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Unapproved Minutes of the May 11, 2004 Sequence IVA Surveillance Panel Meeting held in Detroit, Michigan

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The meeting was called to order at 12:30 PM by Chairman Bill Buscher. A membership list was circulated for members and guests to sign in. The signed membership list is included as Attachment 1. A copy of the agenda is included as Attachment 2. Membership changes include dropping John Moffa as the member for Castrol, Mark Sutherland replaces Alfredo Montez and Sid Clark, GM has been added as a voting member. Minutes from the November 19th, 2002 meeting were approved as written, motion to approve, Bill Buscher, 2nd, Gordon Farnsworth.

Review of Action Items from Previous Meeting

- 1) Cam wear round robin. Complete, data to be reviewed this meeting
- 2) Test targets for reference oil 1009. Complete with 11 data points.
- 3) Allow smaller fuel batches with sizes of 2K to 20K gallons. Implemented, no negative feedback. Halterman-Dow solicits labs when an order is placed and blends batch accordingly.
- 4) Determine number of kit cams, batch number and how many extra cams were purchased through out industry. Complete.
- 5) Industry prove out of new kit cams. To be addressed this meeting.
- 6) A potential wording change regarding the use of EF-411 or test oil as a pre-lube. This item was addressed in information letter.
- 7) Change in calibration frequency to delete sections 10.2.2 through 10.2.4. This item will be revisited during the meeting.

Fuel Supplier Report

Jim Carter presented the Fuels Supplier report (see Attachment 3). Results of analysis from previous batches were reviewed and are found to be acceptable. Batches are blended whenever orders are placed by lab(s). Bill commented that this smaller batch philosophy has not resulted in any additional time delay. Haltermann-Dow requests a notification of three weeks for (two weeks from receipt of P.O.) for turn around. Shipping regulations may also impact shipment times. Usage was 60% of the past six months. Inventory was depleted in the past two weeks. Haltermann-Dow requested the panel allow them to blend batches as needed, motion by Jim Carter, second, Gordon Farnsworth. As a further caveat, Haltermann-Dow would survey all the labs to determine batch size needed and blend accordingly. Discussion of lead time ensued and Jim explained that the batch would take two weeks to blend and another week to ship. Motion was passed unanimously.

Test Hardware Report

Bill Buscher gave a status of hardware being used. No formal report was presented. Bill commented that the TMC database indicates most labs are on the 2001 batch, with some limited data on the 2002 batch. Bill expects solicitation letter from Nissan mid May. Nissan plans to provide hardware through 2008. Gordon asked if it is true that this engine may not be available after 2008. Bill was not able to determine if the availability issue is true. Bill was assigned an action item to contact Nissan to try and better determine the long and short term availability of this hardware. Jerry Brys noted that the calibration issues were addressed via info letter 02-3.

Review of Cam Wear Round Robin

Review of the data on both the high and low wear cams was conducted. Overall, the data appeared to be reasonable; however, some individual positions exhibited some variability. Copies of the data are included as attachment 4. Specifically, Lab D's results on cam 2 exhaust appeared to be a little milder than the other labs. Data by lobe also tended to support this. One thing Bill noted was that lab D's cutoff frequency was different than others. One lab also did not provide traces. The question was asked if the TMC could code the traces. Bill was tasked with seeing if lab E1 could provide traces. Dave commented that part of the problem could be that the variability could be a result of an indexing problem with the TEI fixture. An action item was assigned to determine how indexing was completed. It was determined that the filter is to be set at 25 mm/s. Bill will also have lab D re-measure the cam at the proper cut off speed.

Cam Shaft Bearing Bore Measurement Requirement

Jerry Brys measures bores between each test. This causes a logistic problem because measurements are made by metrology. Jerry would like to make this measurement optional for every tests and mandatory with the installation of a new cylinder head. Typically the bore does not wear. Dwight asked why we started measuring this. The panel agreed that there was no data to suggest if wear in the bore would be an issue. Dan also suggested we make measurement technique optional. A motion was made to make all camshaft bearing bore measurements optional and remove them from the test report. Motion was approved with two waives this motion is effective May 11, 2004.

Sequence IVA Surveillance Panel Meeting
May 11, 2004 Detroit, MI

Review of Test Method Ballot

Test method D 6891 is now available. The next information letter will incorporate any outstanding information letters not in the standard.

Category Reference Oil

Ben discussed the philosophy behind obtaining a category reference oil. The panel discussed whether there was a need to obtain a GF-4 oil and since there was no significant change relative to the category that there is no need for an additional oil. Ben will carry this decision forward to the class panel.

Review of Scope and Objectives

Scope remains the same. Objectives are updated as follows. Revised objectives are included as Attachment 5.

No items of old or new business were noted.

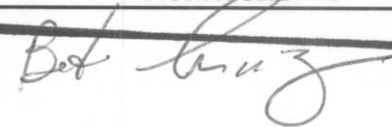






Next meeting will be at the call of the chair.

Meeting was adjourned at 2:01 PM, motion by Bill Buscher, second, Jerry Brys.

A copy of the Motions and Action Items from this meeting are included as Attachment 5.





**MEMBERSHIP
ASTM IVA SURVEILLANCE PANEL**

Attachment	1
Page	1
Reference	November 19, 2002

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**MEMBERSHIP
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Attachment 1
Page 2
Reference November 19, 2002

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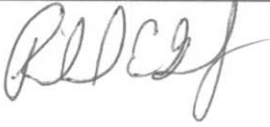

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November 19, 2002

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November 19, 2002

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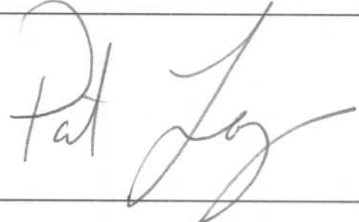

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November 19, 2002

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November 19, 2002

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Attendance	2
Pages	1
Reference	IVA Minutes

Sequence IVA Surveillance Panel

Detroit, Michigan
 Four Points by Sheraton
 May 11, 2004
 12:30 p.m. - 2:30 p.m.

A G E N D A

- | | | |
|-----|---|---------|
| 1. | Chairman comments | |
| 2. | Attendance sign-in sheet distribution | |
| 3. | Membership changes | |
| 4. | Motion and Action recorders | |
| 5. | Approval of minutes for 11/19/2004 | All |
| 6. | Review Action Items from last meeting | Buscher |
| 7. | Fuel supplier report – KA24E Green Fuel | Carter |
| 8. | Test hardware report | Buscher |
| 9. | Review of camshaft wear measurement round robin | Buscher |
| 10. | Camshaft bearing bore measurement requirement | All |
| 11. | Procedure status | Buscher |
| 12. | Need for GF-4 category reference oil | All |
| 13. | Review Scope & Objectives | All |

14. Old Business
15. New Business
16. Next meeting
17. Adjourn

Attachment	<u>2</u>
Page	<u>2 of 2</u>
Reference	<u>IVA Minutes</u>

Attachment 3
Page 1 of 1
Reference 1/A Minutes

PRODUCT: **KA24E TEST FUEL**
PRODUCT CODE: **HF008**

Batch No.: SC2921LS02 RF1721LS01 RA1621LS01
Tank No.: 671 602 602
Analysis Date: 3/31/2004 6/20/2003 1/20/2003

TEST	METHOD	UNITS	SPECIFICATIONS			RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX			
Distillation - IBP	ASTM D86	°F	75		95	93	91	89
5%		°F				113	118	116
10%		°F	120		135	125	131	129
20%		°F				145	152	151
30%		°F				170	178	176
40%		°F				202	207	205
50%		°F	200		230	222	223	222
60%		°F				233	232	232
70%		°F				242	240	242
80%		°F				262	260	262
90%		°F	300		325	324	322	325
95%		°F				345	344	349
Distillation - EP			°F	385		415	395	402
Recovery		vol %		Report	97.4	98.3	98.4	
Residue		vol %		Report	1.0	1.0	1.0	
Loss		vol %		Report	1.6	0.7	0.6	
Gravity	ASTM D4052	°API	58.7		61.2	59.0	58.9	59.6
Density	ASTM D4052	kg/l	0.734		0.744	0.742	0.743	0.740
Reid Vapor Pressure	ASTM D323	psi	8.8		9.2	9.2	9.1	9.2
Carbon	ASTM E191	wt fraction	0.8580		0.8667	0.8652	0.8625	0.8636
Carbon	ASTM D3343	wt fraction		Report	0.8660	0.8658	0.8655	
Sulfur	ASTM D4294	wt %	0.01		0.04	0.02	0.01	0.03
Lead	ASTM D3237	g/gal			0.05	<0.01	<0.01	<0.01
Oxygen	ASTM D4815	wt %			0.05	<0.05	<0.05	<0.05
Composition, aromatics	ASTM D1319	vol %			35.0	31.6	29.9	30.1
Composition, olefins	ASTM D1319	vol %	5.0		10.0	5.9	5.8	6.1
Composition, saturates	ASTM D1319	vol %		Report		62.5	64.3	63.8
Oxidation Stability	ASTM D525	minutes	1440			>1440	>1440	>1440
Copper Corrosion	ASTM D130				1	1	1	1
Gum content, washed	ASTM D381	mg/100ml			5	1	1	1
Research Octane Number	ASTM D2699		96.0		97.5	97.5	97.3	97.5
Motor Octane Number	ASTM D2700			Report	87.4	87.3	89.1	
R+M/2	D2699/2700			Report	92.5	92.3	93.3	
Sensitivity	D2699/2700		7.5			10.1	10.0	8.4
Net Heat of Combustion	ASTM D240	btu/lb		Report	18270	18360	18401	
Color	Visual			Green	Green	Green	Green	

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

PDI Information

Laboratory	Current Tracer	Trace Velocity	Roughness Filter	
			Type	Cutoff
A	PDT-2-522	0.75 mm/s	Gaussian	0.25 mm
B	PDT-2-544	0.50 mm/s	Gaussian	0.25 mm
C	PDT-2-550	0.50 mm/s	Gaussian	0.25 mm
D	PDT-6-1509	0.63 mm/s	Gaussian	0.80 mm
E1	No information provided.			
F	PDT-6-1512	0.50 mm/s	Gaussian	0.25 mm

Attachment	4
Page	1 of 16
Reference	IVA Minutes

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Over-all

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	None.	1.20	1.39	1.60	1.96	1.73	1.46	1.63	10.98
B	None.	1.45	1.62	1.85	2.14	2.12	1.91	1.88	12.96
C	None.	1.51	1.51	1.77	2.03	1.79	1.58	1.64	11.82
D	None.	2.40	2.12	1.96	1.79	1.44	0.98	1.37	12.07
E1	No information provided.	1.62	1.38	1.64	2.05	1.75	1.27	1.38	11.08
F	None.	1.61	1.55	1.72	1.99	1.87	1.46	1.55	11.77
Average		1.63	1.60	1.76	1.99	1.78	1.44	1.58	11.78
Standard Deviation		0.406	0.273	0.134	0.117	0.220	0.310	0.190	0.722

CAM # 2: Over-all

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	None.	10.48	14.69	17.55	21.72	19.93	15.77	8.79	108.92
B	None.	10.52	14.71	18.31	21.40	20.66	16.83	9.56	111.98
C	None.	10.63	14.76	17.60	21.12	19.81	16.20	8.78	108.90
D	None.	10.67	13.65	17.11	19.70	18.51	15.26	9.09	103.99
E1	No information provided.	11.53	15.52	18.70	21.49	19.40	14.78	7.34	108.77
F	None.	10.52	14.50	17.49	20.39	19.15	15.21	8.05	105.30
Average		10.73	14.64	17.79	20.97	19.58	15.68	8.60	107.98
Standard Deviation		0.401	0.599	0.591	0.773	0.735	0.749	0.790	2.879

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Intake

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	None.	1.12	1.30	1.57	2.05	1.86	1.61	1.89	11.40
B	None.	1.27	1.42	1.77	2.32	2.24	2.07	2.01	13.12
C	None.	1.50	1.51	1.77	2.16	1.92	1.67	1.82	12.35
D	None.	2.21	1.78	1.94	2.06	1.59	1.12	1.80	12.51
E1	No information provided.	1.41	1.33	1.66	2.20	1.89	1.35	1.46	11.30
F	None.	1.46	1.56	1.72	2.12	1.95	1.61	1.78	12.19
Average		1.50	1.48	1.74	2.15	1.91	1.57	1.79	12.15
Standard Deviation		0.377	0.176	0.124	0.100	0.208	0.321	0.183	0.692

CAM # 2: Intake

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	None.	11.67	13.96	18.54	23.86	21.34	15.48	5.55	110.42
B	None.	11.57	13.94	19.36	23.52	21.58	16.12	6.12	112.21
C	None.	11.81	14.19	18.66	23.18	21.19	15.77	5.61	110.41
D	None.	11.96	13.90	19.65	22.94	20.66	15.81	7.32	112.24
E1	No information provided.	12.55	14.83	19.51	23.91	20.90	14.36	4.42	110.47
F	None.	11.52	14.04	18.14	22.39	20.49	14.97	5.31	106.86
Average		11.85	14.14	18.98	23.30	21.03	15.42	5.72	110.44
Standard Deviation		0.380	0.352	0.612	0.584	0.417	0.647	0.961	1.959

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Lobe # 1

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.08	1.23	1.72	2.55	2.41	1.35	1.43	11.77
B	Two-Point Line Leveling Method.	1.07	1.25	1.78	2.52	2.93	2.03	2.01	13.59
C	Two-Point Line Leveling Method.	1.67	1.37	1.76	2.73	2.61	1.40	1.52	13.06
D	Two-Point Line Leveling Method.	1.52	2.05	1.54	3.27	3.00	0.67	1.91	13.96
E1	No information provided.	1.31	1.15	1.69	2.46	2.24	1.15	1.28	11.28
F	Two-Point Line Leveling Method.	1.52	1.36	1.80	2.58	2.43	1.59	1.68	12.96
	Average	1.36	1.40	1.72	2.69	2.60	1.37	1.64	12.77
	Standard Deviation	0.250	0.328	0.095	0.300	0.304	0.452	0.283	1.042

CAM # 2: Lobe # 1

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	10.75	12.46	16.55	23.02	19.46	15.78	2.34	100.36
B	Two-Point Line Leveling Method.	10.83	12.33	16.43	22.99	20.23	16.30	3.22	102.33
C	Two-Point Line Leveling Method.	10.84	12.20	16.34	22.54	20.23	16.80	2.55	101.50
D	Two-Point Line Leveling Method.	10.58	14.65	17.85	22.49	19.55	14.54	2.49	102.15
E1	No information provided.	11.37	13.26	17.28	22.96	18.61	14.06	1.90	99.44
F	Two-Point Line Leveling Method.	10.55	12.39	16.47	22.82	19.93	15.85	2.56	100.57
	Average	10.82	12.88	16.82	22.80	19.67	15.56	2.51	101.06
	Standard Deviation	0.296	0.944	0.608	0.234	0.613	1.050	0.427	1.127

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Lobe # 3

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.30	1.37	1.60	2.26	1.75	1.31	1.63	11.22
B	Two-Point Line Leveling Method.	1.36	1.31	1.70	2.76	2.05	1.83	1.73	12.74
C	Two-Point Line Leveling Method.	1.39	1.42	1.59	2.64	1.95	1.78	2.11	12.88
D	Two-Point Line Leveling Method.	2.04	1.62	1.74	2.02	1.58	1.19	1.58	11.77
E1	No information provided.	1.56	1.61	1.74	2.44	1.83	1.28	1.53	11.99
F	Two-Point Line Leveling Method.	1.29	1.65	1.92	2.57	2.09	1.83	2.03	13.38
Average		1.49	1.50	1.72	2.45	1.88	1.54	1.77	12.33
Standard Deviation		0.286	0.147	0.120	0.271	0.193	0.306	0.244	0.804

CAM # 2: Lobe # 3

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	10.55	11.66	16.62	26.86	27.06	19.35	1.96	114.06
B	Two-Point Line Leveling Method.	10.74	11.96	17.28	27.27	27.55	19.67	3.58	118.05
C	Two-Point Line Leveling Method.	11.11	12.68	17.43	26.98	27.50	18.59	2.97	117.26
D	Two-Point Line Leveling Method.	10.12	11.01	16.68	24.97	24.26	17.84	1.73	106.61
E1	No information provided.	11.71	13.11	19.53	27.20	27.16	16.00	2.00	116.71
F	Two-Point Line Leveling Method.	10.05	11.38	17.00	25.83	27.12	18.38	2.78	112.54
Average		10.71	11.97	17.42	26.52	26.78	18.31	2.50	114.21
Standard Deviation		0.628	0.796	1.080	0.920	1.249	1.309	0.721	4.263

2002 Round Robin

Sequence IVA Valve Train Wear Test

Camshaft Lobe Wear

CAM # 1: Lobe # 4

* Lobe # 4 is missing a non-wear edge.

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	No Form Filter Leveling Method.	1.07	1.62	1.72	1.53	1.84	2.36	3.66	13.80
B	No Form Filter Leveling Method.	0.95	1.15	1.26	1.56	2.03	2.73	3.35	13.03
C	Two-Point Line Leveling Method.	2.23	1.52	1.40	1.55	1.57	1.36	1.46	11.09
D	Two-Point Line Leveling Method.	1.90	1.42	2.51	1.93	1.39	0.91	2.11	12.17
E1	No information provided.	1.64	1.37	1.60	2.01	1.83	1.78	1.97	12.20
F	Two-Point Line Leveling Method.	1.36	1.65	1.40	1.58	1.86	1.61	1.64	11.10
Average		1.53	1.46	1.65	1.69	1.75	1.79	2.37	12.23
Standard Deviation		0.493	0.185	0.453	0.216	0.231	0.663	0.918	1.066

CAM # 2: Lobe # 4

* Lobe # 4 is missing a non-wear edge.

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	No Form Filter Leveling Method.	8.97	10.98	14.31	24.65	26.04	18.83	15.36	119.14
B	No Form Filter Leveling Method.	9.08	10.91	20.87	25.83	23.66	18.10	14.68	123.13
C	Two-Point Line Leveling Method.	9.16	11.39	14.34	21.03	22.61	18.35	18.15	115.03
D	Two-Point Line Leveling Method.	9.03	10.13	13.03	19.63	21.41	15.91	11.84	100.98
E1	No information provided.	9.98	11.88	15.45	25.32	25.34	18.78	13.61	120.36
F	Two-Point Line Leveling Method.	9.37	10.29	13.61	19.49	22.18	18.81	13.60	107.35
Average		9.27	10.93	15.27	22.66	23.54	18.13	14.54	114.33
Standard Deviation		0.377	0.658	2.862	2.932	1.831	1.127	2.134	8.537

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Lobe # 6

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.17	1.39	1.32	2.05	1.73	1.27	1.48	10.41
B	Two-Point Line Leveling Method.	1.45	1.59	1.85	2.03	2.79	1.64	1.61	12.96
C	Two-Point Line Leveling Method.	1.38	1.47	1.91	1.73	2.10	1.82	2.31	12.72
D	Two-Point Line Leveling Method.	2.45	1.41	1.78	1.01	1.23	0.87	1.99	10.74
E1	No information provided.	1.49	1.30	1.43	1.68	1.90	1.43	1.64	10.87
F	Two-Point Line Leveling Method.	1.62	1.76	1.57	2.05	1.94	1.47	1.94	12.35
Average		1.59	1.49	1.64	1.76	1.95	1.42	1.83	11.68
Standard Deviation		0.445	0.165	0.240	0.403	0.509	0.327	0.308	1.124

CAM # 2: Lobe # 6

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	15.27	16.21	21.45	25.09	22.90	16.13	2.82	119.87
B	Two-Point Line Leveling Method.	14.72	16.60	21.61	24.33	22.78	16.40	2.81	119.25
C	Two-Point Line Leveling Method.	14.54	16.20	21.35	24.94	23.01	16.26	2.33	118.63
D	Two-Point Line Leveling Method.	9.29	8.32	23.13	25.12	21.19	17.04	5.00	109.09
E1	No information provided.	16.05	17.10	21.68	25.20	22.37	14.85	1.86	119.11
F	Two-Point Line Leveling Method.	14.66	15.77	20.57	24.95	22.32	16.34	2.32	116.93
Average		14.09	15.03	21.63	24.94	22.43	16.17	2.86	117.15
Standard Deviation		2.417	3.319	0.835	0.315	0.668	0.720	1.110	4.071

Attachment

Page 1 of 1

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Lobe # 7

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.04	1.25	1.64	2.29	1.62	1.37	1.50	10.71
B	Two-Point Line Leveling Method.	1.36	1.52	1.87	2.68	1.95	2.23	1.75	13.36
C	Two-Point Line Leveling Method.	1.29	1.98	2.01	2.09	1.55	1.54	1.50	11.96
D	Two-Point Line Leveling Method.	1.30	1.43	2.51	2.16	1.18	1.73	2.13	12.44
E1	No information provided.	1.35	1.31	1.98	2.41	2.05	1.17	1.46	11.73
F	Two-Point Line Leveling Method.	1.54	1.61	1.79	1.99	1.80	1.78	1.80	12.31
Average		1.31	1.52	1.97	2.27	1.69	1.64	1.69	12.09
Standard Deviation		0.161	0.263	0.298	0.249	0.314	0.369	0.259	0.876

CAM # 2: Lobe # 7

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	12.97	17.18	22.32	25.01	20.37	15.76	11.48	125.09
B	Two-Point Line Leveling Method.	12.58	16.13	22.27	24.75	20.97	18.38	8.42	123.50
C	Two-Point Line Leveling Method.	12.71	17.27	22.35	24.25	20.60	17.29	8.68	123.15
D	Two-Point Line Leveling Method.	11.54	13.45	20.15	26.08	21.27	17.68	13.46	123.63
E1	No information provided.	13.32	17.16	22.71	24.96	20.64	16.92	7.85	123.56
F	Two-Point Line Leveling Method.	12.69	16.72	21.50	23.77	21.02	18.99	7.78	122.47
Average		12.64	16.32	21.88	24.80	20.81	17.50	9.61	123.57
Standard Deviation		0.599	1.468	0.937	0.784	0.331	1.134	2.326	0.861

2002 Round Robin
Sequence IVA Valve Train Wear Test
 Camshaft Lobe Wear

CAM # 1: Lobe # 9

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.36	1.63	1.74	2.31	2.02	1.80	1.52	12.38
B	Two-Point Line Leveling Method.	1.44	1.57	1.69	2.18	2.09	2.16	1.97	13.10
C	Two-Point Line Leveling Method.	1.26	1.53	1.78	2.43	2.10	2.04	1.99	13.13
D	Two-Point Line Leveling Method.	1.63	0.84	1.16	1.94	1.25	1.31	1.47	9.60
E1	No information provided.	1.47	1.42	1.52	2.13	1.72	1.56	1.36	11.18
F	Two-Point Line Leveling Method.	1.61	1.48	1.65	2.24	2.05	1.54	1.47	12.04
	Average	1.46	1.41	1.59	2.21	1.87	1.74	1.63	11.91
	Standard Deviation	0.143	0.289	0.229	0.167	0.336	0.325	0.276	1.342

CAM # 2: Lobe # 9

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	12.48	15.57	21.33	23.37	17.48	12.34	3.52	106.09
B	Two-Point Line Leveling Method.	12.14	17.20	21.85	22.18	16.92	12.19	3.18	105.66
C	Two-Point Line Leveling Method.	12.40	15.78	21.70	23.41	17.77	12.43	3.10	106.59
D	Two-Point Line Leveling Method.	13.36	18.87	23.56	20.75	17.41	11.86	5.13	110.94
E1	No information provided.	13.00	17.53	22.47	22.62	16.42	10.38	2.06	104.48
F	Two-Point Line Leveling Method.	12.08	16.88	21.39	22.49	15.07	11.12	2.26	101.29
	Average	12.58	16.97	22.05	22.47	16.85	11.72	3.21	105.84
	Standard Deviation	0.504	1.213	0.845	0.976	0.991	0.811	1.097	3.137

2002 Round Robin Sequence IVA Valve Train Wear Test Camshaft Lobe Wear

Attachment
Page
Reference

4
10 of 16

CAM # 1: Lobe # 10

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.10	0.96	1.53	1.80	1.71	1.46	1.87	10.43
B	Two-Point Line Leveling Method.	1.43	1.68	2.04	2.53	1.91	1.79	1.80	13.18
C	Two-Point Line Leveling Method.	1.46	1.44	1.96	1.83	1.68	1.46	1.77	11.60
D	Two-Point Line Leveling Method.	2.54	2.02	1.53	2.22	1.29	1.18	1.53	12.31
E1	No information provided.	1.43	1.26	1.81	2.40	1.88	1.01	1.17	10.96
F	Two-Point Line Leveling Method.	1.45	1.49	1.90	2.04	1.71	1.49	1.92	12.00
Average		1.57	1.48	1.80	2.14	1.70	1.40	1.68	11.75
Standard Deviation		0.495	0.361	0.219	0.299	0.221	0.271	0.282	0.981

CAM # 2: Lobe # 10

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	10.46	12.19	16.97	22.70	20.96	14.48	4.34	102.10
B	Two-Point Line Leveling Method.	10.37	11.73	16.00	20.57	23.92	16.04	10.31	108.94
C	Two-Point Line Leveling Method.	11.18	12.48	17.06	22.71	21.80	15.07	4.40	104.70
D	Two-Point Line Leveling Method.	11.60	11.20	14.98	21.10	17.36	14.97	6.41	97.62
E1	No information provided.	11.48	12.63	17.67	22.91	20.84	13.38	4.27	103.18
F	Two-Point Line Leveling Method.	10.27	11.89	16.12	21.19	21.62	15.20	6.19	102.48
Average		10.89	12.02	16.47	21.86	21.08	14.86	5.99	103.17
Standard Deviation		0.596	0.526	0.959	1.022	2.135	0.883	2.328	3.689

2002 Round Robin Sequence IVA Valve Train Wear Test Camshaft Lobe Wear

Attachment 4
Page 10 of 16
Reference IVA Minutes

CAM # 1: Lobe # 12

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	0.82	0.94	1.30	1.62	1.76	1.99	2.06	10.49
B	Two-Point Line Leveling Method.	1.13	1.33	1.97	2.31	2.16	2.17	1.89	12.96
C	Two-Point Line Leveling Method.	1.33	1.36	1.75	2.28	1.78	1.93	1.92	12.35
D	Two-Point Line Leveling Method.	4.28	3.45	2.77	1.96	1.78	1.13	1.70	17.07
E1	No information provided.	1.02	1.20	1.51	2.09	1.66	1.41	1.30	10.19
F	Two-Point Line Leveling Method.	1.25	1.50	1.71	1.93	1.74	1.54	1.72	11.39
Average		1.64	1.63	1.84	2.03	1.81	1.70	1.77	12.41
Standard Deviation		1.306	0.911	0.511	0.256	0.176	0.398	0.264	2.517

CAM # 2: Lobe # 12

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	11.90	15.42	18.80	20.21	16.49	11.21	2.61	96.64
B	Two-Point Line Leveling Method.	12.12	14.64	18.58	20.25	16.59	11.86	2.80	96.84
C	Two-Point Line Leveling Method.	12.52	15.53	18.73	19.56	16.03	11.40	2.67	96.44
D	Two-Point Line Leveling Method.	20.18	23.59	27.84	23.38	22.81	16.61	12.48	146.89
E1	No information provided.	13.50	15.99	19.27	20.09	15.81	10.49	1.77	96.92
F	Two-Point Line Leveling Method.	12.47	16.98	18.44	18.60	14.65	5.09	5.02	91.25
Average		13.78	17.03	20.28	20.35	17.06	11.11	4.56	104.16
Standard Deviation		3.182	3.307	3.716	1.610	2.900	3.675	4.030	21.046

2002 Round Robin Sequence IVA Valve Train Wear Test Camshaft Lobe Wear

CAM # 1: Exhaust

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	None.	1.35	1.58	1.66	1.78	1.49	1.16	1.12	10.12
B	None.	1.80	2.01	2.02	1.78	1.88	1.58	1.60	12.66
C	None.	1.52	1.51	1.76	1.76	1.52	1.40	1.28	10.76
D	None.	2.78	2.82	2.00	1.25	1.15	0.68	0.52	11.18
E1	No information provided.	2.03	1.47	1.59	1.74	1.47	1.12	1.21	10.63
F	None.	1.93	1.54	1.74	1.73	1.70	1.17	1.10	10.92
Average		1.90	1.82	1.80	1.67	1.54	1.19	1.14	11.05
Standard Deviation		0.500	0.527	0.177	0.208	0.245	0.304	0.353	0.866

CAM # 2: Exhaust

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	None.	8.10	16.14	15.55	17.44	17.11	16.34	15.26	105.94
B	None.	8.41	16.24	16.20	17.16	18.83	18.24	16.44	111.52
C	None.	8.27	15.90	15.46	17.02	17.06	17.06	15.12	105.88
D	None.	8.07	13.15	12.02	13.23	14.22	14.17	12.64	87.50
E1	No information provided.	9.50	16.88	17.10	16.66	16.41	15.62	13.19	105.36
F	None.	8.51	15.41	16.19	16.40	16.46	15.68	13.52	102.17
Average		8.48	15.62	15.42	16.32	16.68	16.19	14.36	103.06
Standard Deviation		0.530	1.301	1.766	1.557	1.492	1.389	1.466	8.198

Attachment 4
Page 12 of 16
Reference IVA Minutes

2002 Round Robin Sequence IVA Valve Train Wear Test Camshaft Lobe Wear

Attachment 4
Page 13 of 16
Reference NA Minutes

CAM # 1: Lobe # 2

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.24	1.70	1.47	1.65	1.54	1.06	1.02	9.68
B	Two-Point Line Leveling Method.	1.73	2.30	2.24	1.45	1.60	1.58	1.62	12.52
C	Two-Point Line Leveling Method.	1.55	1.29	1.78	1.42	1.54	1.32	1.22	10.12
D	Two-Point Line Leveling Method.	1.54	1.26	1.10	0.77	0.44	0.47	0.48	6.06
E1	No information provided.	2.57	1.69	1.54	1.45	1.44	0.83	0.85	10.37
F	Two-Point Line Leveling Method.	1.65	1.42	1.59	1.45	1.63	1.06	1.09	9.89
Average		1.71	1.61	1.62	1.37	1.37	1.05	1.05	9.77
Standard Deviation		0.451	0.388	0.377	0.303	0.458	0.384	0.380	2.090

CAM # 2: Lobe # 2

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	3.35	12.42	13.46	15.64	16.36	15.80	14.37	91.40
B	Two-Point Line Leveling Method.	3.23	12.23	13.45	15.60	16.63	16.76	14.99	92.89
C	Two-Point Line Leveling Method.	3.69	12.32	13.52	15.88	16.79	16.53	14.09	92.82
D	Two-Point Line Leveling Method.	4.02	14.81	11.97	12.36	18.37	16.92	15.11	93.56
E1	No information provided.	3.88	13.07	13.07	15.56	16.41	15.19	11.82	89.00
F	Two-Point Line Leveling Method.	3.53	12.36	13.21	15.44	17.18	15.27	11.43	88.42
Average		3.62	12.87	13.11	15.08	16.96	16.08	13.64	91.35
Standard Deviation		0.305	0.998	0.586	1.340	0.753	0.761	1.607	2.169

2002 Round Robin

Sequence IVA Valve Train Wear Test

Camshaft Lobe Wear

Attachment

Page

14 of 16

Reference IVA Minutes

CAM # 1: Lobe # 5

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.85	1.95	1.81	2.04	1.67	1.24	1.20	11.76
B	Two-Point Line Leveling Method.	1.66	1.75	1.82	1.70	1.78	1.95	1.83	12.49
C	Two-Point Line Leveling Method.	1.73	1.96	1.88	1.95	1.73	1.92	1.64	12.81
D	Two-Point Line Leveling Method.	2.52	2.16	2.53	1.32	0.93	0.71	0.70	10.87
E1	No information provided.	2.21	1.71	1.77	1.85	1.68	1.44	1.93	12.59
F	Two-Point Line Leveling Method.	2.34	2.01	1.96	1.97	2.13	1.26	1.14	12.81
Average		2.05	1.92	1.96	1.81	1.65	1.42	1.41	12.22
Standard Deviation		0.354	0.168	0.286	0.265	0.393	0.468	0.473	0.767

CAM # 2: Lobe # 5

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	No Form Filter Leveling Method.	13.74	14.85	12.72	13.17	13.89	12.92	11.61	92.90
B	Two-Point Line Leveling Method.	15.88	13.83	12.05	13.75	13.56	14.03	11.94	95.04
C	Two-Point Line Leveling Method.	13.89	14.42	12.72	13.45	13.35	13.33	11.78	92.94
D	Two-Point Line Leveling Method.	12.56	11.11	9.29	10.09	9.89	12.51	9.87	75.32
E1	No information provided.	17.63	14.52	18.46	13.05	12.94	12.58	10.68	99.86
F	Two-Point Line Leveling Method.	15.17	12.99	13.13	12.98	13.26	13.24	11.58	92.35
Average		14.81	13.62	13.06	12.75	12.82	13.10	11.24	91.40
Standard Deviation		1.804	1.393	2.988	1.333	1.467	0.564	0.803	8.354

* Lobe # 5 is missing a non-wear edge?

2002 Round Robin Sequence IVA Valve Train Wear Test Camshaft Lobe Wear

Attachment
Page 4
Reference /VA Minutes
15 of 16

CAM # 1: Lobe # 8

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	1.36	1.57	1.70	2.05	1.20	1.17	0.86	9.91
B	Two-Point Line Leveling Method.	2.09	2.12	2.36	2.40	2.78	1.51	1.84	15.10
C	Two-Point Line Leveling Method.	1.46	1.62	1.76	2.01	1.17	1.18	1.05	10.25
D	Two-Point Line Leveling Method.	2.30	3.55	1.74	0.75	1.19	0.30	0.33	10.16
E1	No information provided.	0.98	1.12	1.60	1.89	1.39	1.01	0.95	8.94
F	Two-Point Line Leveling Method.	1.63	1.31	1.59	1.91	1.50	1.13	1.01	10.08
Average		1.64	1.88	1.79	1.84	1.54	1.05	1.01	10.74
Standard Deviation		0.487	0.885	0.287	0.562	0.622	0.403	0.486	2.189

CAM # 2: Lobe # 8

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	No Form Filter Leveling Method.	2.47	22.18	20.43	22.80	19.96	17.75	17.25	122.84
B	Two-Point Line Leveling Method.	1.85	23.22	21.43	22.10	19.23	18.54	17.62	123.99
C	Two-Point Line Leveling Method.	2.56	22.01	20.18	21.17	18.83	18.17	15.68	118.60
D	Two-Point Line Leveling Method.	2.58	9.89	9.81	14.15	12.06	12.02	10.59	71.10
E1	No information provided.	2.11	23.94	20.66	21.51	18.31	17.47	13.80	117.80
F	Two-Point Line Leveling Method.	2.22	21.21	19.99	20.82	18.62	17.84	15.14	115.84
Average		2.30	20.41	18.75	20.43	17.84	16.97	15.01	111.70
Standard Deviation		0.290	5.241	4.408	3.153	2.886	2.450	2.581	20.127

* Lobe # 8 is missing a non-wear edge?

2002 Round Robin

Sequence IVA Valve Train Wear Test

Camshaft Lobe Wear

CAM # 1: Lobe # 11

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	0.96	1.08	1.67	1.36	1.54	1.15	1.38	9.14
B	Two-Point Line Leveling Method.	1.71	1.87	1.65	1.56	1.35	1.30	1.11	10.55
C	Two-Point Line Leveling Method.	1.34	1.18	1.61	1.68	1.66	1.18	1.22	9.87
D	Two-Point Line Leveling Method.	4.75	4.29	2.62	2.15	2.03	1.25	0.56	17.65
E1	No information provided.	2.37	1.37	1.45	1.79	1.37	1.18	1.10	10.63
F	Two-Point Line Leveling Method.	2.11	1.40	1.81	1.60	1.56	1.23	1.18	10.89
Average		2.21	1.87	1.80	1.69	1.59	1.22	1.09	11.46
Standard Deviation		1.346	1.219	0.417	0.267	0.248	0.055	0.279	3.101

CAM # 2: Lobe # 11

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	No Form Filter Leveling Method.	12.85	15.13	15.59	18.13	18.23	18.88	17.79	116.60
B	No Form Filter Leveling Method.	12.68	15.69	17.86	17.21	25.91	23.64	21.19	134.18
C	No Form Filter Leveling Method.	12.93	14.86	15.43	17.57	19.25	20.20	18.93	119.17
D	Two-Point Line Leveling Method.	13.13	16.78	17.01	16.33	16.56	15.24	14.97	110.02
E1	No information provided.	14.37	16.01	16.20	16.51	17.97	17.26	16.45	114.77
F	No Form Filter Leveling Method.	13.12	15.08	18.43	16.34	16.78	16.39	15.94	112.08
Average		13.18	15.59	16.75	17.02	19.12	18.60	17.55	117.80
Standard Deviation		0.607	0.722	1.226	0.744	3.472	3.033	2.266	8.649

* Lobe # 11 is missing a non-wear edge.

ASTM Sequence IVA Surveillance Panel

Scope and Objectives

Scope

The Sequence IVA Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence IVA test documented in the Research Report RR:D02.1218 as updated by the Information Letter system. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six months. Improvements in wear measurement technique, test operation, test monitoring and test validation will be accomplished through continual communication with the Test Sponsor and Parts Distributor, ASTM Test Monitoring Center, ASTM Committee D02.B0.01 and the ASTM Passenger Car Engine Oil Classification Panel. Actions to improve the process will be recommended when deemed appropriate based on input from the proceeding. The Panel will review development and correlation of updated test procedures with previous test procedures. This process will provide a suitable test procedure for evaluating an automotive lubricant's effect on controlling cam lobe wear for overhead valvetrain equipped engines with sliding cam followers.

Objectives

Target Date

- | | |
|--|-----------------|
| 1. Conduct 2004 metrology workshop | <i>Nov 2004</i> |
| 2. Confirm short and long-term hardware availability | <i>Nov 2004</i> |

William A. Buscher III, Chairman
Sequence IVA Surveillance Panel

Updated: May 2004

May 11, 2004 Sequence IVA Surveillance Panel Meeting
Detroit, MI..
Motion and Action Items as Recorded at the Meeting
by Ben Weber

1. The previous meeting minutes posted on the TMC website were unanimously approved.
2. Action Item – Bill will contact Nissan to verify the long and short-term hardware supply commitment by Nissan.
3. Action Item – Bill to discuss the round robin differences with lab D to try and improve their measurement agreement with the rest of the industry.
4. Action Item – Lab E1 to provide the IVA chairman their traces of the round robin camshaft measurements.
5. Action Item – IVA labs to provide to the chairman how the indexing was done for the round robin data (TEI fixture used?), as well as the cutoff verification used by each lab.
6. [Motion made by Jerry Brys and seconded by Dwight Bowden] All the camshaft bearing bore measurements are now optional and removed from the test report. Effective today. Passed unanimously, with 2 waives.
7. Action Item – Mike K will double check that the approved ASTM Test Method includes all information letters released to date.
8. Action Item – The IVA chairman will report that the SP discussed the GF-4 category calibration oil and the SP felt that the current slate of calibration oils provided the best selection to date. No other oils for the IVA have been brought to the chair's attention to date or presented at this meeting for discussion.

Sequence IVA Surveillance Panel Meeting
May 11, 2004 Detroit, MI

Review of Test Method Ballot

Test method D 6891 is now available. The next information letter will incorporate any outstanding information letters not in the standard.

Category Reference Oil

Ben discussed the philosophy behind obtaining a category reference oil. The panel discussed whether there was a need to obtain a GF-4 oil and since there was no significant change relative to the category that there is no need for an additional oil. Ben will carry this decision forward to the class panel.

Review of Scope and Objectives

Scope remains the same. Objectives are updated as follows. Revised objectives are included as Attachment 5.

No items of old or new business were noted.

Next meeting will be at the call of the chair.

Meeting was adjourned at 2:01 PM, motion by Bill Buscher, second, Jerry Brys.

A copy of the Motions and Action Items from this meeting is included as Attachment 6.