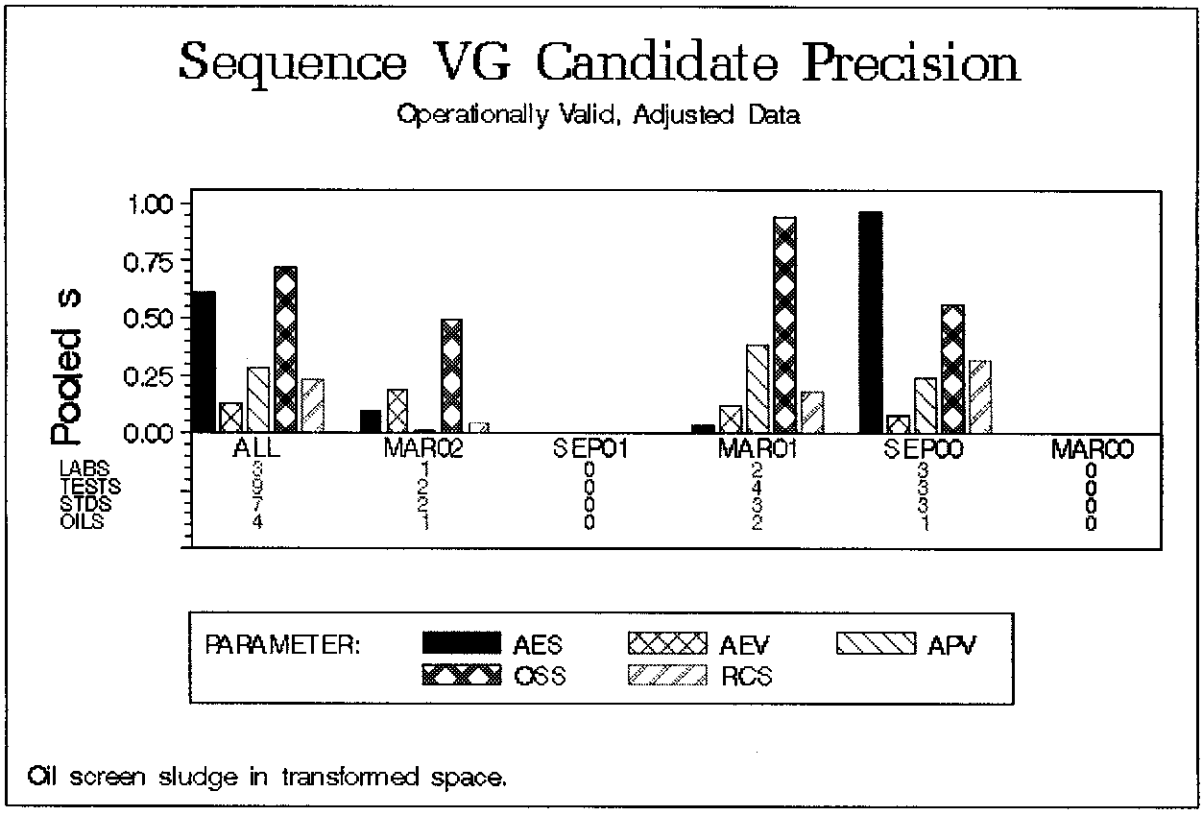
STATUS OF REPORTED TESTS		
STATUS	**N**	**PERCENT**
Operationally Non-Valid, Terminated	5	5.5%
Operationally Non-Valid, Completed	2	2.2%
Operationally Valid	84	92.3%
Total Reported Tests	*91*	*100.0%*
CAUSES FOR LOST TESTS	**N**	
Control Problems	2	
Engine Mechanical Problems	4	
Sponsor Request	1	

SEQUENCE VG PRECISION		
COMPONENTS OF REPLICATED DATA BASE	**N**	
Number of Tests	2	
Number of Oils	1	
Number of Labs	1	
Number of Stands	2	
Number of Severity Adjusted Avg Eng Sludge Tests	0	
Number of Severity Adjusted Avg Eng Varnish Tests	0	
Number of Severity Adjusted Avg Piston Varnish Tests	0	
Number of Severity Adjusted Oil Screen Sludge Tests	2	
Number of Severity Adjusted Rocker Cover Sludge Tests	0	
VARIABLE	**Pooled s**	**R**
Avg Engine Sludge, Adjusted	0.092	0.257
Rocker Cover Sludge, Adjusted	0.042	0.119
Avg Engine Varnish, Adjusted	0.191	0.535
Avg Piston Varnish, Adjusted	0.007	0.020
Oil Screen Sludge, Adjusted	0.490	1.372
Avg Engine Sludge, Non-Adjusted	0.092	0.257
Rocker Cover Sludge, Non-Adjusted	0.042	0.119
Avg Engine Varnish, Non-Adjusted	0.191	0.535
Avg Piston Varnish, Non-Adjusted	0.007	0.020
Oil Screen Sludge, Non-Adjusted	0.490	1.372

Attachment	5
Page	2
Reference	



Attachment	5
Page	3
Reference	



Oil screen sludge in transformed space.

Attachment	6
Page	1
Reference	

PRODUCT: **SVGM2**
PRODUCT CODE: **HF295**

Batch No.:	9906416	9906416	9906416
Tank No.:	74	74	74
Analysis Date:	4/30/2002	4/8/2002	3/4/2002

TEST	METHOD	UNITS	RESULTS	RESULTS	RESULTS
Distillation - IBP	ASTM D86	°F	94	94	94
5%		°F	118	115	124
10%		°F	129	127	145
20%		°F	153	152	169
30%		°F	181	181	190
40%		°F	210	214	207
50%		°F	231	231	221
60%		°F	243	242	241
70%		°F	256	256	257
80%		°F	293	293	284
90%		°F	343	343	339
95%		°F	361	360	353
Distillation - EP		°F	408	408	381
Recovery		vol %	97.3	97.3	97.1
Residue		vol %	1.0	1.0	1.0
Loss		vol %	1.7	1.7	1.9
Gravity	ASTM D4052	°API	57.2	57.1	57.2
Specific Gravity	ASTM D4052	-	0.750	0.750	0.750
Reid Vapor Pressure	ASTM D323	psi	9.1	9.2	8.9
Reid Vapor Pressure	ASTM D5191	psi	9.2	9.2	8.7
Sulfur	ASTM D4294	wt %	<0.01	<0.01	<0.01
Lead	ASTM D3237	g/gal	<0.01	<0.01	
Existent gum, unwashed	ASTM D381	mg/100mls	3	4	3
Existent gum, washed	ASTM D381	mg/100mls	<1	<1	<1

ASTM Surveillance Panel
Sequence VG Development Update

May 15, 2002

Barry Jecewski

Ford Motor Company

Fuels and Lubricants

Ford Motor Company

Attachment	7
Page	2
Reference	

Sponsor Engine Update:

- Responding to industry Sequence VG projections, Ford Motor Co. built 2000(units) of model year 2000 4.6L-2V Romeo engines. As of 6/1/01 Ford received orders for 10% of those 2000 engines.

- Due to lack of oil industry demand for model year 2000 Romeo engines, Ford Power Products has sold 1500 of the 2000 engines.

- The remaining engines must be sold to the participating labs ASAP. Ford can no longer be responsible for all of the overhead costs to maintaining that inventory.

- Due to fiscal restraints on spending this panel must work on improving the process for acquiring test engines for future Sequence tests. It is no longer acceptable for one company to bear the financial responsibility for test engine support.

- Lastly, Ford will continue to support the design verification process related to engine testing for transition to the model year 2000 Romeo engine. In addition to the 8 engines previously donated, Ford will donate 8 more engines for matrix testing.

Ford Motor Company

Attachment	7
Page	3
Reference	

Discussion Regarding Sequence VG Wear Measurement:

Responding to the proposed ILSAC GF-4 standard for engine wear limits Ford Motor Co. would like to make the following recommendations *:*

- At the present time there is a post test rate and report of cylinders#1 and 8. The measurement is done using the average radial bore method. This type of measurement does not take into account engine core shift or bore shift; thereby, causing positive numbers to be reported for bore wear ??

- In order to get a more precise measurement of the engine bores after a Sequence VG test, Ford Motor Company is requesting a change in the method of bore wear measurement. The average radial bore method should be discontinued and replaced with a bore wear profile of the top ring travel .

- This method will allow the OEM's to quantify bore wear vs oil type and allow for an informed decision on the relevance of wear limits in the future.

Ford Motor Company

Attachment 8
Page 1

INSPECTION REPORT

03.17.2002
12:07

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

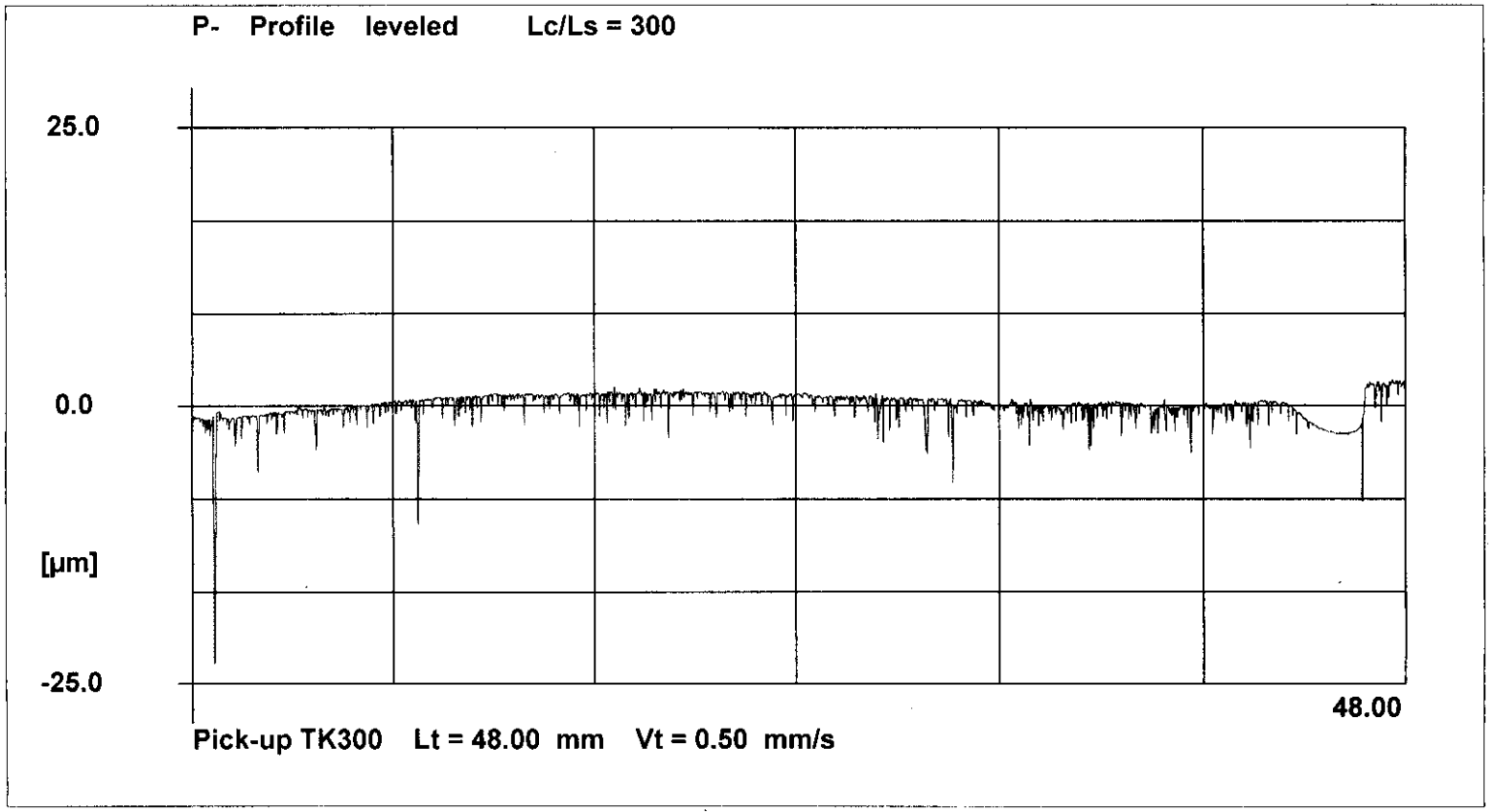
Pick-up type	TK300
Measuring range	80 µm
Assessment length	15.00 mm
Speed	0.50 mm/s
Lc (Cut Off)	2.500 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 5 / #767
LOCATONS	48.0 MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	25.56 µm
Rt	11.85 µm
Ra	0.42 µm
Rz	6.63 µm
Rmax	11.47 µm
RzISO	6.94 µm
Rq	0.70 µm
Wt	1.87 µm

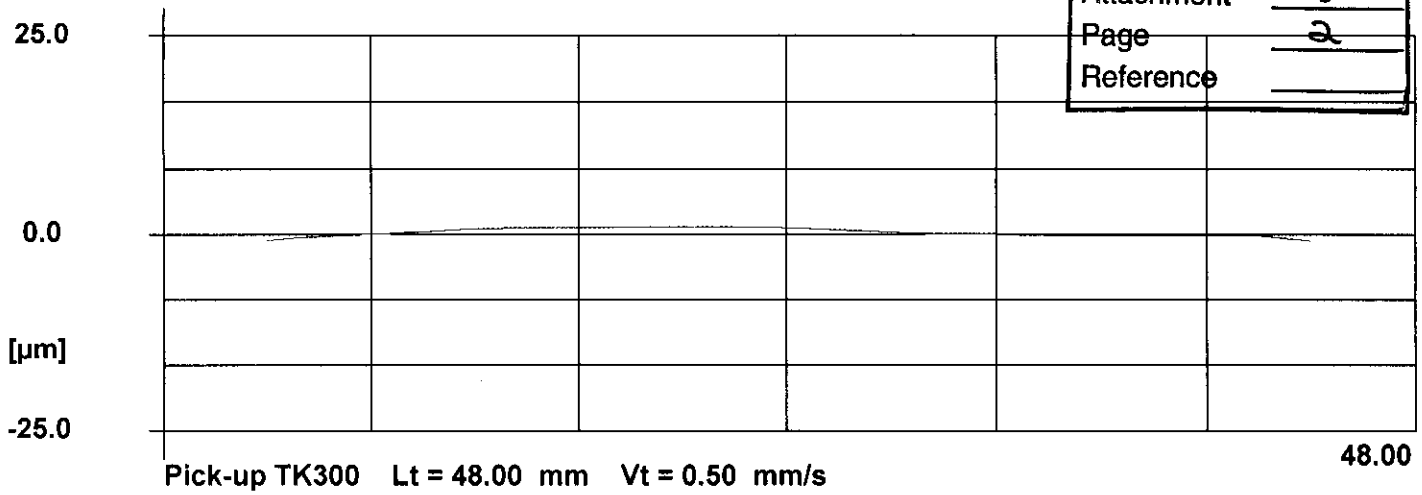
Rpm	0.83 µm
Rp3z	0.230
R3zm	4.96 µm
Rp	1.07 µm
RSm	0.152 mm
Rpm/R3z	0.230
Rku	45.382
Rsk	-4.69

	Act.	Nom.	LT	UT	<>
Rpk	0.29 µm	0.15	0.00	0.30	0.00 µm
Rvk	1.54 µm	1.50	0.50	2.50	0.00 µm
Mr1	7.4 %	5.0	0.0	10.0	0.0 %
Mr2	75.3 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	19.04 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.52 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	10.80 µm	3.00	0.00	6.00	4.80 µm
Rpk*	0.43 µm	3.00	0.00	6.00	0.00 µm
R3z	3.61 µm	3.25	2.50	5.00	0.00 µm



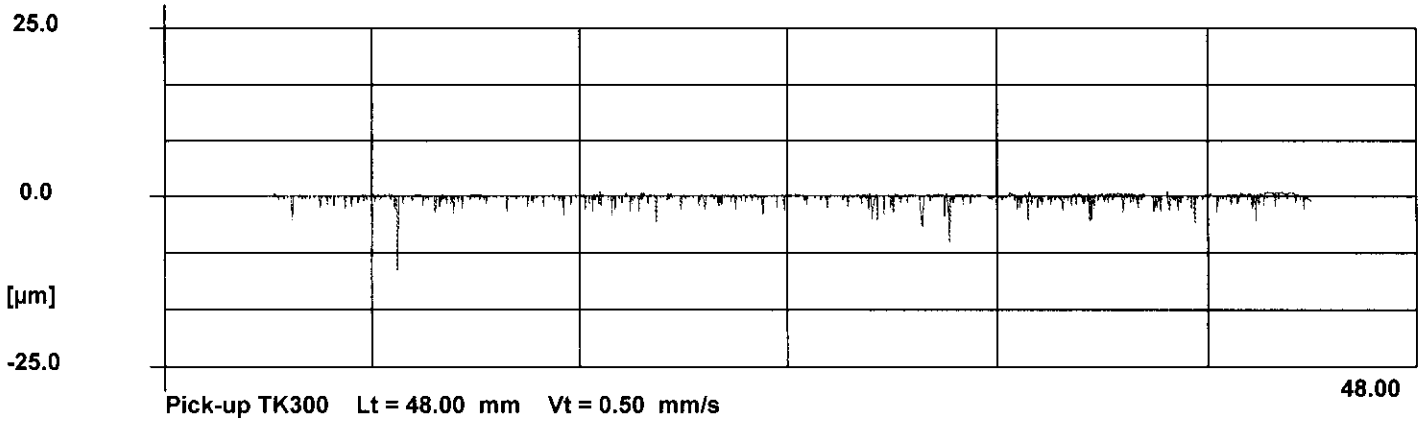
W- Profile leveled Filter M1 DIN4777 Lc = 2.500 mm

Attachment 8
Page 2
Reference



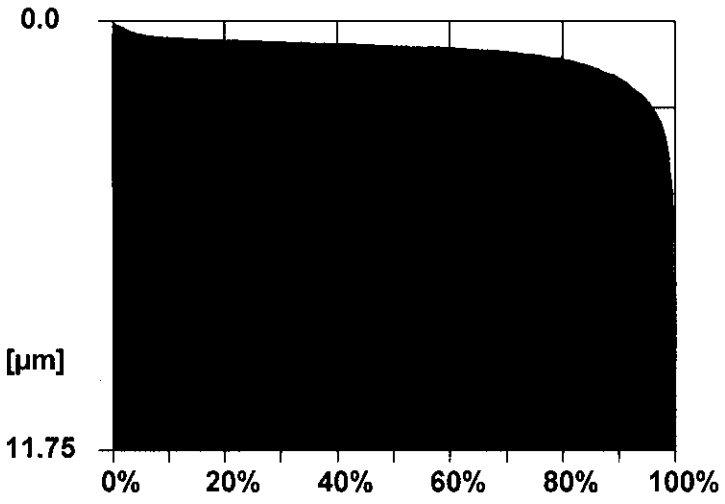
Pick-up TK300 Lt = 48.00 mm Vt = 0.50 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 2.500 mm

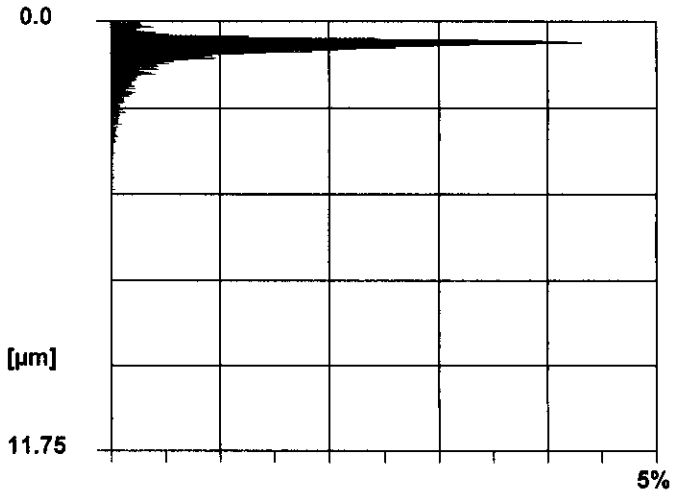


Pick-up TK300 Lt = 48.00 mm Vt = 0.50 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	6.0 %
Rmr02(1.000µm)	68.9 %
Rmr03(1.500µm)	87.1 %
Rmr04(2.000µm)	92.8 %
Rmr05(2.500µm)	96.0 %
Rmr06(3.000µm)	97.9 %
Rmr07(3.500µm)	98.7 %
Rmr08(4.000µm)	99.1 %
Rmr09(4.500µm)	99.5 %
Rmr10(5.000µm)	99.7 %

Rmr01(10.0 %)	0.57 µm
Rmr02(20.0 %)	0.68 µm
Rmr03(30.0 %)	0.74 µm
Rmr04(40.0 %)	0.79 µm
Rmr05(50.0 %)	0.86 µm
Rmr06(60.0 %)	0.92 µm
Rmr07(70.0 %)	1.02 µm
Rmr08(80.0 %)	1.19 µm
Rmr09(90.0 %)	1.71 µm
Rmr10(100.0 %)	11.84 µm

Attachment X
Page 3

INSPECTION REPORT

03.17.2002
12:25

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

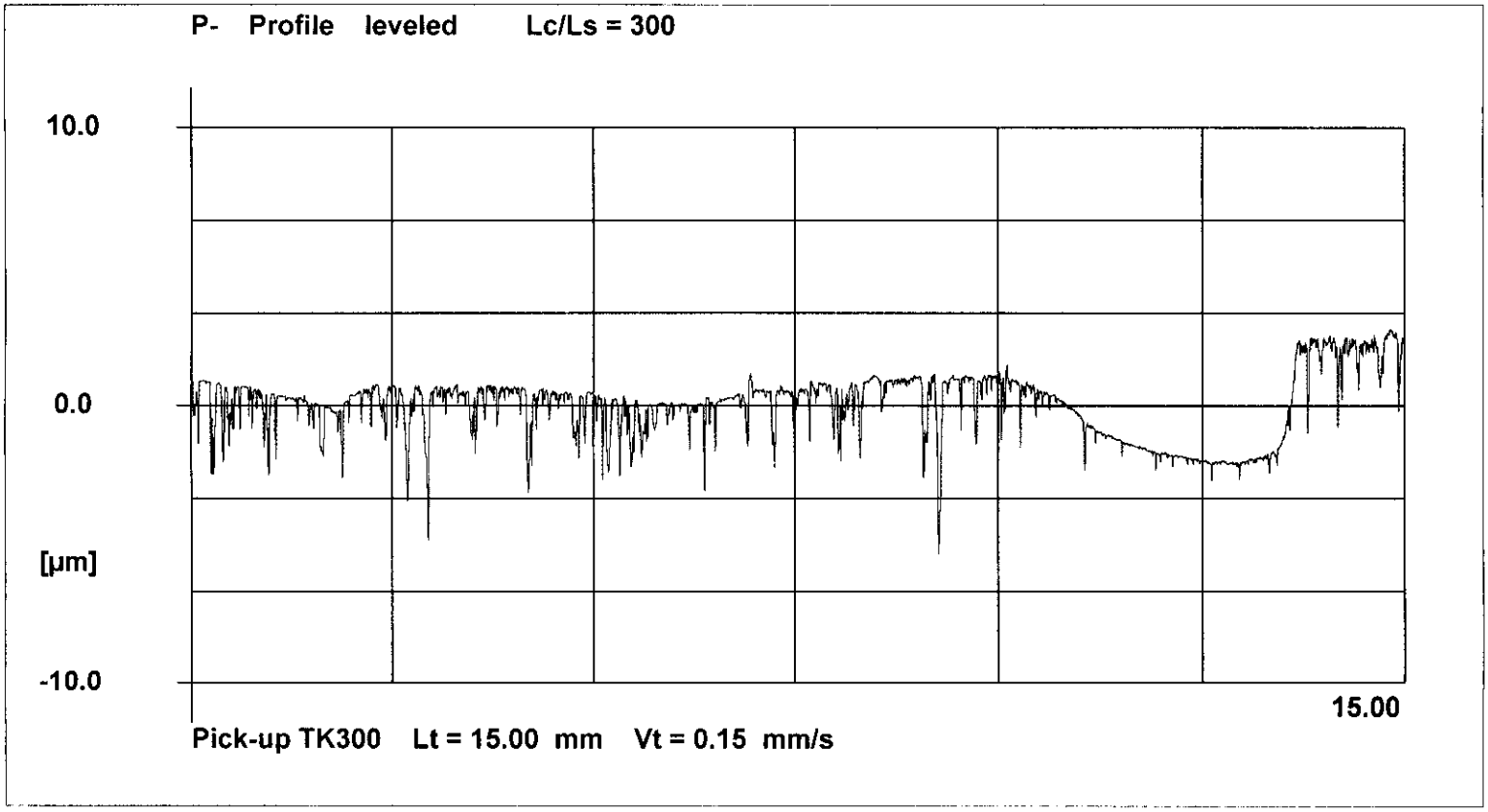
Pick-up type	TK300
Measuring range	80 µm
Assessment length	15.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	2.500 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 5 / #767
LOCATONS	15.0 MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	8.06 µm
Rt	7.71 µm
Ra	0.47 µm
Rz	4.80 µm
Rmax	6.72 µm
RzISO	4.91 µm
Rq	0.70 µm
Wt	2.42 µm

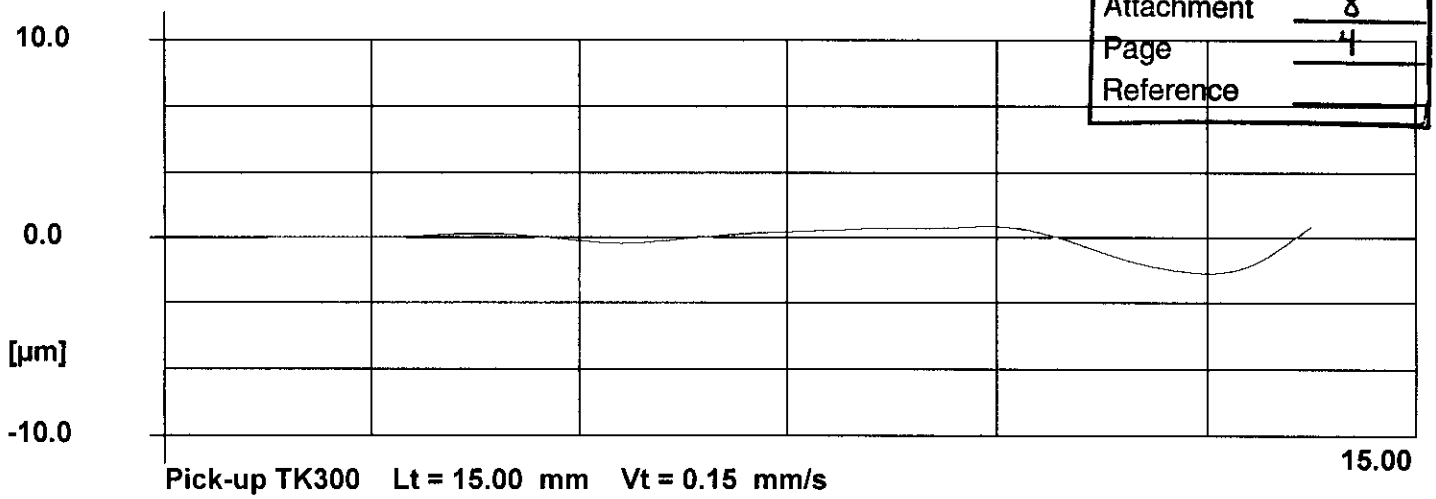
Rpm	1.07 µm
Rp3z	0.416
R3zm	3.27 µm
Rp	1.95 µm
RSm	0.133 mm
Rpm/R3z	0.416
Rku	12.644
Rsk	-2.29

	Act.	Nom.	LT	UT	<>
Rpk	0.49 µm	0.15	0.00	0.30	0.19 µm
Rvk	1.64 µm	1.50	0.50	2.50	0.00 µm
Mr1	4.5 %	5.0	0.0	10.0	0.0 %
Mr2	72.7 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	22.47 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.71 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	5.74 µm	3.00	0.00	6.00	0.00 µm
Rpk*	1.23 µm	3.00	0.00	6.00	0.00 µm
R3z	2.58 µm	3.25	2.50	5.00	0.00 µm



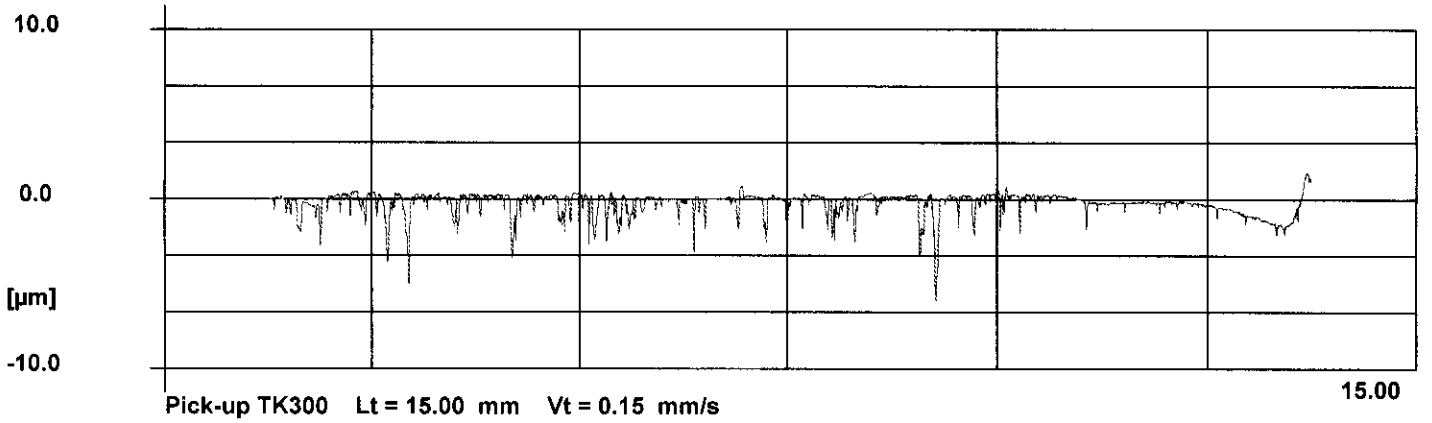
Attachment 8
Page 4
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 2.500 mm



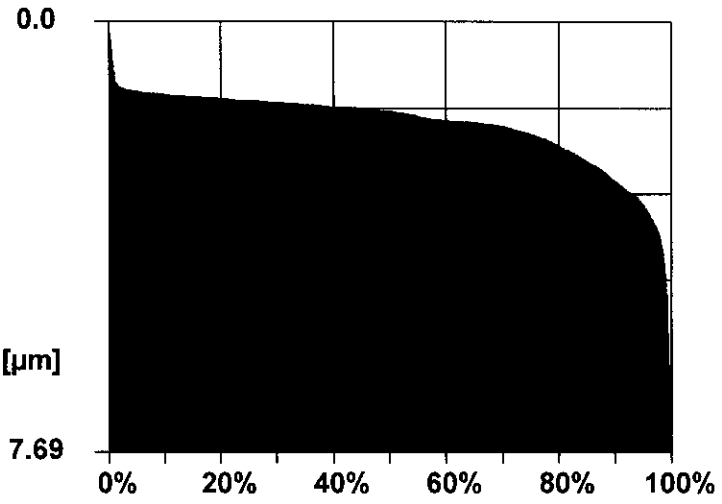
Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 2.500 mm

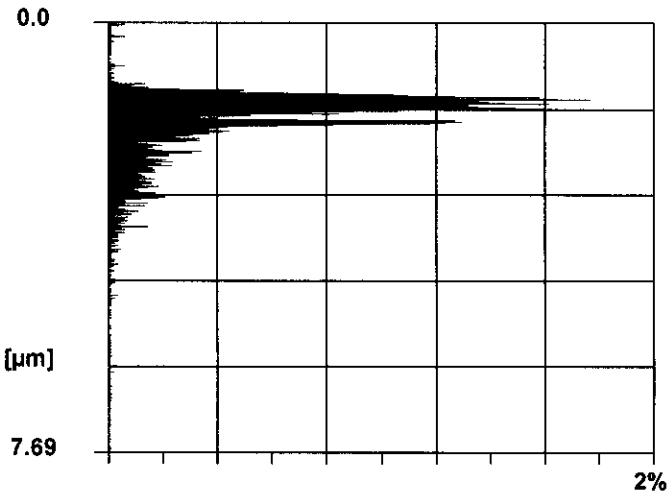


Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	0.6 %
Rmr02(1.000µm)	1.0 %
Rmr03(1.500µm)	19.4 %
Rmr04(2.000µm)	62.5 %
Rmr05(2.500µm)	84.2 %
Rmr06(3.000µm)	91.8 %
Rmr07(3.500µm)	95.8 %
Rmr08(4.000µm)	98.2 %
Rmr09(4.500µm)	99.0 %
Rmr10(5.000µm)	99.4 %

Rmr01(10.0 %)	1.43 µm
Rmr02(20.0 %)	1.51 µm
Rmr03(30.0 %)	1.60 µm
Rmr04(40.0 %)	1.68 µm
Rmr05(50.0 %)	1.78 µm
Rmr06(60.0 %)	1.98 µm
Rmr07(70.0 %)	2.07 µm
Rmr08(80.0 %)	2.31 µm
Rmr09(90.0 %)	2.86 µm
Rmr10(100.0 %)	7.71 µm

Attachment 8
Page 5
Reference

INSPECTION REPORT

03.18.2002
06:11

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

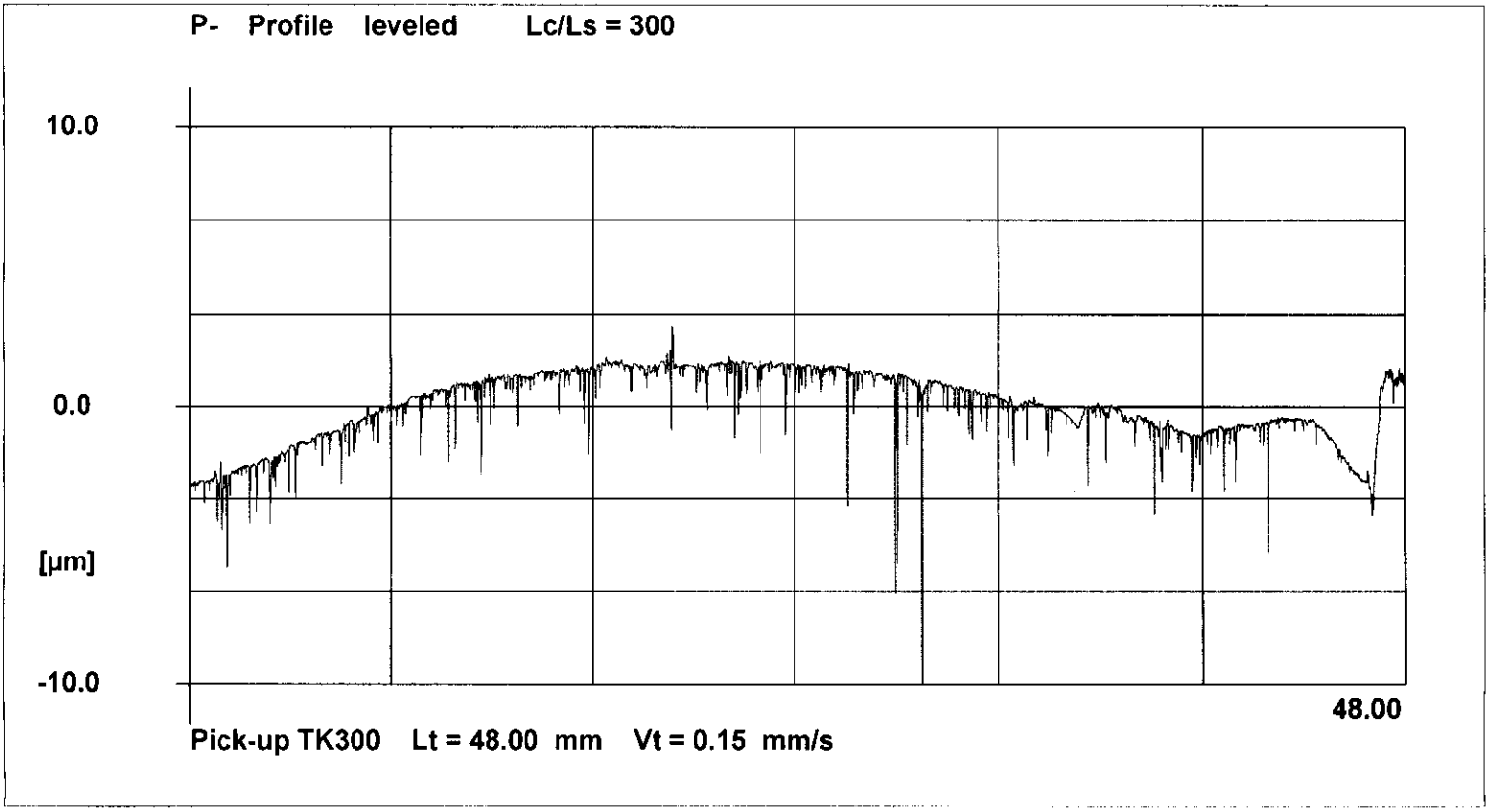
Pick-up type	TK300
Measuring range	80 µm
Assessment length	48.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	8.000 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 6 / #767
LOCATONS	48.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	12.86 µm
Rt	12.07 µm
Ra	0.25 µm
Rz	6.46 µm
Rmax	11.07 µm
RzISO	7.50 µm
Rq	0.51 µm
Wt	3.08 µm

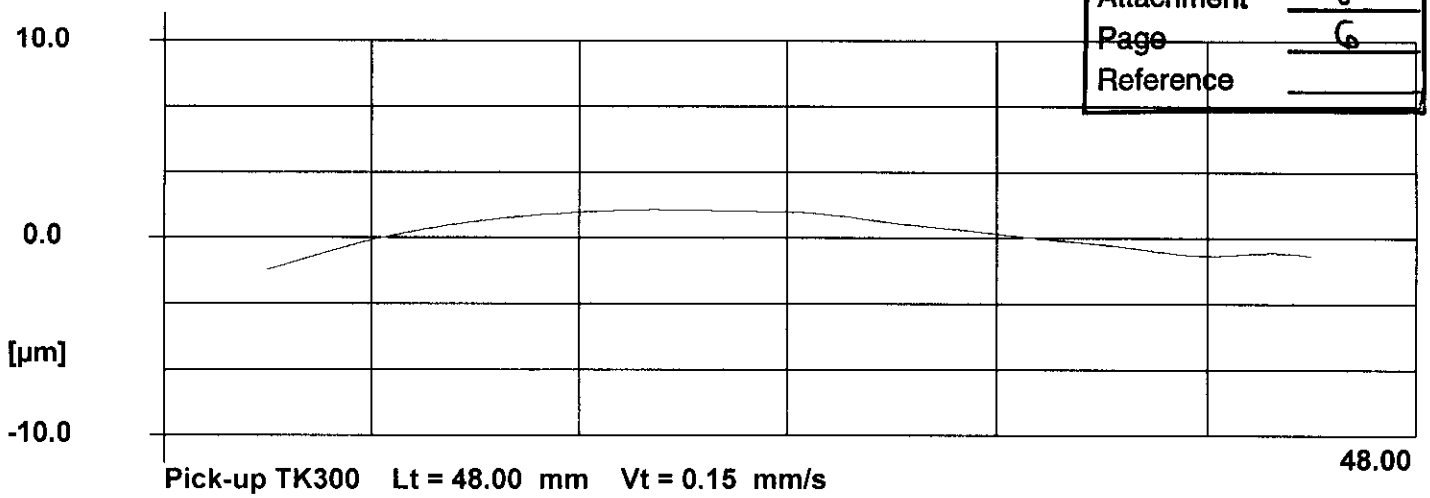
Rpm	0.69 µm
Rp3z	0.247
R3zm	3.42 µm
Rp	1.50 µm
RSm	0.188 mm
Rpm/R3z	0.247
Rku	106.62
Rsk	-7.90

	Act.	Nom.	LT	UT	<>
Rpk	0.18 µm	0.15	0.00	0.30	0.00 µm
Rvk	1.00 µm	1.50	0.50	2.50	0.00 µm
Mr1	6.3 %	5.0	0.0	10.0	0.0 %
Mr2	79.2 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	10.39 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.36 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	10.63 µm	3.00	0.00	6.00	4.63 µm
Rpk*	1.22 µm	3.00	0.00	6.00	0.00 µm
R3z	2.78 µm	3.25	2.50	5.00	0.00 µm



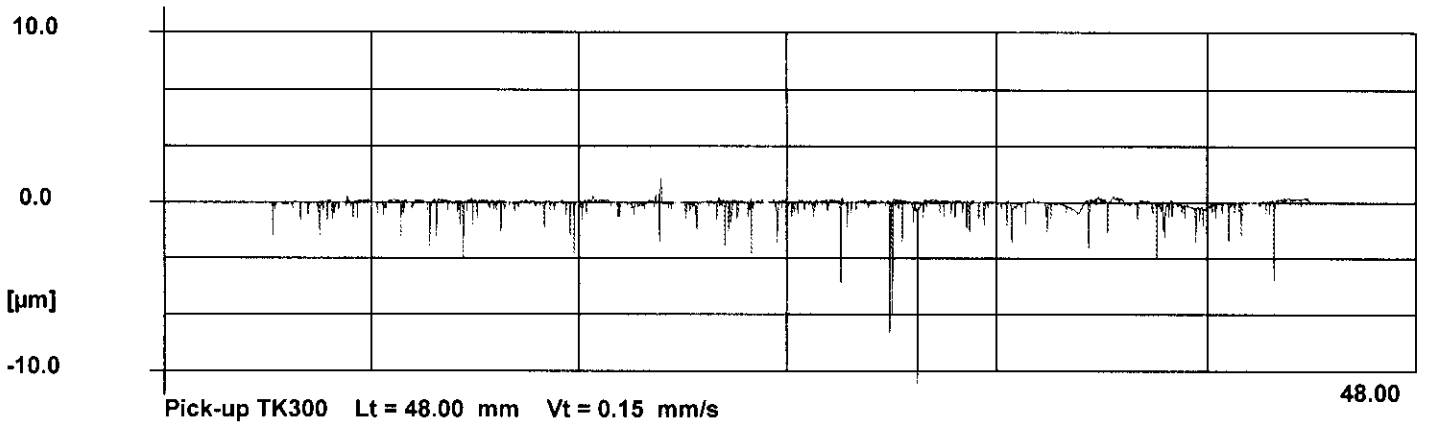
Attachment 8
Page 6
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 8.000 mm



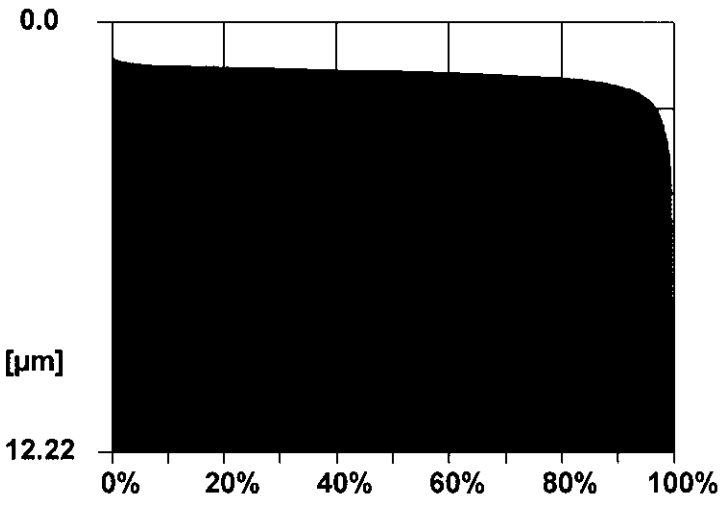
Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 8.000 mm

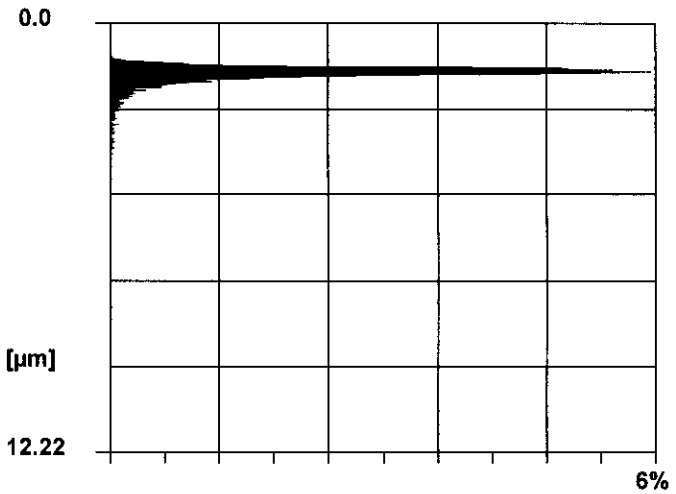


Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	0.1 %
Rmr02(1.000µm)	0.5 %
Rmr03(1.500µm)	75.5 %
Rmr04(2.000µm)	94.1 %
Rmr05(2.500µm)	97.3 %
Rmr06(3.000µm)	98.4 %
Rmr07(3.500µm)	99.1 %
Rmr08(4.000µm)	99.4 %
Rmr09(4.500µm)	99.6 %
Rmr10(5.000µm)	99.7 %

Rmr01(10.0 %)	1.20 µm
Rmr02(20.0 %)	1.26 µm
Rmr03(30.0 %)	1.30 µm
Rmr04(40.0 %)	1.34 µm
Rmr05(50.0 %)	1.38 µm
Rmr06(60.0 %)	1.42 µm
Rmr07(70.0 %)	1.46 µm
Rmr08(80.0 %)	1.56 µm
Rmr09(90.0 %)	1.78 µm
Rmr10(100.0 %)	12.07 µm

Attachment 3
Page 7

INSPECTION REPORT

03.18.2002
06:29

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

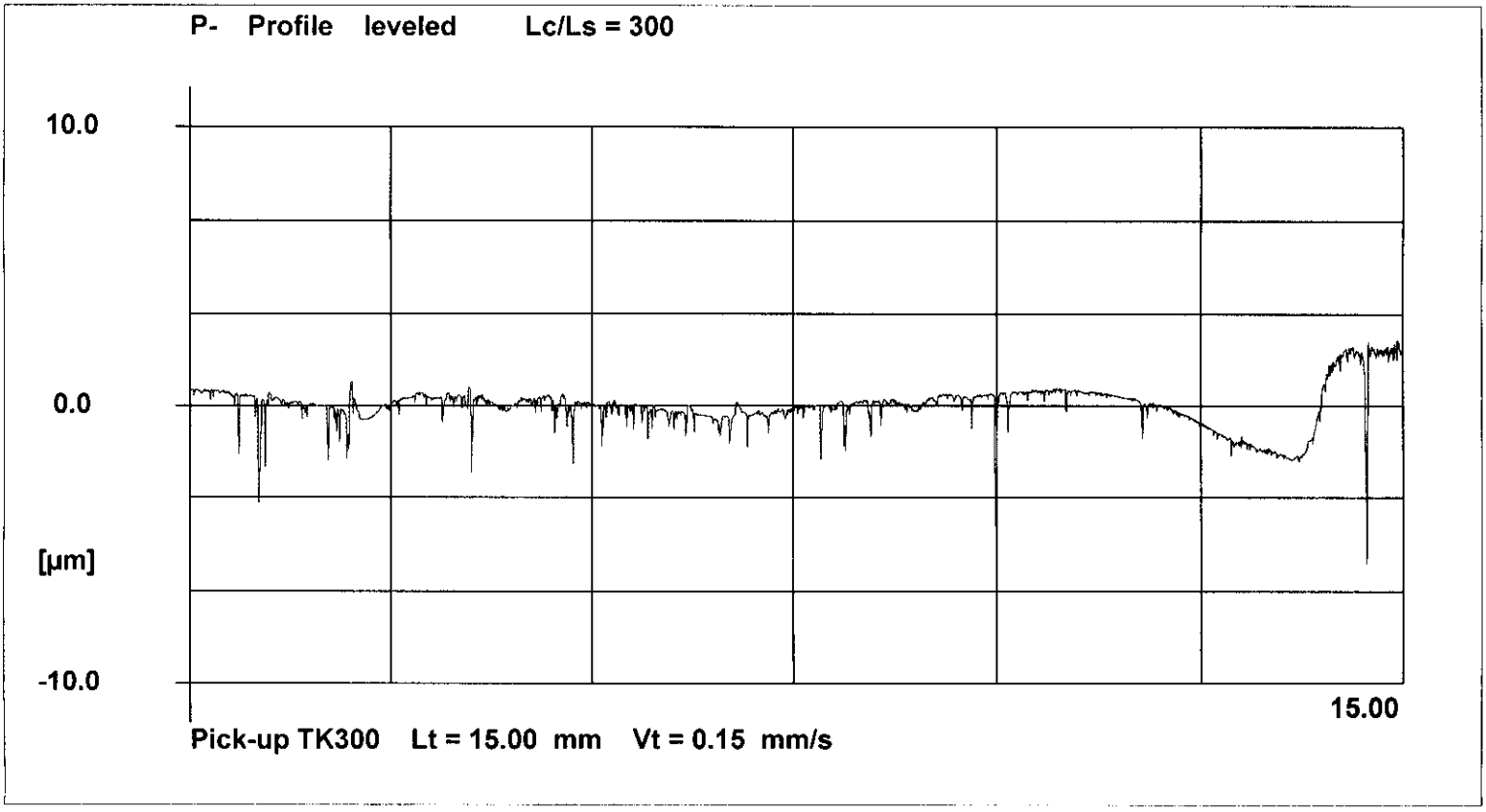
Pick-up type	TK300
Measuring range	80 µm
Assessment length	15.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	2.500 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 6 / #767
LOCATONS	15.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	8.08 µm
Rt	5.62 µm
Ra	0.20 µm
Rz	3.00 µm
Rmax	4.89 µm
RzISO	3.19 µm
Rq	0.35 µm
Wt	1.69 µm

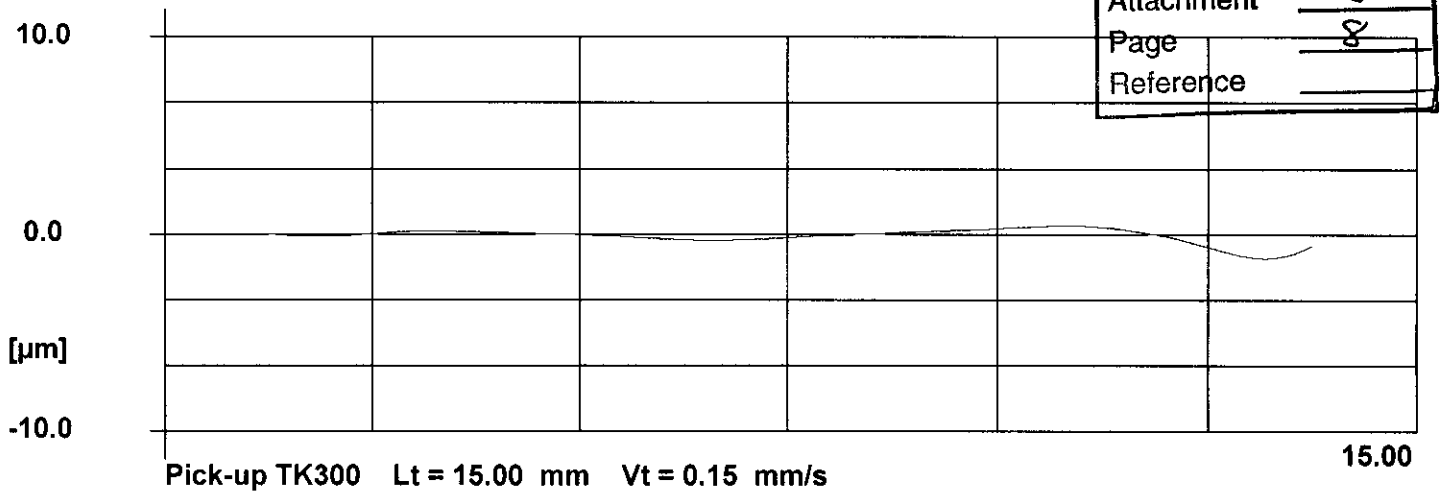
Rpm	0.48 µm
Rp3z	0.322
R3zm	2.20 µm
Rp	1.00 µm
RSm	0.102 mm
Rpm/R3z	0.322
Rku	31.654
Rsk	-3.84

	Act.	Nom.	LT	UT	<>
Rpk	0.20 µm	0.15	0.00	0.30	0.00 µm
Rvk	0.88 µm	1.50	0.50	2.50	0.00 µm
Mr1	4.5 %	5.0	0.0	10.0	0.0 %
Mr2	72.7 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	12.05 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.33 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	4.57 µm	3.00	0.00	6.00	0.00 µm
Rpk*	0.67 µm	3.00	0.00	6.00	0.00 µm
R3z	1.50 µm	3.25	2.50	5.00	-1.00 µm



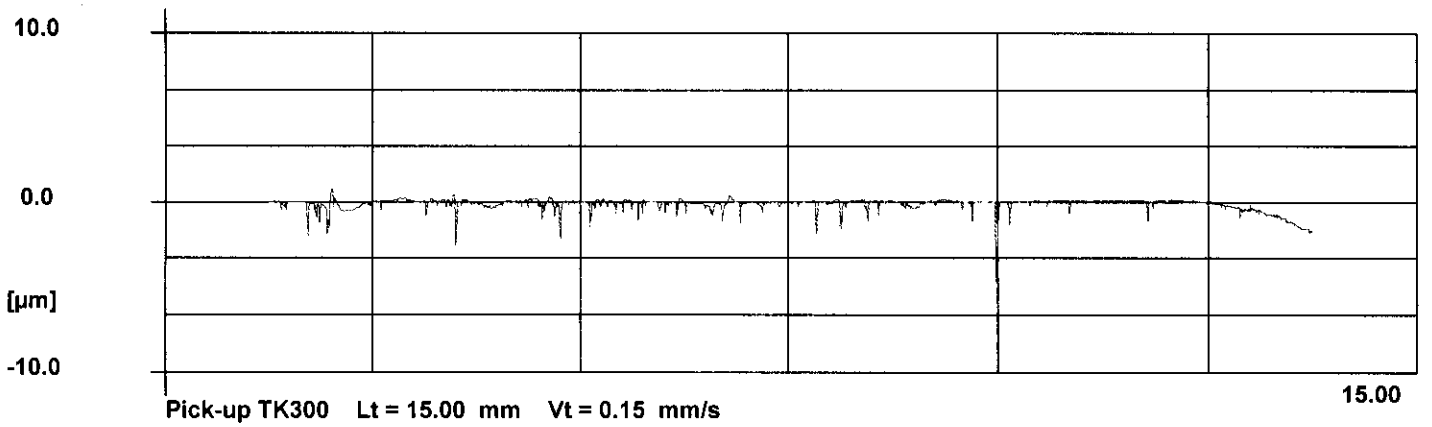
Attachment 8
Page 8
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 2.500 mm



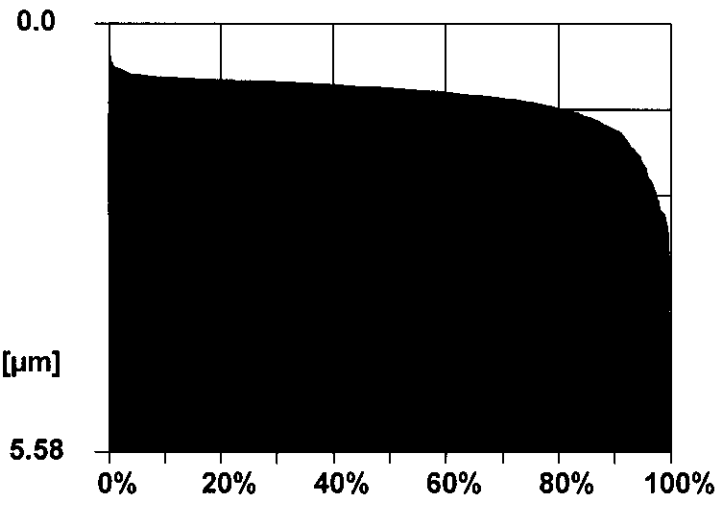
Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 2.500 mm

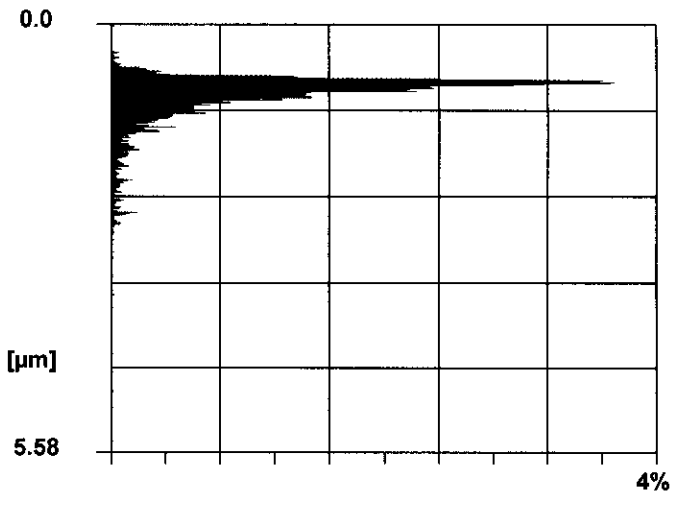


Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	0.4 %	Rmr01(10.0 %)	0.80 µm
Rmr02(1.000µm)	64.6 %	Rmr02(20.0 %)	0.84 µm
Rmr03(1.500µm)	93.1 %	Rmr03(30.0 %)	0.87 µm
Rmr04(2.000µm)	97.1 %	Rmr04(40.0 %)	0.89 µm
Rmr05(2.500µm)	99.4 %	Rmr05(50.0 %)	0.92 µm
Rmr06(3.000µm)	99.7 %	Rmr06(60.0 %)	0.98 µm
Rmr07(3.500µm)	99.8 %	Rmr07(70.0 %)	1.04 µm
Rmr08(4.000µm)	99.8 %	Rmr08(80.0 %)	1.15 µm
Rmr09(4.500µm)	99.9 %	Rmr09(90.0 %)	1.36 µm
Rmr10(5.000µm)	99.9 %	Rmr10(100.0 %)	5.62 µm

Attachment 8
Page 9
Reference

INSPECTION REPORT

03.18.2002
06:26

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

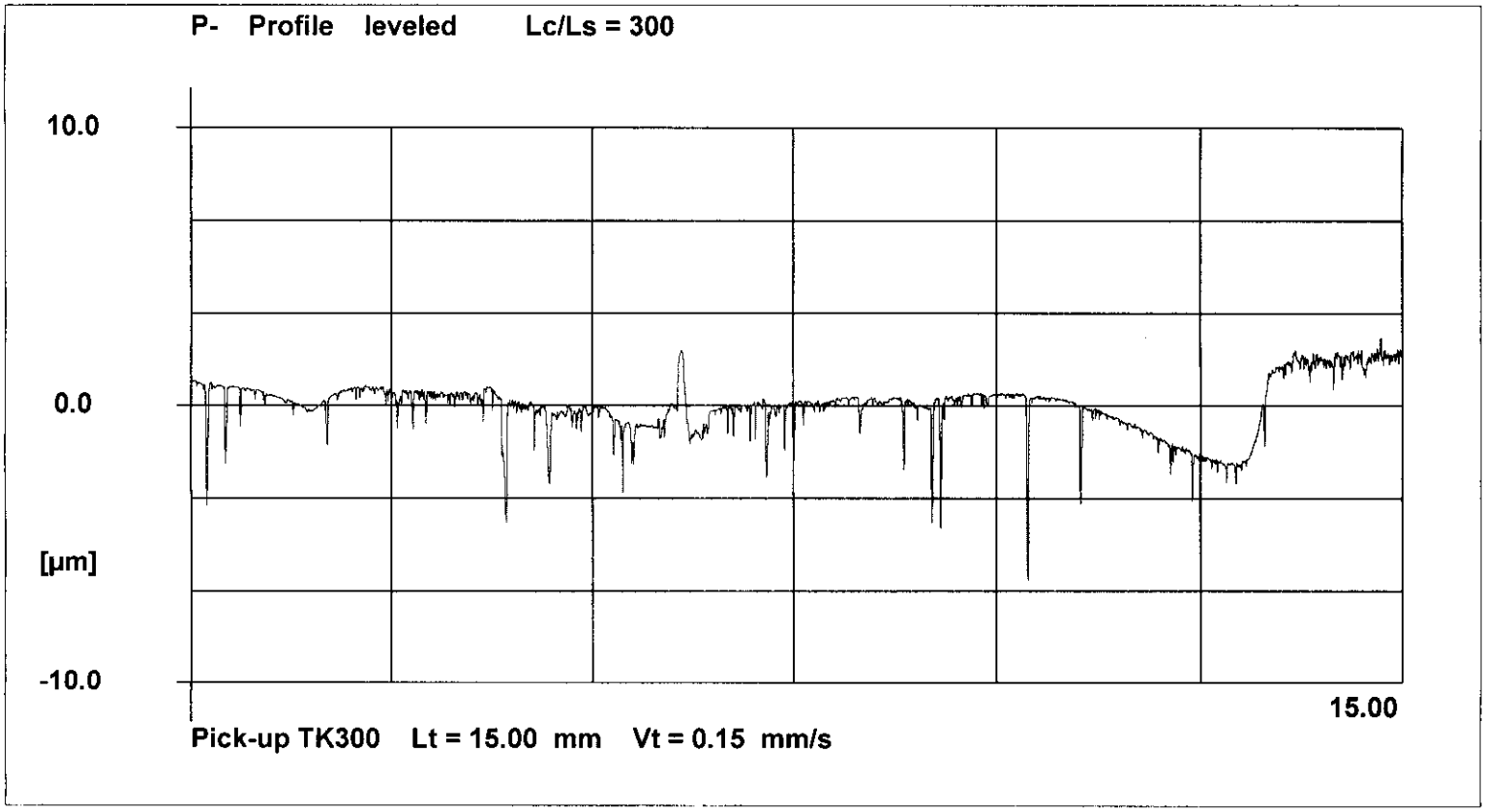
Pick-up type	TK300
Measuring range	80 µm
Assessment length	15.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	2.500 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 6 / #767
LOCATONS	15.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	8.73 µm
Rt	8.77 µm
Ra	0.35 µm
Rz	4.31 µm
Rmax	6.72 µm
RzISO	5.39 µm
Rq	0.60 µm
Wt	2.50 µm

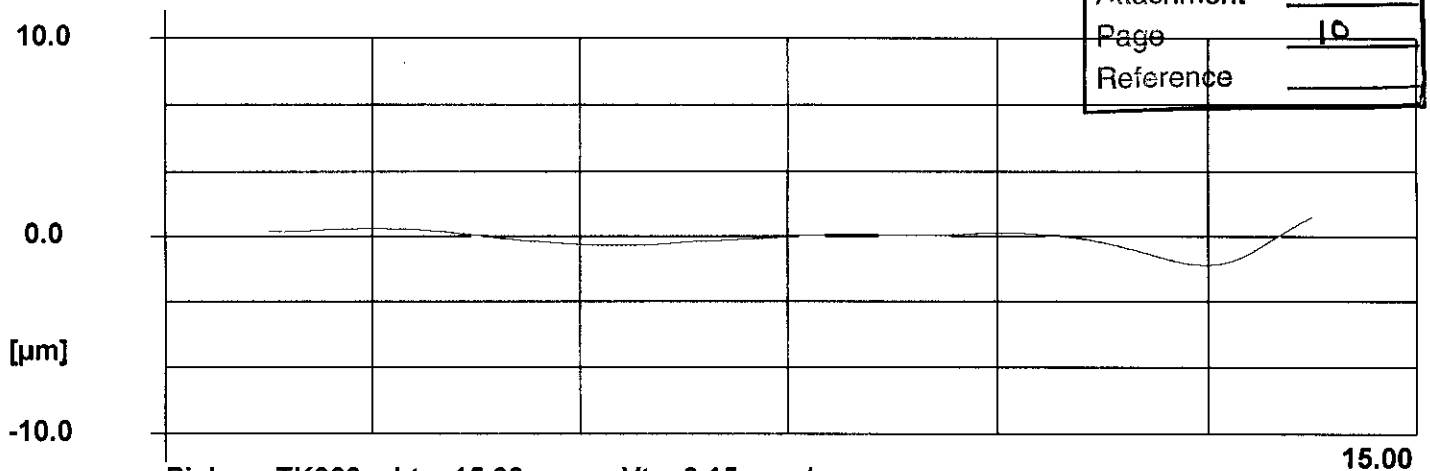
Rpm	1.01 µm
Rp3z	0.369
R3zm	4.55 µm
Rp	2.40 µm
RSm	0.114 mm
Rpm/R3z	0.369
Rku	24.259
Rsk	-2.94

	Act.	Nom.	LT	UT	<>
Rpk	0.91 µm	0.15	0.00	0.30	0.61 µm
Rvk	1.29 µm	1.50	0.50	2.50	0.00 µm
Mr1	6.2 %	5.0	0.0	10.0	0.0 %
Mr2	70.6 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	18.99 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.45 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	6.30 µm	3.00	0.00	6.00	0.30 µm
Rpk*	1.92 µm	3.00	0.00	6.00	0.00 µm
R3z	2.73 µm	3.25	2.50	5.00	0.00 µm



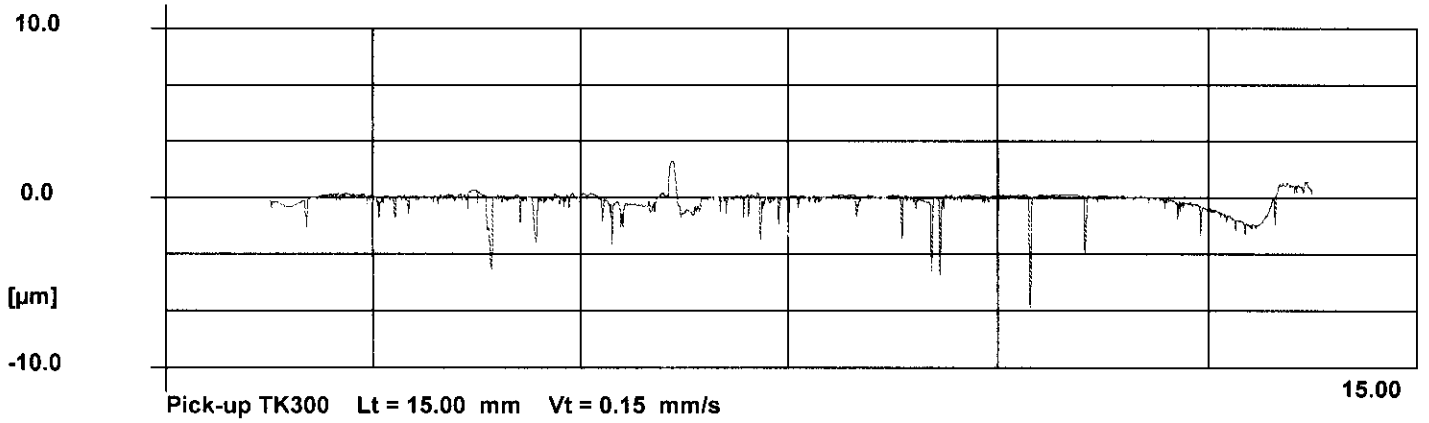
Attachment 8
Page 10
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 2.500 mm



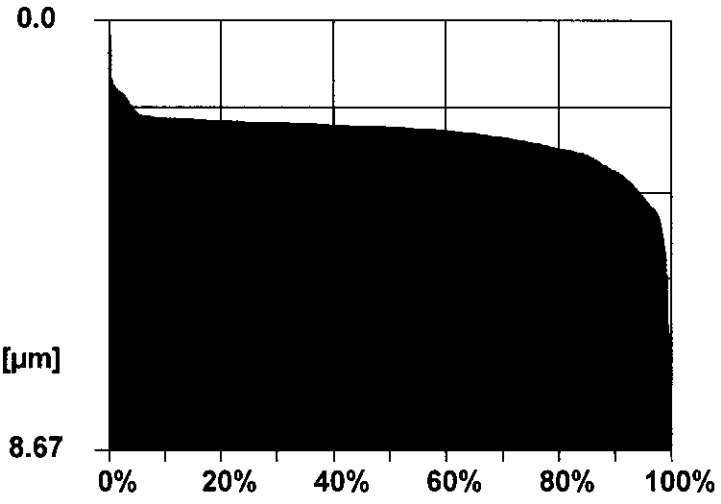
Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 2.500 mm

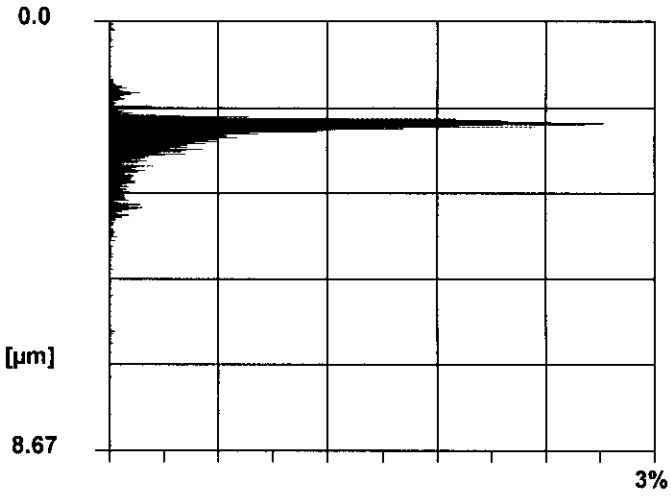


Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	0.4 %
Rmr02(1.000µm)	0.5 %
Rmr03(1.500µm)	2.8 %
Rmr04(2.000µm)	6.7 %
Rmr05(2.500µm)	74.1 %
Rmr06(3.000µm)	90.0 %
Rmr07(3.500µm)	95.7 %
Rmr08(4.000µm)	97.9 %
Rmr09(4.500µm)	98.7 %
Rmr10(5.000µm)	99.2 %

Rmr01(10.0 %)	2.07 µm
Rmr02(20.0 %)	2.13 µm
Rmr03(30.0 %)	2.18 µm
Rmr04(40.0 %)	2.23 µm
Rmr05(50.0 %)	2.28 µm
Rmr06(60.0 %)	2.34 µm
Rmr07(70.0 %)	2.45 µm
Rmr08(80.0 %)	2.62 µm
Rmr09(90.0 %)	3.01 µm
Rmr10(100.0 %)	8.77 µm

Attachment 8
Page 11

INSPECTION REPORT

03.18.2002
08:05

Reference

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

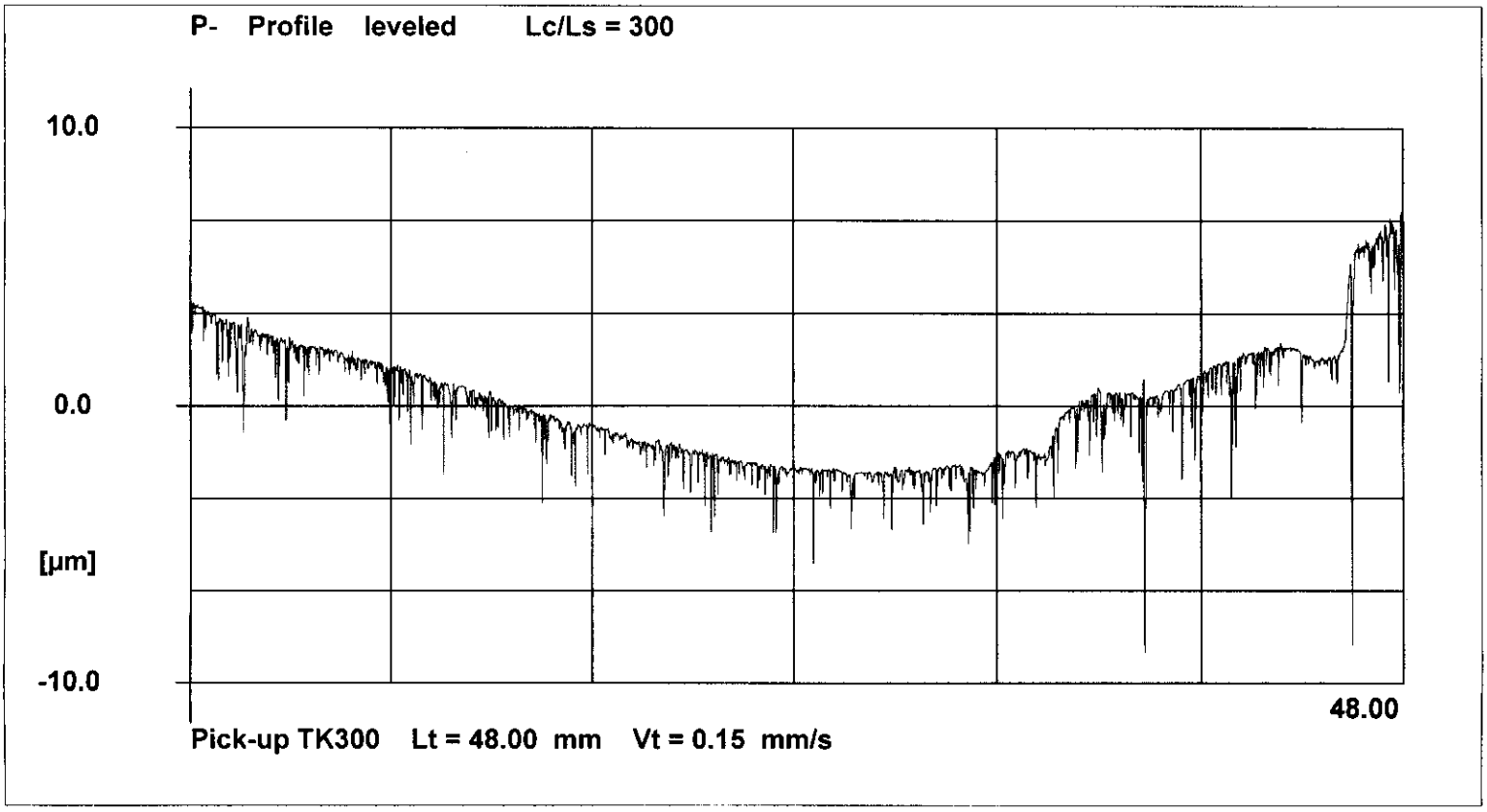
Pick-up type	**TK300**
Measuring range	**80 µm**
Assessment length	**48.00 mm**
Speed	**0.15 mm/s**
Lc (Cut Off)	**8.000 mm**
Filter	**M1 DIN4777**
Zero Line Pmr:	**0.00 %**
Zero Line Rmr:	**0.00 %**

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 7 / #767
LOCATONS	48.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	16.02 µm
Rt	10.02 µm
Ra	0.30 µm
Rz	4.86 µm
Rmax	10.02 µm
RzISO	5.49 µm
Rq	0.54 µm
Wt	4.65 µm

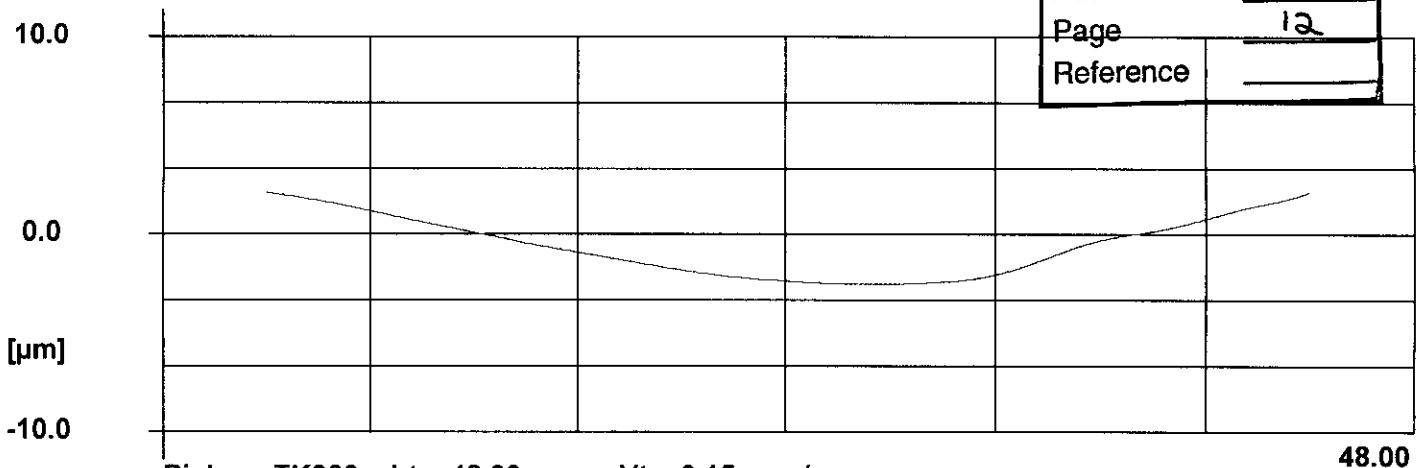
Rpm	0.65 µm
Rp3z	0.233
R3zm	3.81 µm
Rp	1.03 µm
RSm	0.155 mm
Rpm/R3z	0.233
Rku	61.908
Rsk	-5.53

	Act.	Nom.	LT	UT	<>
Rpk	0.29 µm	0.15	0.00	0.30	0.00 µm
Rvk	1.10 µm	1.50	0.50	2.50	0.00 µm
Mr1	8.3 %	5.0	0.0	10.0	0.0 %
Mr2	75.6 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	13.45 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.44 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	9.02 µm	3.00	0.00	6.00	3.02 µm
Rpk*	0.61 µm	3.00	0.00	6.00	0.00 µm
R3z	2.81 µm	3.25	2.50	5.00	0.00 µm



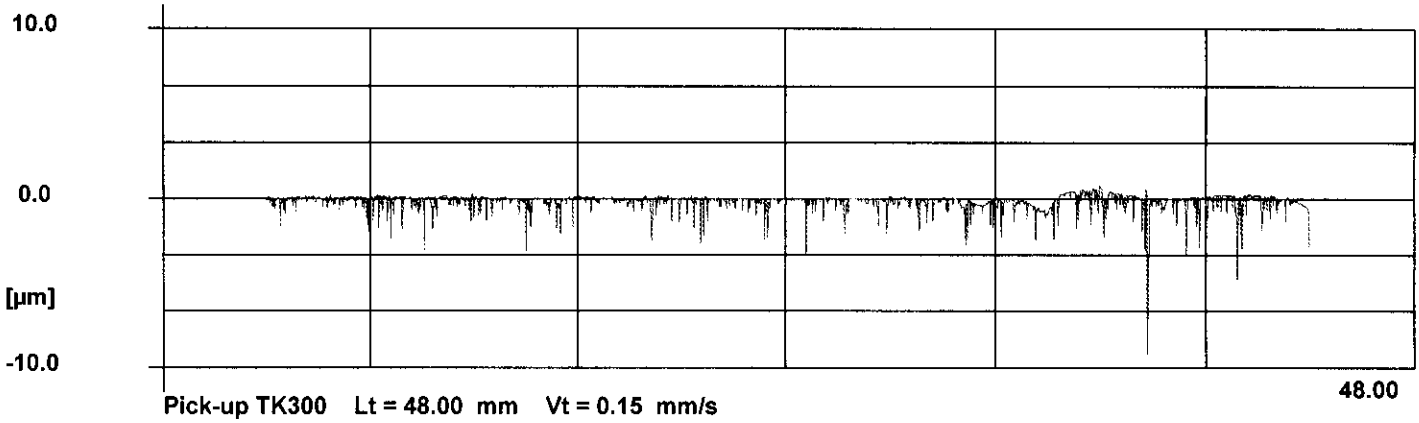
Attachment 8
Page 12
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 8.000 mm



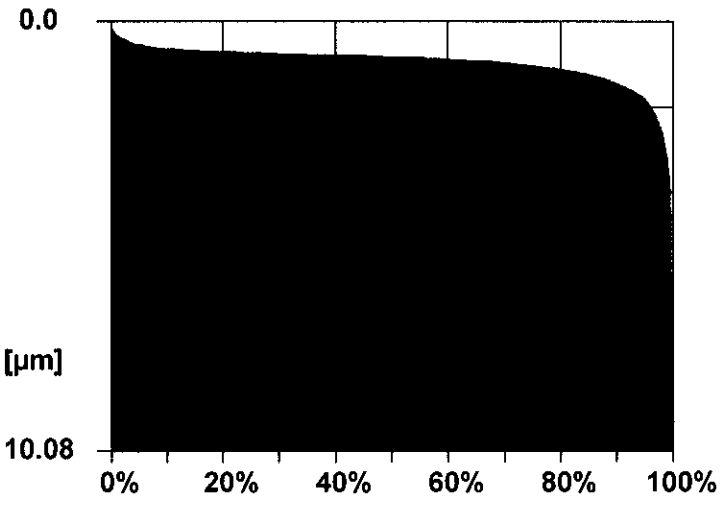
Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 8.000 mm

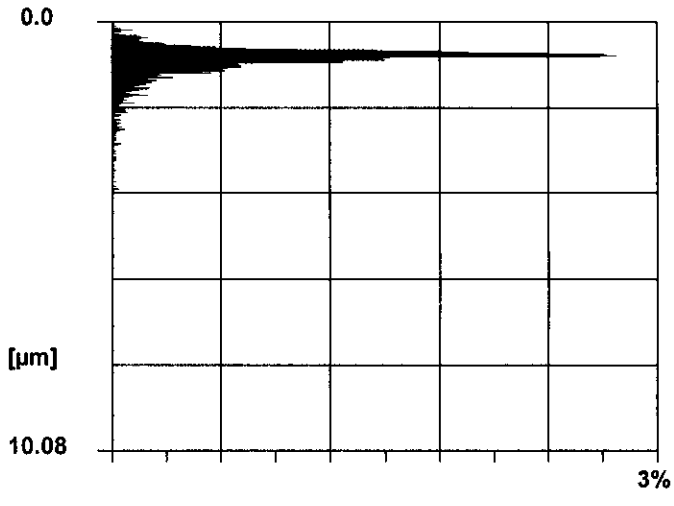


Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	3.8 %
Rmr02(1.000µm)	65.6 %
Rmr03(1.500µm)	90.0 %
Rmr04(2.000µm)	95.8 %
Rmr05(2.500µm)	97.7 %
Rmr06(3.000µm)	98.7 %
Rmr07(3.500µm)	99.3 %
Rmr08(4.000µm)	99.6 %
Rmr09(4.500µm)	99.7 %
Rmr10(5.000µm)	99.7 %

Rmr01(10.0 %)	0.67 µm
Rmr02(20.0 %)	0.79 µm
Rmr03(30.0 %)	0.84 µm
Rmr04(40.0 %)	0.88 µm
Rmr05(50.0 %)	0.92 µm
Rmr06(60.0 %)	0.97 µm
Rmr07(70.0 %)	1.04 µm
Rmr08(80.0 %)	1.18 µm
Rmr09(90.0 %)	1.51 µm
Rmr10(100.0 %)	10.02 µm

Attachment 8
Page 13

INSPECTION REPORT

03.18.2002
08:31

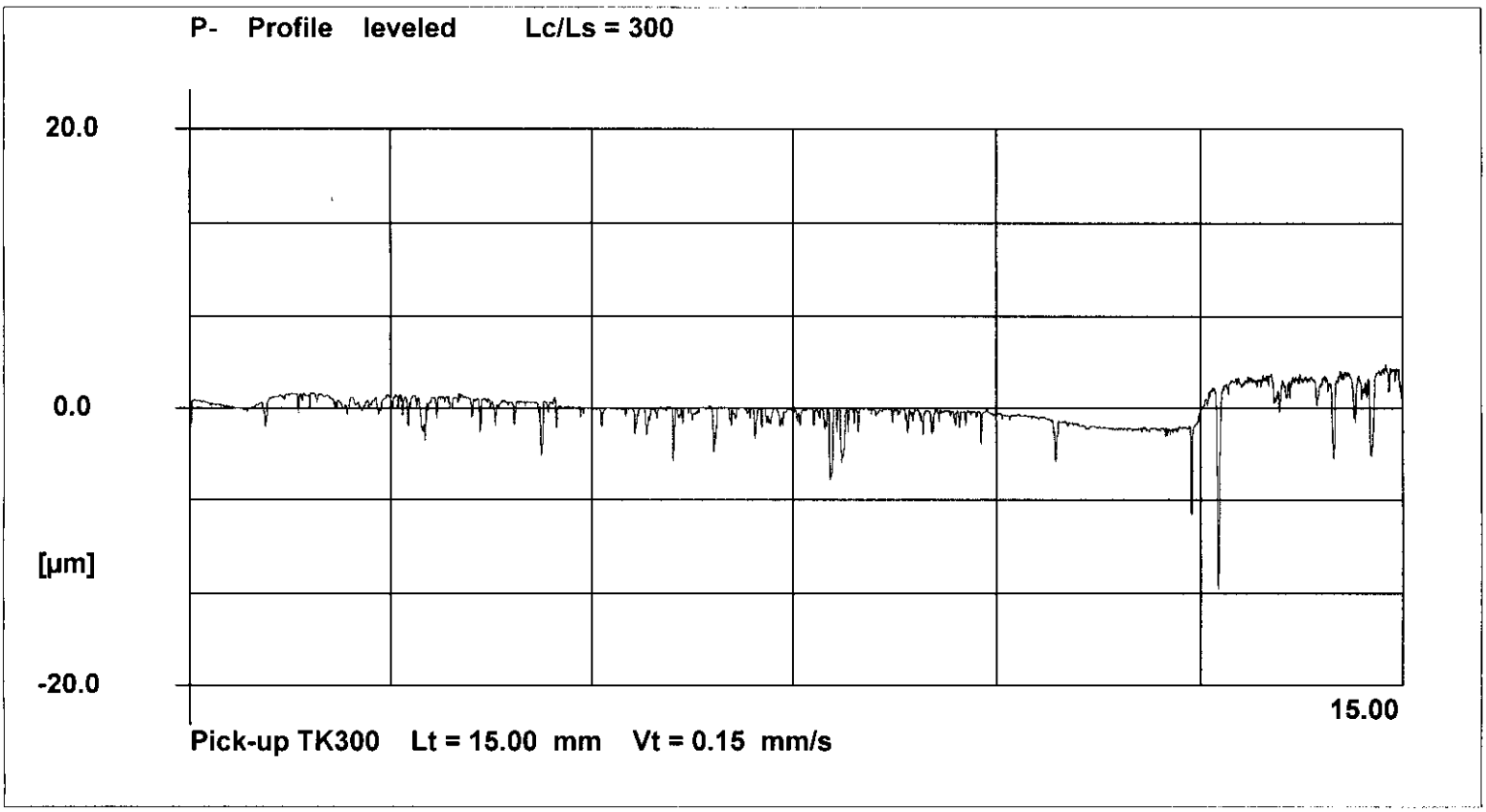
HOMMELWERKE	
Turbo Roughness V3.16	
Measuring conditions	
Pick-up type	TK300
Measuring range	80 µm
Assessment length	15.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	2.500 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 7 / #767
LOCATONS	15.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	16.29 µm
Rt	14.71 µm
Ra	0.44 µm
Rz	6.24 µm
Rmax	14.71 µm
RzISO	7.45 µm
Rq	0.86 µm
Wt	3.08 µm

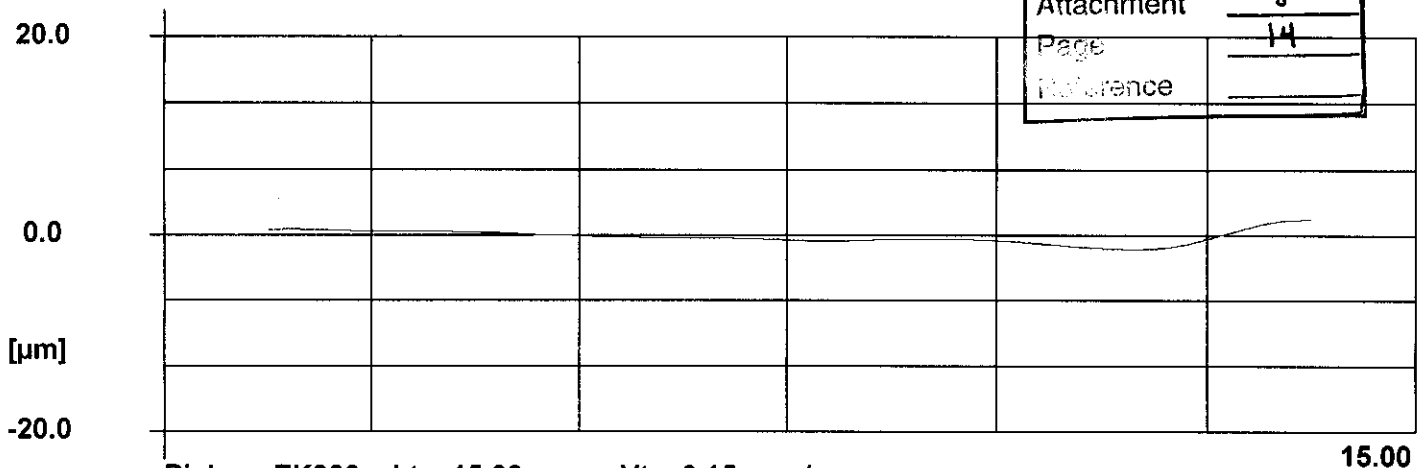
Rpm	0.83 µm
Rp3z	0.306
R3zm	3.57 µm
Rp	1.53 µm
RSm	0.115 mm
Rpm/R3z	0.306
Rku	78.862
Rsk	-6.57

	Act.	Nom.	LT	UT	<>
Rpk	0.52 µm	0.15	0.00	0.30	0.22 µm
Rvk	1.56 µm	1.50	0.50	2.50	0.00 µm
Mr1	7.9 %	5.0	0.0	10.0	0.0 %
Mr2	73.1 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	20.98 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.59 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	13.44 µm	3.00	0.00	6.00	7.44 µm
Rpk*	0.73 µm	3.00	0.00	6.00	0.00 µm
R3z	2.72 µm	3.25	2.50	5.00	0.00 µm



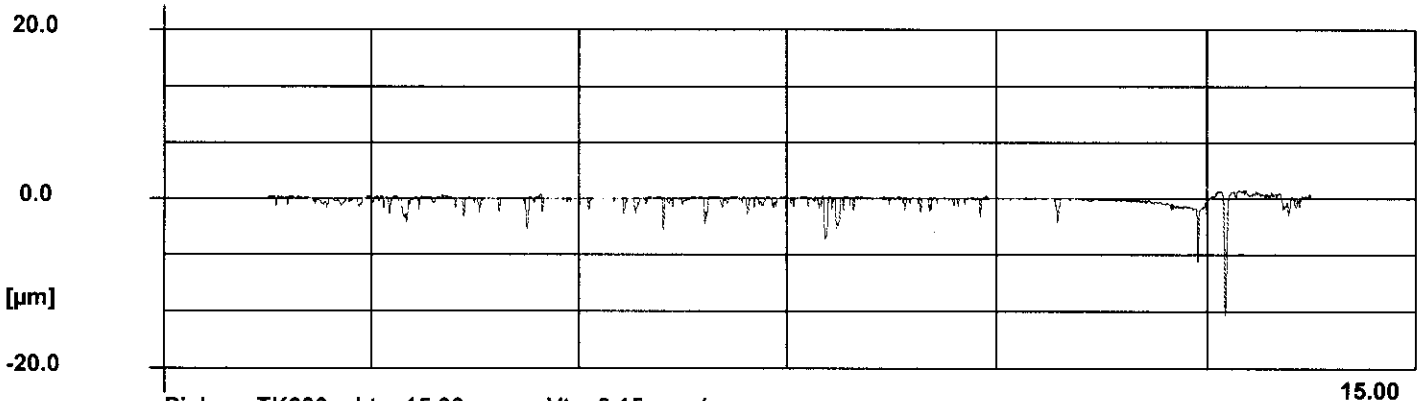
W- Profile leveled Filter M1 DIN4777 Lc = 2.500 mm

Attachment 8
Page 14
Reference



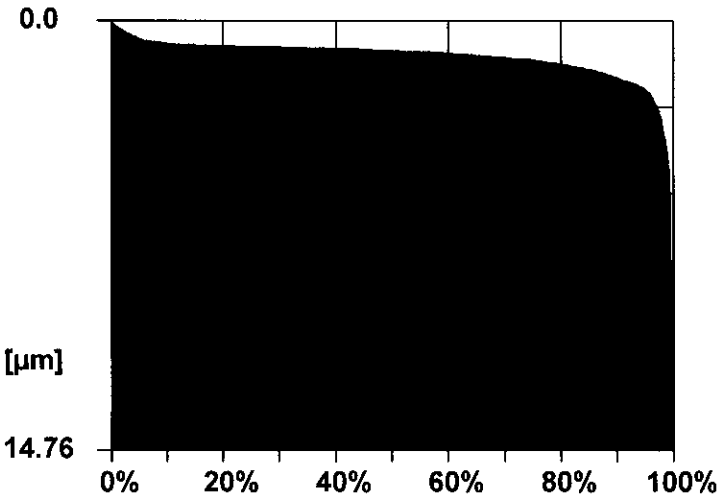
Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 2.500 mm

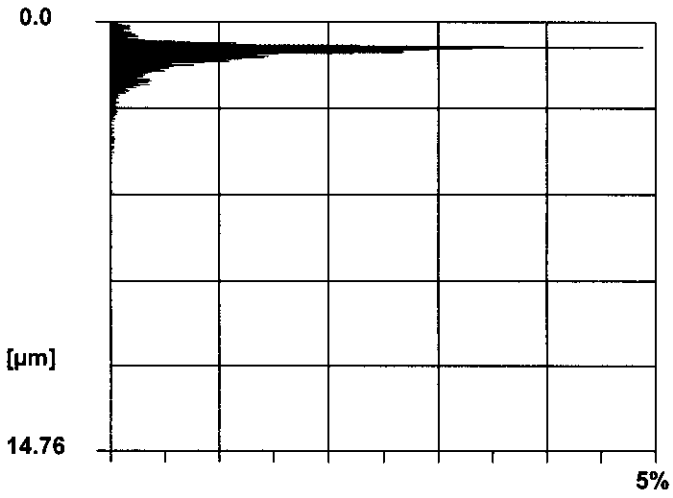


Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	2.9 %	Rmr01(10.0 %)	1.03 µm
Rmr02(1.000µm)	8.2 %	Rmr02(20.0 %)	1.13 µm
Rmr03(1.500µm)	64.1 %	Rmr03(30.0 %)	1.22 µm
Rmr04(2.000µm)	87.0 %	Rmr04(40.0 %)	1.31 µm
Rmr05(2.500µm)	94.6 %	Rmr05(50.0 %)	1.38 µm
Rmr06(3.000µm)	96.6 %	Rmr06(60.0 %)	1.46 µm
Rmr07(3.500µm)	97.8 %	Rmr07(70.0 %)	1.59 µm
Rmr08(4.000µm)	98.3 %	Rmr08(80.0 %)	1.75 µm
Rmr09(4.500µm)	98.9 %	Rmr09(90.0 %)	2.13 µm
Rmr10(5.000µm)	99.2 %	Rmr10(100.0 %)	14.70 µm

Attachment 3
Page 15

INSPECTION REPORT

03.18.2002
08:49

HOMMELWERKE
Turbo Roughness V3.16
Measuring conditions

Pick-up type	TK300
Measuring range	80 µm
Assessment length	48.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	8.000 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

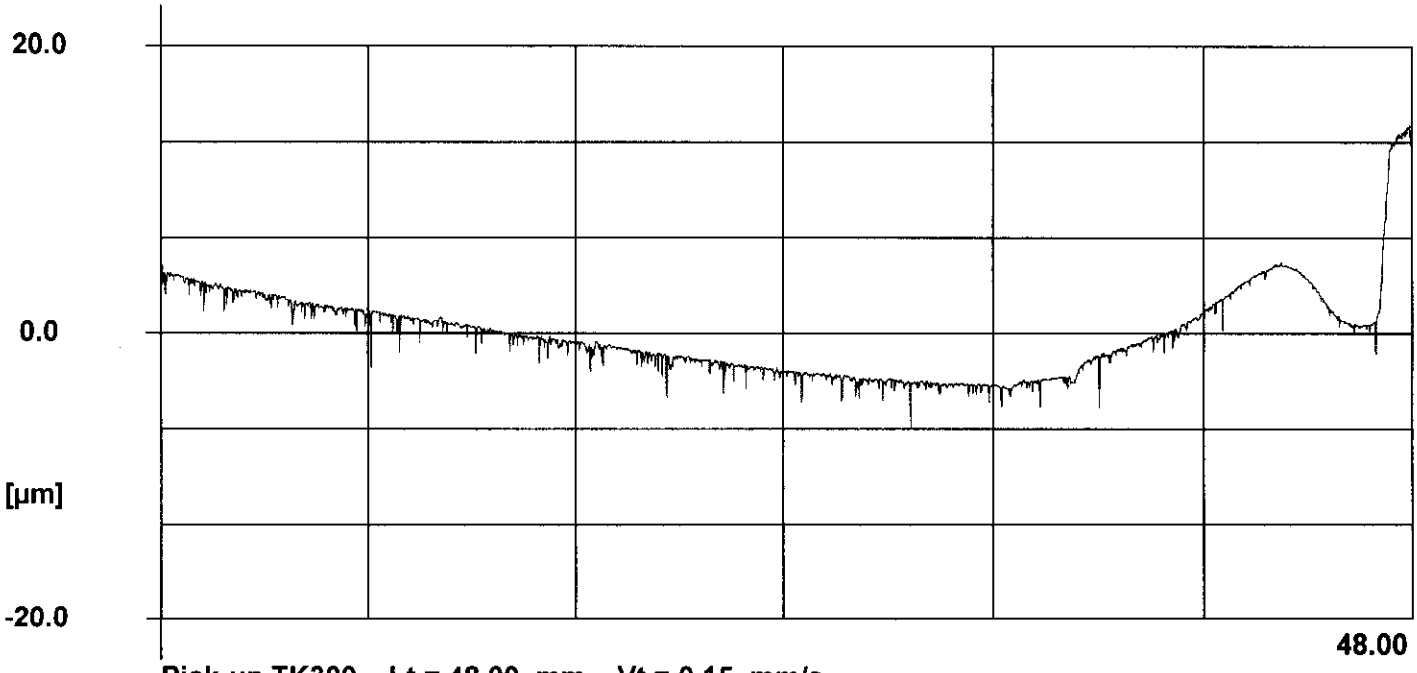
FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 8 / #767
LOCATONS	48.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	21.26 µm
Rt	5.26 µm
Ra	0.24 µm
Rz	3.64 µm
Rmax	4.84 µm
RzISO	3.52 µm
Rq	0.41 µm
Wt	7.03 µm

Rpm	0.63 µm
Rp3z	0.300
R3zm	2.75 µm
Rp	1.54 µm
RSm	0.172 mm
Rpm/R3z	0.300
Rku	13.303
Rsk	-0.95

	Act.	Nom.	LT	UT	<>
Rpk	0.79 µm	0.15	0.00	0.30	0.49 µm
Rvk	0.70 µm	1.50	0.50	2.50	0.00 µm
Mr1	8.3 %	5.0	0.0	10.0	0.0 %
Mr2	78.2 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	7.65 mm3/cm2	15.00	0.00	30.00	0.00 mm3/cm2
Rk	0.41 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	3.59 µm	3.00	0.00	6.00	0.00 µm
Rpk*	1.00 µm	3.00	0.00	6.00	0.00 µm
R3z	2.10 µm	3.25	2.50	5.00	-0.40 µm

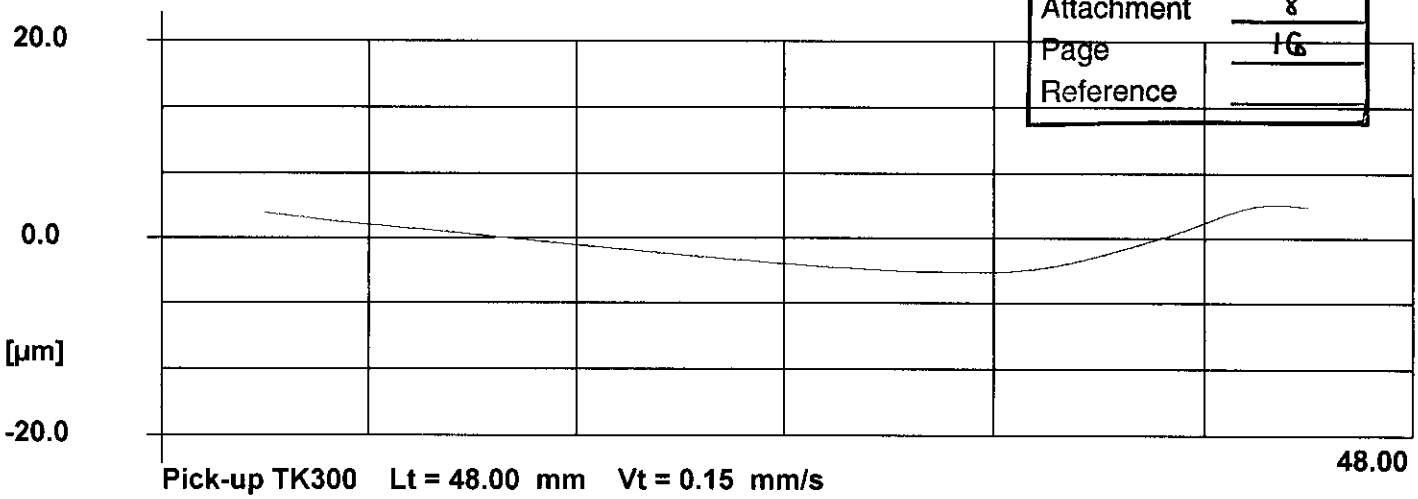
P- Profile leveled Lc/Ls = 300



Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

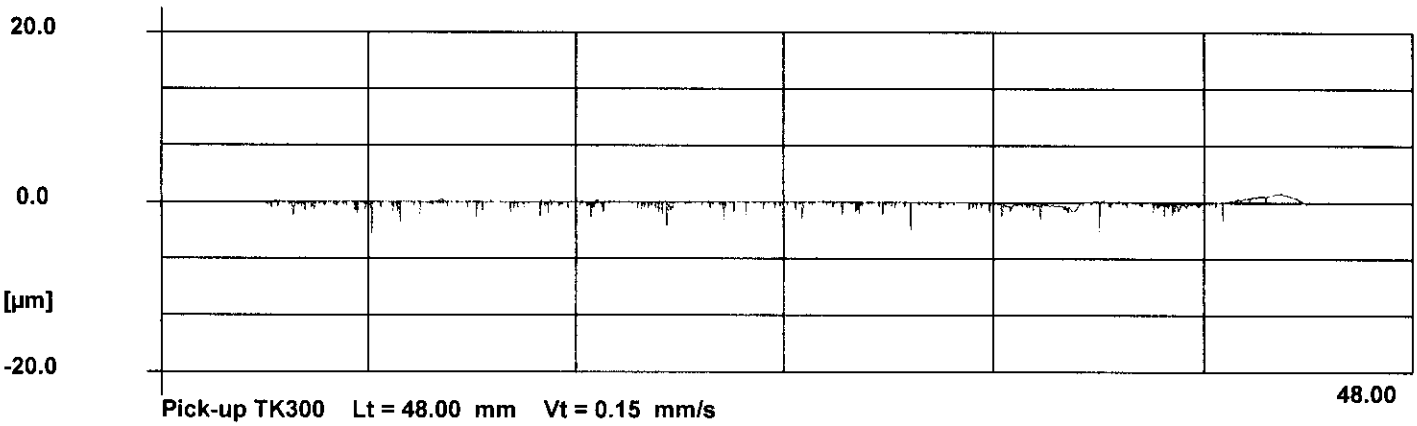
Attachment 8
Page 16
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 8.000 mm



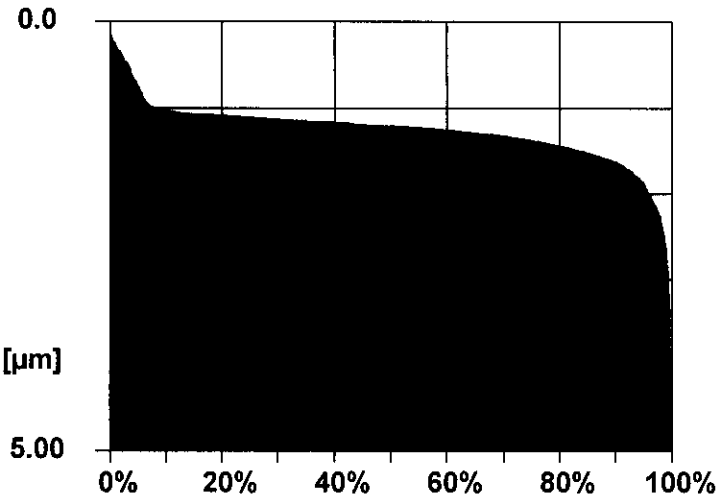
Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 8.000 mm

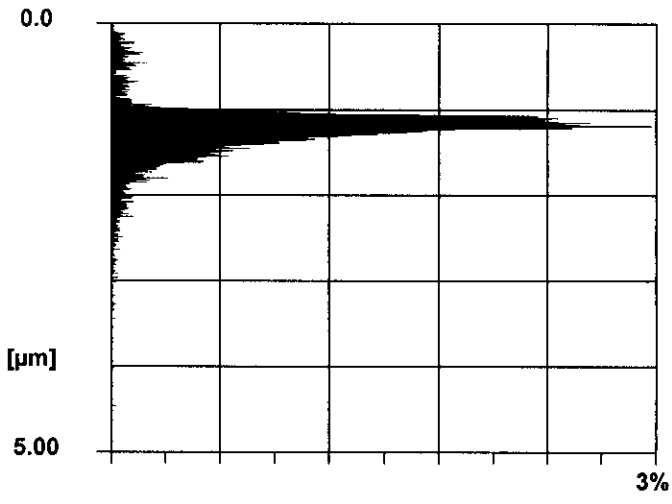


Pick-up TK300 Lt = 48.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency



Rmr01(0.500µm)	2.9 %
Rmr02(1.000µm)	5.9 %
Rmr03(1.500µm)	55.0 %
Rmr04(2.000µm)	93.1 %
Rmr05(2.500µm)	97.9 %
Rmr06(3.000µm)	99.2 %
Rmr07(3.500µm)	99.6 %
Rmr08(4.000µm)	99.8 %
Rmr09(4.500µm)	99.9 %
Rmr10(5.000µm)	99.9 %

Rmr01(10.0 %)	1.29 µm
Rmr02(20.0 %)	1.37 µm
Rmr03(30.0 %)	1.41 µm
Rmr04(40.0 %)	1.45 µm
Rmr05(50.0 %)	1.49 µm
Rmr06(60.0 %)	1.53 µm
Rmr07(70.0 %)	1.59 µm
Rmr08(80.0 %)	1.68 µm
Rmr09(90.0 %)	1.87 µm
Rmr10(100.0 %)	5.26 µm

Attachment 8
Page 17

INSPECTION REPORT

03.18.2002
09:24

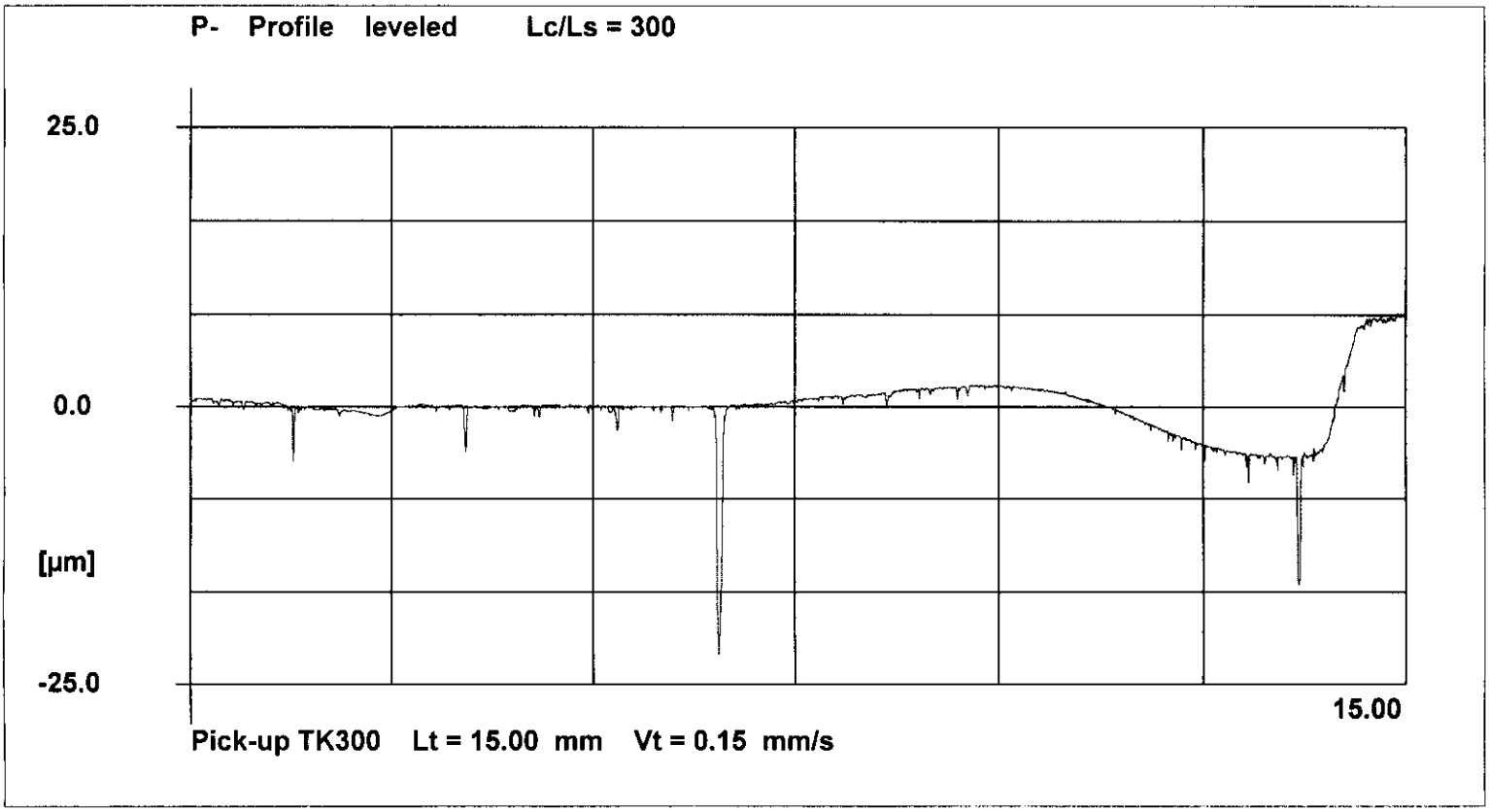
HOMMELWERKE	
Turbo Roughness V3.16	
Measuring conditions	
Pick-up type	TK300
Measuring range	80 µm
Assessment length	15.00 mm
Speed	0.15 mm/s
Lc (Cut Off)	2.500 mm
Filter	M1 DIN4777
Zero Line Pmr:	0.00 %
Zero Line Rmr:	0.00 %

FORD/WHITT/EMDO	CYL BORE S/F
ENGINE NUMBER	4.6L CYL BLOCK
SERIAL NUMBER	W.R. 0247784
CYLINDER BORES	L.H. / CYL # 8 / #767
LOCATONS	15.0MM/TOP OF CYL BORE
REQUESTOR	TO TOP OF CYL BLOCK
OPERATOR	SHEILA HARRIS

Pt	30.85 µm
Rt	22.45 µm
Ra	0.42 µm
Rz	9.14 µm
Rmax	22.45 µm
RzISO	7.78 µm
Rq	1.56 µm
Wt	6.01 µm

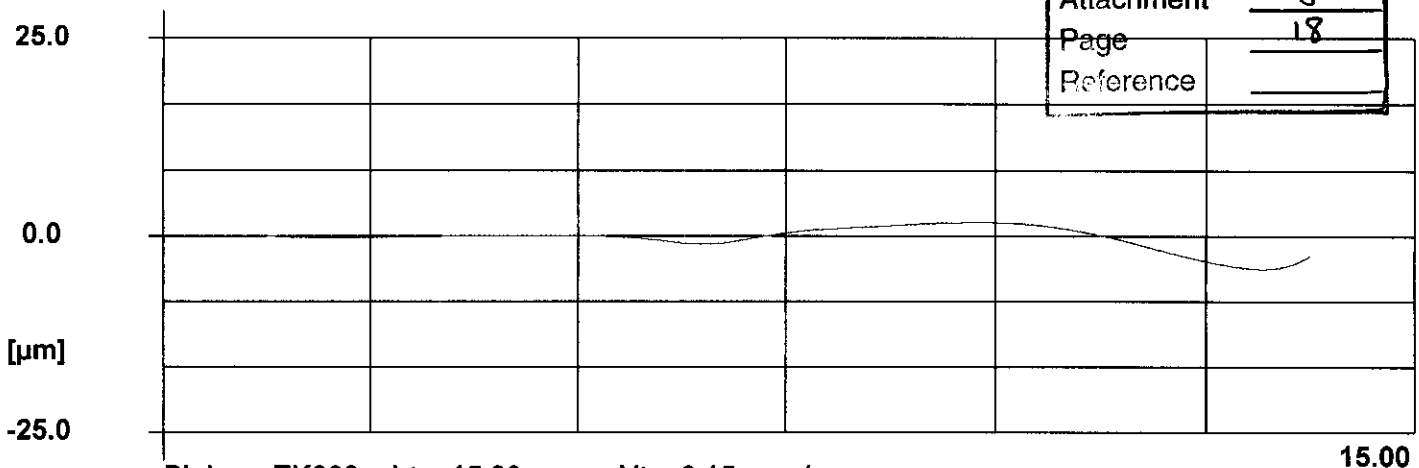
Rpm	0.68 µm
Rp3z	0.416
R3zm	2.89 µm
Rp	1.22 µm
RSm	0.132 mm
Rpm/R3z	0.416
Rku	106.45
Rsk	-9.56

	Act.	Nom.	LT	UT	<>
Rpk	0.09 µm	0.15	0.00	0.30	0.00 µm
Rvk	2.38 µm	1.50	0.50	2.50	0.00 µm
Mr1	2.8 %	5.0	0.0	10.0	0.0 %
Mr2	74.7 %	80.0	70.0	90.0	0.0 %
Vo(Mr2) 0.001*	30.13 mm3/cm2	15.00	0.00	30.00	0.13 mm3/cm2
Rk	0.44 µm	1.00	0.00	2.00	0.00 µm
REFERENCE ONLY					
Rvk*	22.09 µm	3.00	0.00	6.00	16.09 µm
Rpk*	0.23 µm	3.00	0.00	6.00	0.00 µm
R3z	1.63 µm	3.25	2.50	5.00	-0.87 µm



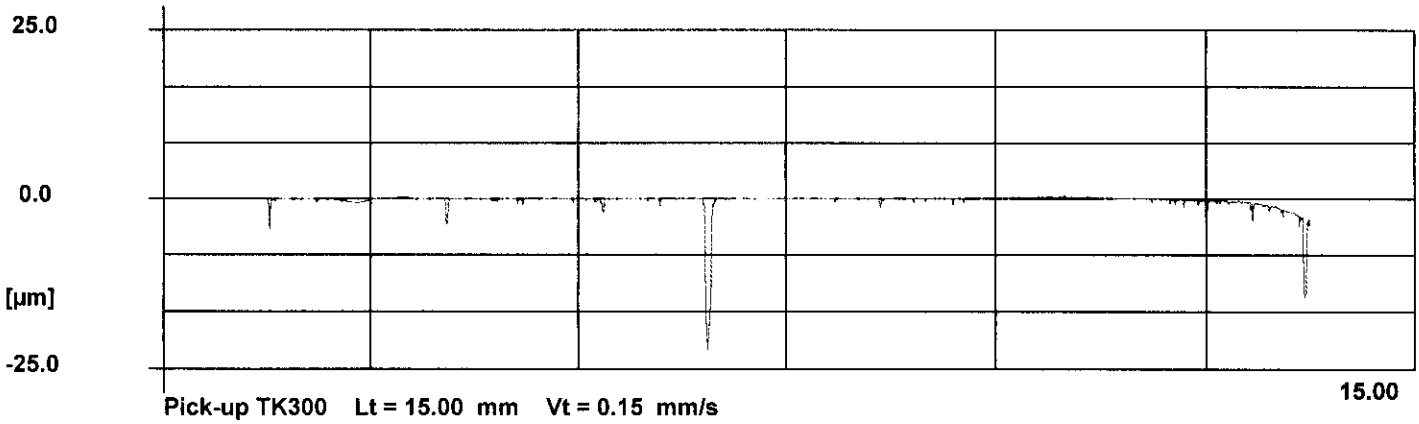
Attachment 8
Page 18
Reference

W- Profile leveled Filter M1 DIN4777 Lc = 2.500 mm



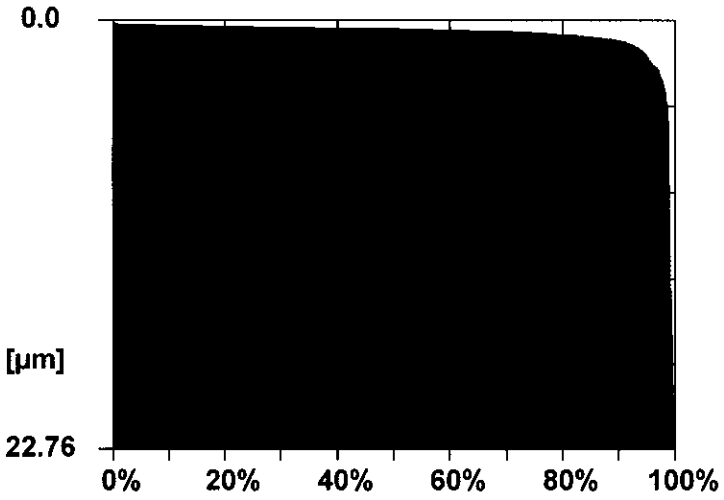
Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K- Profile leveled Filter M2 DIN4776 Lc = 2.500 mm

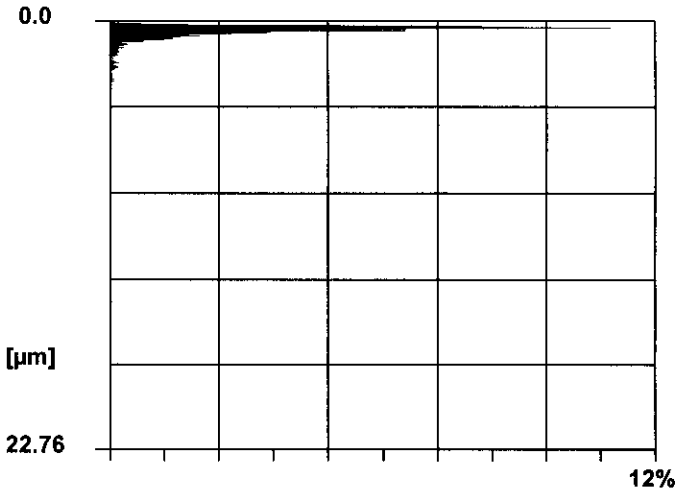


Pick-up TK300 Lt = 15.00 mm Vt = 0.15 mm/s

K-Profile Material ratio



K-Profile Frequency

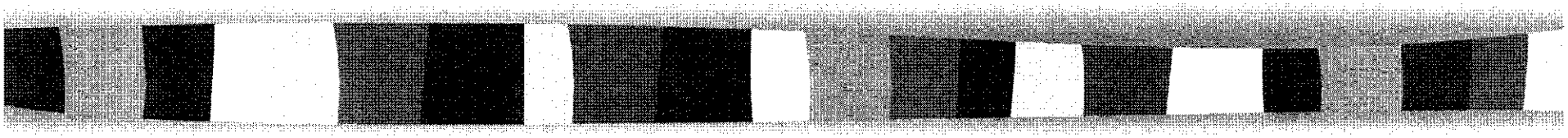


Rmr01(0.500µm)	7.2 %
Rmr02(1.000µm)	26.5 %
Rmr03(1.500µm)	89.4 %
Rmr04(2.000µm)	95.9 %
Rmr05(2.500µm)	97.2 %
Rmr06(3.000µm)	97.9 %
Rmr07(3.500µm)	98.3 %
Rmr08(4.000µm)	98.5 %
Rmr09(4.500µm)	98.6 %
Rmr10(5.000µm)	98.7 %

Rmr01(10.0 %)	0.78 µm
Rmr02(20.0 %)	0.98 µm
Rmr03(30.0 %)	1.02 µm
Rmr04(40.0 %)	1.06 µm
Rmr05(50.0 %)	1.10 µm
Rmr06(60.0 %)	1.17 µm
Rmr07(70.0 %)	1.24 µm
Rmr08(80.0 %)	1.32 µm
Rmr09(90.0 %)	1.52 µm
Rmr10(100.0 %)	22.44 µm

Attachment	9
Page	1
Reference	

The VG ROMEO MATRIX



05.15.2002

VG SURVEILLANCE PANEL

DETRIOT, MI

Attachment	9
Page	2
Reference	

AER ENGINE SUPPLY

AER	DATE	USEAGE
270	May-02	15
255	Jun-02	15
240	Jul-02	18
222	Aug-02	20
202	Sep-02	22
180	Oct-02	25
155	Nov-02	30
125	Dec-02	35
90	Jan-03	34
56	Feb-03	32
24	Mar-03	24
1000	**Apr-03**	**35**
965	**May-03**	**30**
935	**Jun-03**	**21**
914	**Jul-03**	**27**
887	**Aug-03**	**27**
860	**Sep-03**	**16**
844	**Oct-03**	**23**

GF-3	DATE	USEAGE
270	May-00	20
250	Jun-00	19
231	Jul-00	22
209	Aug-00	23
186	Sep-00	24
162	Oct-00	39
123	Nov-00	29
94	Dec-00	32
62	Jan-01	26
36	Feb-01	33
3	Mar-01	39
	Apr-01	35
	May-01	30
	Jun-01	21
	Jul-01	27
	Aug-01	27
	Sep-01	16
	Oct-01	23

THANKS

- FORD SUPPLIED ENGINES AND H/W PART NUMBERS, AND RAN DEVELOPMENT TESTS
- SwRI RAN 1/2 OF MATRIX
- PEAR RAN 1/2 OF MATRIX
- BOTH LABS COORDINATED ON OPERATIONS AND RATINGS AND TEST HARDWARE CONFIRMATION

ROMEO HARDWARE MODS

- CHANGE PCV VALVE TO EV-152
- DIFFERENT FRONT COVER
- NEW MANIFOLD
- DIFFERENT INTAKE ELBOW AND BLOWBY PLUMBING
- NEW HONING PLATES AND RING GAP TOOLS FROM BHJ
- NEW SLUDGE RATING TOOL - SEE EXAMPLE FROM PEAR
- NEW HONING TECHNIQUE

REDUCED OIL CHARGE

Date Completed	Test Length	AES merits	RCS merits	AEV merits	PSV merits	OSC % Area	HSR
05/18/01	216	8.72	9.21	9.36	8.31	0	0
06/08/01	216	8.51	8.96	9.21	8.18	20	0
ROMEO MATRIX RESULTS - SwRI AND PEAR							
10/01/01	PEAR	7.17	7.96	9.06	8.10	49	0
04/07/02	SwRI	8.72	9.24	9.32	8.33	1	0
04/18/02	SwRI	6.62	8.41	9.20	8.42	15	0
04/21/02	PEAR	7.58	8.28	9.26	8.55	44	0
ROMEO	**min**	**6.62**	**7.96**	**9.06**	**8.10**	**1.00**	**0.00**
MATRIX	**max**	**8.72**	**9.24**	**9.32**	**8.55**	**49.00**	**0.00**
DATA	**mean**	**7.52**	**8.47**	**9.21**	**8.35**	*** 2.796**	**0**
ONLY	**std. dev.**	**0.890**	**0.545**	**0.111**	**0.190**	*** 1.493**	**0**
Comment: 2700 gram initial oil charge.							
EV-152 low flow PCV valve.							
1006	**mean**	**8.43**	**9.35**	**9.27**	**8.49**	*** 1.384**	**0**
TARGETS	**std. dev.**	**0.600**	**0.200**	**0.100**	**0.180**	*** 0.850**	**0**

EXTENDED TEST LENGTH

Southwest Research Institute
Sequence VG Test Development Program
MY 2000 4.6L V8 Ford Romeo Production Engine

Extended Length Testing

Stand Number	Oil Code	Block Size	AES merits	RCS merits	AEV merits	PSV merits	OSC % Area	HSR
1	1006	0.25MM	8.79	9.43	9.47	8.63	0	0
2	1006	0.50MM	8.49	9.12	9.41	8.61	2	0
2	925-3	0.50MM	6.42	7.00	8.16	7.53	90	0

Comments: 264 hour total test length (standard VG test length + 48 hours).
3000 gram initial oil charge (standard VG initial oil charge).
EV-152 low flow PCV valve.

1006	mean	8.43	9.35	9.27	8.49	1.384	0
TARGETS	std. dev.	0.600	0.200	0.100	0.180	0.850	0
925-3	mean	6.23	7.38	8.52	7.39	3.992	0
TARGETS	std. dev.	0.620	0.450	0.280	0.280	0.649	0

ALTERATE SOLUTIONS

- 1. CHANGE OIL CHARGE FROM 2700 GRAMS TO 2850 GRAMS - THERE IS NO DATA ON THIS MOD
- 2. INCREASE TEST LENGTH TO 264 HOURS MAXIMUM [+ 2 DAYS]
- 3. CHANGE OTHER TEST CONDITIONS TO ADJUST SEVERITY- BACK TO TEST DEVELOPMENT

AN INDUSTRY MATRIX

- 1. FORD DONATE HARDWARE
- 2. LABS DONATE 2 TESTS, AND BUYS PARTS AND TOOLS FOR BUILDS
- 3. BUILD WORK SHOP PRIOR TO MATRIX START
- 4. EXTENDED TEST LENGTH WITH 24 HOURS TOP END INSPECTIONS
- 5. REGULAR LAB CONF. CALLS

MATRIX CONFIGURATION

LAB	OIL LOW	OIL HIGH
A	925-3	1006
B	925-3	1006
C	925-3	1006
D	925-3	1006

Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206-4489
(412) 365-1000

Attachment	10
Page	1
Reference	

MEMORANDUM: 02-038

DATE: May 7, 2002

TO: IIIF and VG Surveillance Panels

FROM: Scott Parke

SUBJECT: Light Duty Rating Status Report

The first Light Duty Rating Workshop under ASTM auspices was held at Southwest Research during the week of October 8, 2001. All of the usual CRC workshop participants were present and helped in ensuring that all of the activities covered by the CRC Light Duty Rating Workshop were continued.

Two items affecting VG test rating are currently being discussed. One is the varnish rating for the rocker cover. Currently, the rocker cover is rated for varnish. However, the rated surface of the rocker cover tends to discolor over time. This makes rating difficult and eventually impossible thus necessitating the replacement of the rocker cover. In an effort to avoid replacement of an otherwise perfectly functional (and not inexpensive) part, raters have been rating varnish on the cam baffle in addition to the rocker cover varnish to see how the two areas compare. The data generated thus far indicates good agreement between the two. The O&H chairman and TMC will be approaching the VG Surveillance Panel with a proposal to switch the rating from the valve/cam cover to the cam baffle.

The other VG item is the introduction of the Romeo engines. The head casting for this engine is different from the old engine in the area where sludge depth is measured. There is a raised area that prevents the sludge depth gauge from being properly inserted into the jig used to control the insertion location and angle. PerkinElmer has devised a modification to the sludge depth gauge that allows the current jig to continue to be used. The bottom part of the gauge has been narrowed to allow it to clear the raised area of the head while the upper part remains the standard width to ensure that it mates properly with the existing jig.

In IIIF, the weighted piston deposits parameter is currently under scrutiny. To investigate, some of the labs have been double rating their pistons (multiple raters rating the same parts). Thus far, the double ratings indicate that this is not a rating problem.

And one final item: Historically, the Light Duty Rating Workshop has been held in October. So has the Heavy Duty Rating Workshop. In an effort to reduce the impact to labs of having raters out of the lab on travel, the Light Duty Rating Taskforce plans to investigate the possibility of moving the Light Duty Rating Workshop to, maybe, January or February. These months are being targeted in order to also avoid conflicts with so much of the semi-annual activity that occurs in April and May.

SDP/sdp/ m02-038.sdp.doc

c: F. M. Farber

distribution: Email

Attachment	11
Page	1
Reference	

ILSAC/OIL Request Regarding Sequence VE

Background:

At the April 30 ILSAC/Oil meeting the topic of alternate tests for the IIIG was discussed. Should the IIIG not be available or acceptable for GF-4, the leading alternate test for IIIG wear performance mentioned was the Sequence VE.

ILSAC/Oil request:

As chairman of the Sequence VE I was asked to determine if the Sequence VE could be re-established as a calibrated ASTM test procedure and if so what effort is required.

Information gathering:

I asked the TMC to survey the laboratories to get an estimate of currently available sequence VE test hardware and fuel. Rich will report on this.

I checked to see how many VG tests have been run to get an estimate of how may VE tests would be needed if the test is included in GF-4.

- 191 reference tests
- 505 registered candidate tests over 2.25 years

Attachment	11
Page	2
Reference	

Brief History:

- One independent laboratory was unable to successfully calibrate after March 2000. Over half the tests run in 1999 & 2000 were severe on **wear** and **sludge.**
  - *Last acceptable reference was March 1, 2000*

- The other independent laboratory was unable to calibrate after August 2000. Laboratory was severe on **wear** and **sludge.**
  - *Last acceptable reference was August 23, 2000*

- Three dependant laboratories successfully referenced in early 2001. However, the **wear** results at one laboratory were **severe** of targets for last 4 references (*all different reference oils*).

Attachment	11
Page	3
Reference	

Summary of referenced stands:

- In early 2001 there were only two Sequence VE stands in industry running near target level performance based on reference data.

- Sequence VE calibration status was discussed at the May 23, 2001 Sequence V surveillance panel meeting but no to resolve issues was agreed. There was very little demand for the VE test thus low resource to pursue corrective action.

- The Sequence VE calibration problems were discussed at the June 2001 PCEOCP and Tech B meetings. Tech B voted to terminate ASTM TMC monitoring of the Sequence VE due to calibration issues and very low candidate test volume.

- The **last** Sequence VE calibration test was run **February 8, 2000**.

Minimum Expected Actions required to Resurrect the VE (*for discussion*):

- **Establish future supply of acceptable engine kits**
- **Reblend and approve fresh batch of fuel**
- **Conduct a precision/severity matrix to re-establish and demonstrate industry VE testing competence**
- **Establish minimum 'new' stand calibration requirements**

Discussion:

1. Does the Sequence V Surveillance Panel agree with the above as minimum actions if VE is to be re-established?
2. Does the Sequence V Surveillance Panel believe that resurrection of the VE test is technically feasible? Reasonable?
   - If answer to item #1 is no, what response does the group want the Seq. V chairman to communicated to ILSAC/Oil at this time?
   - If the answer to item #1 is yes, I propose no further action until fate of the IIIG is known. Does the Sequence VE Surveillance Panel agree?

Attachment	12
Page	1
Reference	

MOTION

Lambda meters shall be used to measure air-fuel ratio in each engine bank. First use of Lamba meters at each lab will be on at least one reference test started on or after March 01, 2002. The entire lab may be converted after one valid, acceptable reference on the new measurement devices. In the report package, an average Lambda value will be shown for each bank in each stage on Form 6. Change Section 9.6.1.2 to read: Calibrate the lambda measurement device by introducing the sensor to air prior to a reference oil test.

Attachment	13
Page	1
Reference	

MOTION

CHANGE 7.10.4.2 TO READ:

The EEC power shall come from a battery (13.5 +/- 1.5 V) or a power supply that does not interrupt/interfere with proper EEC operation. That power supply can also be used for the Lambda meters.

Attachment	14
Page	1
Reference	

Comparison of AEV using Cam Baffle Varnish instead of RAC Varnish

- Used eleven tests were baffle varnish was rated with existing method.
- Evaluated impact on Industry, lab and stand Control charts.
- Reviewed candidate results (24) for potential impact.

Attachment	14
Page	2
Reference	

Data Used for Analysis

Reference Data		Candidate Data	
AEV with RAC	AEV with Baffle	AEV with RAC	AEV with Baffle
9.2	9.14	9.27	9.26
9.26	9.26	9.00	9.03
8.59	8.51	9.15	9.20
9.33	9.21	9.18	9.22
8.64	8.47	9.19	9.16
9.37	9.37	9.63	9.60
9.1	9.16	9.26	9.35
9.33	9.37	9.61	9.60
8.73	8.67	8.99	9.14
9.3	9.34	9.22	9.17
9.32	9.19	9.23	9.24
9.27	9.17	9.21	9.27
		9.14	9.19
	Average Difference	9.27	9.43
	-0.03 merits	8.97	8.96
		9.24	9.00
		9.02	9.15
		9.22	9.19
		8.85	8.83 *
		9.18	9.20
		9.15	9.14
		9.20	8.89
		9.33	9.37
		9.38	9.19
		Average Difference 0.00 merits	Borderline pass goes to borderline fail

Attachment	14
Page	3
Reference	

Industry Impact

- Control Charts show little change with most recent data

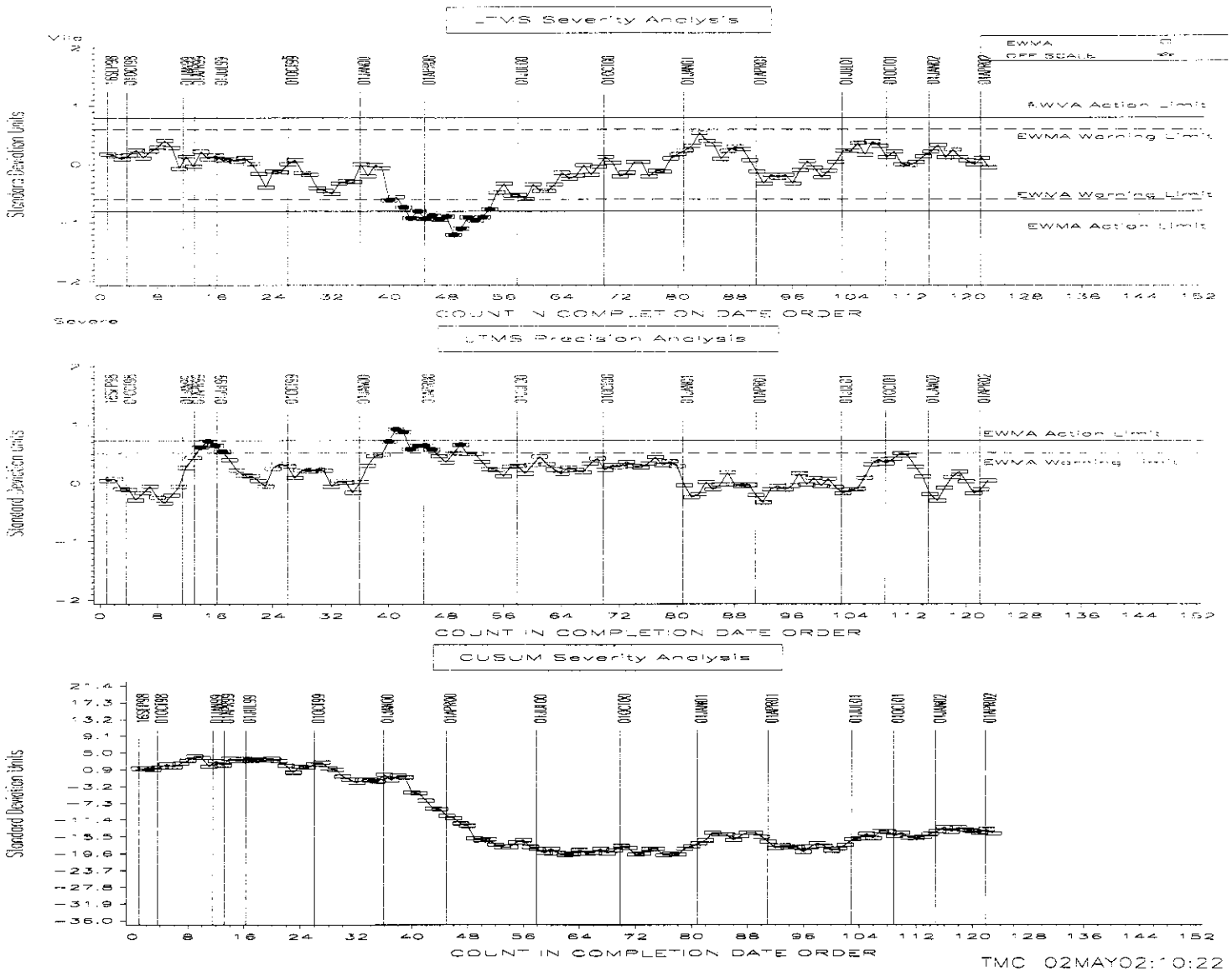
Attachment	14
Page	4
Reference	

SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

AEV Calculated using Cam Baffles

AVERAGE ENGINE VARNISH 3-PART FINAL RESULT

Figure 1

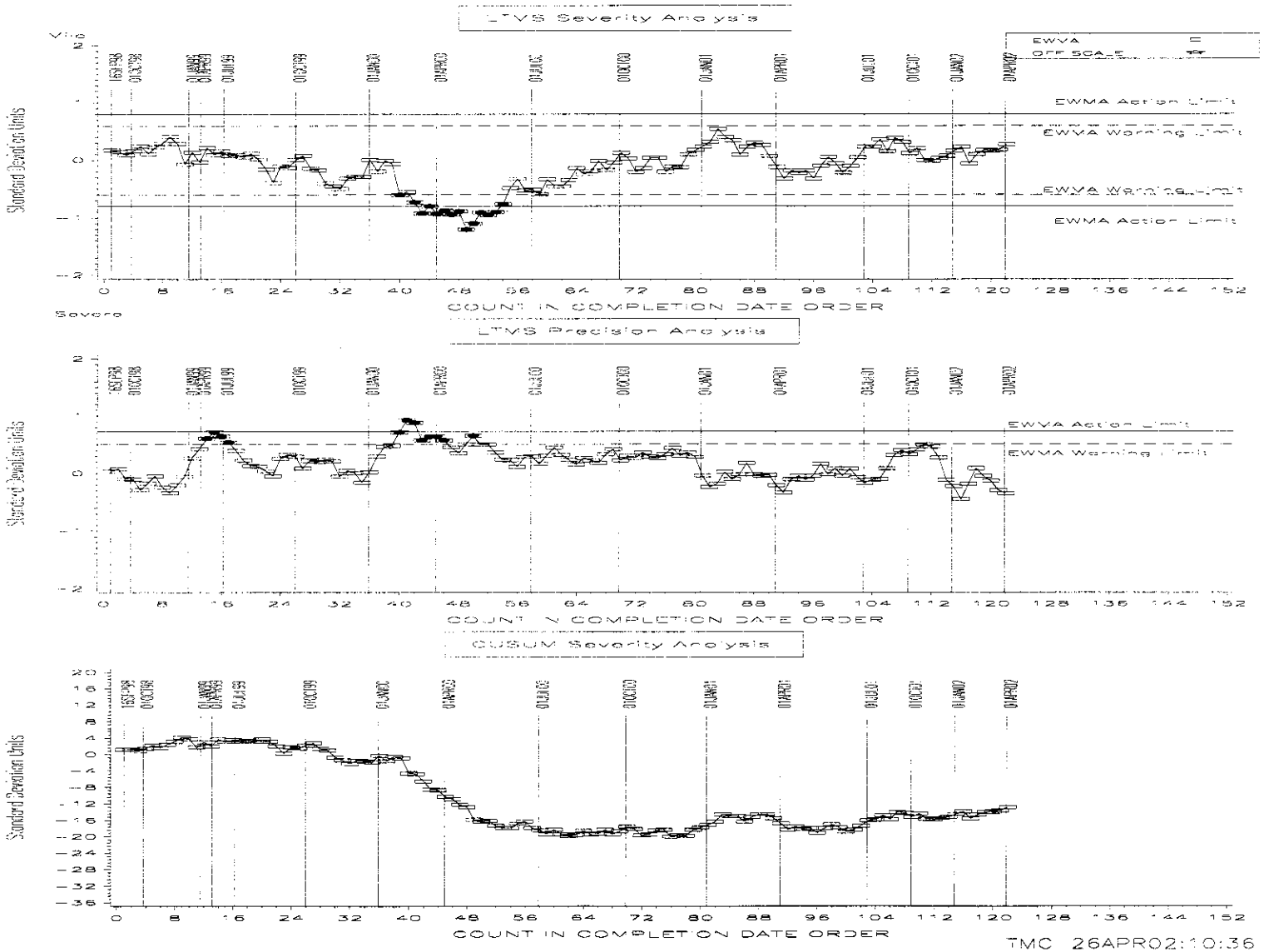


TMC 02MAY02:10:22

Attachment	14
Page	5
Reference	

SEQUENCE VG NDUSTRY OPERAT ONALLY VALID DATA
AEV CALCULATED USING EXISTING METHOD
AVERAGE ENGINE VARNISH 3—PART FINAL RESULT

Figure 2



TMC 26APR02:10:36

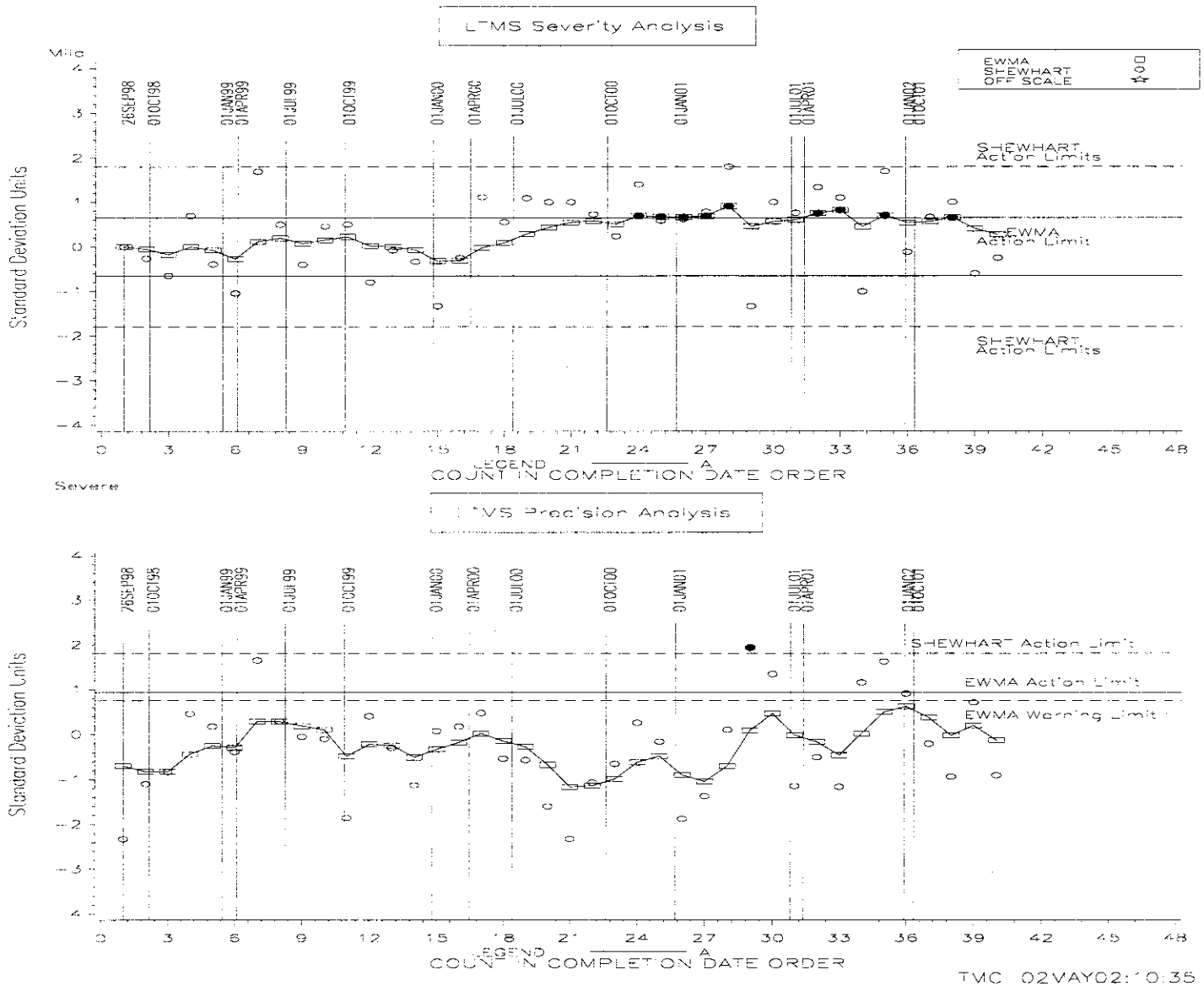
Attachment	14
Page	6
Reference	

Lab Impact

- No Lab has an SA for AEV, when results using Baffle AEV, no SA is in effect.
- No precision problems

Attachment	14
Page	7
Reference	

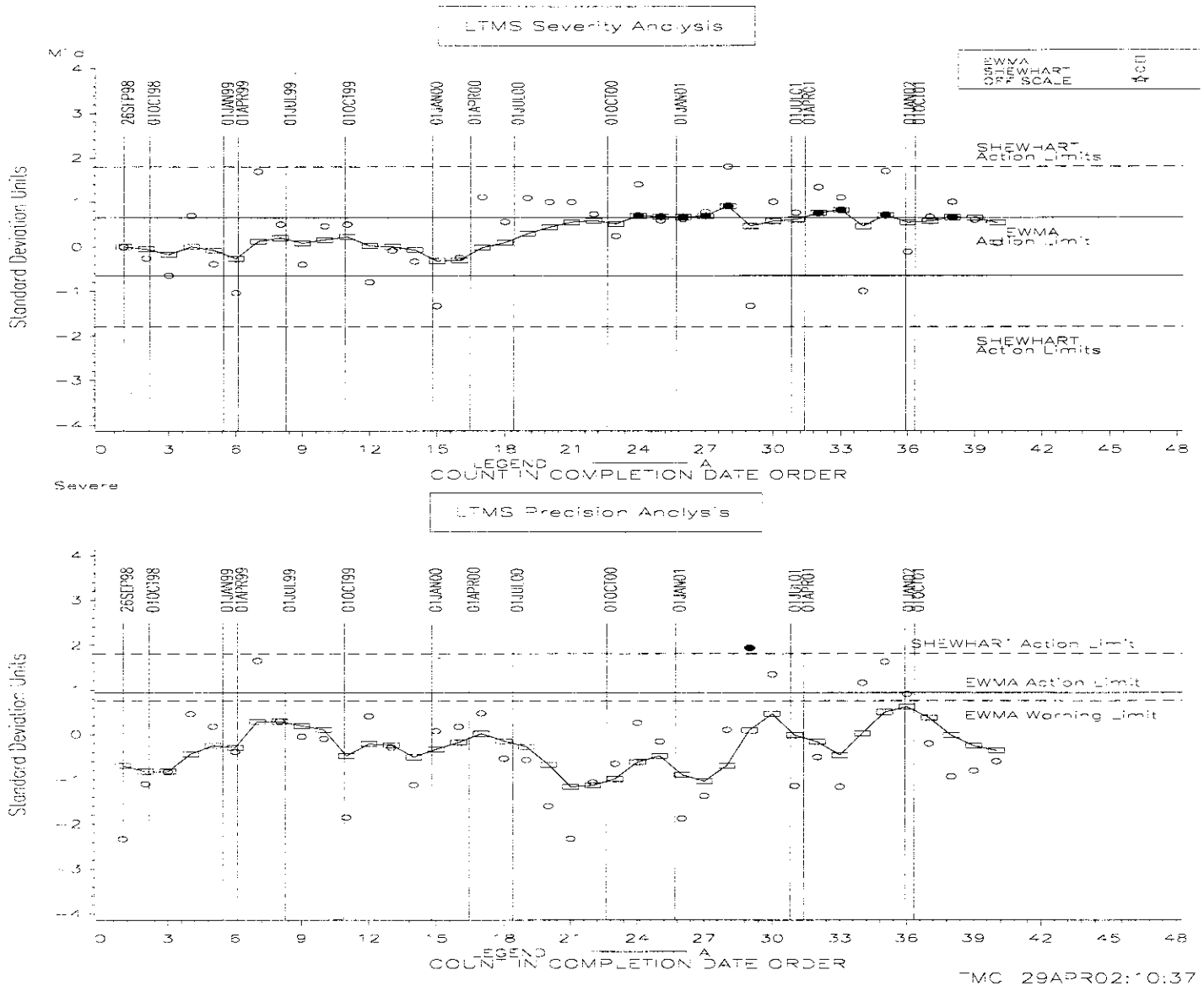
SEQUENCE VG LAB OPERATIONALLY VALID DATA
AEV Calculated using Com Baffle Varnish
AVERAGE ENGINE VARN SH 3—PART FINAL RESULT



TMC 02MAY02:10:35

Attachment	14
Page	8
Reference	

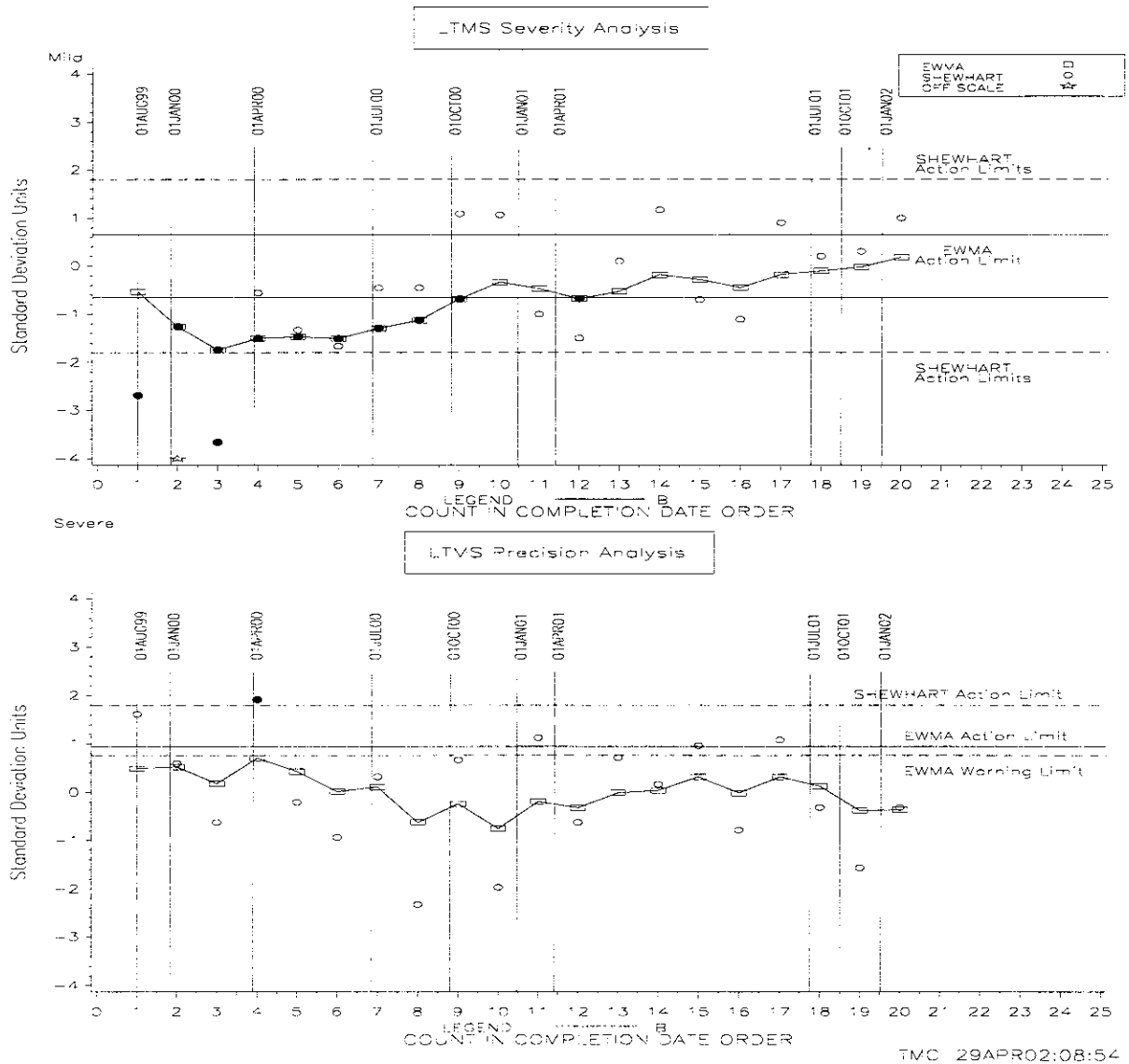
SEQUENCE VG _AB OPERAT ONAL_Y VALID DATA
Existing AEV
AVERAGE ENG NE VARNISH 3—PART FINAL RESULT



TMC 29APR02:10:37

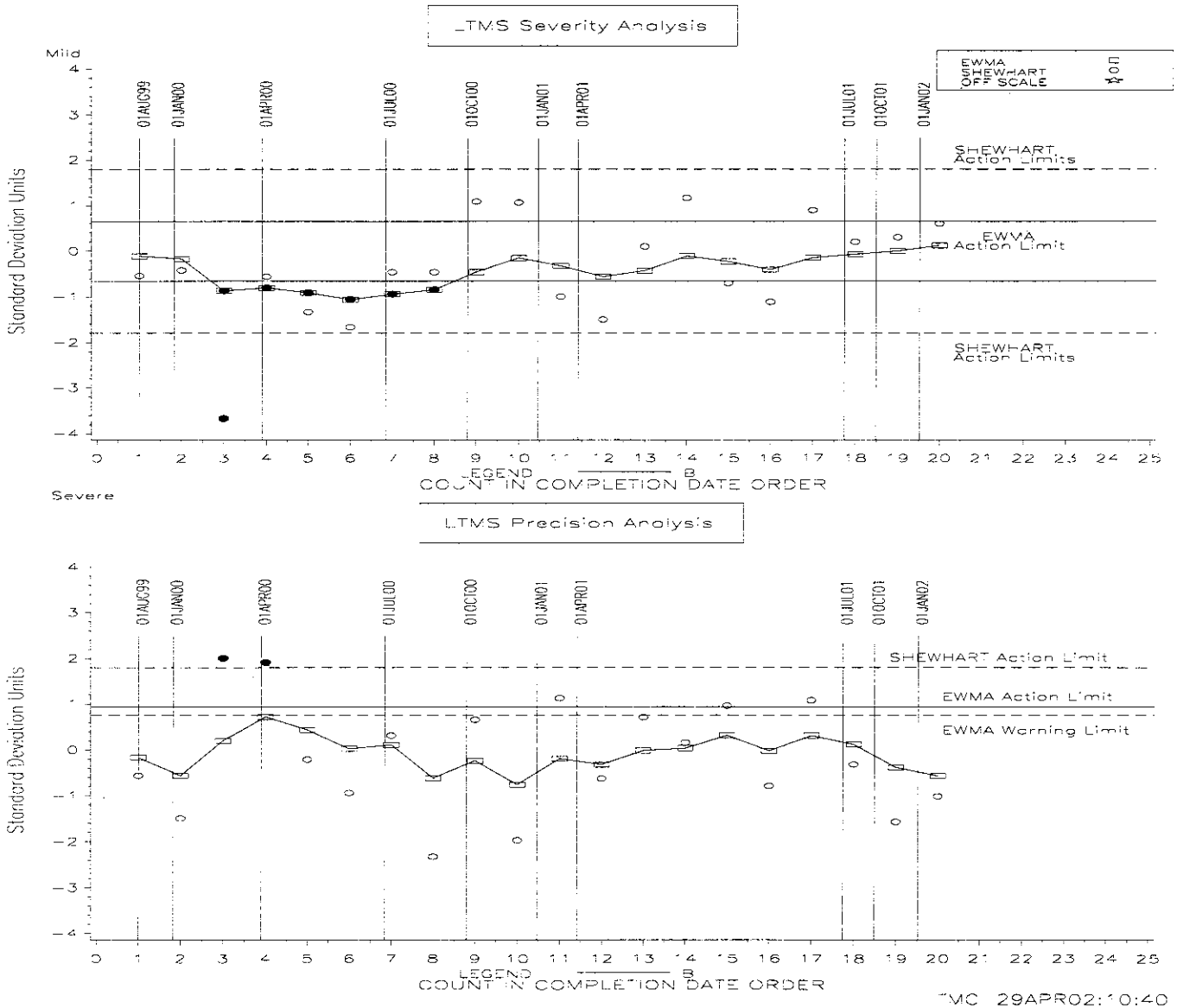
Attachment	14
Page	9
Reference	

SEQUENCE VG LAB OPERATIONALLY VALID DATA
AEV Calculated using Cam Baffle Varnish
AVERAGE ENGINE VARNISH 3-PART FINAL RESULT

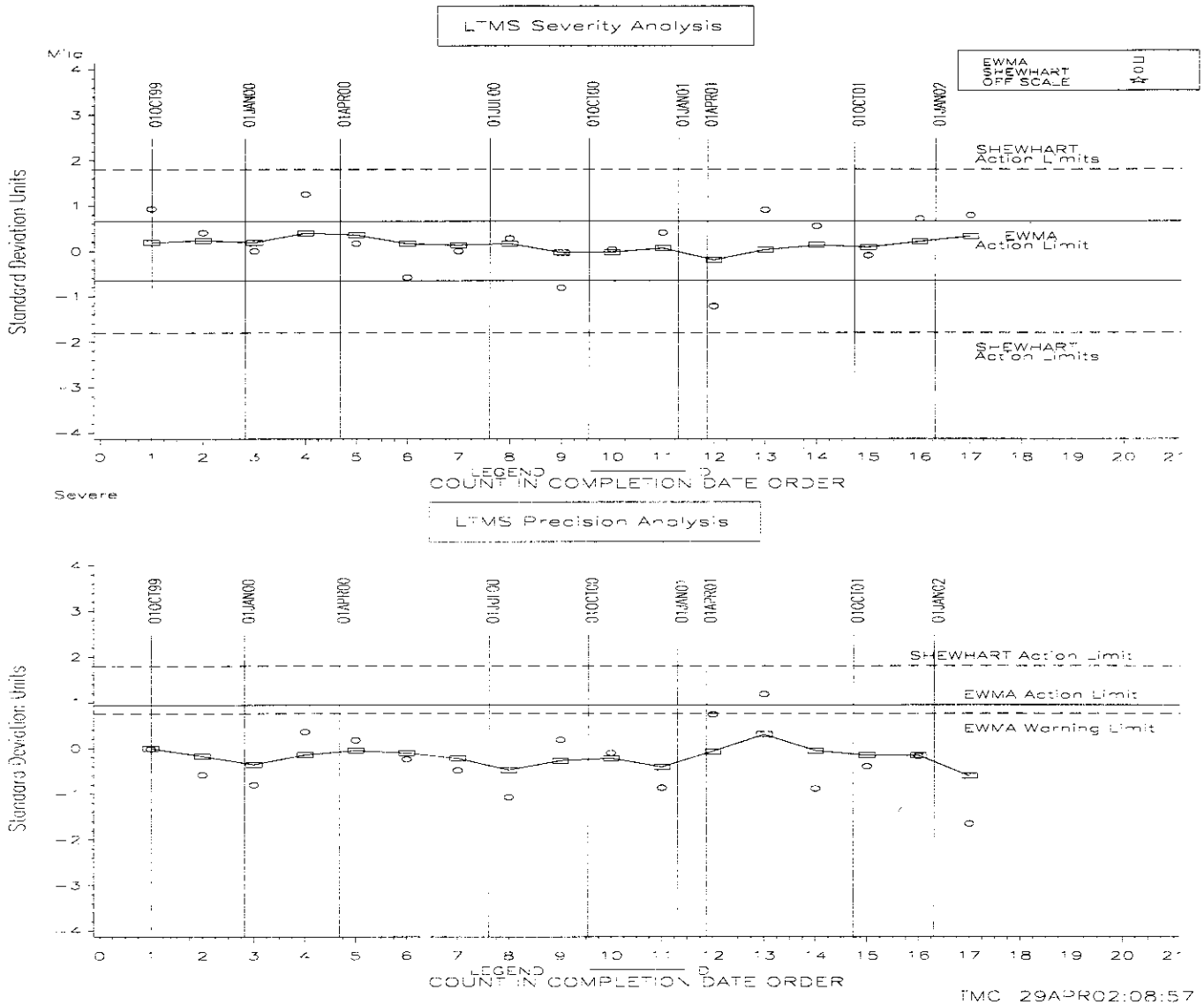


Attachment	14
Page	10
Reference	

SEQUENCE VG _AB OPERATIONALLY VALID DATA
Existing AEV
AVERAGE ENGINE VARNISH 3-PART FINAL RESULT



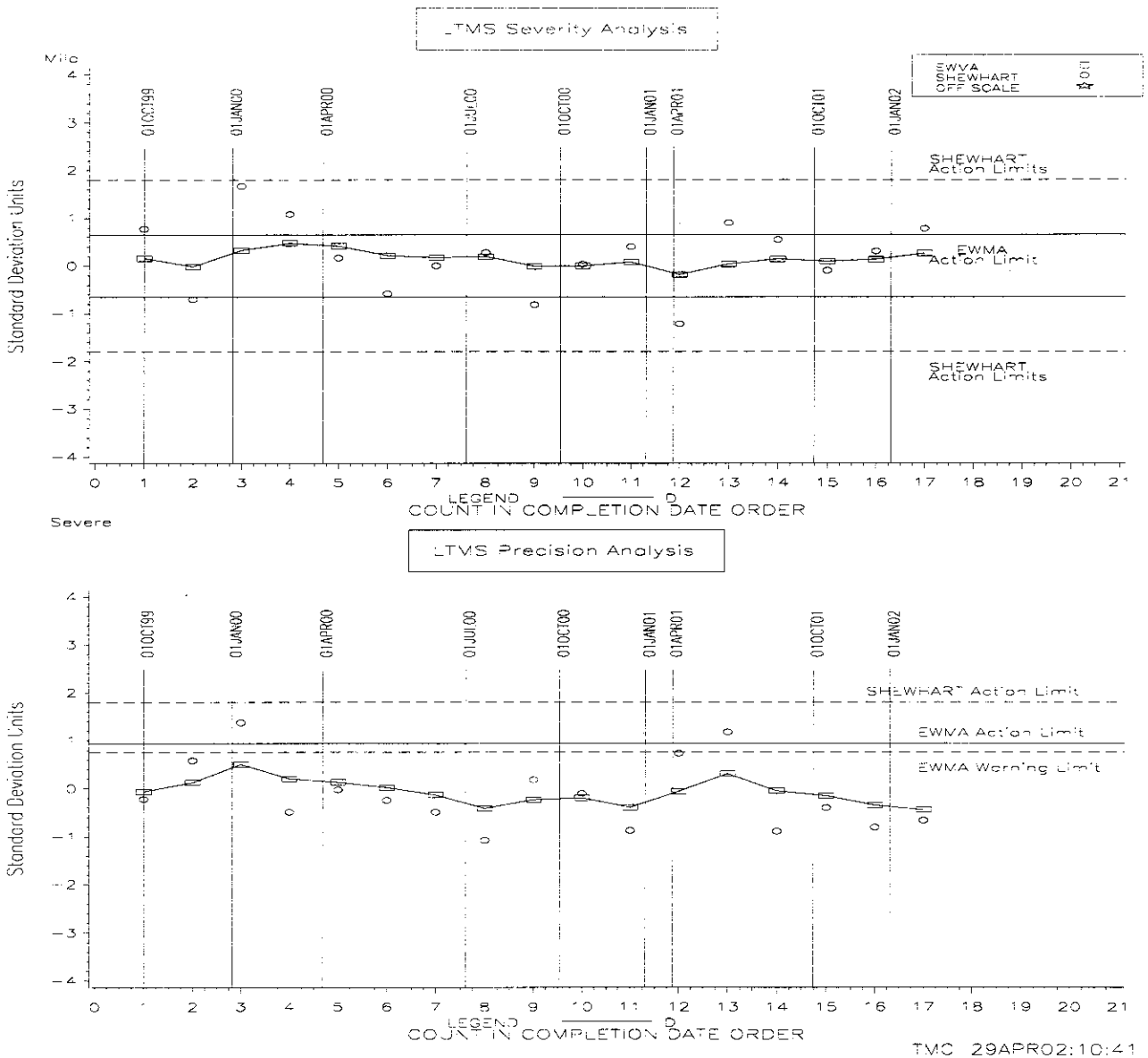
SEQUENCE VG _AB OPERAT ONALLY VAL D DATA
AEV Calculated using Com Baffle Varnish
AVERAGE ENGINE VARNISH 3—PART FINAL RESULT



TMC 29APR02:08:57

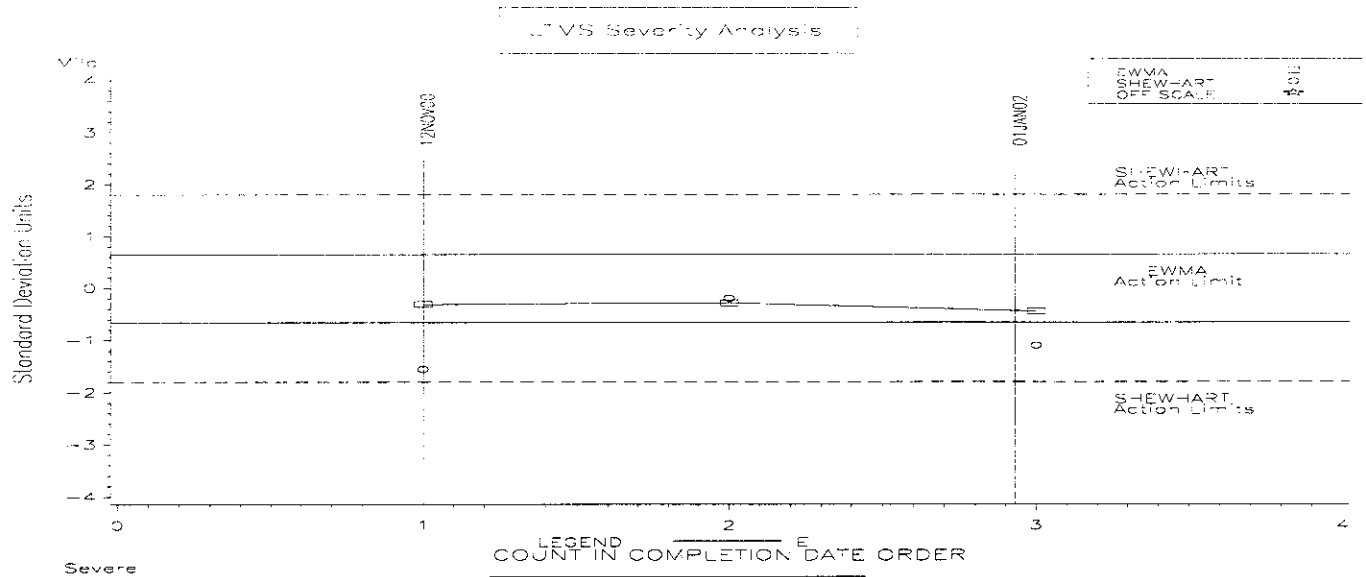
Attachment	14
Page	12
Reference	

SEQUENCE VG - LAB OPERATIONALLY VALID DATA
Existing AEV
AVERAGE ENGINE VARNISH 3 - PART FINAL RESULT

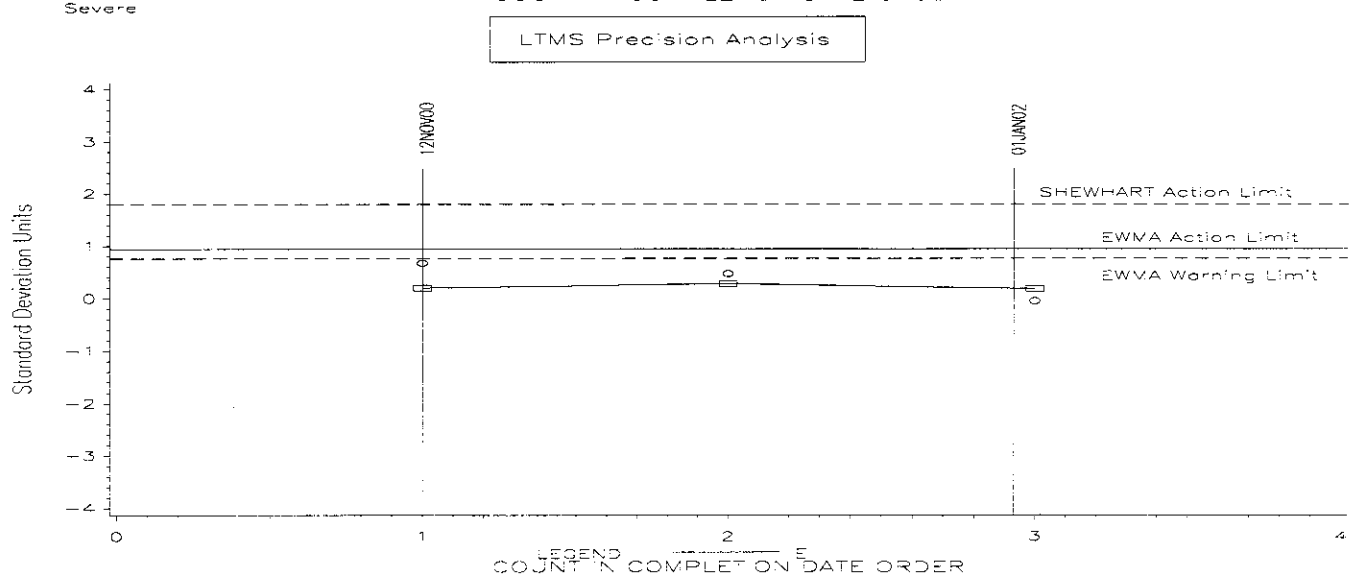


Attachment	14
Page	13
Reference	

SEQUENCE VG LAB OPERATIONALLY VALID DATA
AFV Calculated Using Com Buffalo Varnish
AVERAGE ENGINE VARNISH 3 PART FINAL RESULT

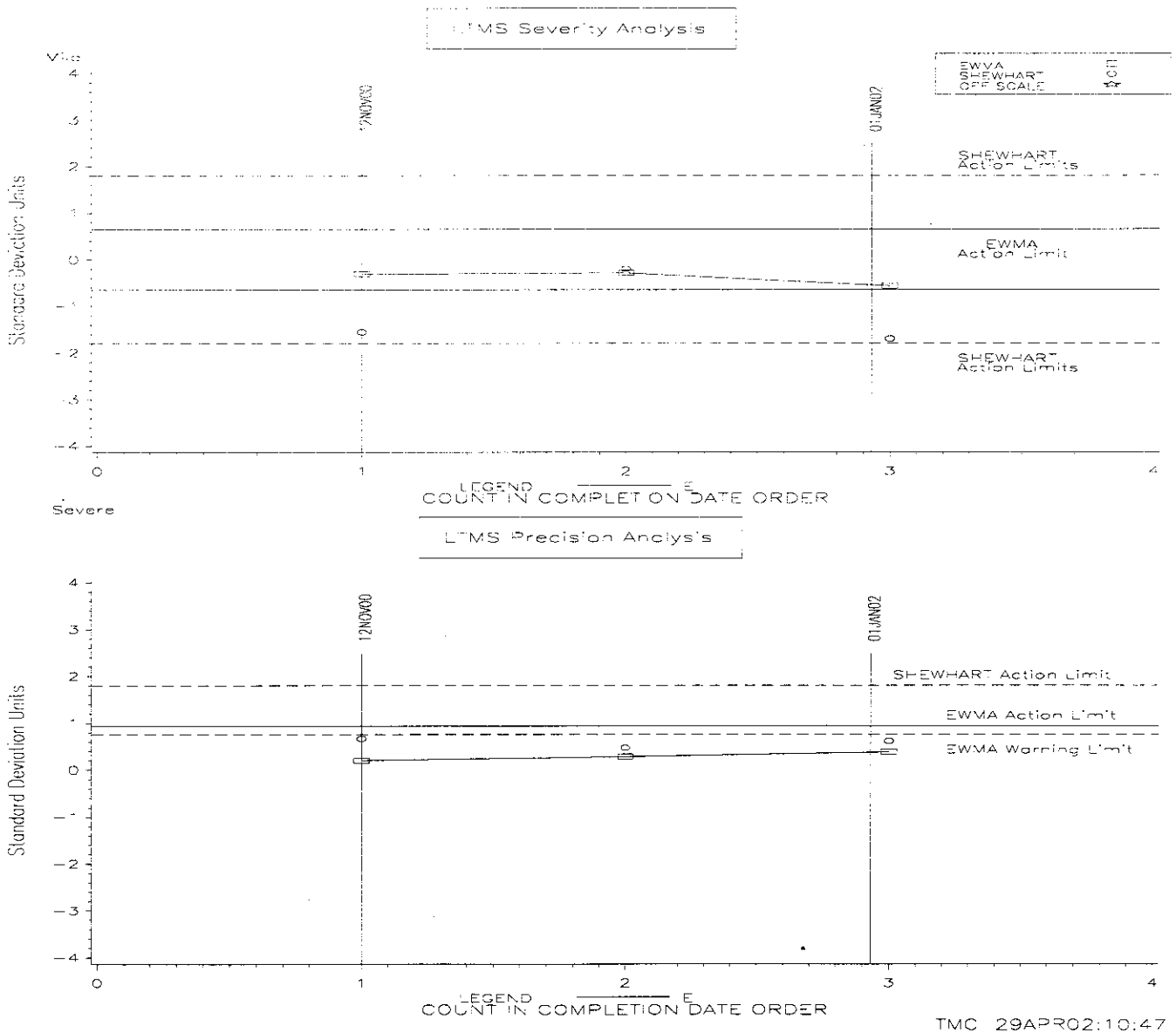


Severe



TMC 29APR02:09:18

SEQUENCE VC LAB OPERATIONALLY VALID DATA
Existing AEV
AVERAGE ENGINE VARNISH 3-PART FINAL RESULT

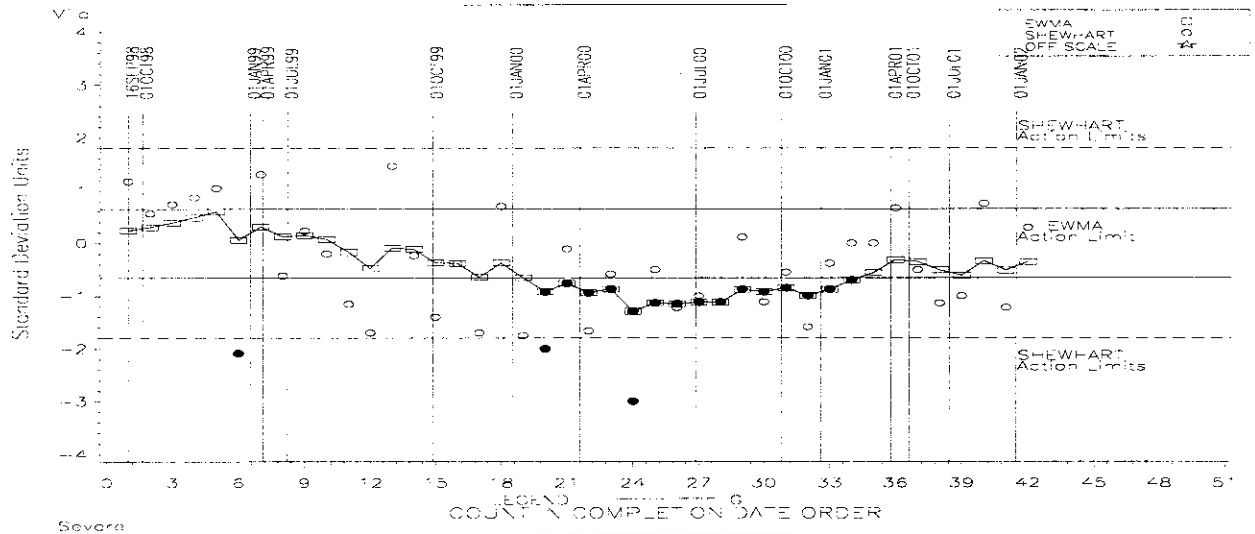


TMC 29APR02:10:47

Attachment	14
Page	15
Reference	

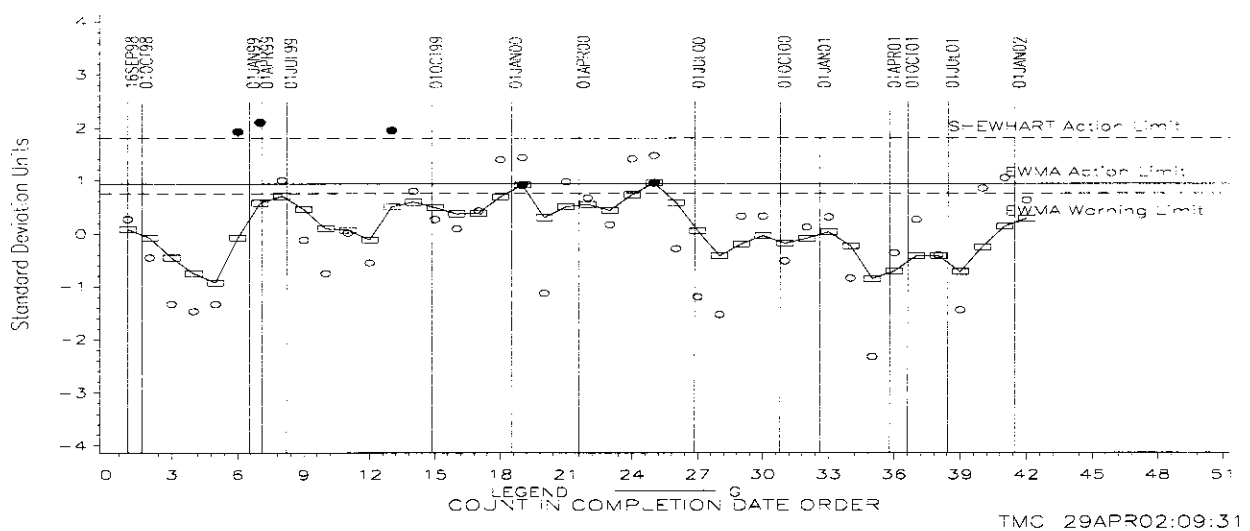
SEQUENCE VG LAB OPERATIONALLY VALID DATA
Existing AEV
AVERAGE ENGINE VARNISH--PART FINAL RESULT

TMS Severity Analysis



Severe

TMS Precision Analysis

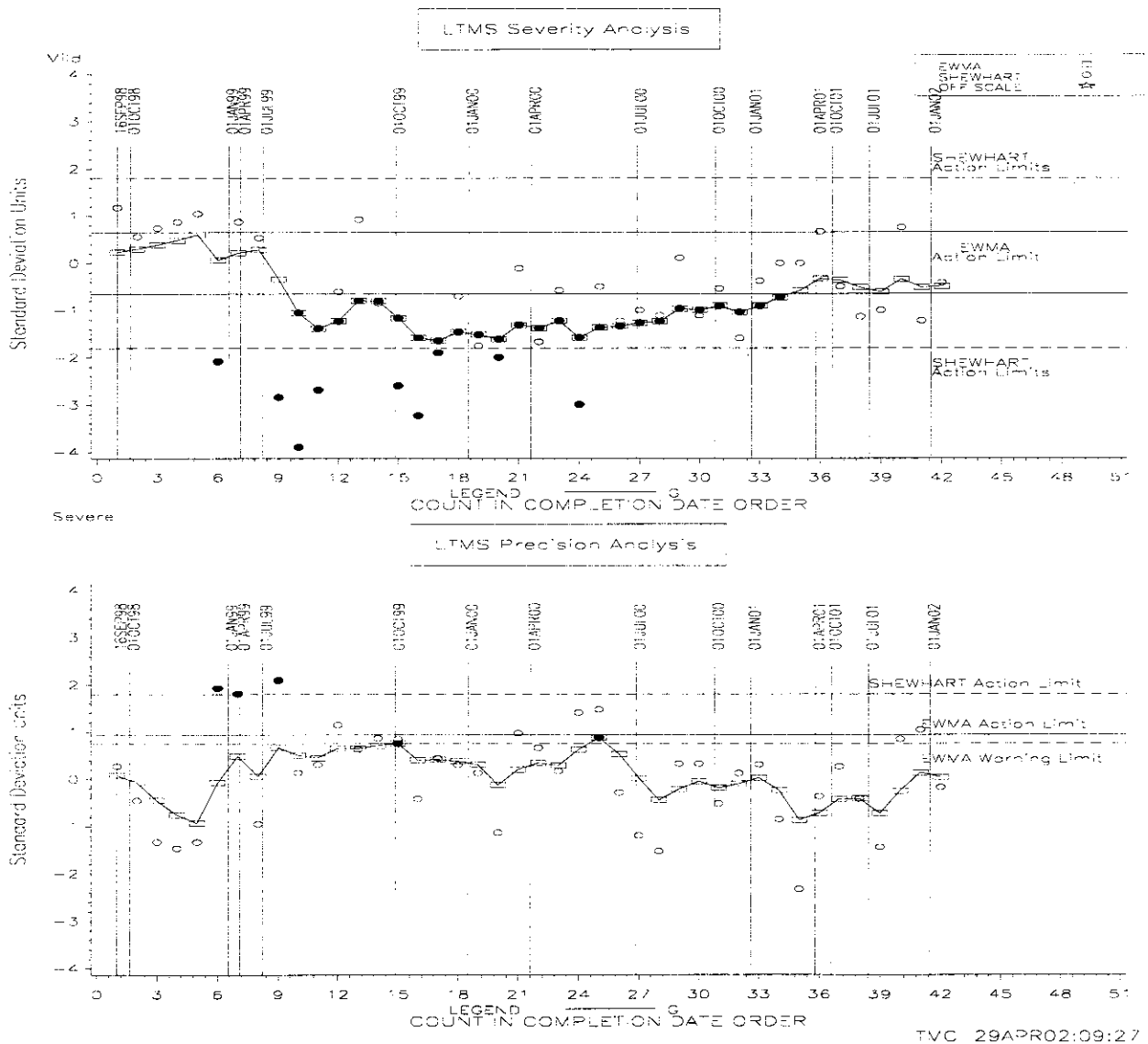


TMC 29APR02:09:31

SEQUENCE VG LAB OPERATIONALLY VALID DATA

ACV Calculated Using Com Baffle Varnish

AVERAGE ENGINE VARNISH 3--PART FINAL RESULT



Attachment 14
Page 17
Reference

Stand Impact

- No stand alarms on the current calibrated stand data set.
- No change in acceptability of results

Attachment	19
Page	18
Reference	

Candidate Data

- On Average, candidate results showed no difference (2 labs, n=24)
- However, 1 lab tended to be more severe, while the other lab tended to be mild.
- A border line pass at one lab (8.85) became a borderline fail (8.83).

Attachment	14
Page	19
Reference	

Candidate Data

Lab	Mean, Current AEV	Mean, Baffle AEV	Delta, Merits
A	9.15	9.09	-0.06
B	9.24	9.27	0.035
Average	Difference	All Results	-0.01

Conclusions

- Reference data suggests minimal impact
- Candidate data suggests some impact, at least one candidate which passed would fail.
- Severity issues between two labs???

Attachment	15
Page	1
Reference	

MOTION # 3

Effective _____,

convert varnish rating sites as follows:

Section 13.3.1:

piston skirts, …and left and right cam baffles.

Annex A11:

Add cam baffle varnish rating locations.

Change other locations as needed to add baffle varnish rating without conflicts.