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

Originally Issued: June, 2015

Reply to: Richard Grundza
ASTM Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206
Phone: 412-365-1031
Fax: 412-365-1047
Email: reg@astmtmc.cmu.edu

Unapproved Minutes of the June 4, 2015 Sequence IV Surveillance Panel Meeting.

The meeting was called to order by Chairman Buscher at 8:10 AM Eastern Time.

A list of attendees is included as attachment 1. Chris Miletti and Matt Bowden also participated via teleconference. Membership changes include Brian Marks replacing Tim Miranda for BP.

A copy of the agenda is included as attachment 2.

Bill Buscher replaces all Al Lopez as voting member for Intertek. Andy Ritchie has Infineum's proxy, Jerry Brys has Chris Miletti's vote and Eric Liu had Fred Gerhart's vote.

Minutes from the 10/22/2014 Meeting were approved with no corrections.

Action Items from Previous Meeting
A review of the status of action items from the previous meeting was under taken. There was only one action item and its status is as follows:

Action Item – Run 3 more donated tests on oil 300. TMC to grant reference extensions for the test stands used on a one for one basis. Tests to be conducted on currently calibrated stands and currently calibrated cam batches. A conference call will be scheduled to discuss the results.
Completed 3 additional tests, but conference call never conducted. Discussion included in today's agenda.

Hardware review
There are 3 labs running tests on four to six stands and based on surveys of the labs, there are 692 test runs remaining (see attachment 3). This translates to anywhere from a two to eight years of test life. Some limiting factors that may limit test life are the number of cams available as well as 0W-16 oils may shorten life, but there is limited data right now. A question was asked as to whether all cams have been reground, and Jason Bowden indicated that the regrinding has been completed. Labs were asked to discuss their experience with the reground cams and the three labs currently calibrated as IVA labs indicated they were not experiencing any difficulties with the reground cams.

RO 300 Data reviewed
With regards to the introduction reference oil 300, the panel reviewed data that was presented at a previous meeting (see attachments 4 and 5). There were concerns expressed that reference oil 300 performs similar to 1006-2, with a corrected mean of 97 microns (see attachment 6). The application of SA's didn't improve variability or change the severity by much. The intent was to obtain an oil with performance in the 50 – 60 micron range. The supplier data indicated the oil was nominally 50 microns. Given that the performance of reference oil 300 is similar to reference oil 1006-2, with large variability in wear by lobe, and is more severe than 1006-2 in the IVB test, the panel agreed not to use this oil in the Sequence IVA test.

Fuel Supplier Report
There was no formal report to the panel from the fuel supplier. The supplier reiterated that fuel is blended on an "as needed" basis and that roughly 1-2 batches are blended per year. The supplier was not aware of any issues going forwarded. It was further noted that this fuel is being used in IVB development and for Sequence VIII. The supplier will continue to blend on demand. Is IVB sensitive to fuel changes. Experience with current development hasn't shown any differences. Labs are running different batches and getting similar results. Different fuels may provide different results. Some development work was done using VID additized fuels and milder results were obtained. The panel will continue to monitor fuel. Additional discussions took place with regards to fuel batch and the availability of the C of A data. That data is currently not provided by the fuel supplier. Historic batch analysis has been included in the minutes, but recent C of A's are not available. After additional discussions, two action items were assigned. The first was thae fuel supplier will supply certificate of analysis parameters to the TMC for posting on the website for the Sequence IVA. The second action item was to add the C of A sheet to the test report for the IVB. The addition of this sheet to the report packet will be accomplished after the precision matrix.

TMC Report
Rich Grundza of the Test Monitoring Center provided a quick update on severity and precision of the IVA test. Both severity and precision are in control and precision estimates for the period ending October, 2015 are comparable to historical levels. There are 3 calibrated labs with a total of 4 stands and all labs and stands are calibrated on the reground hardware. A copy of TMC report can be accessed via the following link:
ftp://ftp.astmtmc.cmu.edu/docs/gas/B01SemiAnnualReports/semiannualreports/B01%20SemiAnnualReport%20-%20Apr%202015.pdf

Scope and Objectives
The scope and objectives were reviewed and are included as attachment 7.
The status of long term hardware has been addressed. Driveline mounting is incomplete. The panel agreed this needs to be kept open and active and the panel needs to resolve these items regarding driveline. Labs have procedures for replacement of driveline components but further refinements and understanding of the influence on tests need to be pursued, this was left as on going. Introduction of GF-5 Reference oil 300 has been dropped

New Business:
Todd Dvorak asked if the fuel data could be made available. Additional discussions took place with regards to fuel batch and the availability of the C of A data. That data is currently not provided by the fuel supplier. Historic batch analysis has been included in the minutes, but recent C of A's are not available. After additional discussions, two action items were assigned. The first was that fuel supplier will supply certificate of analysis parameters to the TMC for posting on the website for the Sequence IVA. The second action item was to add the C of A sheet to the test report for the IVB. The addition of this sheet to the report packet will be accomplished after the precision matrix.

IVB Development
Bill Buscher reviewed the development work to date on the development of the IVB. Bill also reviewed a IVA to IVB comparison (attachment 8). There was a unanimous vote from AOAP to allow the IVB test to move forward to matrix testing. Two labs have completed prove out testing and will be forwarding those results to the TMC for posting on the website and satisfying electronic transmittal requirements. A third lab is currently running prove out tests and will be starting the second prove out test shortly.
A number of items still remain to be completed. The finalized sales agreement still needs to be signed by one lab. The MOA is still a work in progress and lacks signatures from all parties. Hardware for the matrix plus one reference period has been procured by the CPD, and the CPD indicated there is a six month supply of hardware available. Laser etched lifters will be used, rather than notched lifters. Bill indicated that the anticipated start date is August 1 for the matrix with four 200 hour tests per stand, he anticipated the matrix being completed by October.

Bill then gave an update on the status of the procedure and build manual (see attachment 9). Bi-weekly calls have been conducted and the task force is making considerable progress in having the finalized procedure in place for the matrix.
Report package will close beta later this month and will be available for use in time for the matrix. Reference oils have been obtained ad re in the labs ready for the start of the matrix.

A number of questions and discussions took place regarding whether 0W-16 oils had been tested. 0W-16 Tech 1 has been run at Intertek and a 0W-16 version of REO3 has been run at SwRI and both labs indicated the tests ran full length and did not incur any operational anomalies. Bill also

indicated some potential candidate work has been conducted on 0W-16 and no issues were noted with these oils either, though there was a comment that 0W-16 oils tended to give higher wear. Additional discussions took place with regards to testing on other oils. A question came up at whether REO3 would be used as a reference oil. It was indicated that REO3 had not been offered up as a reference oil, but some members of the classification panel had indicated they might try and pursue it as a category type reference oil.

The discussions then turned to operational data and what criteria would be used to determine validity of tests, etc. Currently, data is being logged at one second frequencies, creating large data files with challenges as to moving them to the TMC for posting and industry access. Bill and Al Lopez reviewed how transition data is evaluated at the present time and that the labs showed good agreement in the conduct of transitioning the test from stage to stage. Jo Martinez has done some analysis on the data generated to date and has not found significant differences between SwRI and IAR and also between stands. Kevin O'Malley pointed out that data format would need to be consistent and naming conventions of the parameters would need to match the data dictionary. There was also discussion about the measurement techniques and how they agree between labs and there have been round robins which showed consistent agreement between labs. A considerable discussion took place with regards to the light source of the Keyence measurement device and whether it was better or worse than some other devices available, but no recommendations or actions came out of it. Finally, each panel has been asked to develop equivalency limits between the new test and the current test. The panel agreed there is not an immediate need as the IVA test will be available for the foreseeable future and the panel will address if the IVA becomes unavailable.

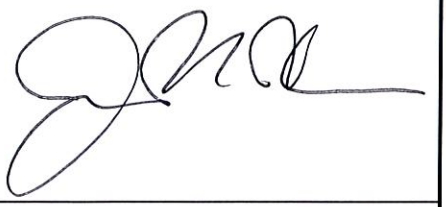
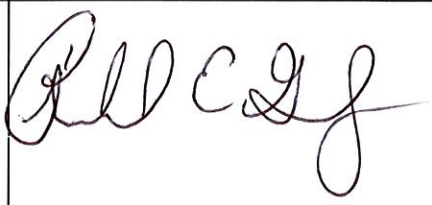
Next meeting will probably be in November.

The meeting was adjourned at 10:20 AM.

A listing of action items from this meeting is included as attachment 10.

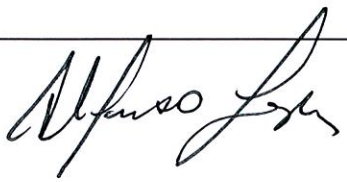
MEMBERSHIP
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Bowden, Jason	OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 Phone No.: 440-354-7007 Fax No.: 440-354-7080 Email: jhbowden@ohtech.com	
Buscher III, William	Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238 Phone No.: 210-647-9489 or 210-240-8990 cell Fax No.: 210-684-6074 Email: william.buscher@intertek.com	
Buscher, Jr., William	Buscher Consulting Services P.O. Box 112 Hopewell Jct., NY 12533 Phone No.: 914-897-8069 Fax No.: 914-897-8069 Email: buschwa@aol.com	
Caudill, Timothy	Ashland Inc. 22nd & Front Streets Ashland, KY 41114 Phone No.: 606-329-1960 x5708 Fax No.: 606-329-2044 Email: tlcaudill@ashland.com	
Gerhart, Fred	Southwest Research Institute 6220 Culebra Road P.O. Drawer 28510 San Antonio, TX 78228-0510 Phone No.: 210-522-3842 or 210-317-8303 cell Fax No.: 210-684-7523 Email: fred.gerhart@swri.org	
Glaenzer, Dave	Afton Chemical Corporation 500 Spring Street P.O. Box 2158 Richmond, VA 23217-2158 Phone No.: 804-788-5214 Fax No.: 804-788-6358 Email: dave.glaenzer@aftonchemical.com	
Grundza, Rich	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 Phone No.: 412-365-1031 Fax No.: 412-365-1047 Email: reg@astmtmc.cmu.edu	
Hsu, Jeffery	Shell Global Solutions 3333 Highway 6 South Houston, TX 77082 Phone No.: 281-544-8619 Fax No.: 281-544-8150 Email: j.hsu@shell.com	

MEMBERSHIP
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
King, Tracey	Haltermann Solutions 2296 Hulett Okemos, MI 48864 Phone No.: 947-517-4107 Fax No.: Email: tking@jhaltermann.com	
Kowalski, Teri	Toyota Motor North America, Inc. 1555 Woodridge Ann Arbor, MI 48105 Phone No.: 734- 995-4032 or 734-355-8082 cell Fax No.: 734- 995-9049 Email: teri.kowalski@tema.toyota.com	
Lanctot, Dan ☆	Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249 Phone No.: Fax No.: Email: DLanctot@tei-net.com	
Lopez, Al	Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238-1993 Phone No.: 210-647-9465 or 210-862-7935 cell Fax No.: 210-523-4607 Email: al.lopez@intertek.com	
Matthews, Bruce	GM Powertrain Mail Code 483-730-322 823 Joslyn Rd. Pontiac, MI 48340-2920 Phone No.: 248-830-9197 Fax No.: 248-857-4425 Email: bruce.matthews@gm.com	
Mileti, Chris	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092 Phone No.: 440-347-2521 Fax No.: 440-347-4096 Email: christopher.mileti@Lubrizol.com	
Miranda, Timothy	BP Castrol 1500 Valley Road Wayne, NJ 07470 Phone No.: 973-305-3334 Fax No.: 973-686-4039 Email: timothy.miranda@bp.com	
Mosher, Mark	ExxonMobil Research & Engineering Co. 600 Billingsport Road P.O. Box 480 Paulsboro, NJ 08066-0480 Phone No.: 856-224-2132 Fax No.: 856-224-3628 Email: mark.r.mosher@exxonmobil.com	

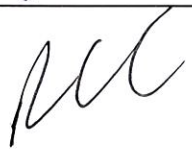
MEMBERSHIP
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Rieth, Ryan	Infineum USA L.P. 1900 E. Linden Avenue Linden, NJ 07036-0536 Phone No.: 908-474-7377 Fax No.: 908-474-3637 Email: Ryan.Rieth@Infineum.com	
Romano, Ron	Ford Motor Company 1800 Fairlane Drive Allen Park, MI 48101 Phone No.: 313-845-4068 Fax No.: 313-323-8042 Email: rromano@ford.com	
Sagawa, Takumaru	Nissan Motor Co., Ltd. 560-2, Okatsukoku, Atsugi city Kanagawa 243-0192 Phone No.: 046-270-1515 Fax No.: 046-270-1585 Email: t-sagawa@mail.nissan.co.jp	
Sinha, Kaustav	Chevron Oronite Company LLC 4800 Fournace Place Bellaire, TX 77401 Phone No.: 713-432-6642 Fax No.: 713-432-3330 Email: LFNQ@chevron.com	KS.
Tang, Haiying	Chrysler Group LLC 800 Chrysler Drive Auburn Hills, MI Phone No.: Fax No.: Email: HT146@Chrysler.com	
	Phone No.: Fax No.: Email:	
	Phone No.: Fax No.: Email:	
	Phone No.: Fax No.: Email:	

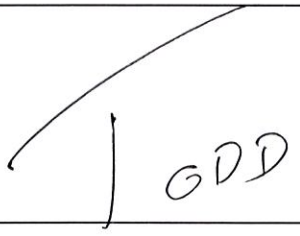
NON-MEMBER MAILING LIST
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Altman, Ed	Afton Chemical Corporation 500 Spring Street P.O. Box 2158 Richmond, VA 23217-2158 Phone No.: 804-788-5279 Fax No.: 804-788-6358 Email: ed.altman@aftonchemical.com	
Bishop, Zack	Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249 Phone No.: Fax No.: 210-690-1959 Email: ZBishop@tei-net.com	
Boese, Doyle	Infineum USA L.P. 1900 E. Linden Avenue Linden, NJ 07036-0536 Phone No.: 908-474-3176 Fax No.: 908-474-3637 Email: doyle.boese@infineum.com	
Bowden, Adam	OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 Phone No.: 440-354-7007 Fax No.: 440-354-7080 Email: adbowden@ohtech.com	
Bowden, Dwight	OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 Phone No.: 440-354-7007 Fax No.: 440-354-7080 Email: dhbowden@ohtech.com	
Bowden, Matt	OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 Phone No.: 440-354-7007 Fax No.: 440-354-7080 Email: mbowden@ohtech.com	
Brys, Jerome	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092 Phone No.: 440-347-2631 / 440-943-1200 Fax No.: 440-943-9013 Email: jabs@lubrizol.com	
Campbell, Bob	Afton Chemical Corporation 500 Spring Street P.O. Box 2158 Richmond, VA 23217-2158 Phone No.: 804-788- Fax No.: 804-788-6358 Email: bob.campbell@aftonchemical.com	

NON-MEMBER MAILING LIST
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Carlson, Jon	Lubrizol Corporation 14602 Huebner, Suite 116-PMB 198 San Antonio, TX 78230 Phone No.: 210-391-8838 cell Fax No.: 210-522-0391 Email: jomc@lubrizol.com	
Carter, James	Phone No.: Fax No.: Email:	
Castanien, Chris	Phone No.: Fax No.: Email:	
Clark, Sid	Southwest Research Institute 50481 Peggy Lane Chesterfield, MI 48047 Phone No.: 586-873-1255 Email: sidney.clark@swri.org	
Clark, Jeff	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 Phone No.: 412-365-1032 Fax No.: 412-365-1047 Email: jac@astmtmc.cmu.edu	
Conrad Michael	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092 Phone No.: Fax No.: Email: Michael.Conrad@Lubrizol.com	
Dvorak, Todd	Afton Chemical Corporation 500 Spring Street P.O. Box 2158 Richmond, VA 23217-2158 Phone No.: 804-788- Fax No.: 804-788-6358 Email: todd.dvorak@aftonchemical.com	
Farnsworth, Gordon	Infineum USA L.P. 1900 E. Linden Avenue Linden, NJ 07036-0536 Phone No.: 570-934-2776 Fax No.: 908-474-3637 Email: gordon.farnsworth@infineum.com	

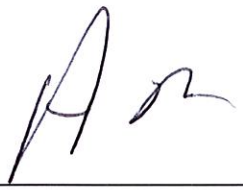
NON-MEMBER MAILING LIST
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Ishikawa, Masa	Infineum USA L.P. 1900 East Linden Avenue Linden, NJ 07036 Phone No.: 908-474-2384 Fax No.: 908-474-3597 Email: masa.ishikawa@infineum.com	
Kelly, Jack	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092 Phone No.: 216-943-1200 Fax No.: Email: jack@lubrizol.com	
Knight, Clayton	Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249 Phone No.: 210-862-5987 cell Fax No.: 210-690-1959 Email: cknight@tei-net.com	
Lang, Patrick	Southwest Research Institute 6220 Culebra Road P.O. Drawer 28510 San Antonio, TX 78228-0510 Phone No.: 210-522-2820 or 210-240-9461 cell Fax No.: 210-684-7523 Email: patrick.lang@swri.org	
Linden, Jim	Linden Consulting LLC 673 Campus Road Rochester Hills, MI 48309 Phone No.: 248-321-5343 Fax No.: Email: lindenjim@jlindenconsulting.com	
Liu, Eric	Southwest Research Institute 6220 Culebra Road P.O. Drawer 28510 San Antonio, TX 78228-0510 Phone No.: 210-522-5937 or 210-416-9024 cell Fax No.: 210-684-7523 Email: eric.liu@swri.org	
Lochte, Michael	Southwest Research Institute 6220 Culebra Road P.O. Drawer 28510 San Antonio, TX 78228-0510 Phone No.: 210-522-5430 Fax No.: 210-684-7523 Email: michael.lochte@swri.org	
Martinez, Jo	Chevron Oronite Company LLC 100 Chevron Way, 60-1211 P.O. Box 1627 Richmond, CA 94802-0627 Phone No.: 510-242-5563 Fax No.: 510-242-1930 Email: jogm@chevrontexaco.com	

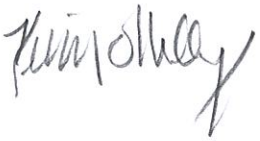
NON-MEMBER MAILING LIST
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
McMillan, Mike	Infineum 5019 Deer Creek Cir N Washington, MI 48094 Phone No.: 586-677-9198 Fax No.: Email: mmcmillan123@comcast.net	
Pastor, Jofran	Infineum Phone No.: Fax No.: Email: mmcmillan123@comcast.net	
Porter, Christian	Afton Chemical Corporation 500 Spring Street P.O. Box 2158 Richmond, VA 23217-2158 Phone No.: 804-788-5837 Fax No.: 804-788-6358 Email: christian.porter@aftonchemical.com	
Ritchie, Andrew	Infineum USA L.P. 1900 E. Linden Avenue Linden, NJ 07036-0536 Phone No.: 908-474-2097 Fax No.: 908-474-3637 Email: andrew.ritchie@infineum.com	
Rutherford, Jim	Chevron Oronite Company LLC 100 Chevron Way, 60-1211 P.O. Box 1627 Richmond, CA 94802-0627 Phone No.: 510-242-3410 Fax No.: 510-242-1930 Email: jaru@chevrontexaco.com	
Savant, Amol	Ashland Inc. 22nd & Front Streets Ashland, KY 41114 Phone No.: Fax No.: Email: ACSavant@ashland.com	
Scinto, Phil	Lubrizol Corporation 29400 Lakeland Blvd. Mail Drop 152-A Wickliffe, OH 44092 Phone No.: 440-347-2161 Fax No.: 440-347-9031 Email: prs@lubrizol.com	
Smolenski, Don	 Phone No.: Fax No.: Email:	

NON-MEMBER MAILING LIST
ASTM IVA SURVEILLANCE PANEL

June 4, 2015

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Sutherland, Mark	Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249 Phone No.: 210-867-8357 Fax No.: 210-690-1959 Email: msutherland@tei-net.com	
Thompson, Hap	Global PQL Stds Assoc. 404 Twin Oaks Lane St Johns, FL 32259 Phone No.: 908-287-9596 Fax No.: Same Email: Hapjthom@aol.com	
Warholic, Mike	Phone No.: 609-744-6782 Fax No.: Email: Michael.Warholic@Infineum.com	
ROBERT STOCKWELL	Phone No.: Fax No.: Email:	RTS
CLIFFORD SALVESEN	EXXON MOBIL Phone No.: Fax No.: Email: clifford.r.salvesen@exxonmobil.com	
O'Malley, Kevin	Lubrizol Corporation 29400 Lakeland Blvd Wickliffe, OH 44092 Phone No.: (440) 347-4141 Fax No.: Email: KVOM@lubrizol.com	
MIRANDA, GREG	LUBRIZOL CORP 29400 LAKELAND Blvd Wickliffe, OH 44092 Phone No.: 440. 347. 8516 Fax No.: Email: GDMR@LUBRIZOL.COM	
GLEASON, JOE	29400 Lakeland Blvd. OH. 44092 Phone No.: 440 347 2494 Fax No.: Email: Jogl@lubrizol.com	

Attachment 2

Sequence IV Surveillance Panel

San Antonio, TX
Southwest Research Institute, Building 209
June 4, 2015
8:00 a.m. - 12:00 p.m.

A G E N D A

1.	Chairman comments	
2.	Attendance sign-in sheet distribution	
3.	Membership changes	
4.	Motion and action recorder	
5.	Approval of minutes for 10/22/2014	All
6.	Action item review	Chairman
7.	Status of test availability	Chairman
8.	Status of reground camshafts	OHT/Labs
9.	Introduction of ASTM REO 300	All
10.	Fuel supplier report – KA24E Green fuel	Haltermann
11.	TMC reports (A*ny questions?*)	TMC
12.	Review scope & objectives	Chairman
13.	Old business	
14.	New business	
15.	Sequence IVB Task Force Meeting	All
16.	Motion and action item review	
17.	Next meeting	
18.	Adjourn	

Sequence IVA Estimated Availability

As of 6/1/2015

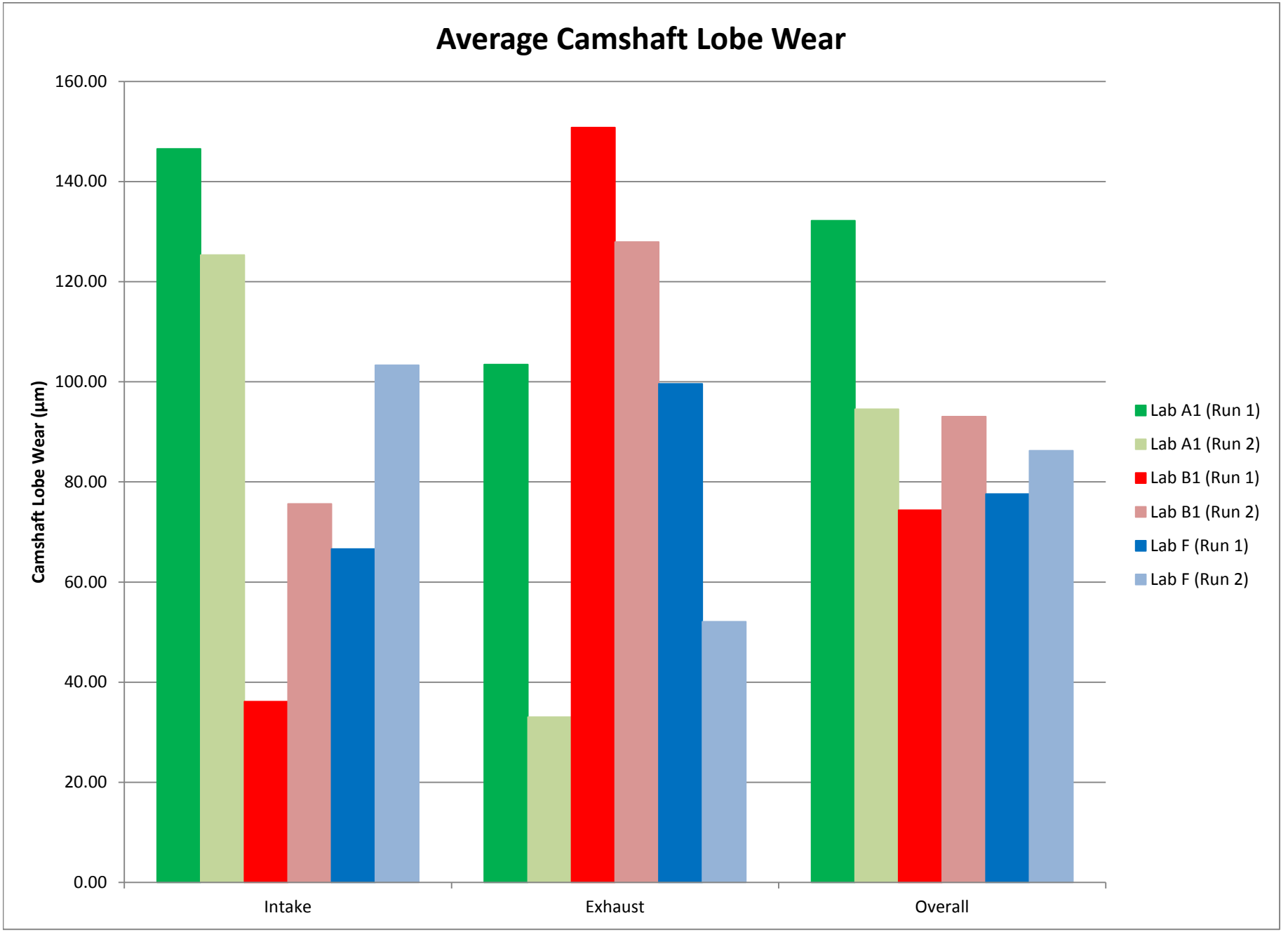
Lab	Number of Stands	Calibrated Stands	Number of Runs	Estimated Years	Limiting Factor
A1	4	2	375	5	Camshafts, or Engines if Excessive 0W-16 Testing
B1	1	1	267	8	Camshafts
F	1	1	50	2	Camshafts
Total	6	4	692	2 - 8 Year Range	Camshafts

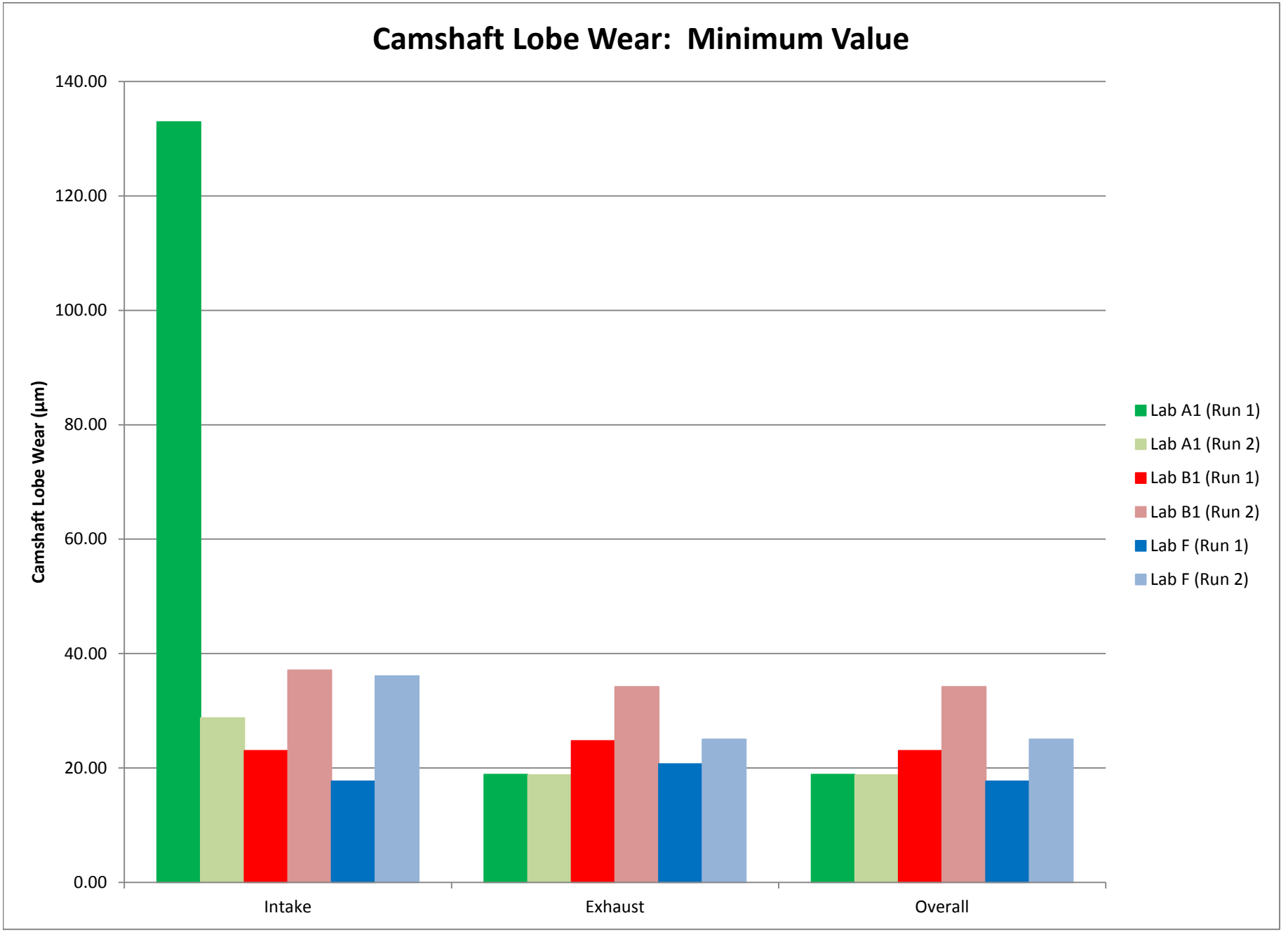
Sequence IVA

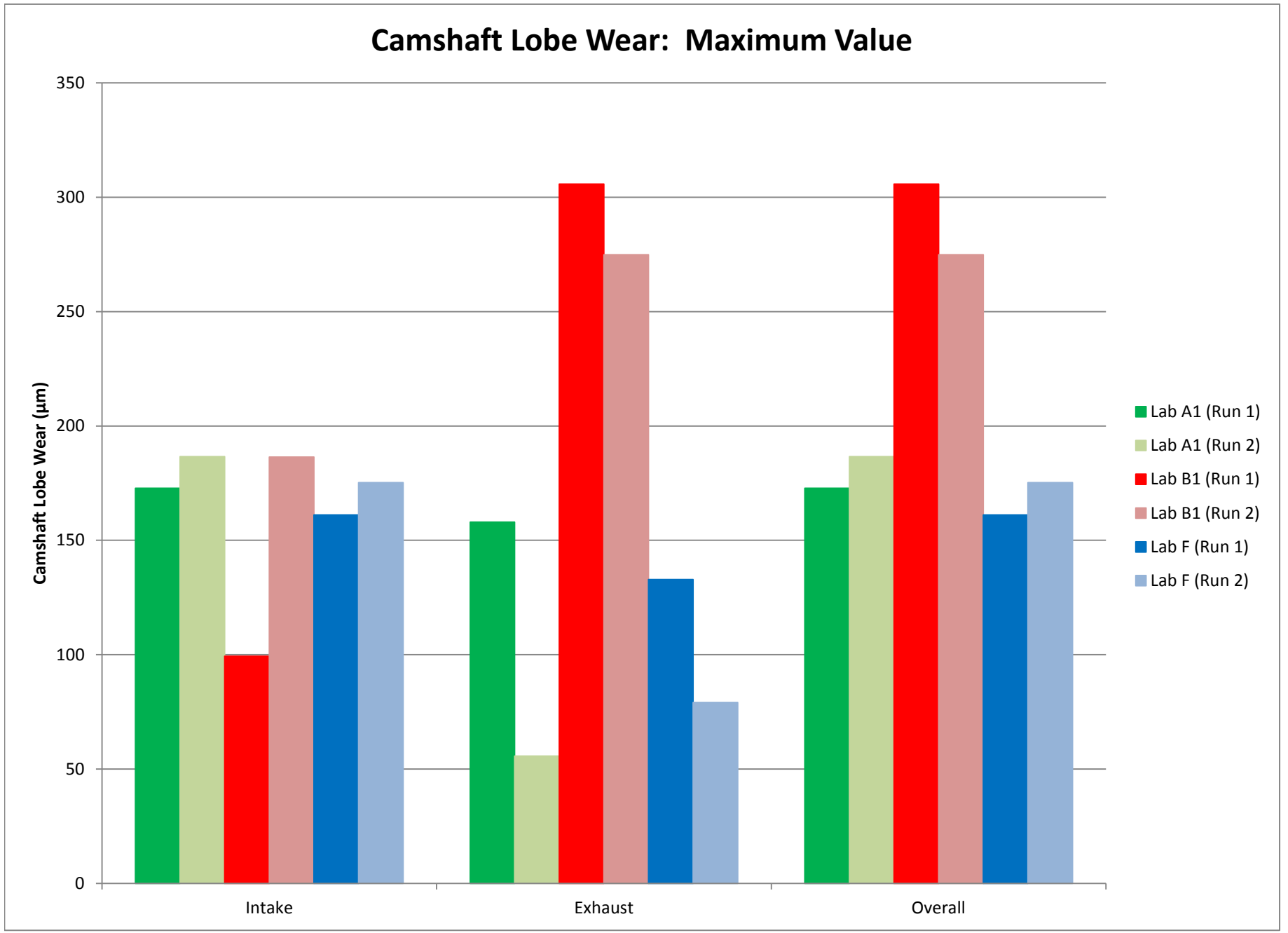
ASTM REO 300 Donated Testing

LTMS Lab		A1	A1	B1	B1	F	F
Camshaft Batch		BC-1	BC-1	BC-2	BC-2	BC-2	BC-2
Intake	1	132.91	186.65	25.97	54.59	18.04	175.28
	3	136.75	28.75	23.02	49.40	18.52	36.11
	4	146.87	164.98	24.13	64.84	161.08	126.68
	6	167.97	133.87	29.30	73.11	160.89	85.62
	7	172.77	144.32	99.32	186.39	117.84	107.79
	9	145.53	140.20	27.33	37.11	18.14	100.04
	10	135.10	105.78	30.28	67.11	20.63	94.92
	12	134.47	98.10	29.74	72.44	17.72	100.27
	Avg.	146.55	125.33	36.14	75.62	66.61	103.34
	Min.	132.91	28.75	23.02	37.11	17.72	36.11
	Max.	172.77	186.65	99.32	186.39	161.08	175.28
	Std. Dev.	15.614	48.460	25.666	46.426	67.573	39.033
Exhaust	2	18.88	18.81	24.77	34.21	115.72	25.05
	5	120.86	55.68	30.89	38.40	20.74	41.83
	8	158.01	34.25	241.75	164.31	129.14	79.20
	11	116.16	23.41	305.76	274.87	132.87	62.31
	Avg.	103.48	33.04	150.79	127.95	99.62	52.10
	Min.	18.88	18.81	24.77	34.21	20.74	25.05
	Max.	158.01	55.68	305.76	274.87	132.87	79.20
	Std. Dev.	59.424	16.424	144.391	115.056	53.098	23.635
Overall	**Avg.**	**132.19**	**94.57**	**74.36**	**93.07**	**77.61**	**86.26**
	Min.	18.88	18.81	23.02	34.21	17.72	25.05
	Max.	172.77	186.65	305.76	274.87	161.08	175.28
	Std. Dev.	39.596	60.274	96.396	75.138	62.760	41.934

Calculated Seq. IVA REO 300 Statistics		Mean	93.01
		S	20.82
	Acceptance Bands	Min.	55.52
		Max.	130.49


Average Camshaft Lobe Wear
Camshaft Lobe Wear (µm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Intake
Exhaust
Overall
Lab A1 (Run 1)
Lab A1 (Run 2)
Lab B1 (Run 1)
Lab B1 (Run 2)
Lab F (Run 1)
Lab F (Run 2)


Camshaft Lobe Wear: Minimum Value
Camshaft Lobe Wear (µm)
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Intake
Exhaust
Overall
Lab A1 (Run 1)
Lab A1 (Run 2)
Lab B1 (Run 1)
Lab B1 (Run 2)
Lab F (Run 1)
Lab F (Run 2)


Camshaft Lobe Wear: Maximum Value
Camshaft Lobe Wear (µm)
350
300
250
200
150
100
50
0
Intake
Exhaust
Overall
Lab A1 (Run 1)
Lab A1 (Run 2)
Lab B1 (Run 1)
Lab B1 (Run 2)
Lab F (Run 1)
Lab F (Run 2)

Attachment 7

ASTM Sequence IV Surveillance Panel

Scope and Objectives

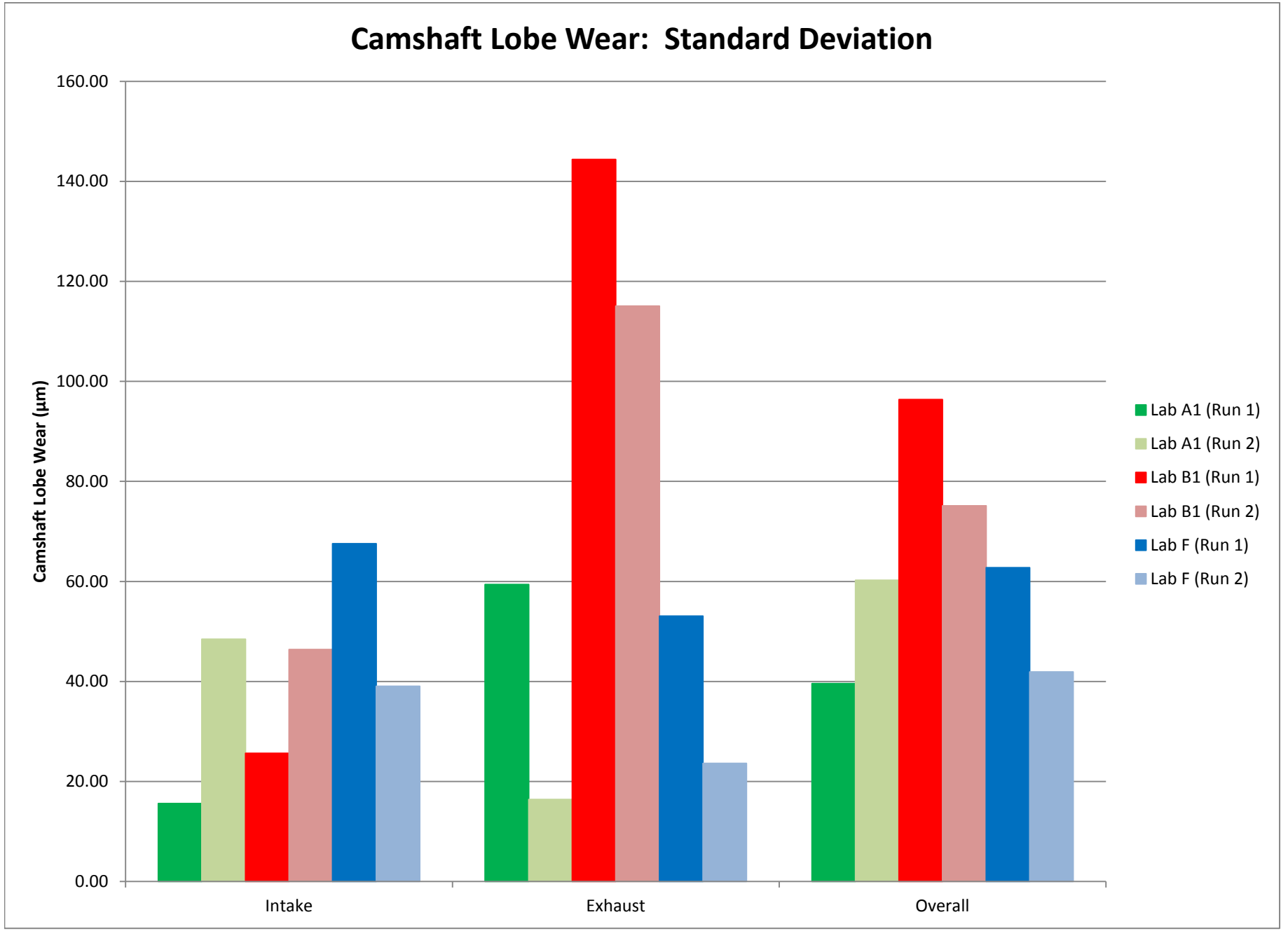
Scope

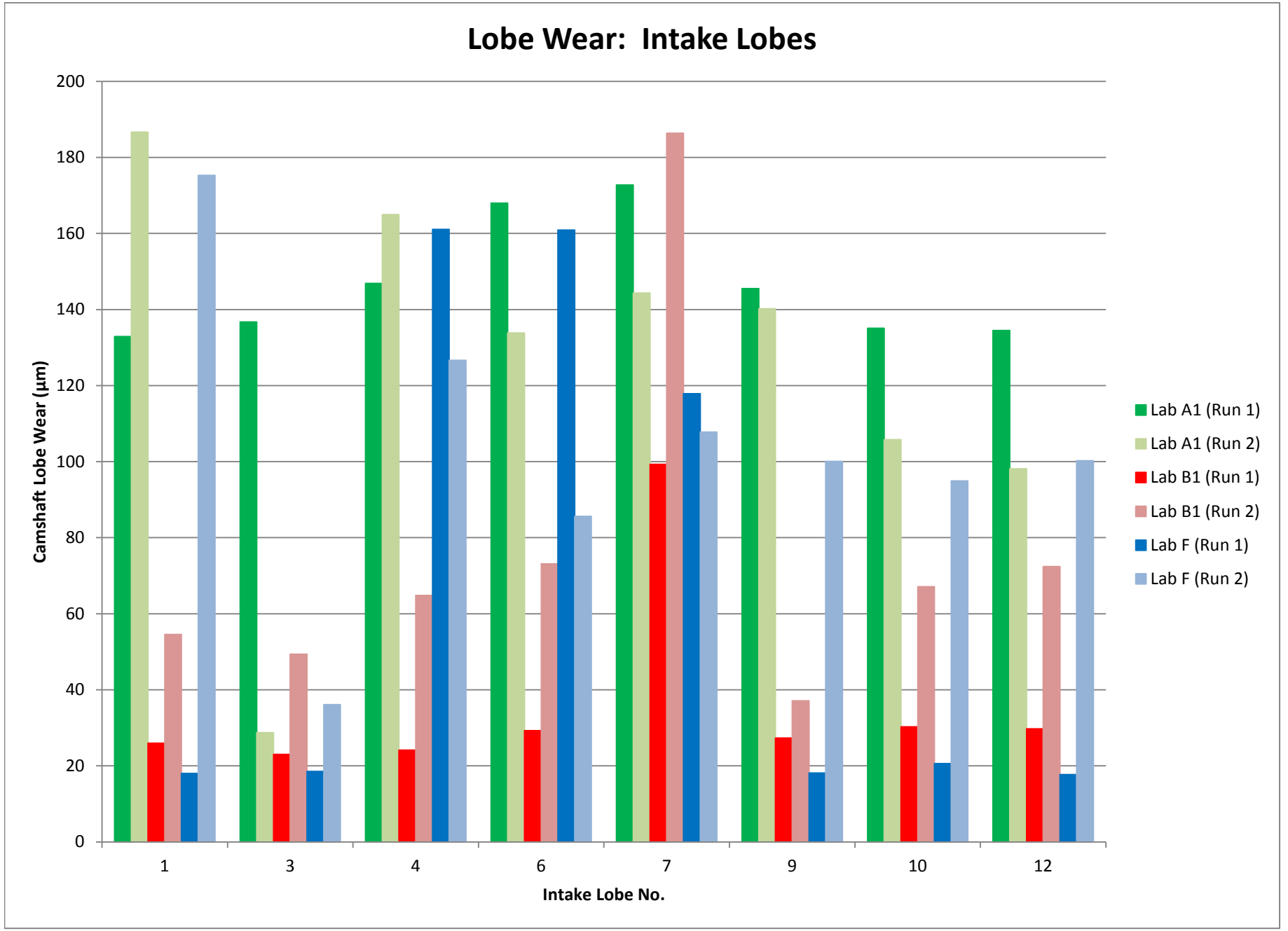
The Sequence IV Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence IVA test documented in Test Method D 6891 as updated by the Information Letter system. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least 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.

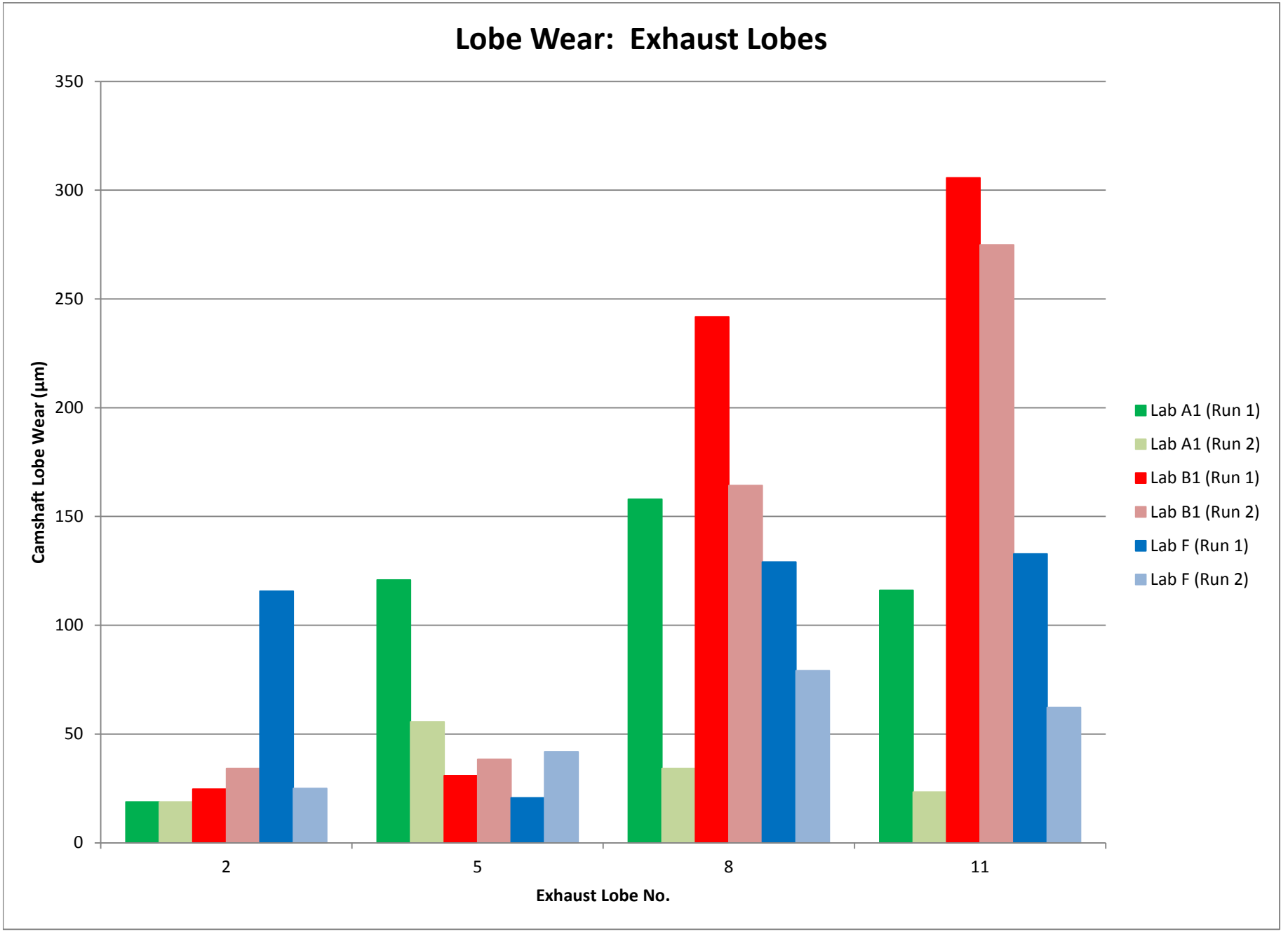
Objectives	**Target Date**
1. Pursue engine mounting and driveline identification, optimization and maintenance procedure and interval.	*On-going*

William A. Buscher III, Chairman
Sequence IV Surveillance Panel

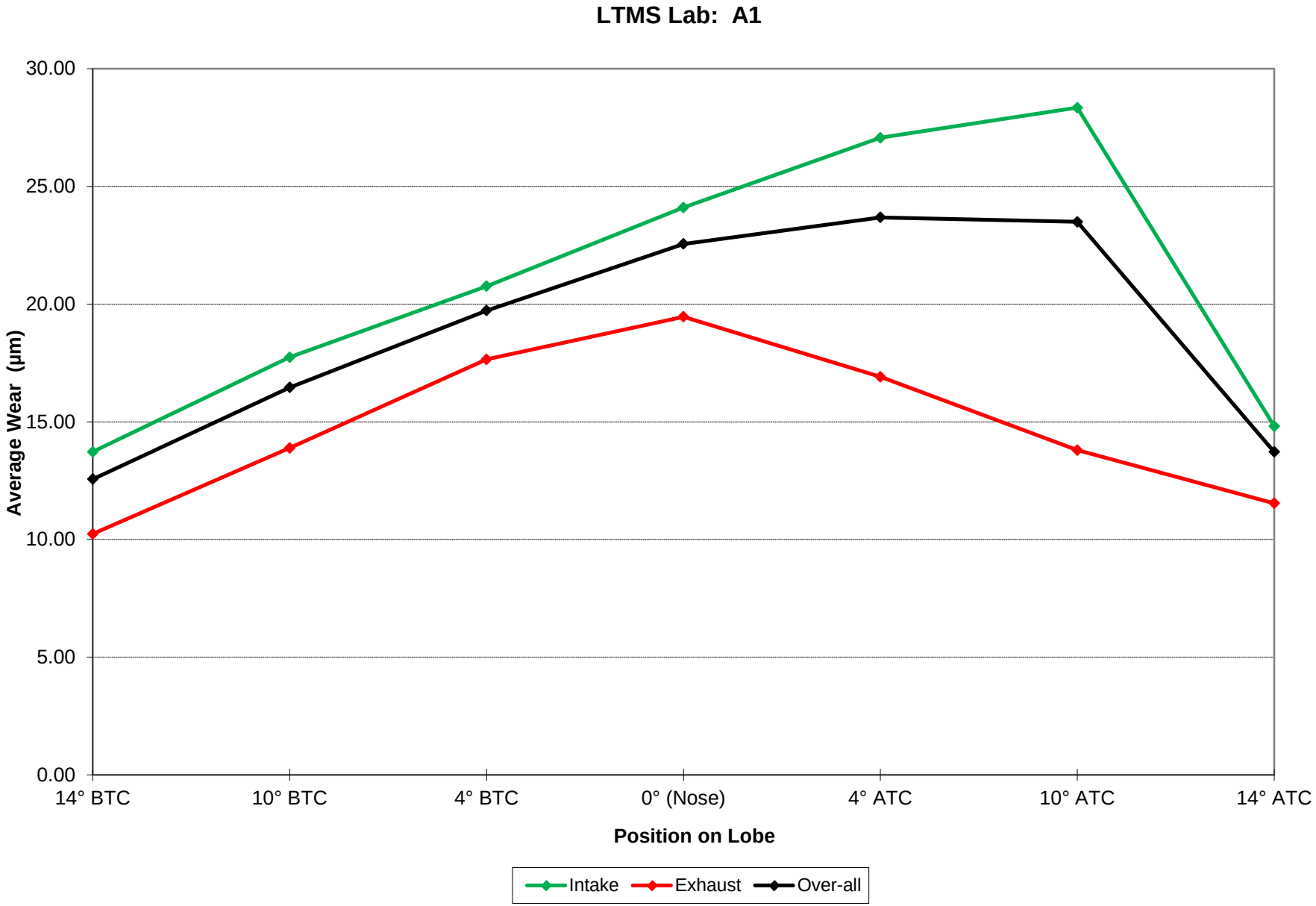
Updated: June 2015


Camshaft Lobe Wear: Standard Deviation
Camshaft Lobe Wear (µm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Intake
Exhaust
Overall
Lab A1 (Run 1)
Lab A1 (Run 2)
Lab B1 (Run 1)
Lab B1 (Run 2)
Lab F (Run 1)
Lab F (Run 2)

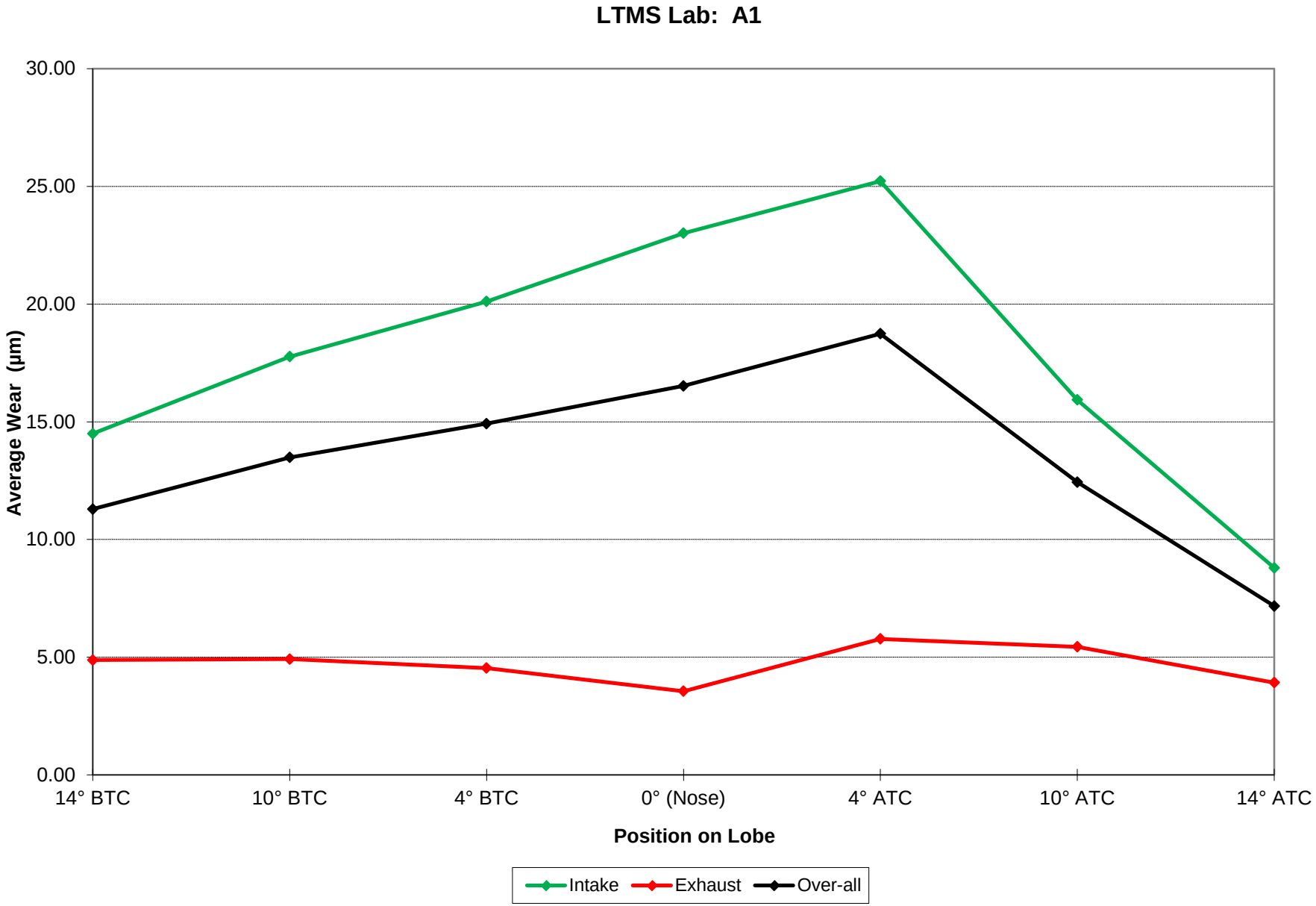

Lobe Wear: Intake Lobes
Camshaft Lobe Wear (µm)
200
180
160
140
120
100
80
60
40
20
0
1
3
4
6
7
9
10
12
Intake Lobe No.
Lab A1 (Run 1)
Lab A1 (Run 2)
Lab B1 (Run 1)
Lab B1 (Run 2)
Lab F (Run 1)
Lab F (Run 2)


Lobe Wear: Exhaust Lobes
350
300
250
200
150
100
50
0
Camshaft Lobe Wear (µm)
2
5
8
11
Exhaust Lobe No.
Lab A1 (Run 1)
Lab A1 (Run 2)
Lab B1 (Run 1)
Lab B1 (Run 2)
Lab F (Run 1)
Lab F (Run 2)

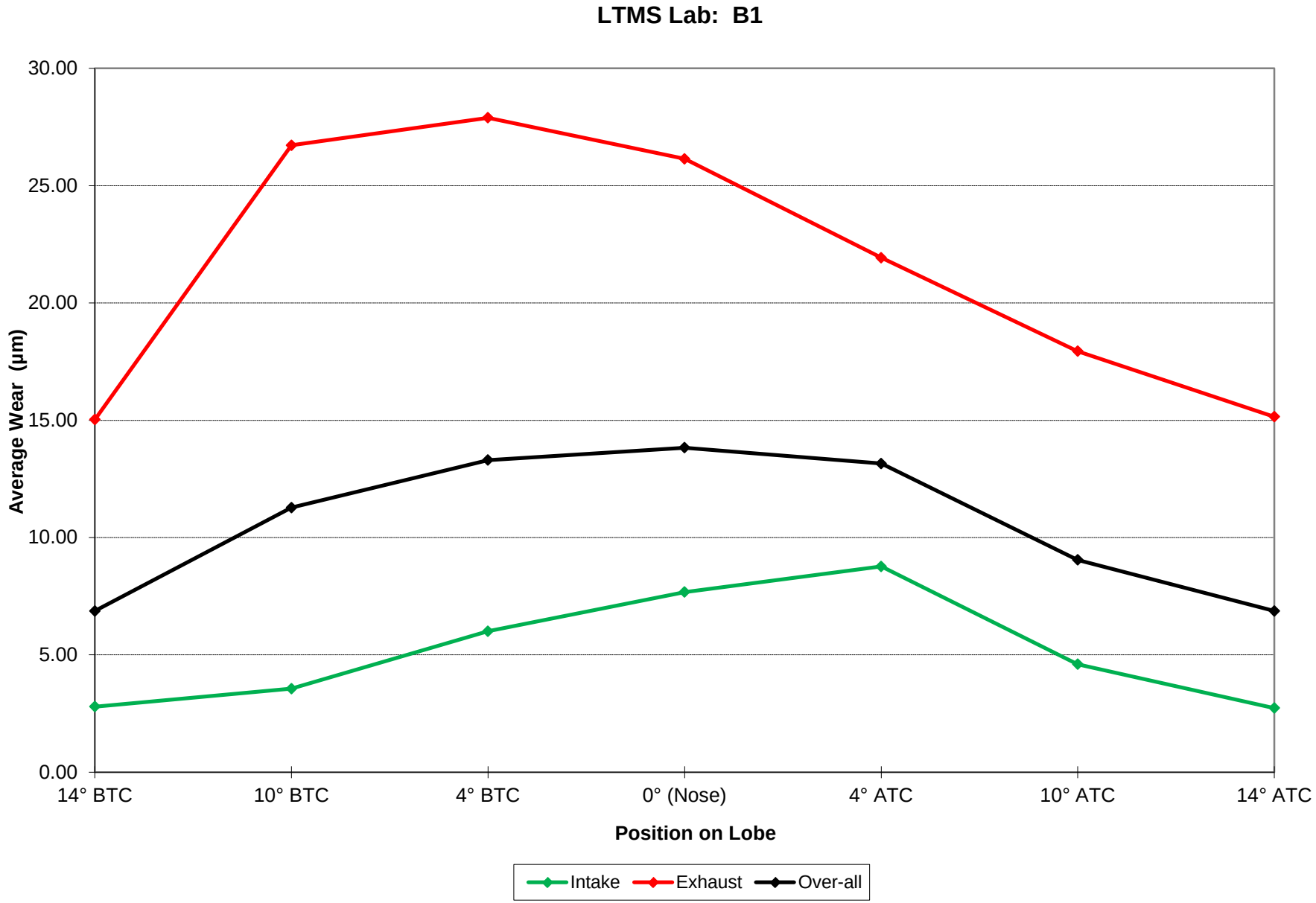
Sequence IVA: Camshaft Lobe Wear Profiles



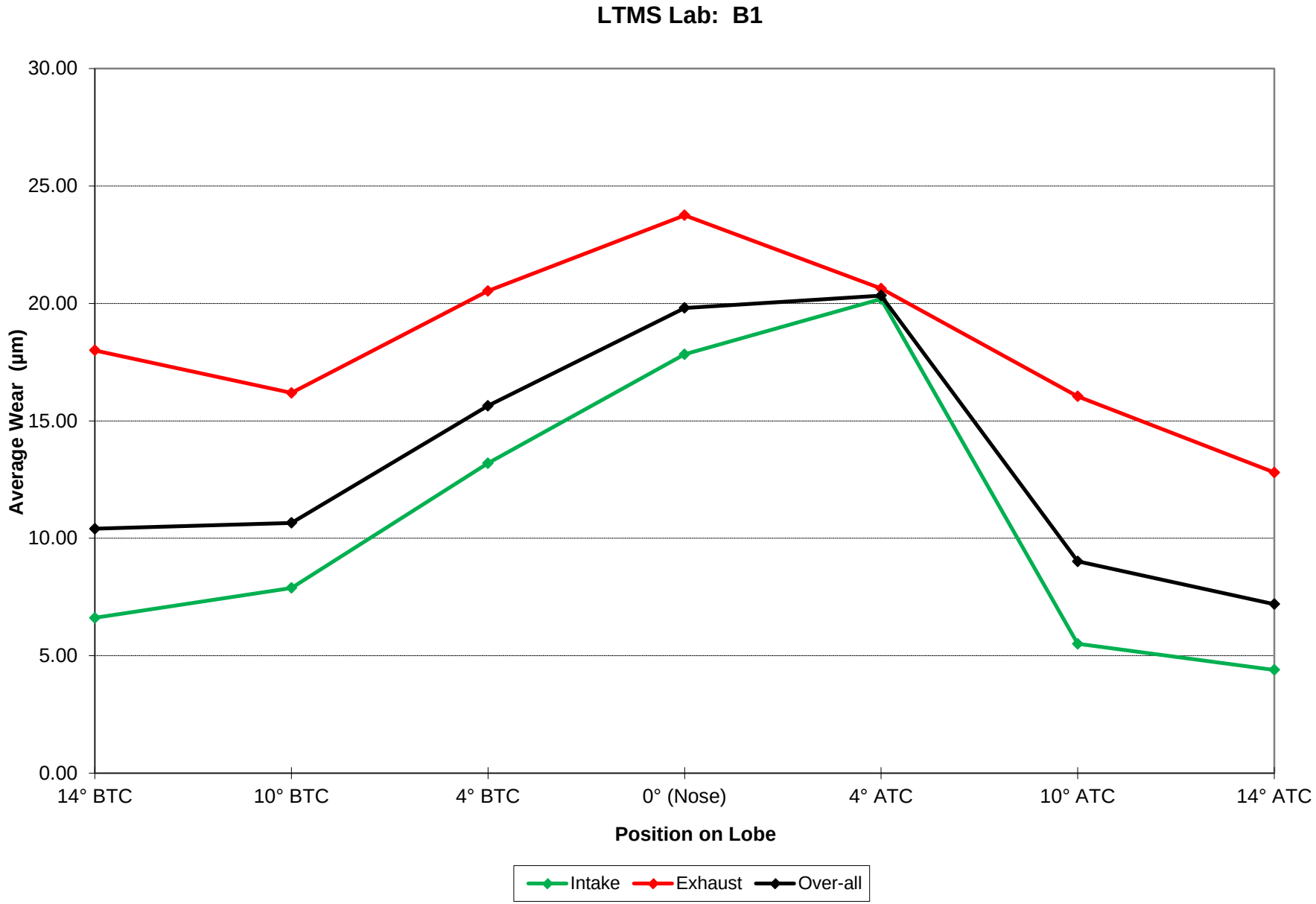
Sequence IVA: Camshaft Lobe Wear Profiles



Sequence IVA: Camshaft Lobe Wear Profiles

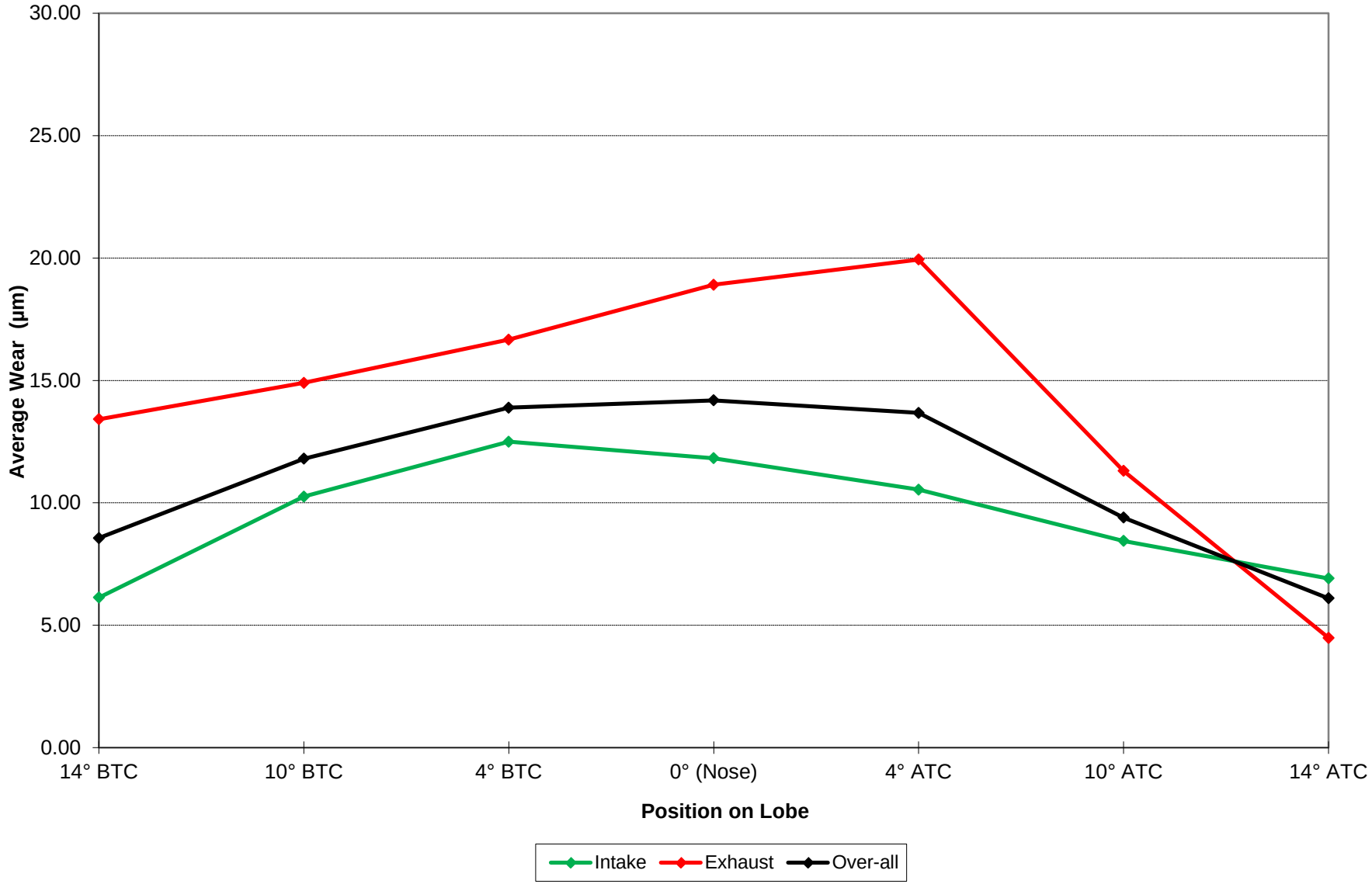


Sequence IVA: Camshaft Lobe Wear Profiles

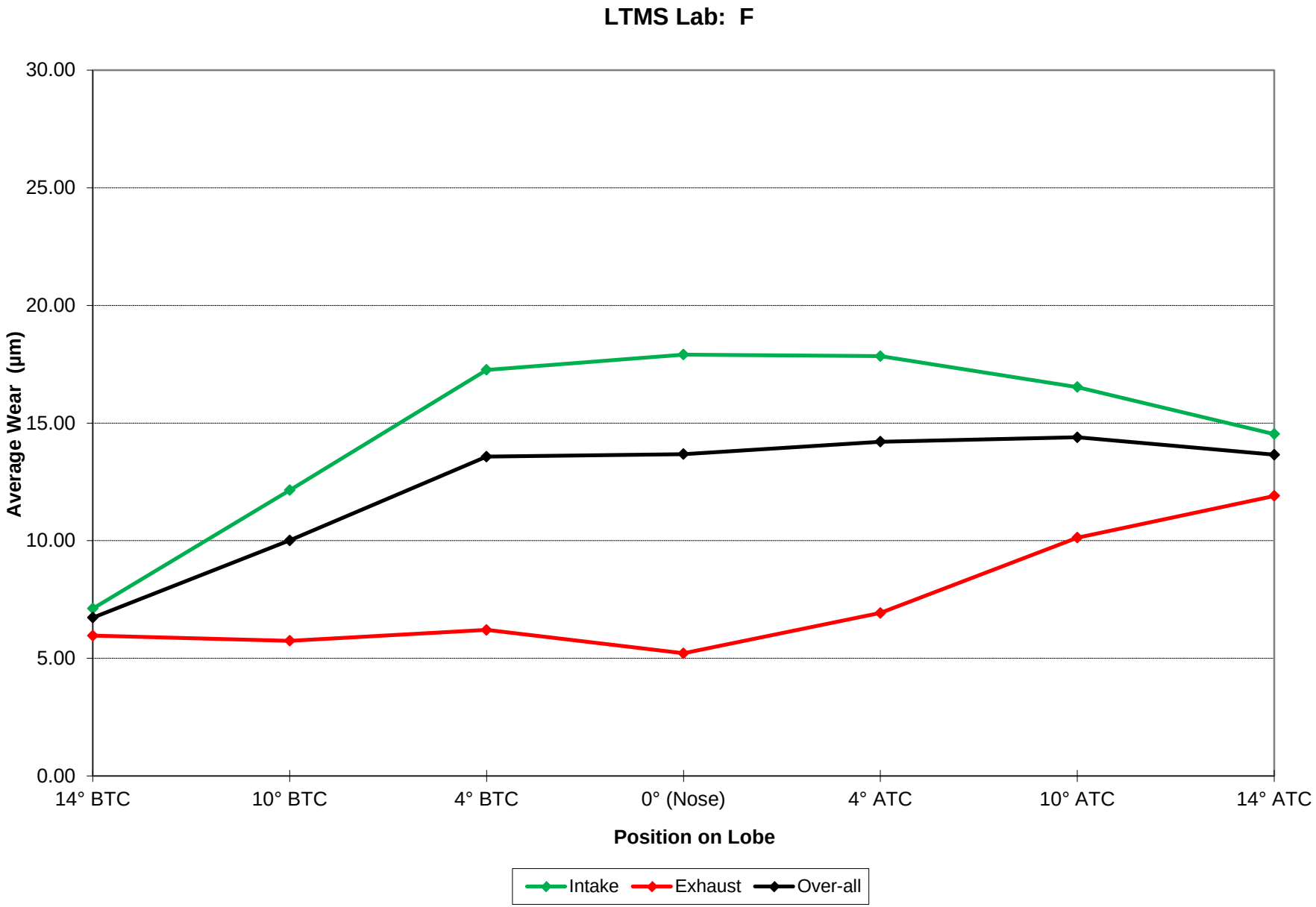


Sequence IVA: Camshaft Lobe Wear Profiles

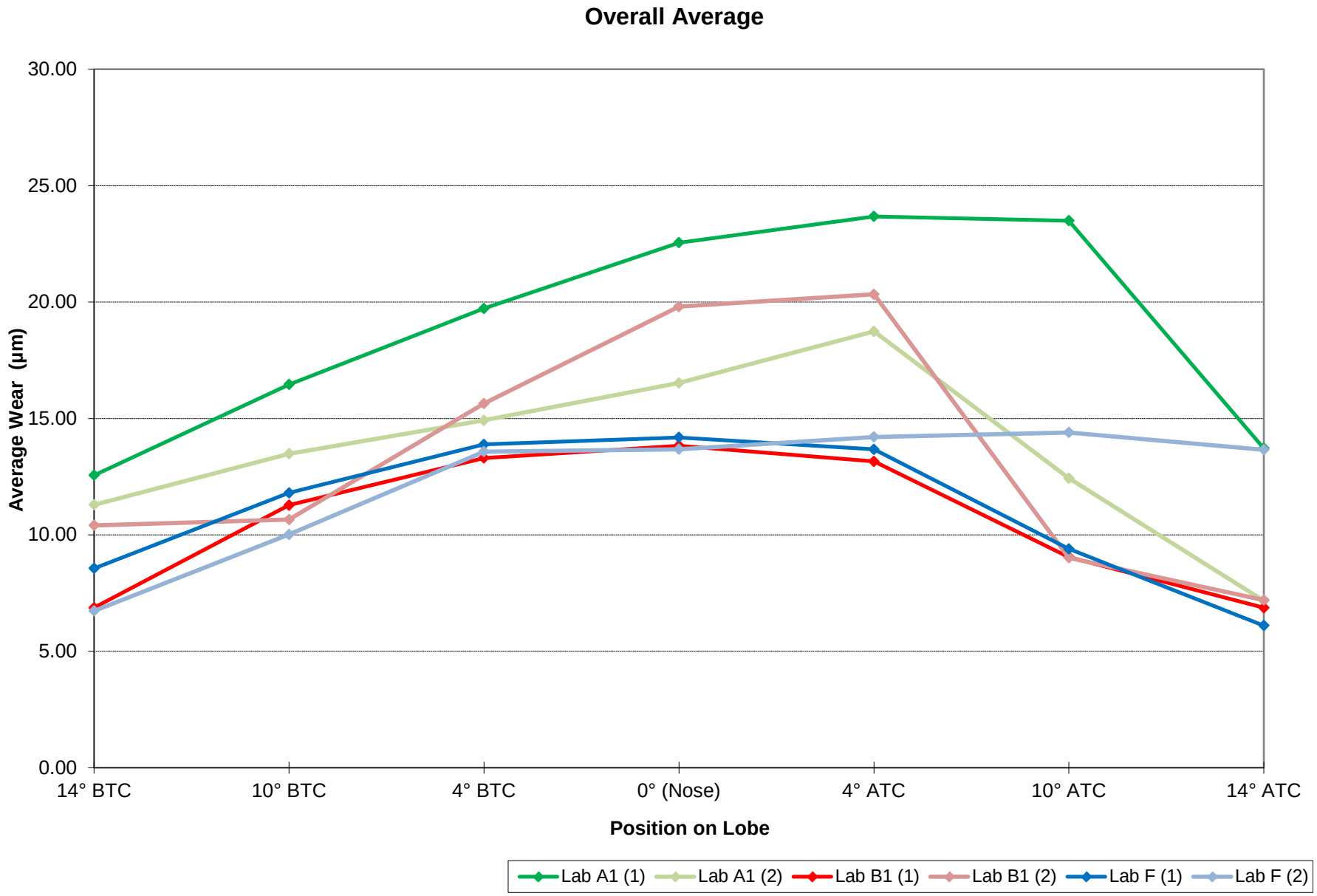
LTMS Lab: F

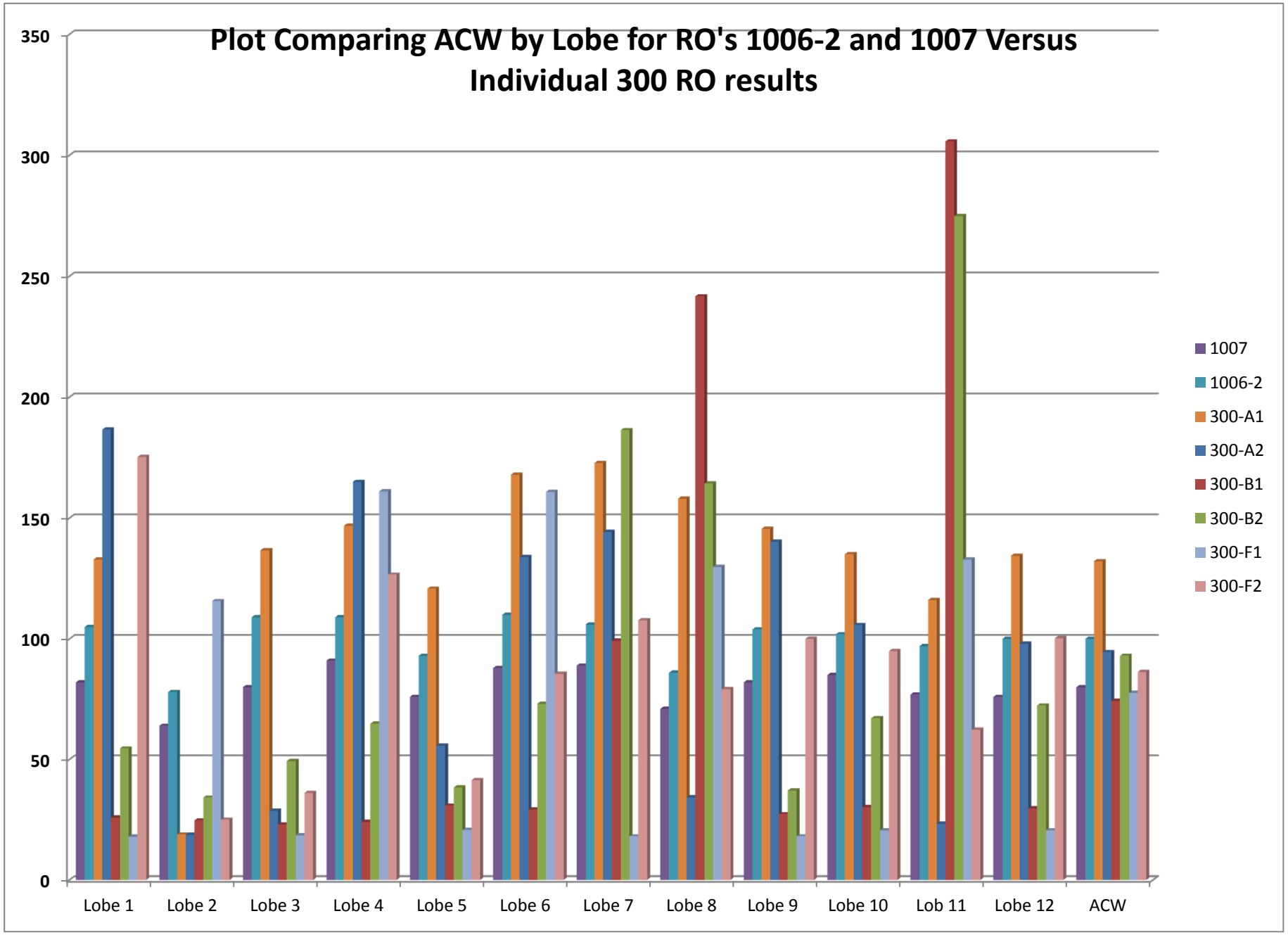


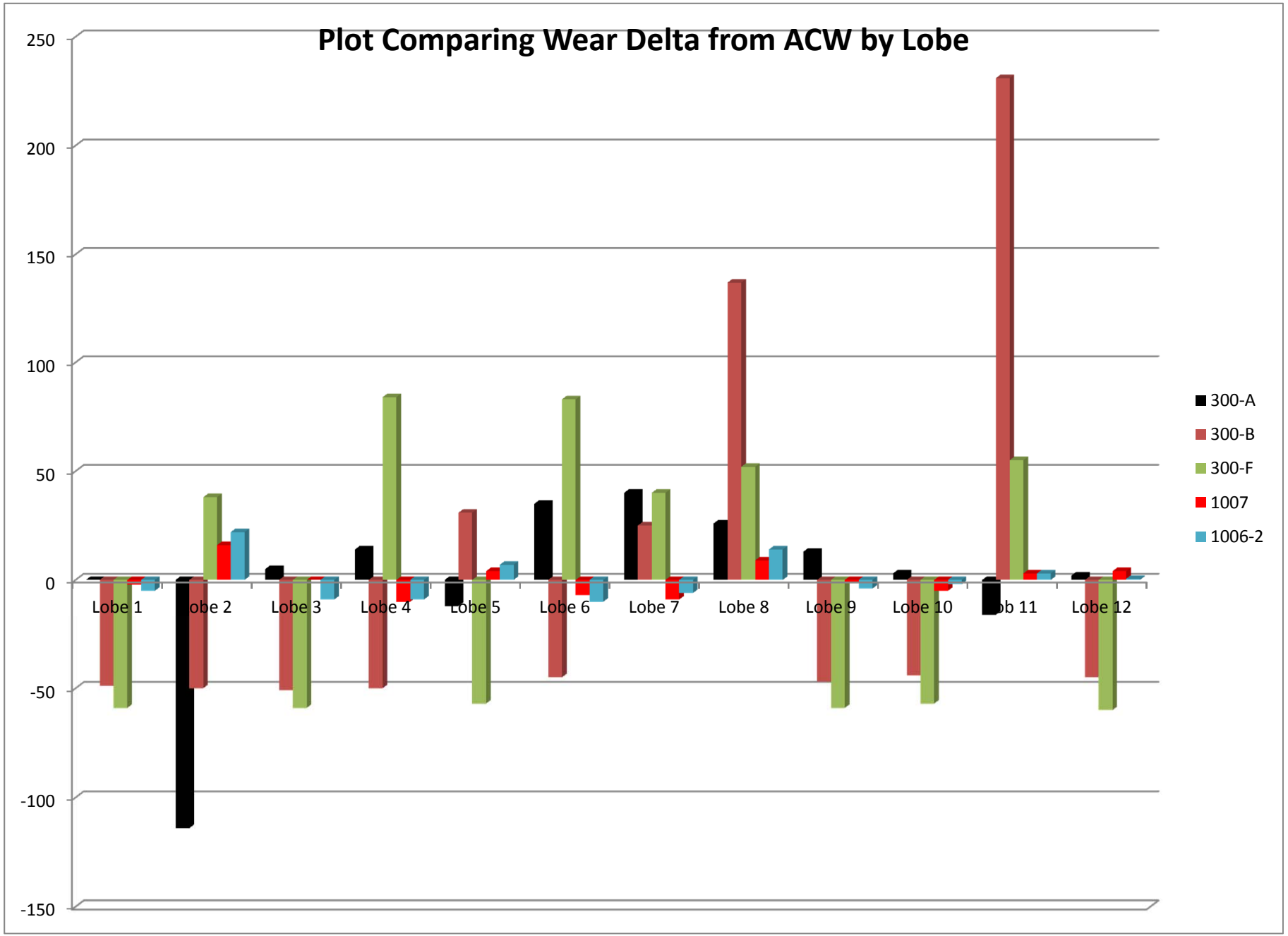
Sequence IVA: Camshaft Lobe Wear Profiles



Sequence IVA: Camshaft Lobe Wear Profiles




Plot Comparing ACW by Lobe for RO's 1006-2 and 1007 Versus Individual 300 RO results
350
300
250
200
150
100
50
0
Lobe 1
Lobe 2
Lobe 3
Lobe 4
Lobe 5
Lobe 6
Lobe 7
Lobe 8
Lobe 9
Lobe 10
Lob 11
Lobe 12
ACW
1007
1006-2
300-A1
300-A2
300-B1
300-B2
300-F1
300-F2


Plot Comparing Wear Delta from ACW by Lobe
250
200
150
100
50
0
-50
-100
-150
Lobe 1
Lobe 2
Lobe 3
Lobe 4
Lobe 5
Lobe 6
Lobe 7
Lobe 8
Lobe 9
Lobe 10
Lobe 11
Lobe 12
300-A
300-B
300-F
1007
1006-2

Attachment 7

ASTM Sequence IV Surveillance Panel

Scope and Objectives

Scope

The Sequence IV Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence IVA test documented in Test Method D 6891 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. Pursue engine mounting and driveline identification, optimization and maintenance procedure and interval.	*On-going*

William A. Buscher III, Chairman
Sequence IV Surveillance Panel

Updated: June 2015

Sequence IVB Test Procedure Status **Updated: 6/4/15**

Document	Section	Description	Sequence IVA Test Procedure Equivalency	Initial Draft Written	Initial Review Conducted	Status of Revisions	Revisions Completed	Final Draft Review Completed	Accepted for Public Distribution
Test Procedure	Section D	Break-in and Aging Procedure	Section 11	YES	YES	Revision 5 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section E	Engine Operation Procedure	Section 11	YES	YES	Intertek working on Revision 3. Will distribute for advance review. Will review on Tuesday, 6/9/15.	NO	NO	NO
	Section H	Pre and Post-test Measurements Procedure	Section 12	YES	YES	Revision 4 completed and acceptable as the final version for distribution.	YES	YES	YES
	Keyence Procedure	Keyence Measurements and Calibration Check Procedure	Section 12	YES	YES	Revision 3.4 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section 1	Scope	Section 1	YES	YES	Revision 1 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section 2	Reference Documents	Section 2	To be drafted once necessary information is available.					
	Section 3	Terminology	Section 3	To be drafted once necessary information is available.					
	Section 4	Summary of Test Method	Section 4	YES	YES	Revision 1 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section 5	Significance and Use	Section 5	YES	YES	Revision 1 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section 7	Reagents and Materials	Section 7	To be drafted once necessary information is available.					
	Section 8	Oil Blend Sampling Requirements	Section 8	To be drafted once necessary information is available.					
	Section 10	Data Acquisition, Reference Oil Application, Equipment Calibration and Maintenance	Section 10	YES	YES	Revision 1 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section 13	Test Report	Section 13	YES	YES	Revision 1 completed and acceptable as the final version for distribution.	YES	YES	YES
	Section 14	Precision and Bias	Section 14	To be drafted once necessary information is available.					
	Section 15	Keywords	Section 15	To be drafted once necessary information is available.					
	Annex A1 - A4	ASTM Test Monitoring Center: A1 - Background Information, A2 - Calibration Procedures, A3 - Maintenance Activities, A4 - Related Information	Annex A6	YES	YES	Revision 1 completed and acceptable as the final version for distribution.	YES	YES	YES
	Annex A6	Parts List	Annex A2	In Process	NO	Intertek to write initial draft, with assistance, if needed.	NO	NO	NO
	Annex A7	Procedures for lab to properly install and set-up the TEI supplied Golden Stand	Section 9	In Process	NO	SwRI to write initial draft, with assistance, if needed.	NO	NO	NO
	Annex A8	Fuels Specification Information	Annex A4	In Process	NO	Intertek to write initial draft.	NO	NO	NO
	Annex A5	Safety Precautions	Annex A5	YES	YES	No revisions from IVA procedure required and carry-over from the IVA procedure acceptable as the final version for distribution.	YES	YES	YES

Sequence IVB Test Procedure Status **Updated: 6/4/15**

Document	Section	Description	Sequence IVA Test Procedure Equivalency	Initial Draft Written	Initial Review Conducted	Status of Revisions	Revisions Completed	Final Draft Review Completed	Accepted for Public Distribution
Engine Assembly Manual	Section 1	New Engine Preparation	Section 6, 9	YES	YES	SwRI completed and distributed Revision 1. Advance review in process. Will review on Friday, 6/12/15.	NO	NO	NO
	Section 2	Camshaft and Lifter Installation	Section 6, 9	YES	YES	SwRI completed and distributed Revision 3. Advance review in process. Will review on Tuesday, 6/16/15.	NO	NO	NO
	Section 3	Cylinder Head Replacement	Section 6, 9	YES	YES	SwRI completed and distributed Revision 4. Advance review in process. Will review on Friday, 6/19/15.	NO	NO	NO

Test	IVA	IVB
Specification	GF-3/4/5	GF-6
Test Availability	1999 - 2017 +	2015 - ???
Test Type	Flush and Run	Flush and Run
Purpose	Low Temp Valve-Train Wear	Low Temp Valve-Train Wear
Engine	1994 Nissan KA24E 2.4L	2012 Toyota 2NR-FE 1.5L
Allowable Engine Runs	48	12
Allowable Cylinder Head Runs	24	6
Valve-Train Design	SOHC Sliding Follower Hydraulic Lash Adjuster	DOHC Direct-Acting-Mechanical-Bucket Lifter
Primary Wear Parameter	Intake and Exhaust Camshaft Lobes	Intake Lifters
Pass/Fail Parameter	Average Camshaft Wear	To Be Determined (Intake Lfter Wear +)
Test Fuel	Haltermann KA24E Green	Haltermann KA24E Green
Fuel Usage (gallons)	55	200
Test Duration (hours)	100	200
Test Cycle Duration	1 hour	30 seconds
Test Cycles Per Test	100	24,000
Test Cycle Breakdown	5-min / 45-min / 5-min / 5-min	8-sec / 7-sec / 8-sec / 7-sec
Engine Speed (rpm)	800 / 1500	800 / 4300
Engine Torque (N-m)	25	25
Engine Coolant Temperature (°C)	50 / 55 (Coolant Out)	49 (Coolant In)
Engine Oil Temperature (°C)	49 / 59 (Cylinder Head Oil Gallery)	53 / 55 (Engine Block Oil Gallery)
RAC Coolant Temperature (°C)	Same as Engine Coolant Temperature	20
Intake Air Temperature (°C)	32	32
Intake Air Pressure (kPa)	0.05	0.07
Intake Air Humidity (g/kg)	11.5	11.5
Exhaust Backpressure (kPa-abs)	103.5	103.5 / 104.5

Attachment 10

Sequence IV Surveillance Panel
June 4, 2015
8:00AM – 12:00PM
Southwest Research Institute
San Antonio, TX

Motions and Action Items
As Recorded at the Meeting by Bill Buscher

1. Action Item – Haltermann to supply C of A data, in Excel format, for Haltermann KA24E Green fuel batches, produced from 1/1/2013 through 12/31/2015, to the ASTM TMC for posting on the TMC website.

2. Action Item – Add Haltermann KA24E Green fuel batch C of A data into Sequence IVB test report and data dictionary.