100 YEARS

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100 Barr Harbor Drive ■ 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: N DAVID SMITH, North Carolina Dept Of Agric, 2 West Edenton St, PO Box 27647, Raleigh, NC 27611, (919) 733-3313, FAX:919-715-0524, EMail: david_smith@ncdamail.agr.state.nc.us
First Vice Chairman: SUSAN E. LITKA, UOP Research Center, 50 East Algonquin Road, PO Box 5016, Des Plaines, IL 60017-5016, (847) 391-3390, FAX: 847-391-3330
Second Vice Chairman: KURT H. STRAUSS, 69 Brookside Rd, Portland, ME 04103, (207) 773-4380, FAX: 207-775-6214
Secretary: KENNETH O. HENDERSON, Cannon Instrument Co, PO Box 16, State College, PA 16804-0016, (814) 353-8000, FAX: 814-353-8007, EMail: kenohenderson@worldnet.att.net
Assistant Secretary: W JAMES BOVER, Exxon Biomedical Sciences, Mettlers Rd Cn2350, East Millstone, NJ 08875-2350, (732) 873-6318, FAX: 732-873-6009, EMail: james.bover@ere.exxon.sprint.c
Staff Manager: EARL R. SULLIVAN, (610) 832-9709, EMail: esulliva@astm.org

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Reply to: Dan Worcester
PerkinElmer Automotive Research
5404 Bandera Rd.
San Antonio, TX 78238-1993
(210) 523-4659 or 684-2310
Fax: (210) 523-4607
Email: Dan.Worcester@perkinelmer.com

UNCONFIRMED MINUTES OF THE ASTM SEQUENCE V OPERATIONS AND HARDWARE MEETING

Held in San Antonio, TX on January 18, 2001

1. Call to Order

1.1 The meeting of the Sequence V Operations and Hardware Panel was called to order by the Chairman, Jim Moritz at 8:00 AM. An attendance list is shown as Attachment 1. There were 12 signed members and guests present.

1.2 Minutes from the meeting on 07.25.2001 were not approved due to the being mailed just prior to the meeting.

1.3 Barry Jecewski will take over as the Ford representative.

1.4 The agenda is to turn the meeting over to Mike and Barry for a review of the status of the new VG hardware testing.

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2. Action Items From This Meeting

2.1 Barry will check on differences between the two types of heads for new engines.
2.2 Blowby composition between AER and new engines needs to be compared.
2.3 Power Products should attend a meeting.
2.4 Dwight Bowden will check on recommended torque for rocker covers.

3. Ford Presentation — Mike Riley/B. Jecewski

3.1 The presentation and test results are included as Attachments 2 and 3.
3.2 The Romeo plant selected 2000 model year 2000 complete engines.
3.3 A solicitation will occur this year. This new hardware is expected to last about 6 years.
3.4 Tests have been run to compare those engines to AER built hardware.
  3.4.1 Two oversizes of 0.20 and 0.50mm are being used.
  3.4.2 A different manifold and PVC valve [EV 152] are required.
  3.4.3 MAP was changed from 69 to 75 kPa.
  3.4.4 Eleven tests were run on oil 1006; higher MAP and different PCV flow have affected sludge severity. Test length extension by 48 hours did increase severity of sludge.

4. Discussion of Test Results

4.1 Fuel dilution is slightly lower [about 2% less] on the new engines compared to AER.
4.2 For the extended length test, inspections were performed at 216, 240 and 264 hours. Sludge was estimated at 9.3, 9.0, and 8.79 (a final rated result).
4.3 Heads were re-used with new valves and lapping, not cutting seats.
4.4 Blowby starts higher [mid 70's] and drops lower [low 60's] compared to AER engines.
4.5 A new honing procedure [similar to IIIF], machine [CV-616], and cleaning frequency for honing fluid will need to be specified.
4.6 Coolant flow and blowby composition may have been changed with new manifold and valve.
4.7 There have been issues with head oil pressure, and on car versus new or old truck cams.
4.8 There were differences on piston plating, and the first test had the graphite removed with scotch brite. The piston supplier now plates the pistons.

5. Hardware Schedule

5.1 There was a request to see repeat runs on the different piston sizes.
5.2 A decision must be made on whether labs will split the 2000 engines, or a yearly supply will be made available.

6. Rocker Cover Leaks

6.1 Two covers have leaked at internal seams.
6.2 Each lab is using a different torque specification. This needs to be made standard.

7. Motion To Adjourn

7.1 A motion was made by Jim Moritz and seconded by Gary Tietze.

7.2 The meeting adjourned at 12:05 PM.

Adjourn at 12:05 PM.
Motion Passed: *Unanimous*

Sequence VG Test Report

ASTM Sequence VG O&H Panel Meeting

San Antonio, Texas

January 18, 2001

Mike Riley / B. Jecewski

Ford Motor Company

Fuels and Lubricants Engineering

Overview
VG Test with 2000 MY 4.6L Engine

- **Ford Romeo Engine Plant supplied 2,000 2000 Model Year 4.6L 2V engines.**
- **2 tests/block with 0.25 and 0.50 mm oversized cylinder bores are planned.**
- **Development tests indicate sludge and varnish deposits comparable to current AER built engine test.**
- **Test lab solicitation to distribute all 2,000 new engines and kits will be made early 2nd quarter 2001 to assure engines are available a few months before testing is expected to start late 2001/early 2002.**
- **Assuming use of new engines starts 1/1/2002, 2 tests/block and 650 VG tests/year should meet VG test needs for about 6 years.**

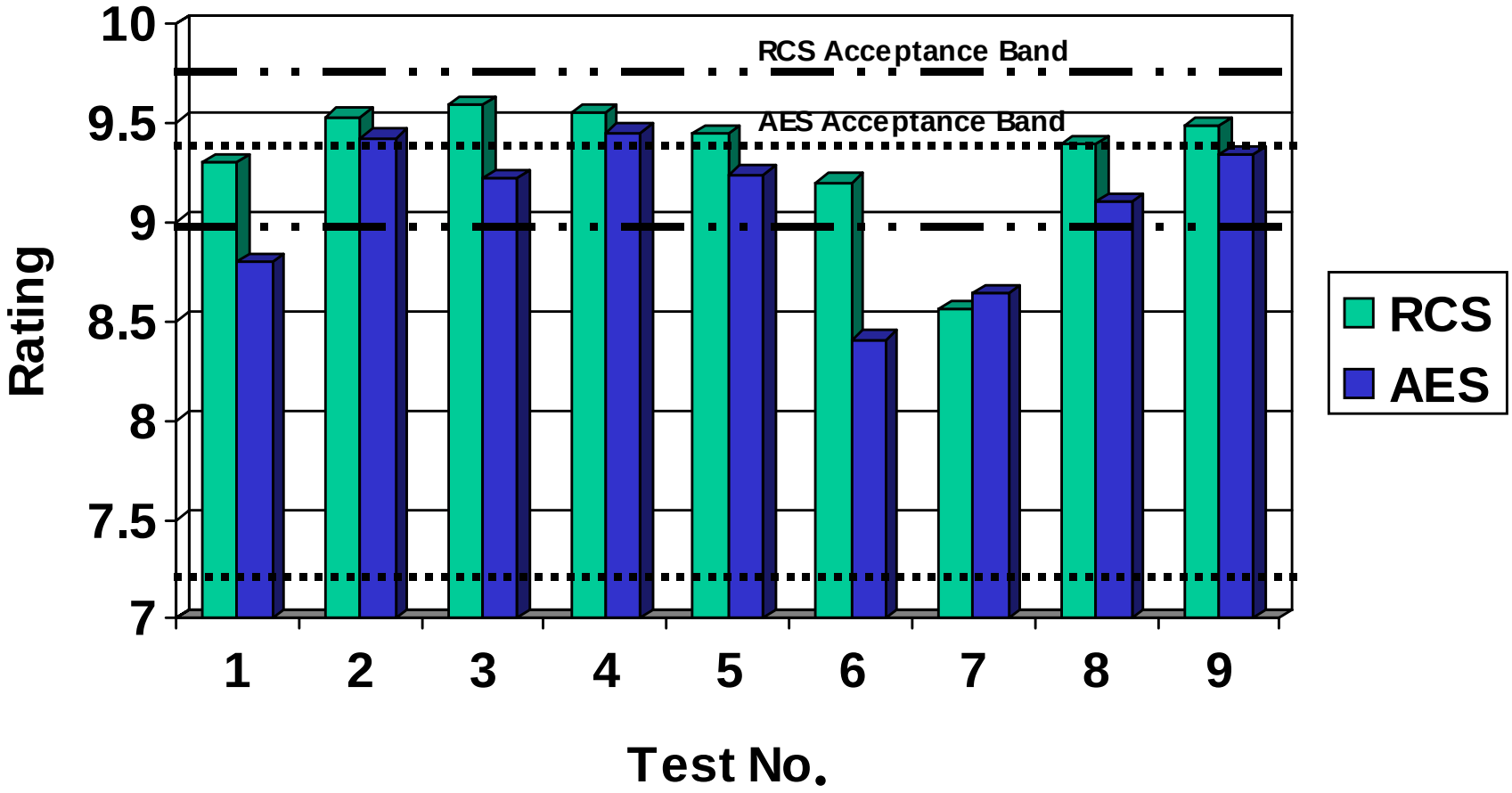
M. Riley /B. Jecewski
Ford Motor Company
Fuels and Lubricants Eng

Testing with 2000 MY 4.6L Engines

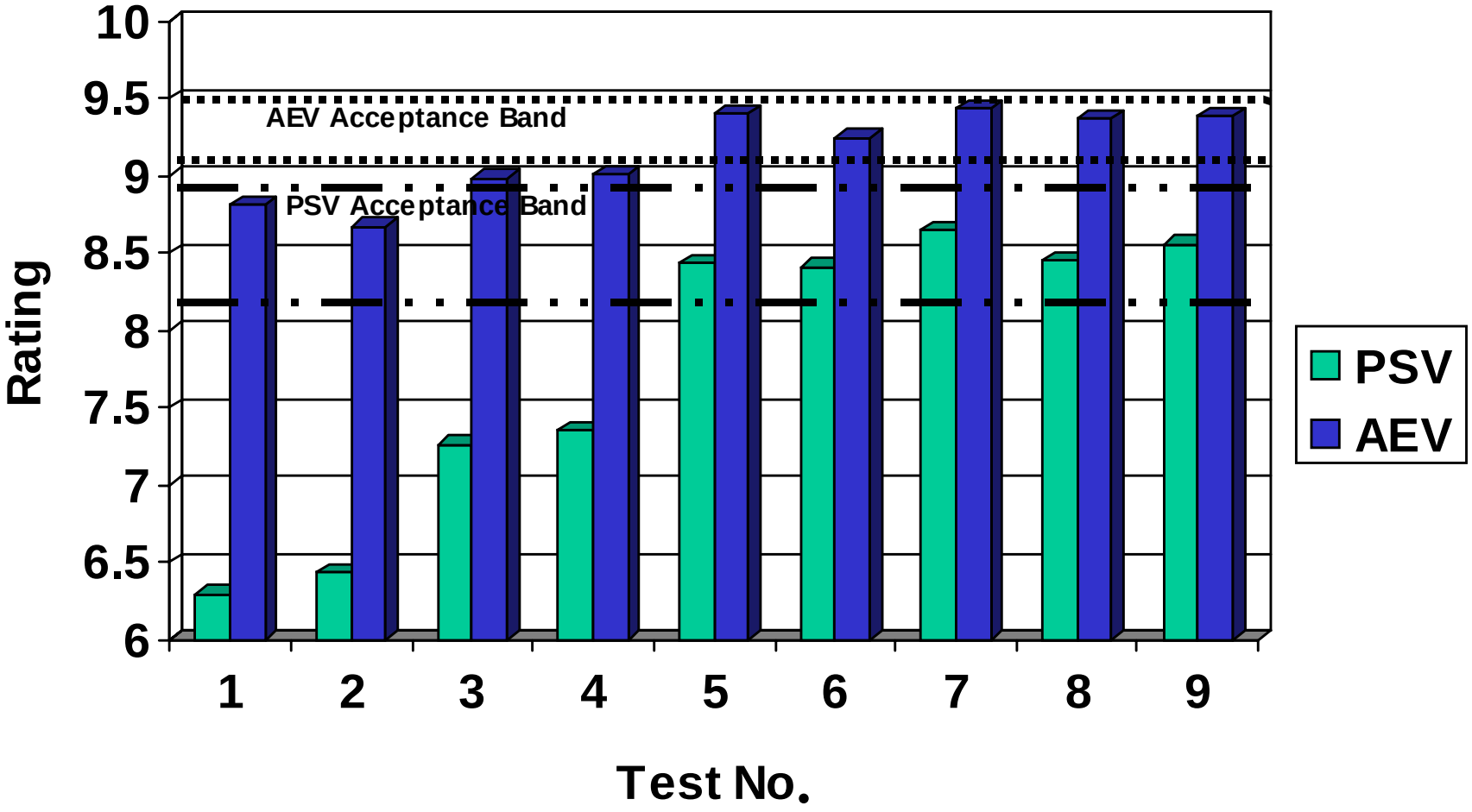
- **Nine tests completed with 1006 reference oil included evaluation of minor hardware/operation changes such as:**
  - **Intake manifold to adapt to both F5AE.. and F8AE.. cylinder heads.**
  - **PCV valve reduced flow rate by about 50%.**
  - **Increased MAP from 69 to 75 kpa.**
- **Test results:**
  - **Mild sludge deposits in some tests. Higher MAP and lower PCV valve flow rates increase sludge. Other changes being investigated.**
  - **Varnish and other results are comparable to current test.**

M. Riley / B. Jecewski
Ford Motor Company
Fuels and Lubricants Eng

New 4.6L VG Sludge Deposits
Reference Oil 1006



New 4.6L VG Varnish Deposits
Reference Oil 1006



Plans for 2000 MY 4.6L VG Engine Test

- **Additional testing to accomplish:**
  - **Sludge and varnish targets with both cylinder bore size engine tests**
  - **Acceptable repeatability and reproducibility**
  - **Oil performance discrimination**

- **Complete hardware kits.**

- **Ford Power Products solicit labs for engine needs.**

M. Riley / B. Jecewski
Ford Motor Company
Fuels and Lubricants Eng

Sequence VG Tests with Production Engines from Romeo Engine Plant

	GF-3 Spec	AER Builds	Test #1	Test #2	Test #3	Test #4
Test Completion Date			02/13/2000	03/27/2000	04/09/2000	04/23/2000
Purpose			1st "F5" heads	1st "F8" heads	Compare to Test #2 "F8" hds	Repeat Test #2
Oil Code		1006	1006	1006	1006	1006
Cylinder Head			F5	F8	F5	F8
Bore Size		+0.5 microns	Production	Production	Production	Production
Comments			Standard bore pistons graphite manually removed	Standard bore pistons no graphite applied	Standard bore pistons no graphite applied	Larger Pistons
AES	7.8 min	8.43 (7.05-9.65)	8.80	9.42	9.22	9.45
RCS	8.0 min	9.34 (8.87-9.81)	9.31	9.53	9.59	9.55
AEV	8.9 min	9.27 (9.05-9.49)	8.81	8.67	8.98	9.01
PSV	8.0 min	8.49 (8.20-8.92)	6.30	6.44	7.26	7.35
Fuel Dilution, Avg			8.4	6.8	6.7	6.8

Mike Riley/Barry Jecewski
Ford Motor Co
Fuel and Lubes Eng
05/17/2001

Sequence VG Tests with Production Engines from Romeo Engine Plant

Test #5	Test #6	Test #7	Test #8	Test #9	Test #10	Test #11
06/30/2000	08/21/2000	09/10/2000		12/15/2000	12/22/00 *	
	MAP 75 kpa	PCV = 2.5 cfm	PCV = 2.5 cfm	EC-152 PCV 2.5 cfm	EC-152 PCV 2.5 cfm	EC-152 PCV 2.5 cfm
	others 69 kpa	others 5 cfm	MAP 73 kpa	MAP 75 kpa	MAP 75 kpa	MAP 69 kpa
1006	1006	1006	1006	1006	1006	1006
	F5 & F8					
0.5 u oversize	0.5 u oversize	0.5 u oversize	0.5 u oversize	0.25 u oversize	0.50 u oversize	0.25 u oversize
					Test stopped @7:00 hrs coolant leak	Note: Test time =+216 Hrs (on test 1-11-01)
9.24	8.41	8.64	9.10	9.34		
9.44	9.2	8.56	9.39	9.48		
9.40	9.24	9.43	9.37	9.39		
8.43	8.41	8.65	8.45	8.56		
6.8	6.0	6.3				

Mike Riley/Barry Jecewski
Ford Motor Co
Fuel and Lubes Eng
05/17/2001