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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

May 25, 2006

Reply to:

Donald T. Bartlett
The Lubrizol Corporation
29400 Lakeland Blvd.
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(440) 347-2388
(440) 347-2878 (FAX)

ASTM D02.B0.03 L-37 Surveillance Panel
Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the:

- **May 9th, 2006 L-37 Surveillance Panel Meeting conducted at the Four Points by Sheraton, Detroit Metro Airport, Romulus, MI.**

Please direct any corrections or comments to my attention.

Sincerely,

Donald T. Bartlett

Donald T. Bartlett, Chairman
L-37 Surveillance Panel

Report of Meeting
L-37 Surveillance Panel
4-Points Sheraton, Detroit Metro Airport, Romulus, MI
May 9th, 2006

Sign-in/Review of Membership: The meeting was called to order at 2:09 pm. The sign-in sheet is *Attachment 1.* The membership review is *Attachment 2.* There were no updates.

Motion 1 ⇒ **Mr. Sullivan, Second ⇒ Mr. Koglin** - Approve both of Surveillance Panel meeting minutes as written.

- ✓ February 8, 2006 Panel Meeting
- ✓ March 21, 2006 Teleconference Meeting

Motion Results: Pass
Unanimous (6, 0, 0)

Meeting Agenda
The meeting agenda is included as *Attachment 3.*

1. 2006 Lubrited Hardware Order Placement- All
   a. Tentative count - Labs to place binding PO's
2. 2005 Green Hardware Matrix Update and Action - TMC
   a. 44-test matrix which was recently completed

Summary of Meeting Discussions

2005 Green Hardware Matrix Update P4L792/V1L417 Non-Lubrited gear batch

Standard Data Review:

Lab to lab comparisons for P4L792/V1L417: *Attachment 4* is the summary spreadsheet of all Standard and Low Temperature testing conducted in the industry 44-test matrix.

The TMC began by reviewing lab-to-lab comparison data for TMC 151-3 for all reference tests on all gear distress types. Two tests were run at each lab on TMC 151-3. The TMC presented reference oil performance in the same manner for TMC 152 and TMC 153. No significant lab to lab differences observed.

Gear batch comparisons: See *Attachment 5.*
Mr. Lind continued by showing a review of this gear batch versus other gear batches across all reference oils. Wear appears to be slightly mild compared to recent gear batches. Mr. Gropp mentioned that the test shifted slightly severe on wear, based on the rating definition,

on recent gear batches where tooling marks were more prevalent. Mr. Sullivan asked whether there was statistical significance in these batches and Mr. Lind said that he didn't believe this was confirmed. Mr. Sullivan & Mr. Gropp mentioned that we lose track of what are we comparing too? Mr. Sullivan stated that we should boil the test severity down to whether the fail oil fail and the pass oils pass. Getting back to the data review, when comparing all gear batches against each other using TMC 151-2 and -3, this gear batch was slightly mild on rippling.

On TMC 152, the P4L792/V1L417 is slightly milder than the P4T771/V1L351 on wear and rippling.
On TMC 153, the P4L792/V1L417 is slightly milder than the V1L351 on ridging and rippling. On spitting, the results look equivalent. However there was a large visible difference (severe) on 1 test. This test did not qualify as an outlier against the ASTM procedure for checking outliers.

Oil Comparison:
TMC 127 didn't discriminate as well against the other oils on the parameter of ridging.
TMC 127 discriminates well on rippling.
TMC 127 doesn't typically show discrimination on Spitting which is the case for this gear batch.

Motion 2 ⇒ **Mr. Gropp, Second ⇒ Mr. Smith**: Effective 5/9/06, approve the P4L792/V1L417 for use in the standard L-37 test with no correction factors.

Mr. Sullivan started the discussion. He doesn't necessarily believe that a correction factor would be warranted for this batch but believes we need to determine a consistent method for applying factors in both directions (positive and severe directions). At the moment, we seem to reinvent want we're doing at the time of each gear batch acceptance. What would the TMC recommend doing for a correction factor?

Motion Results: Pass
For: 5
Opposed: 0
Abstentions: 1

Canadian Data Review: See ***Attachment 6.***

Lab to lab comparisons for P4L792/V1L417:
The TMC began by reviewing lab-to-lab comparison data for TMC 152 for all reference tests on all gear distress types. Two tests were run at each lab. No significant lab to lab differences observed.

Gear batch comparisons:
No significant lab-to-lab differences observed.

Oil Comparison:
Wear is slightly milder with TMC 152 and 153 than the V1L351 gear batch. Rippling is slightly milder with TMC 152 than the V1L351 gear batch. No significant lab to lab differences observed.

Motion 3 ⇒ Mr. Smith, Second ⇒ Mr. Sullivan): Effective 5/9/06, approve the P4L792/V1L417 for use in the Canadian version of the L-37 test with no correction factors.

Motion Results: Pass
For: 5
Opposed: 0
Abstentions: 1

Other discussion on a motion from the February 8, 2006 Panel meeting:

Mr. Bartlett brought the panel up to speed on the action item from the February meeting to have the most consistent raters in the LTMS system review all of the pinions and certify the mean for this gear batch. The panel then decided that only the TMC 127 runs should be looked at by the most consistent raters.

Action Item: All of the TMC 127 pinions (4-test total, 1 from each lab) are currently in the possession of the TMC. The TMC was instructed to send the four pinions to the two most consistent raters and report the rating comparisons back to the Panel at the next meeting.

Motion 3 from the 2/8/06 SP meeting stated: "Mr. Sullivan, Second Mr. Schenkenberger - On behalf of the Panel, the TMC will ask the company's of the 2 most consistent raters to rate the pinions only from the P4L792/V1L417 44-test hardware matrix. The laboratories were directed to send all of the pinions to the TMC. Phase 1 and 2 can be sent now. The motion carried with 6 votes in favor, 0 no votes, and 2 abstentions".

After review of the data, the panel decided that only the TMC 127 pinions needed to be looked at by the 2 most consistent raters. Motion 3 from the February 8, 2006 Panel meeting was therefore rescinded by the following motion.

Motion 4 ⇒ Mr. Smith, Second ⇒ Mr. Burrow: Except for TMC 127, rescind Motion 3 from 2/8/06 SP meeting.

Motion Results: Pass
For: 5
Opposed: 0
Abstentions: 1

P4L792/V1L417 Test Targets:

The TMC reviewed the proposed bands which are included as ***Attachment 7***.
The TMC comments include the following:

- Per previous panel discussions, all non-lubrited hardware Industry Pooled Standard Deviation and mean has been used. All bands were widened in most cases.
- Since 8 tests have been used to generate these means, the bands will be updated after 20 tests. The n-size will not be updated at 10 tests since we already are close.
- On TMC 151-3, the standard deviation for rippling was statistically adjusted to allow an 8 to pass.
- On TMC 153, the standard deviation was not statistically adjusted to allow a 10 to pass because it would significantly affect the lower end of the band (one of the disadvantages of using this process in the "transformed space.)
- Bands for the ring are strictly for monitoring.

Motion 5 ⇒ **Mr. Lind, Second ⇒ Mr. Koehler)**: The Panel accepts the targets as presented Effective May 9th, 2006.

Motion Results: Pass
For: 6
Opposed: 0
Abstentions: 0

2006 Lubrited Hardware Order Placement

Attachment 8 details the status as the industry prepares to tender binding PO's.

The chairman reported that the initial axle price has been re-negotiated from $1055 to $931 each axle based on communications from the chairman and Dana purchasing (Mr. David Shippee). The industry labs expressed our appreciation for this effort and support from Dana. The quantities have been identified and Afton has increased their projection from 250 to 275. Fort Wayne and Lugoff visits are planned with no specific date identified yet.
The Panel supports the labs tendering binding PO's by May 30th, 2006.

Action item: The SP chairman is to notify Dana management once industry purchase orders have been placed to work with Mr. Kreinbring, Ft. Wayne and Lugoff representatives to identify a target production and assembly date in 2006.

The meeting was adjourned at 4:18 pm (M. Koglin/Mr. Smith).

Respectively submitted,

Donald T. Bartlett
L-37 Surveillance Panel Chairman

ASTM L-37 Surveillance Panel Membership/Mailing List

* Please add Burrow

Meeting Date: May 9, 2006

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Akucewich, Ed	Non-Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2415 Fax: 440-347-9011 E-Mail: esak@lubrizol.com
DB	Bartlett, Don	Voting/Chair	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2388 Fax: 440-347-2878 E-Mail: dtb@lubrizol.com
	Bell, Don	Non Voting	Afton Chemical 500 Spring Street Richmond, VA 23219	Phone: 804-788-6332 Fax: 804-788-6243 E-Mail: don.bell@aftonchemical.com
	Bryson, Tom	Voting	Mack Trucks 13302 Pennsylvania Avenue Hagerstown, Maryland 21740	Phone: 301-790-6744 Fax: 301-790-5605 E-Mail: thomas.bryson@volvo.com
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* Initial to indicate attendance at subject meeting

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ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: May 9, 2006

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	De La Fuente, Hector	Non Voting	Southwest Research Institute PO Drawer 28510 San Antono, Texas 78228-0510	Phone: 586-522-5996 Fax: 210-684-7523 E-Mail: hdelafuente@swri.edu
	Dharte, John	Voting	American Axle & Manufacturing 2965 Technology Drive Rochester Hills, MI 48309-3589 78228-0510	Phone: 248-299-6478 Fax: 248-293-6945 E-Mail: Dhartej@aam.com
	Farber, Frank	Non Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1030 Fax: 412-365-1047 E-Mail: fmf@astmtmc.cmu.edu

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ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: May 9, 2006

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	Huron, John	Non Voting	Chevron Oronite Company LLC Suite 210 San Antonio, Texas 78228-1374	Phone: 210-731-5609 Fax: 210 731 5699 E-Mail: HURO@chevrontexaco.com
PVK	Kampe, Pete	Non-voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-4422 Fax: 440-347-2878 E-Mail: pvk@lubrizol.com
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ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: May 9, 2006

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	Kozlowski, Ralph	Non Voting	PARC Technical Services, Inc. 100 William Pitt Way Pittsburg, PA 15238	Phone: 412-826-5044 Fax: 412-826-5443 E-Mail:
	Kreinbring, Don	Voting	Dana Corporation 6938 Elm Valley Drive, Kalamazoo, MI 49009	Phone: 269-567-1140 Fax: 269-567-1140 E-Mail: don.kreinbring@dana.com
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DML	Lind, Don	Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1034 Fax: 412-365-1047 E-Mail: dml@astmtmc.cmu.edu

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ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: May 9, 2006

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	Purnell, Keith	Non Voting	Performance Review Institute 161 Thornhill Rd. Warrendale, Pa. 15086-7527	Phone: 724-772-1616 ext 8182 Fax: 724-772-1699 E-Mail: kpurnell@sae.org
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	McGlone, Bruce	Voting	Meritor Automotive 2135 West Maple Troy, Michigan 48084	Phone: 248-435-9929 Fax: 248-435-1411 E-Mail: Bruce.McGlone@ArvinMeritor.com

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ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: May 9, 2006

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Meeting Date: May 9, 2006

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	Sullivan, Bill	Voting	ExxonMobil Chemical Company P. O. Box 3140 Edison, New Jersey 08818	Phone: 732-321-3354 Fax: 732-321-6064 E-Mail: william.t.sullivan@exxonmobil.com
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Meeting Date: May 9, 2006

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	Yanchar, Paul	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-3474468 Fax: 440-347-9011 E-Mail: pjy@lubrizol.com
	Zakarian, Jack	Non Voting	Chevron Products 100 Chevron Way Richmond, CA 94802	Phone: 510-242-3595 Fax: 510-242-3758 E-Mail: jaza@chevron.com
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L-37 Surveillance Panel Voting Members

Donald Bartlett	The Lubrizol Corporation (Chairman)
Tom Bryson	Volvo Powertrain Corporation
Juan Buitrago	Chevron Oronite Company
Allen Comfort	AMSTA-TR-D/210 US Army Tacom-Tardec
John Dharte	American Axle & Manufacturing
Brian Koehler	Southwest Research Institute
Cory Koglin	Afton Chemical Company
Don Kreinbring	Dana Corporation
Don Lind	ASTM Test Monitoring Center
Jim Linden	GMR Research and Development
Thelma Marougy	Eaton Corporation
Bruce McGlone	ArvinMeritor Materials Engineering
Salvatore Rea	Infineum
Dale Smith	PARC Technical Services
William Sullivan	ExxonMobil Chemical Company
Paula Vettel	D.A. Stuart Company

L-37 Surveillance Panel
Sheraton Detroit Metro Airport
May 9h, 2006

AGENDA

I. Call to Order & Membership Review

II. Approval of Panel Minutes

- ✓ February 8, 2006 Panel Meeting
- ✓ March 21, 2006 Teleconference Meeting

III. 2006 Lubrited Hardware Order Placement Status-
- Quote Status from Dana
- Count by Labs to place binding PO's

IV. 2005 Green Hardware Matrix Final Update and Action – TMC

V. Adjournment

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5/4/06

GEAR BATCH V1L417/P4L792 NON_LUBRITED HARDWARE MATRIX DATA

Standard Temperature Data

CMIR	LAB	Std.	Run	OIL	Pinbat	Ringbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	fpcrat	lpcrat	GUSA
49503	D	3A	464	127	V1L417	P4L792	20060114	8	9	8	9.9	8	10	10	10	0	3	
46001	B	191	2263	127	V1L417	P4L792	20060107	6	4	8	9.5	7	5	9	9.9	0	2	15143
44289	E	2	234	127	V1L417	P4L792	20060112	8	9	7	9.7	7	9	9	9.9	0	2	
49554	A	2	2917	127	V1L417	P4L792	20060113	7	9	5	9.7	7	9	9	9.9	0	2	
53444	D	3A	472	151-3	V1L417	P4L792	20060126	9	10	10	9.9	9	10	10	10	1	3	
53445	D	3A	515	151-3	V1L417	P4L792	20060403	8	10	10	10	9	10	10	10	0	2	15846
56556	B	191	2275	151-3	V1L417	P4L792	20060124	8	10	10	10	7	10	10	10	0	2	16354
56557	B	191	2301	151-3	V1L417	P4L792	20060325	8	10	10	9.9	9	10	10	9.9	0	2	15199
53460	E	2	240	151-3	V1L417	P4L792	20060124	6	9	8	9.9	7	10	9	9.9	0	2	
55506	E	2	251	151-3	V1L417	P4L792	20060330	8	9	8	9.9	7	10	9	9.9	0	2	15905
50356	A	2	2926	151-3	V1L417	P4L792	20060128	8	10	9	9.9	8	10	9	9.9	1	2	16083
54426	A	2	2980	151-3	V1L417	P4L792	20060412	8	10	9	9.9	8	10	9	9.9	0	2	15970
56536	D	3A	491	152	V1L417	P4L792	20060224	8	10	10	10	9	10	10	10	0	2	15971
58274	D	3A	516	152	V1L417	P4L792	20060405	9	10	10	10	9	10	10	10	0	2	15842
55496	B	191	2284	152	V1L417	P4L792	20060214	9	10	10	9.9	7	10	10	10	0	2	15775
58289	B	191	2305	152	V1L417	P4L792	20060330	9	10	10	10	8	10	10	10	1	2	15519
58301	E	2	248	152	V1L417	P4L792	20060310	8	9	8	9.9	7	10	9	9.9	0	2	15777
58302	E	2	252	152	V1L417	P4L792	20060331	8	9	8	9.9	7	10	9	9.9	1	2	15277
53557	A	2	2940	152	V1L417	P4L792	20060217	8	10	9	9.9	8	10	9	9.9	0	2	15404
53558	A	2	2941	152	V1L417	P4L792	20060218	8	10	9	9.9	8	10	10	9.8	0	2	15144
56537	D	3A	493	153	V1L417	P4L792	20060227	9	10	10	9.9	9	10	10	10	0	2	15979
58279	D	3A	523	153	V1L417	P4L792	20060416	9	10	8	9.9	9	10	10	10	1	2	15951
55498	B	191	2286	153	V1L417	P4L792	20060217	6	8	8	9.8	7	8	9	10	-1	2	15467
58293	B	191	2310	153	V1L417	P4L792	20060405	7	8	9	9.8	7	8	10	9.9	0	2	16342
53555	E	2	245	153	V1L417	P4L792	20060301	8	9	8	4	7	9	9	9.8	0	2	15513
58306	E	2	254	153	V1L417	P4L792	20060405	8	8	8	9.9	7	9	9	9.9	0	2	15597
53560	A	2	2955	153	V1L417	P4L792	20060309	8	9	9	9.9	8	10	10	9.9	0	2	15904
53562	A	2	2977	153	V1L417	P4L792	20060406	8	9	9	9.9	8	10	9	9.9	0	2	15844

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5/9/06

GEAR BATCH V1L417/P4L792 NON_LUBRITED HARDWARE MATRIX DATA

Low Temperature Data

CMIR	LAB	Std.	Run	OIL	Pinbat	Ringbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	fpcrat	lpcrat	GUSA
58273	D	3A	498	152	V1L417	P4L792	20060306	9	10	10	10	9	10	10	10	0	2	15770
58276	D	3A	527	152	V1L417	P4L792	20060421	9	10	9	10	9	10	10	10	0	2	15943
55497	B	191	2285	152	V1L417	P4L792	20060215	9	10	9	10	7	10	10	10	0	2	15973
58290	B	191	2307	152	V1L417	P4L792	20060401	8	10	9	10	7	10	10	10	-1	2	15519
58300	E	2	246	152	V1L417	P4L792	20060302	8	9	8	9.9	7	10	9	9.9	0	2	15393
58303	E	2	253	152	V1L417	P4L792	20060404	8	9	8	9.9	7	10	9	9.9	0	2	15725
53559	A	2	2946	152	V1L417	P4L792	20060225	8	9	8	9.9	8	10	10	9.9	0	2	15200
58314	A	2	2981	152	V1L417	P4L792	20060413	8	10	9	9.9	8	10	10	9.9	0	2	15328
56538	D	3A	496	153	V1L417	P4L792	20060302	8	10	10	10	9	10	10	10	0	2	15979
58280	D	3A	512	153	V1L417	P4L792	20060327	9	10	10	10	9	10	10	10	0	2	15180
55499	B	191	2296	153	V1L417	P4L792	20060304	9	9	10	9.9	7	10	10	9.9	0	2	16226
55500	B	191	2311	153	V1L417	P4L792	20060407	8	10	10	9.9	8	10	10	9.9	0	2	16036
58307	E	2	247	153	V1L417	P4L792	20060309	8	10	9	9.9	7	10	9	9.9	0	2	15457
58308	E	2	255	153	V1L417	P4L792	20060406	8	10	9	9.9	7	10	9	9.9	0	2	15853
53561	A	2	2956	153	V1L417	P4L792	20060310	8	9	10	9.9	8	10	10	9.9	0	2	15456
53563	A	2	2979	153	V1L417	P4L792	20060411	8	10	9	9.9	8	10	9	9.9	0	2	15780

Attachment 4
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Reference 2-37
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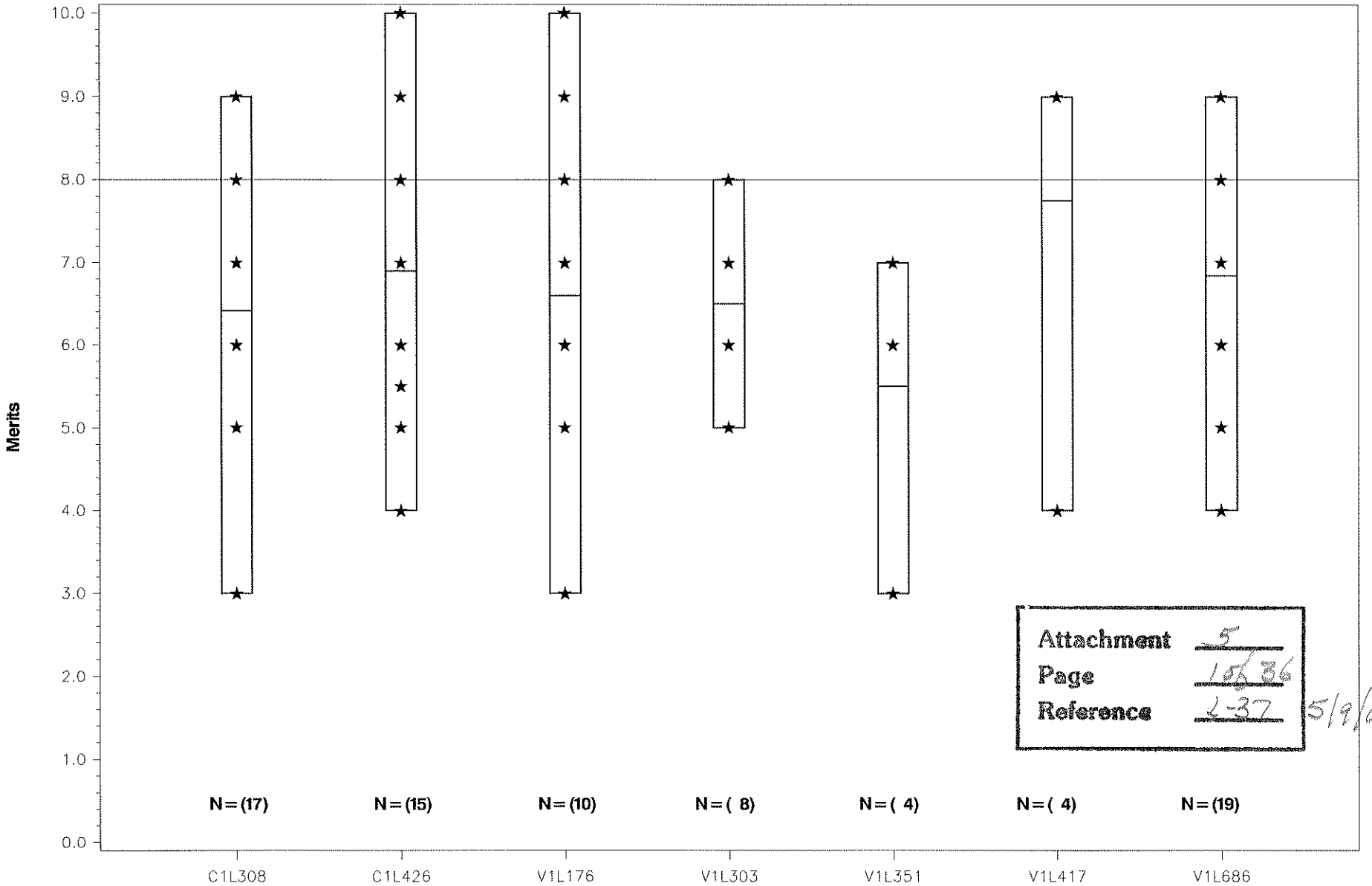
L–37 Reference Oil Performance by Pinion Batch

Ridging – NON–LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37

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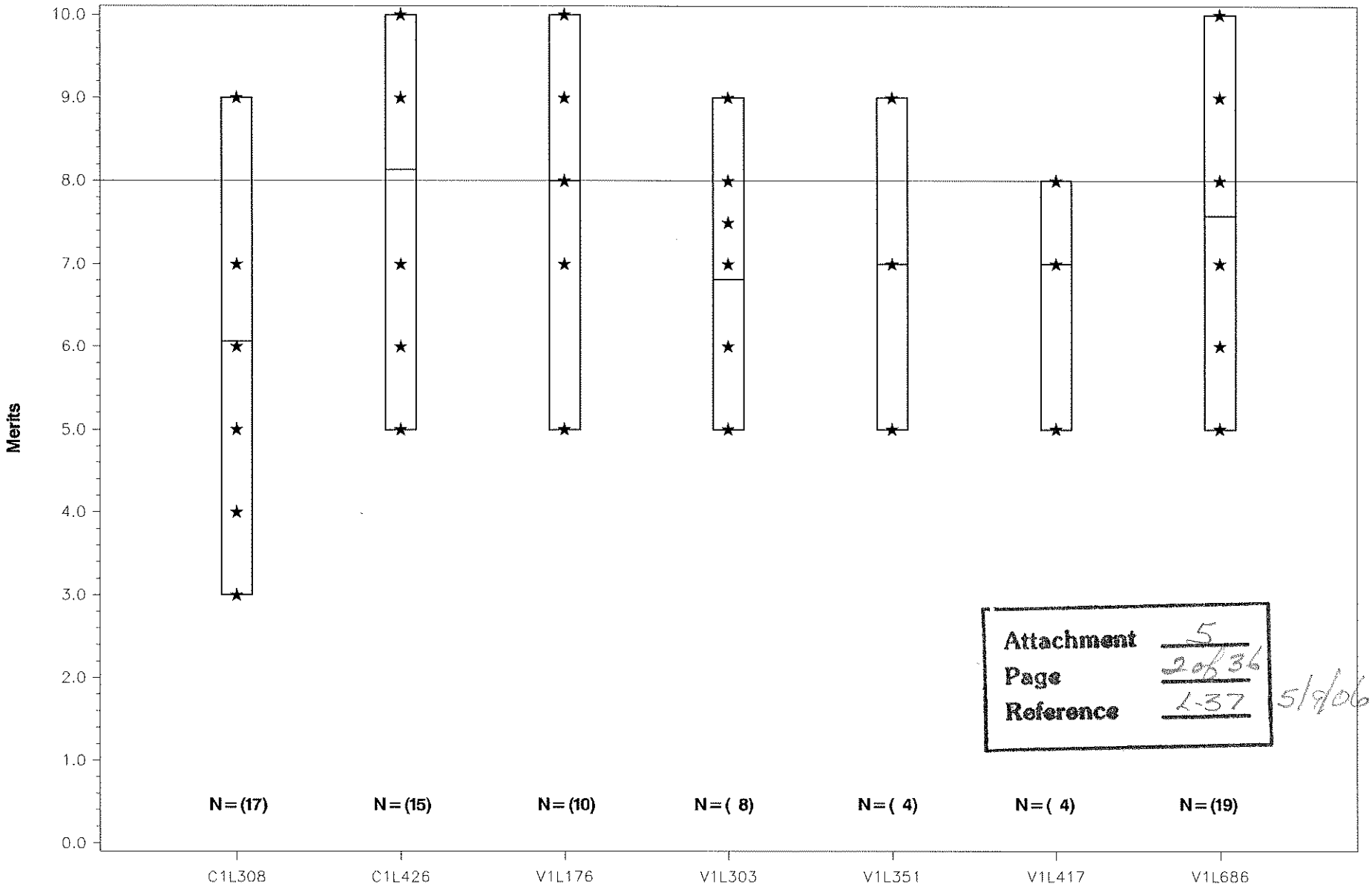
L-37 Reference Oil Performance by Pinion Batch

Rippling – NON-LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37

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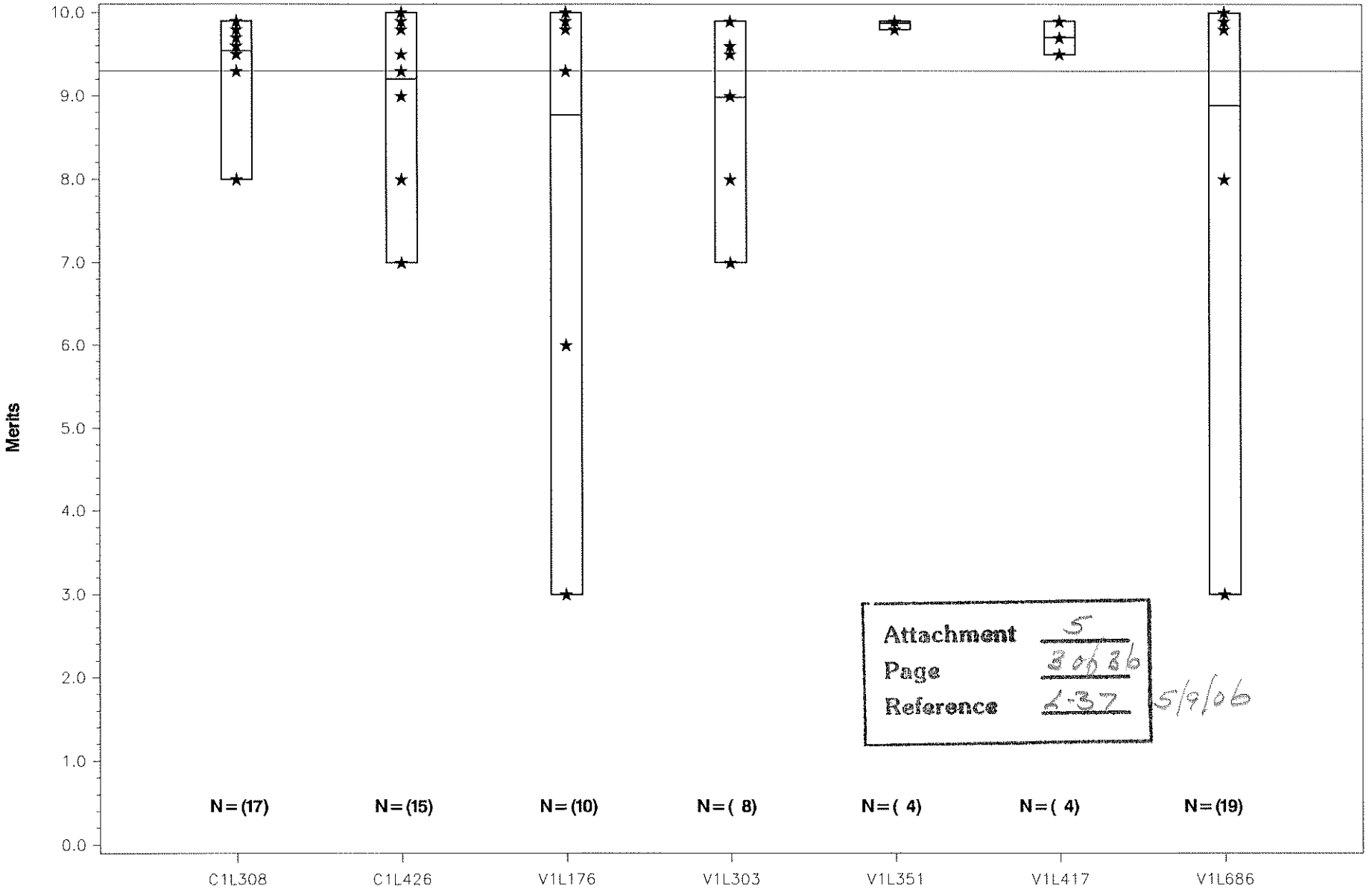
L-37 Reference Oil Performance by Pinion Batch

Spitting – NON-LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37

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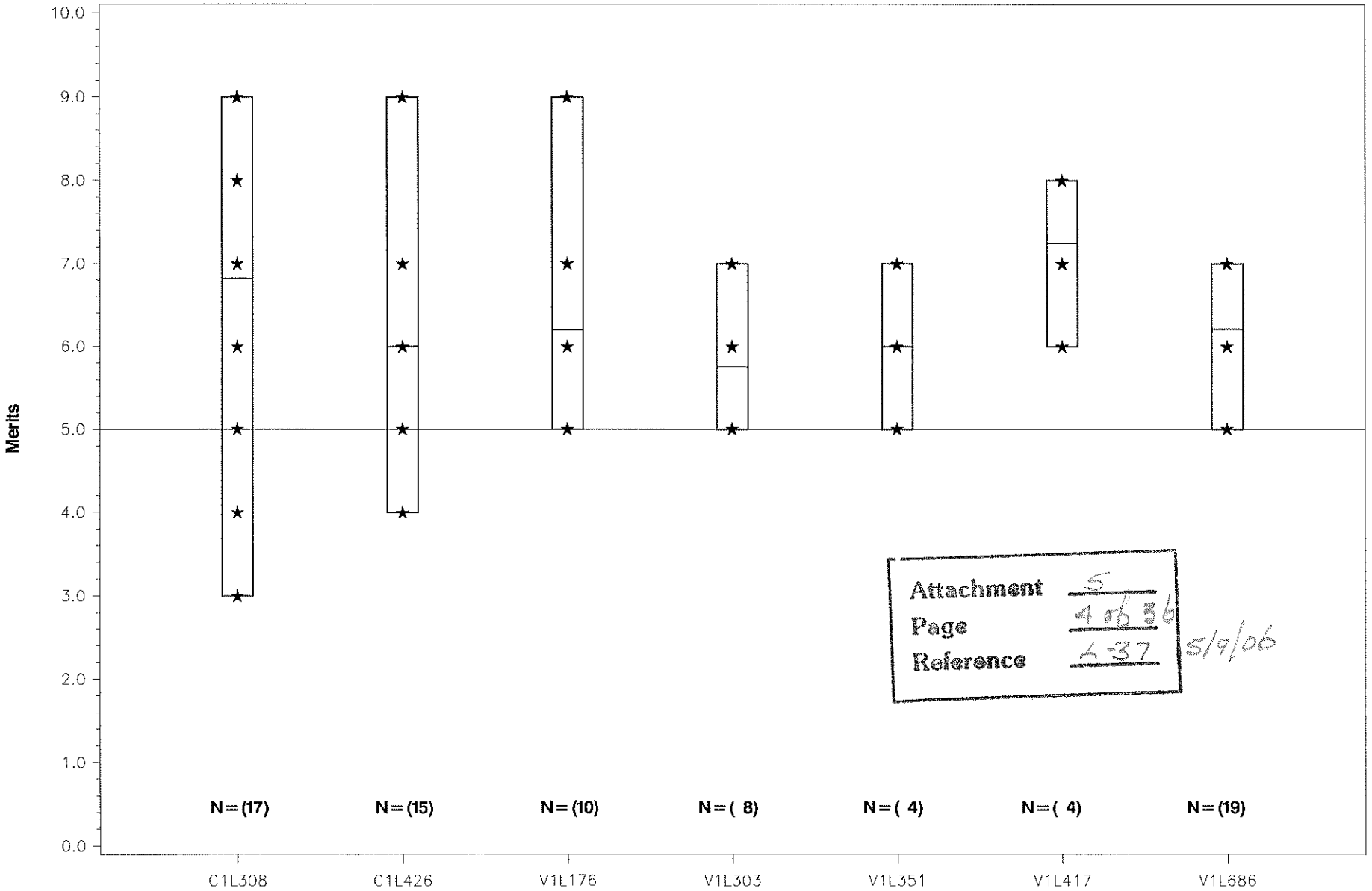
L-37 Reference Oil Performance by Pinion Batch

Wear – NON-LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37

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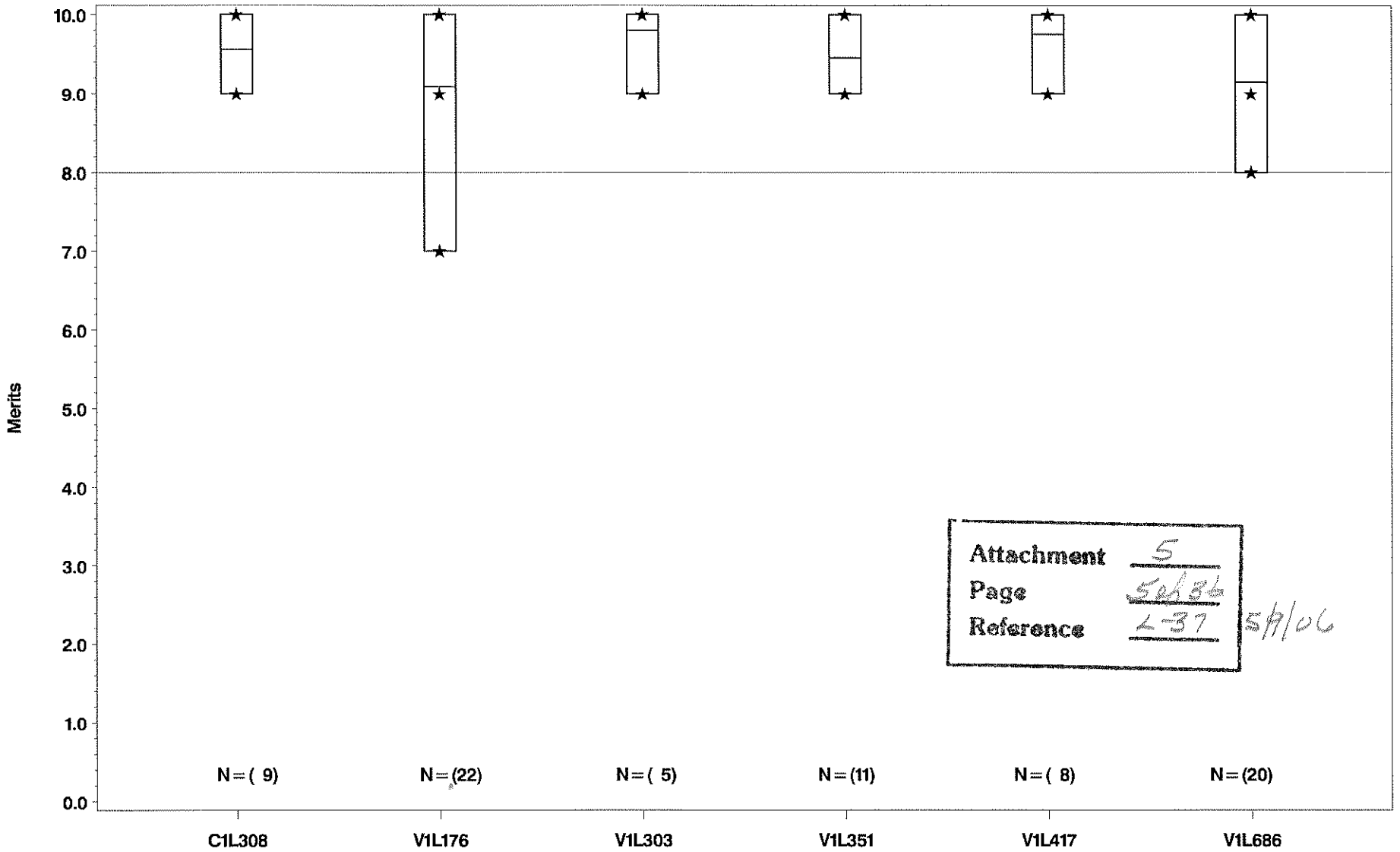
L-37 Reference Oil Performance by Pinion Batch

Ridging – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oils 151-2 & 151-3



Attachment 5

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Reference L-37

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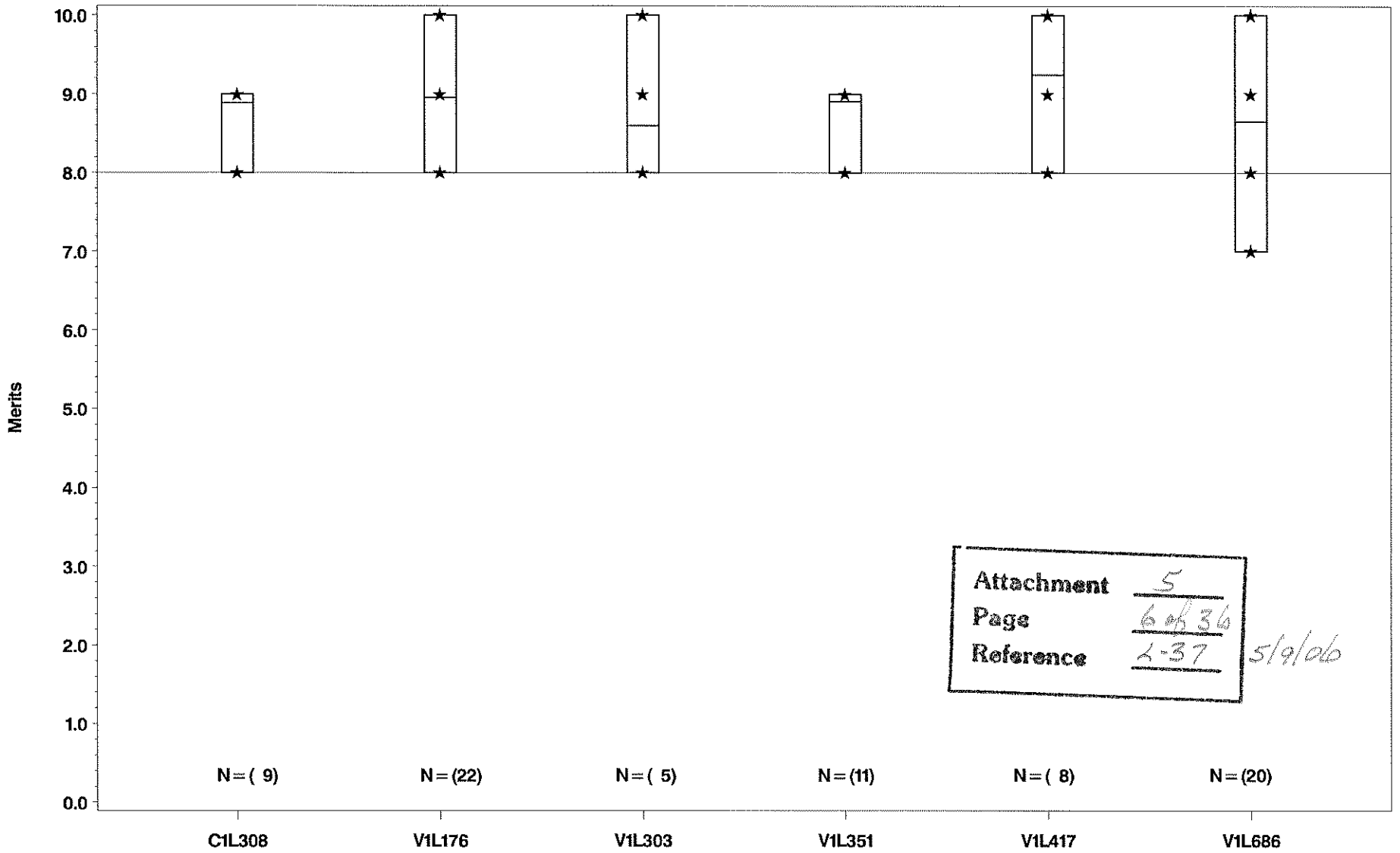
L-37 Reference Oil Performance by Pinion Batch

Rippling - NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oils 151-2 & 151-3



Attachment 5
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Reference L-37
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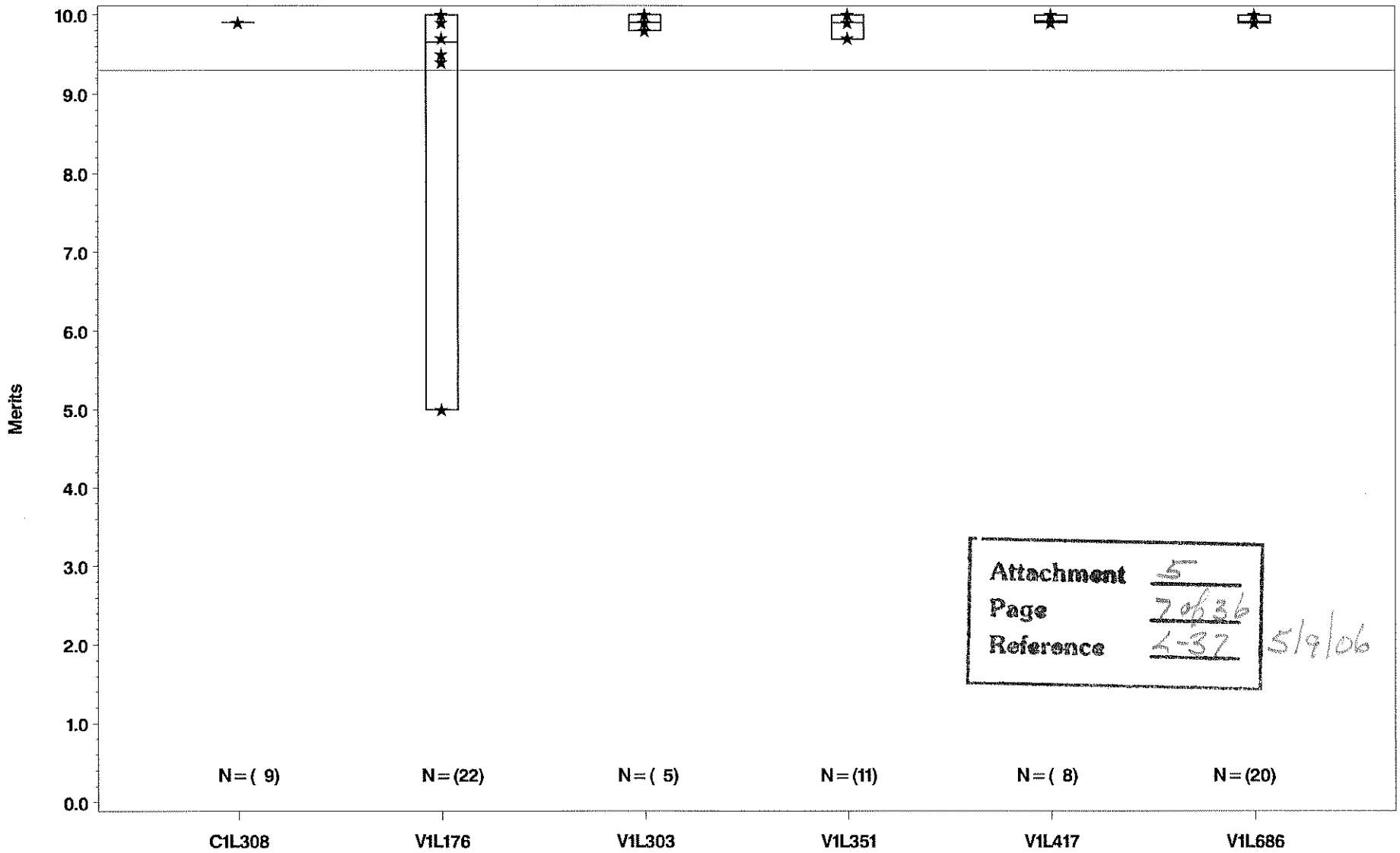
L-37 Reference Oil Performance by Pinion Batch

Spitting -- NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oils 151-2 & 151-3



Attachment 5
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Reference L-37
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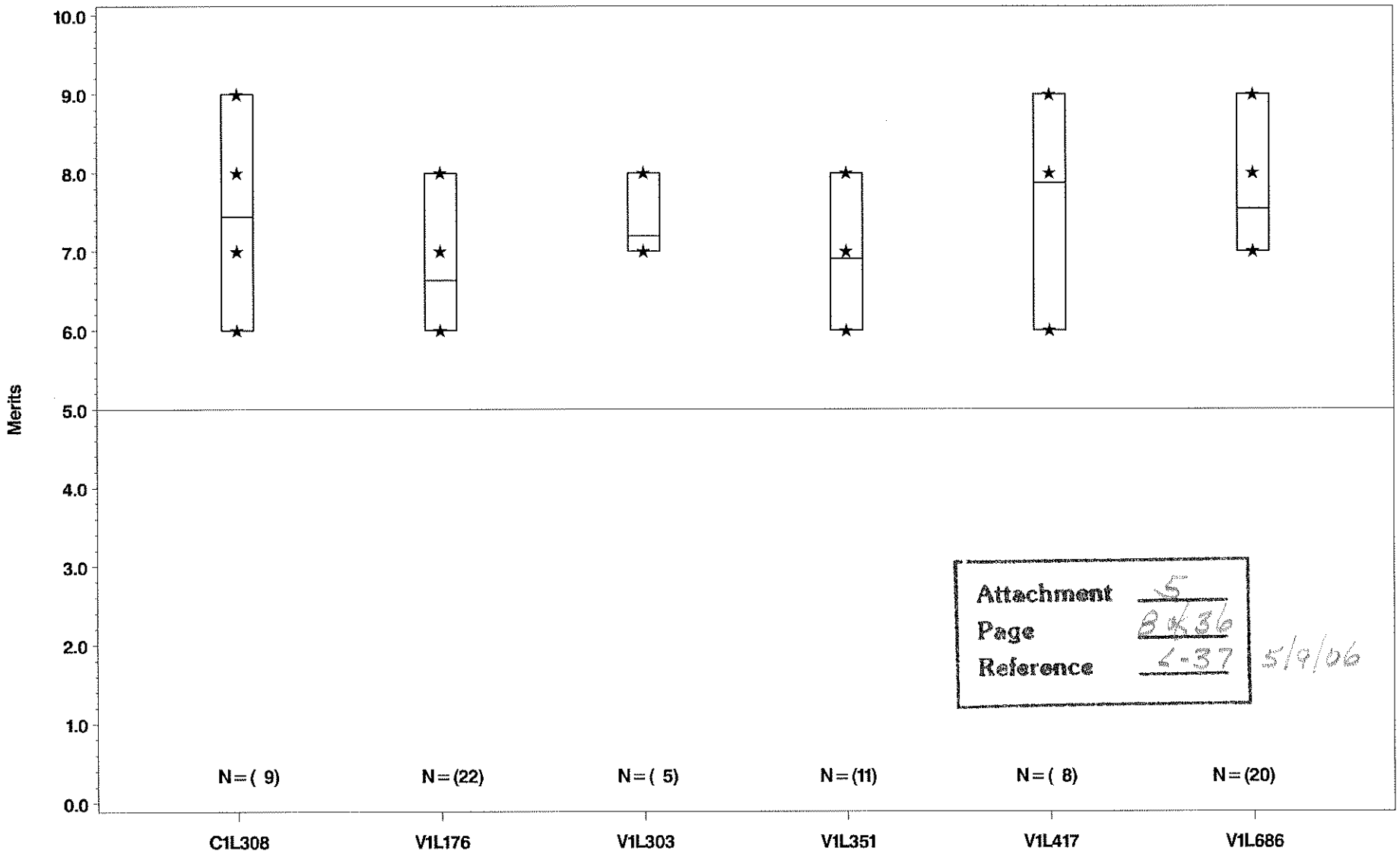
L-37 Reference Oil Performance by Pinion Batch

Wear -- NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oils 151-2 & 151-3



Attachment 5
Page 8 & 36
Reference L-37

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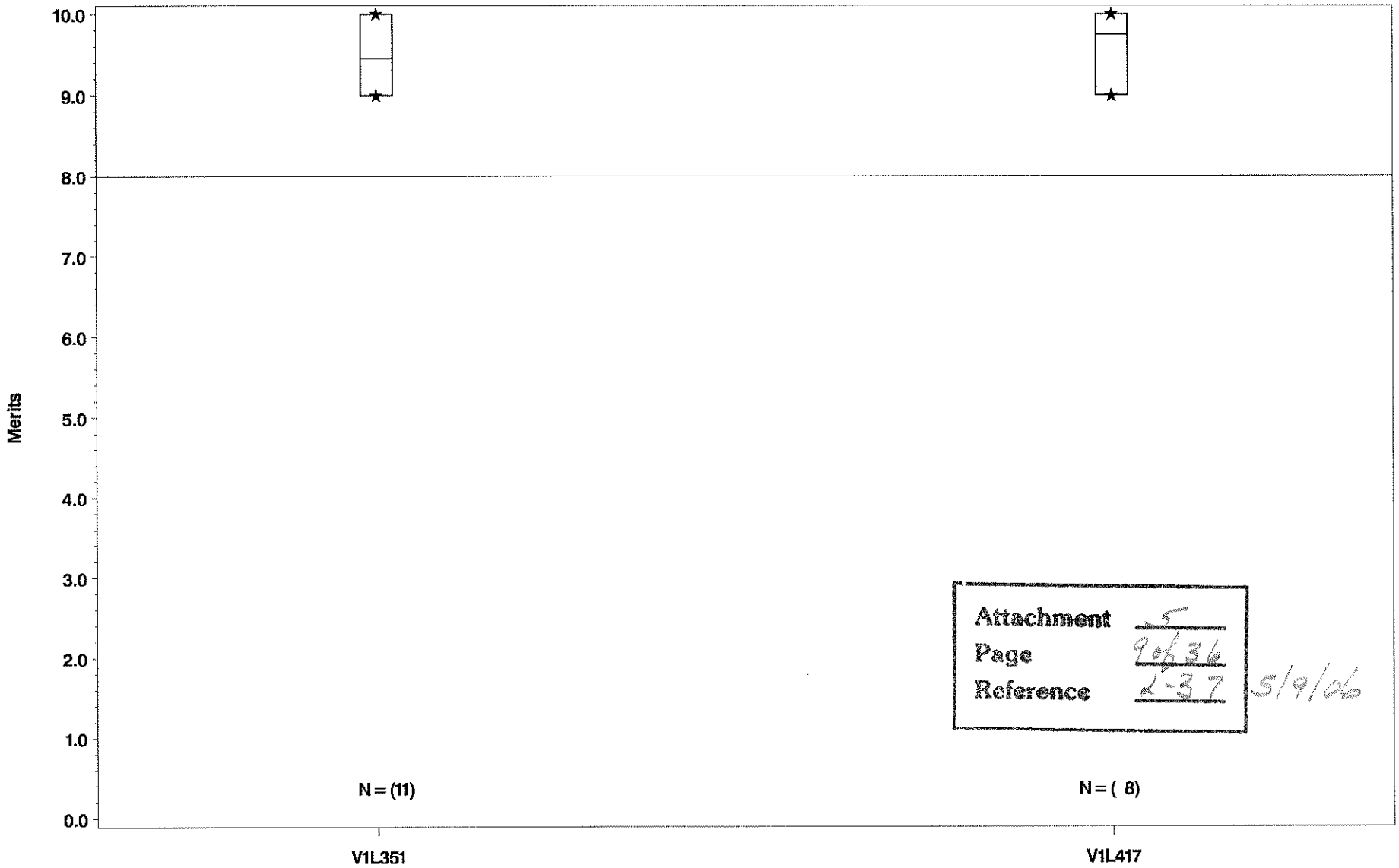
L-37 Reference Oil Performance by Pinion Batch

Ridging – NON-LUBRITED

Reference Oil 152 Standard Temperature



Attachment 5
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Reference L-37
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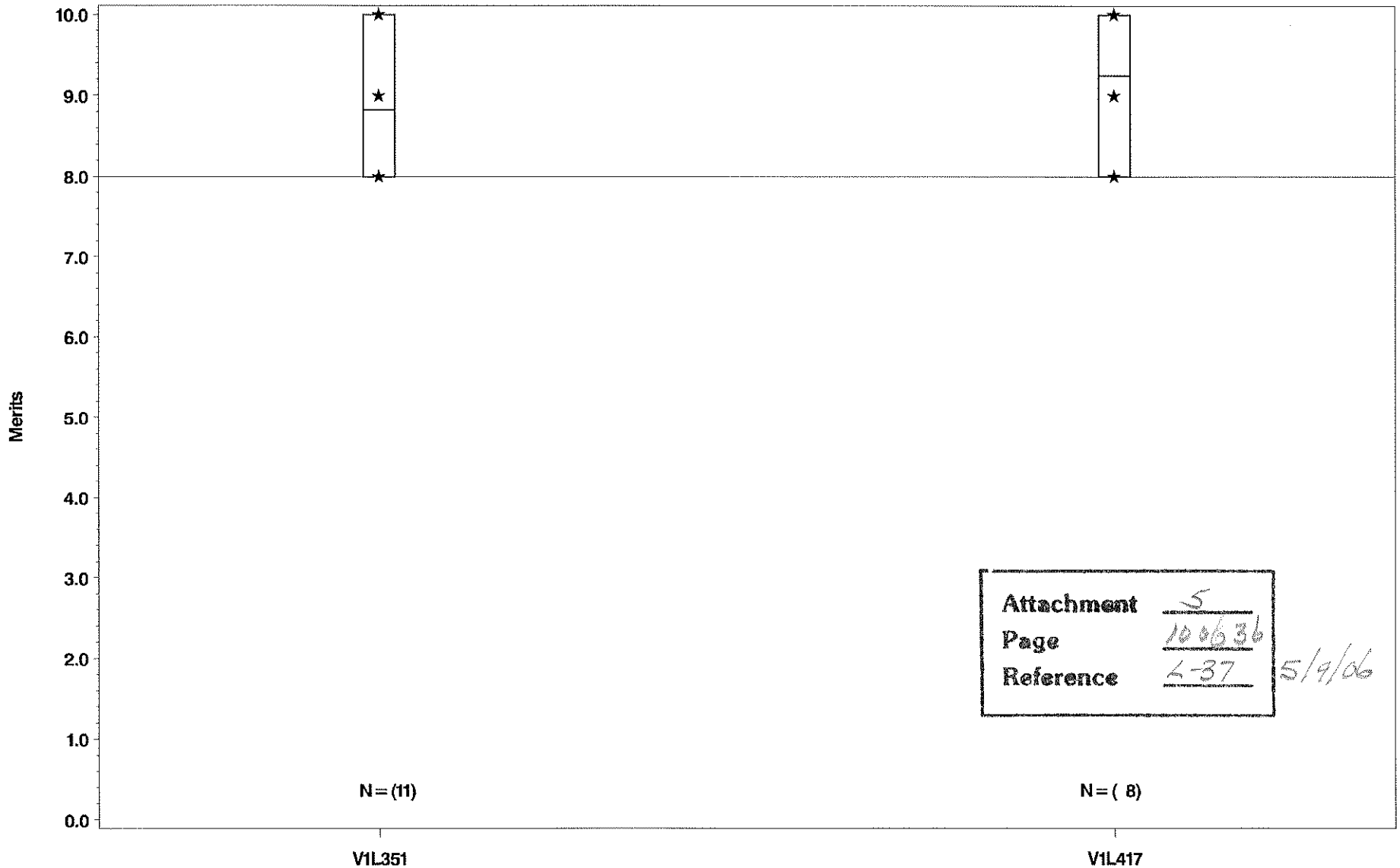
L-37 Reference Oil Performance by Pinion Batch

Rippling -- NON-LUBRITED

Reference Oil 152 Standard Temperature



Attachment 5
Page 10636
Reference L-37
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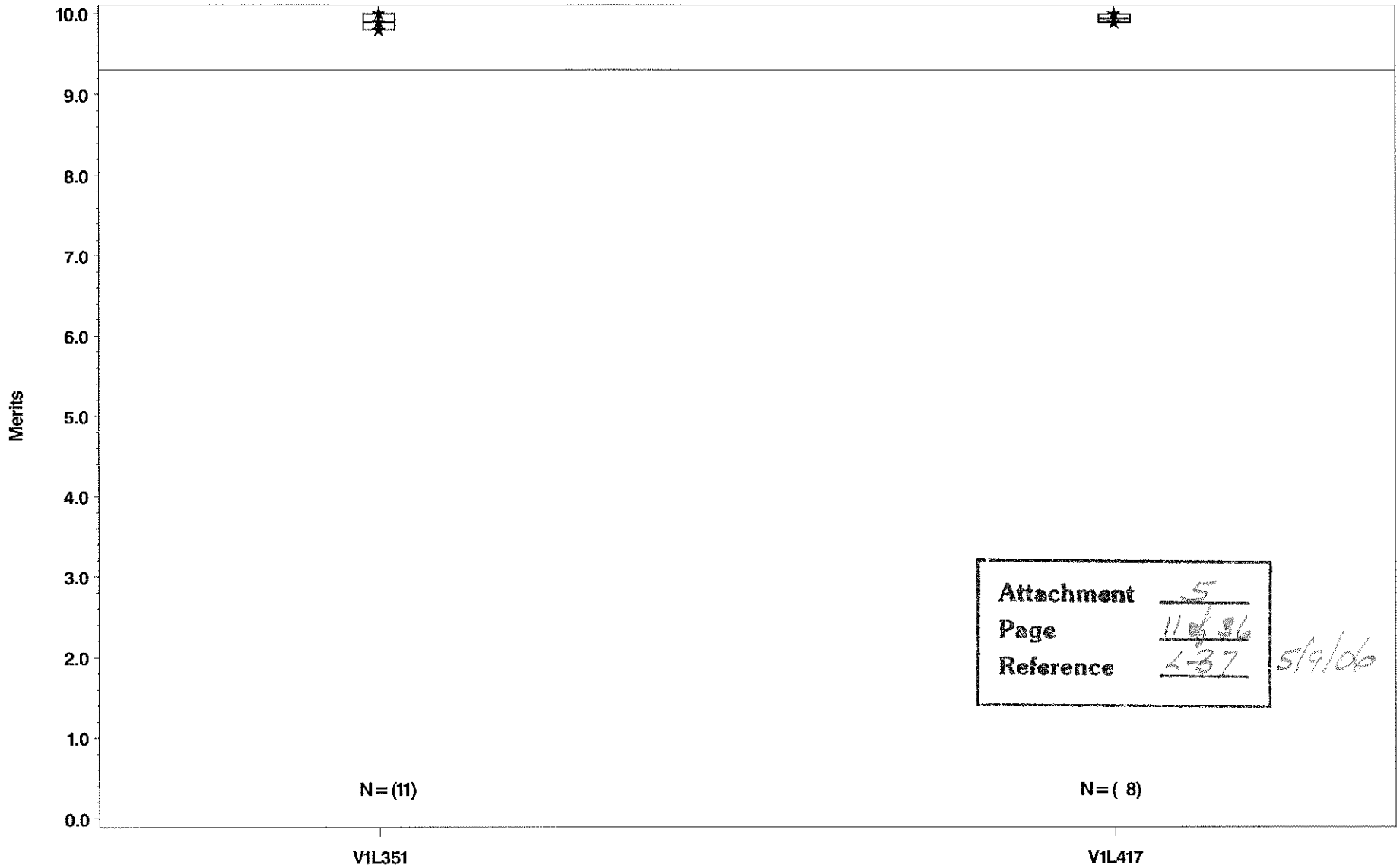
L-37 Reference Oil Performance by Pinion Batch

Spitting – NON-LUBRITED

Reference Oil 152 Standard Temperature



Attachment 5
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Reference L-37

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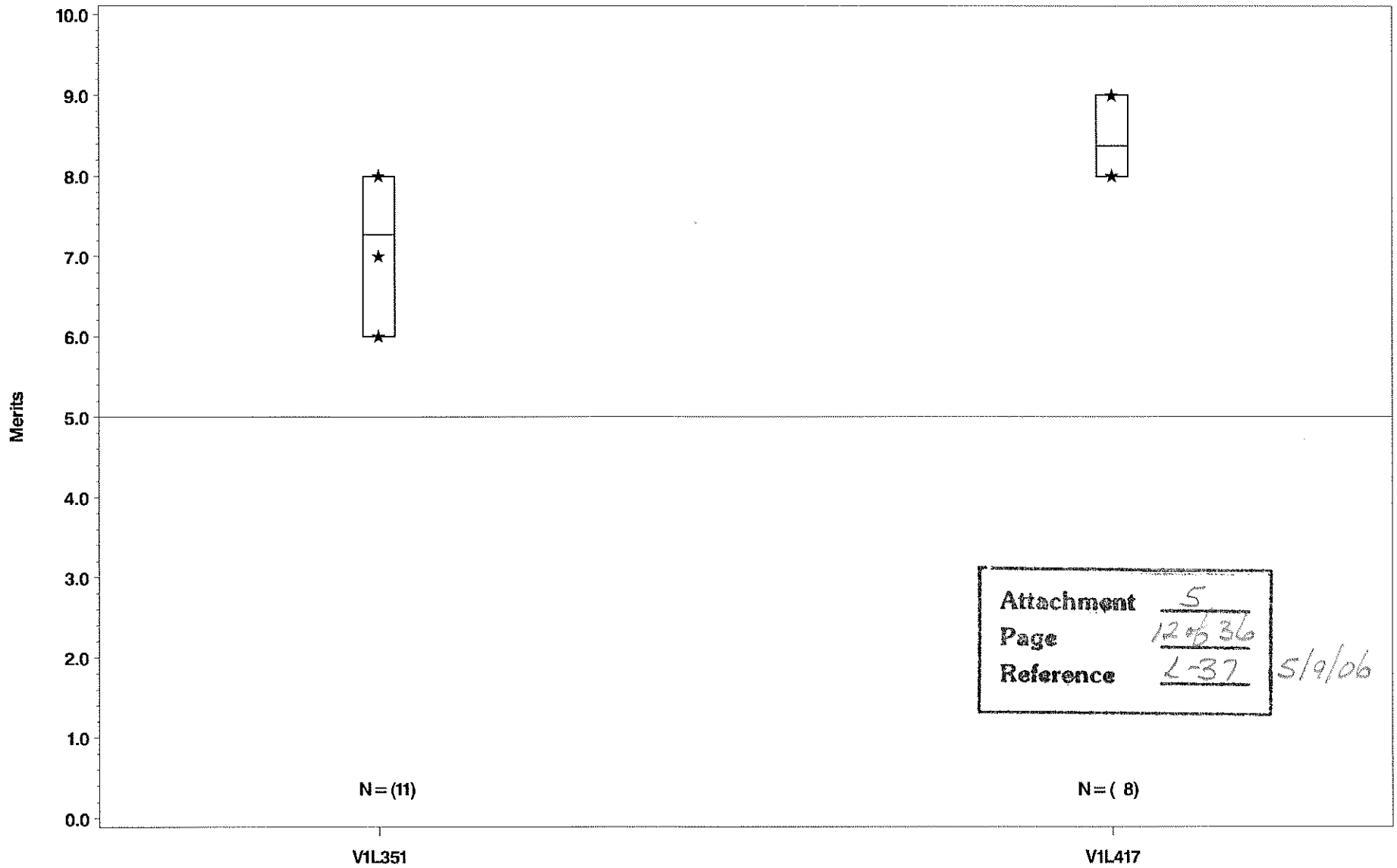
L-37 Reference Oil Performance by Pinion Batch

Wear -- NON-LUBRITED

Reference Oil 152 Standard Temperature



Attachment 5
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Reference L-37
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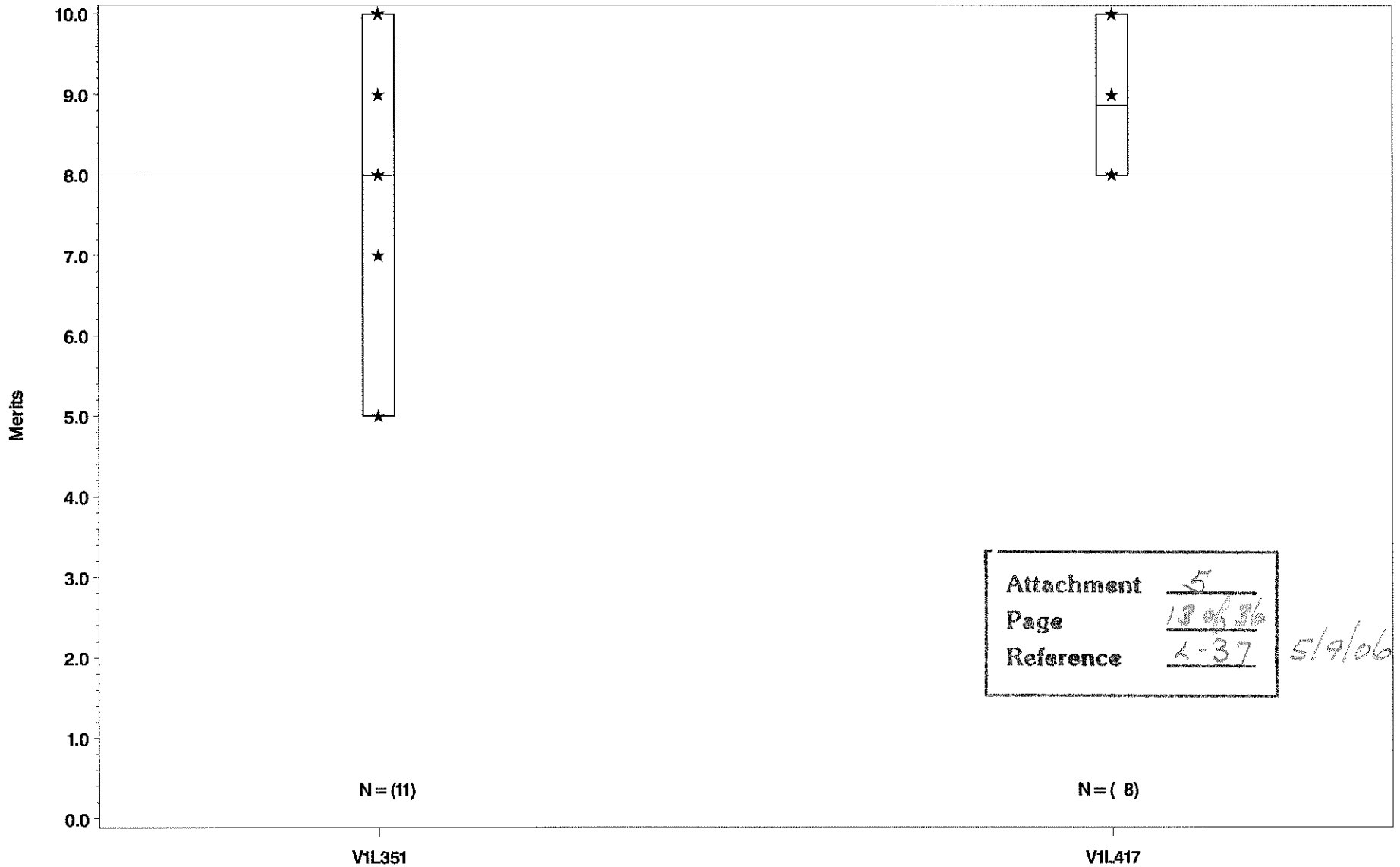
L-37 Reference Oil Performance by Pinion Batch

Ridging – NON-LUBRITED

Reference Oil 153 Standard Temperature



Attachment 5
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Reference L-37

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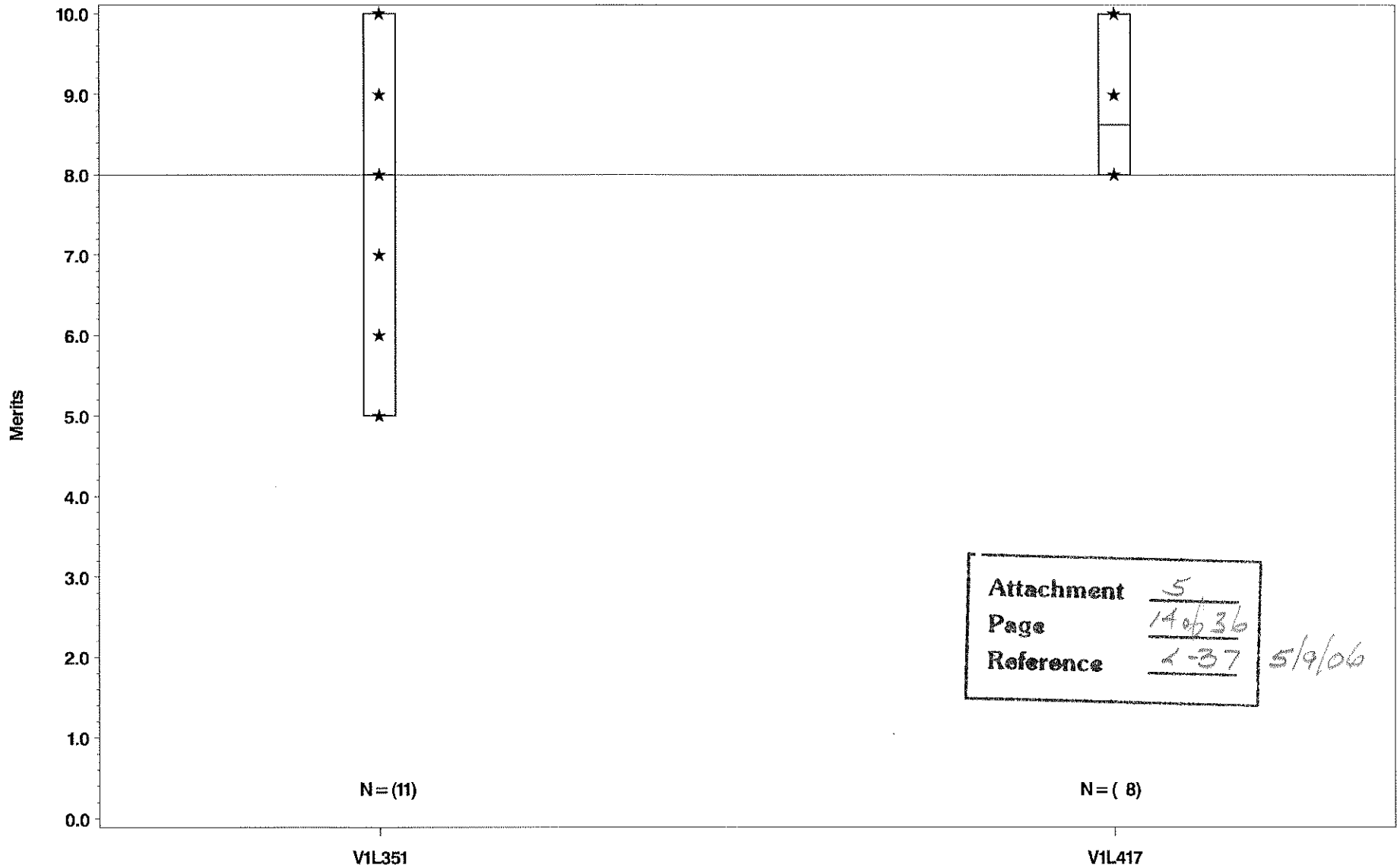
L--37 Reference Oil Performance by Pinion Batch

Rippling -- NON--LUBRITED

Reference Oil 153 Standard Temperature



Attachment 5
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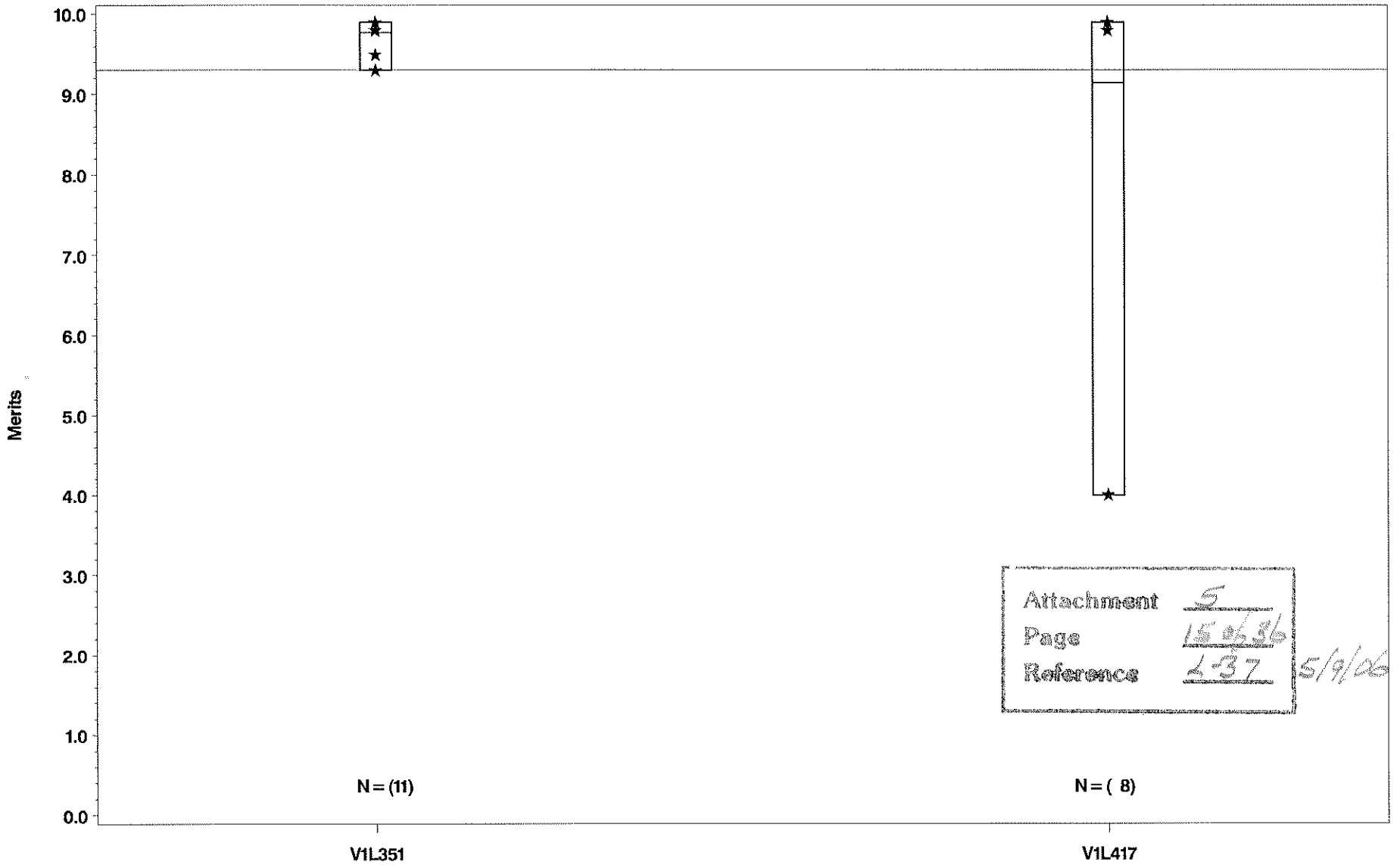
Reference L-37 5/9/06

L-37 Reference Oil Performance by Pinion Batch

Spitting -- NON-LUBRITED

Reference Oil 153 Standard Temperature



Attachment 5
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Reference L-37
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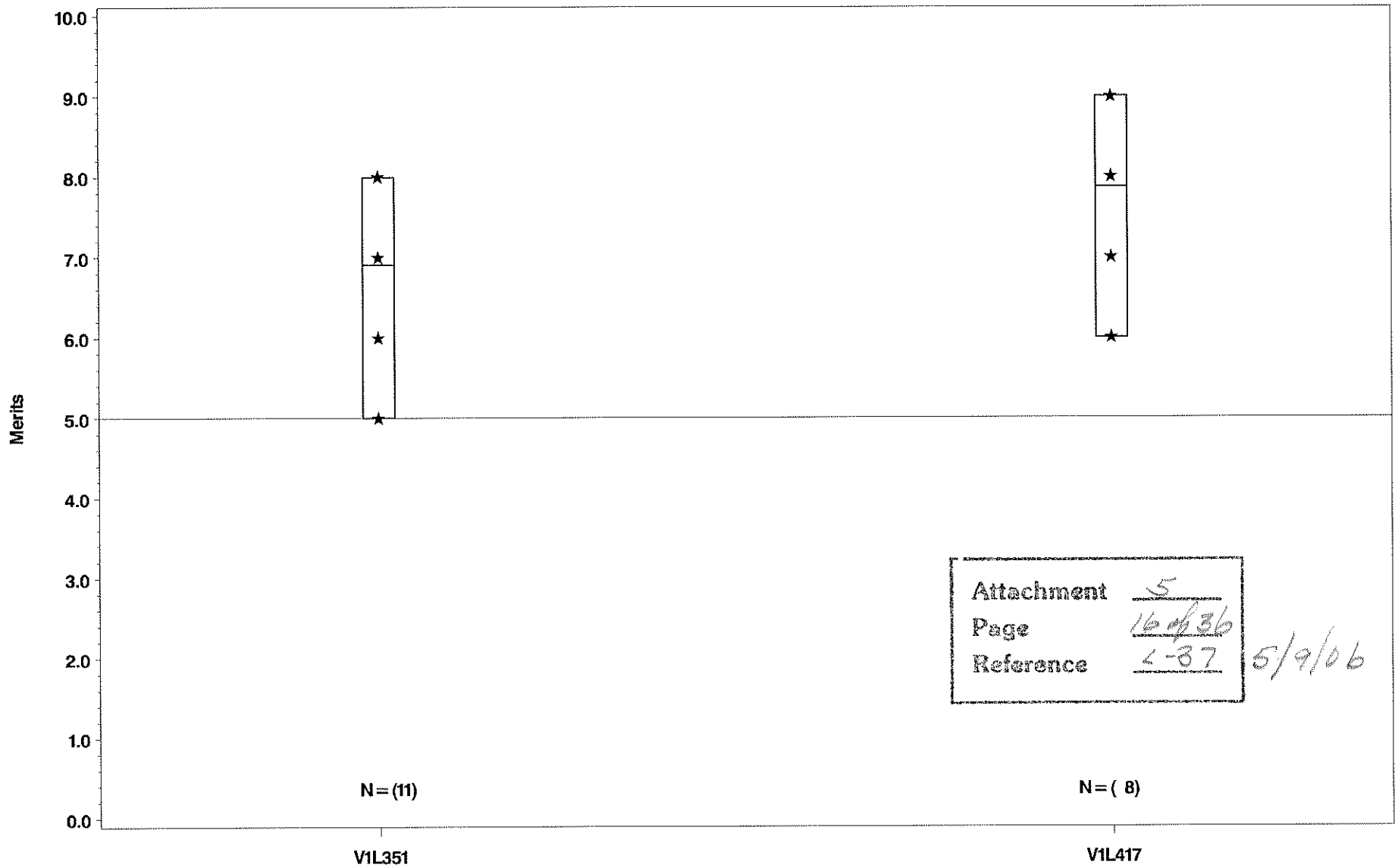
L-37 Reference Oil Performance by Pinion Batch

Wear – NON-LUBRITED

Reference Oil 153 Standard Temperature



Attachment 5
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Reference L-37
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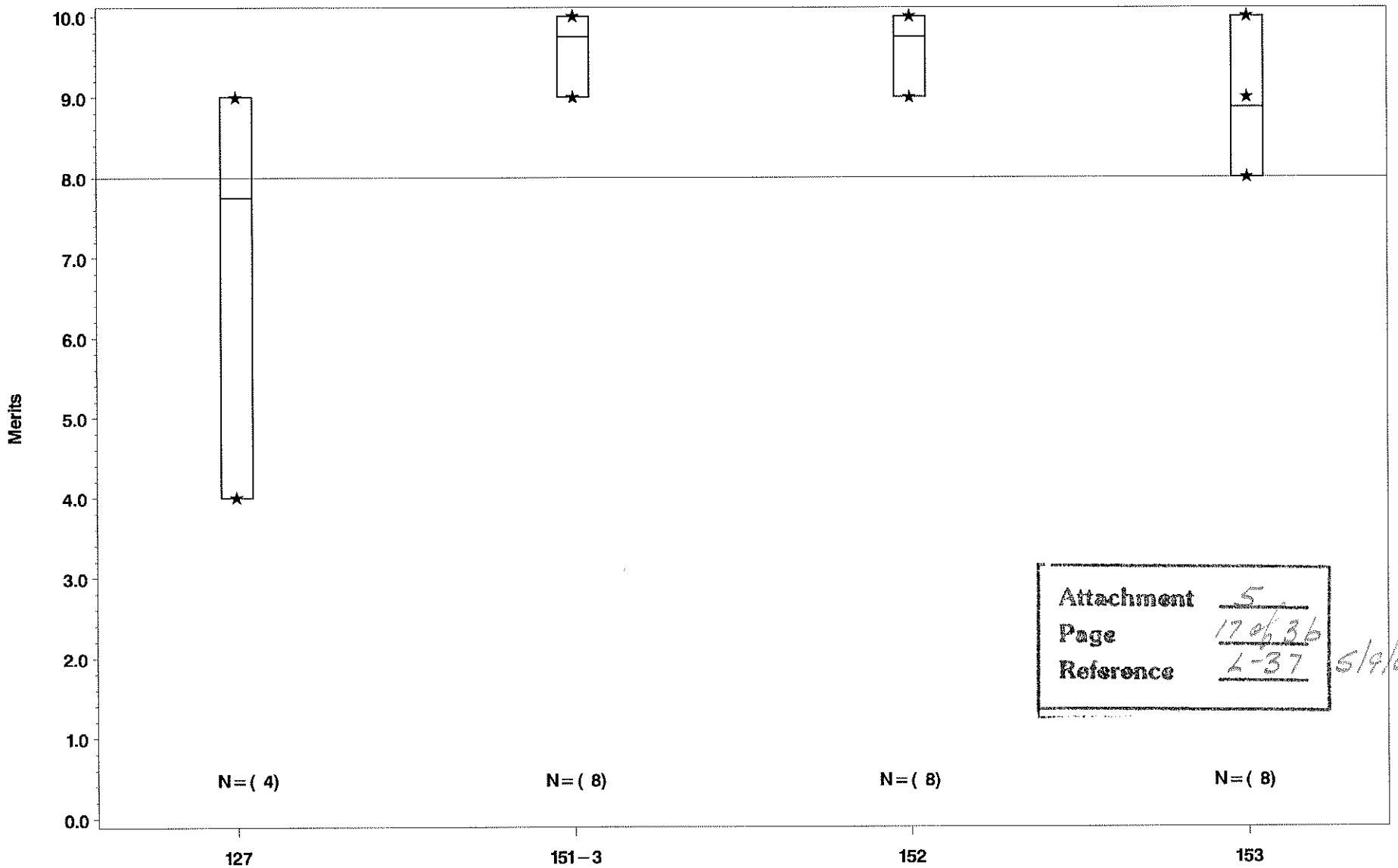
L – 37 Reference Oil Comparison

Ridging – NON – LUBRITED – Standard

Gear Batch V1L417/P4L792



Attachment 5
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Reference L-37

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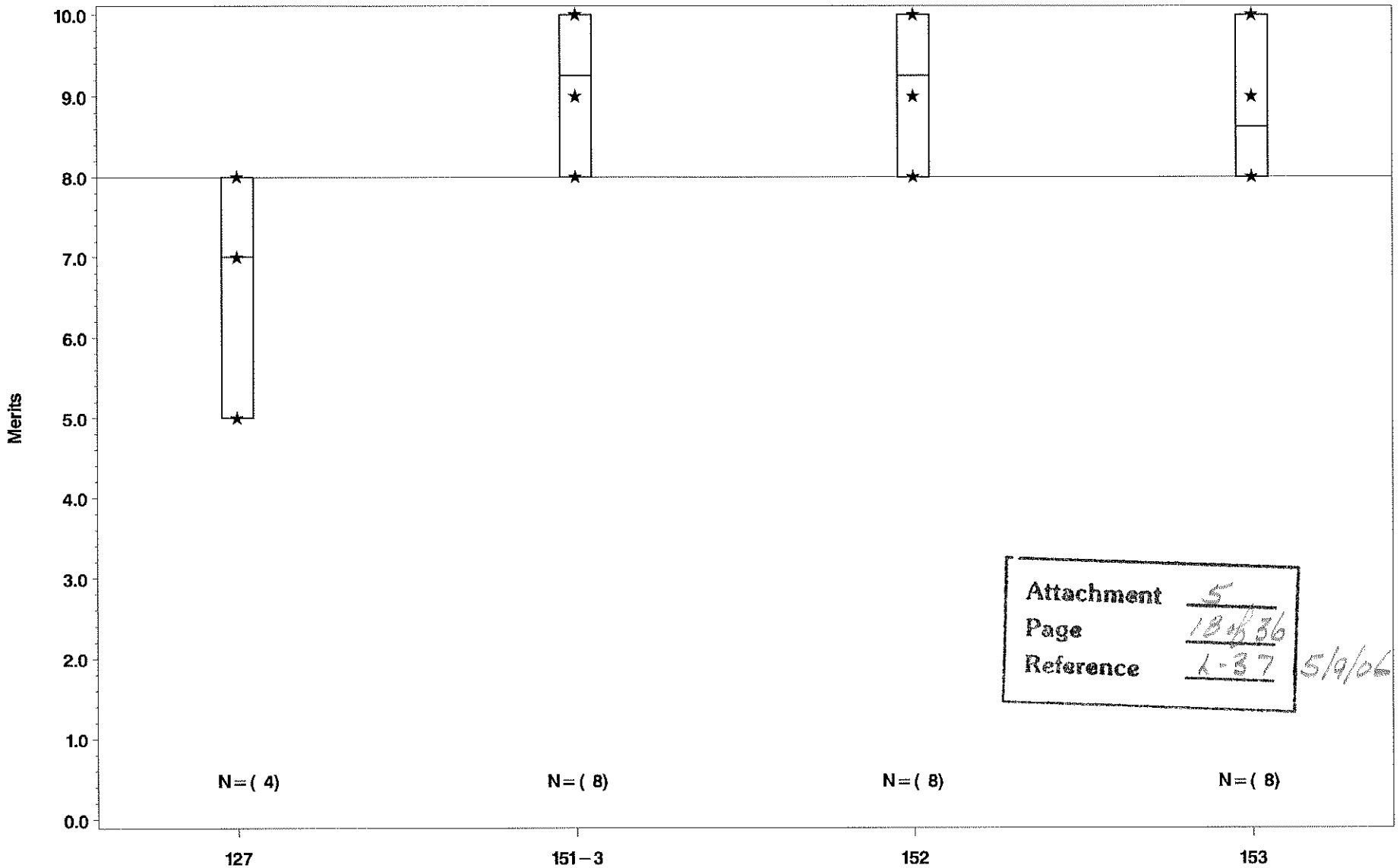
L – 37 Reference Oil Comparison

Rippling – NON – LUBRITED – Standard

Gear Batch V1L417/P4L792



Attachment 5
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Reference L-37
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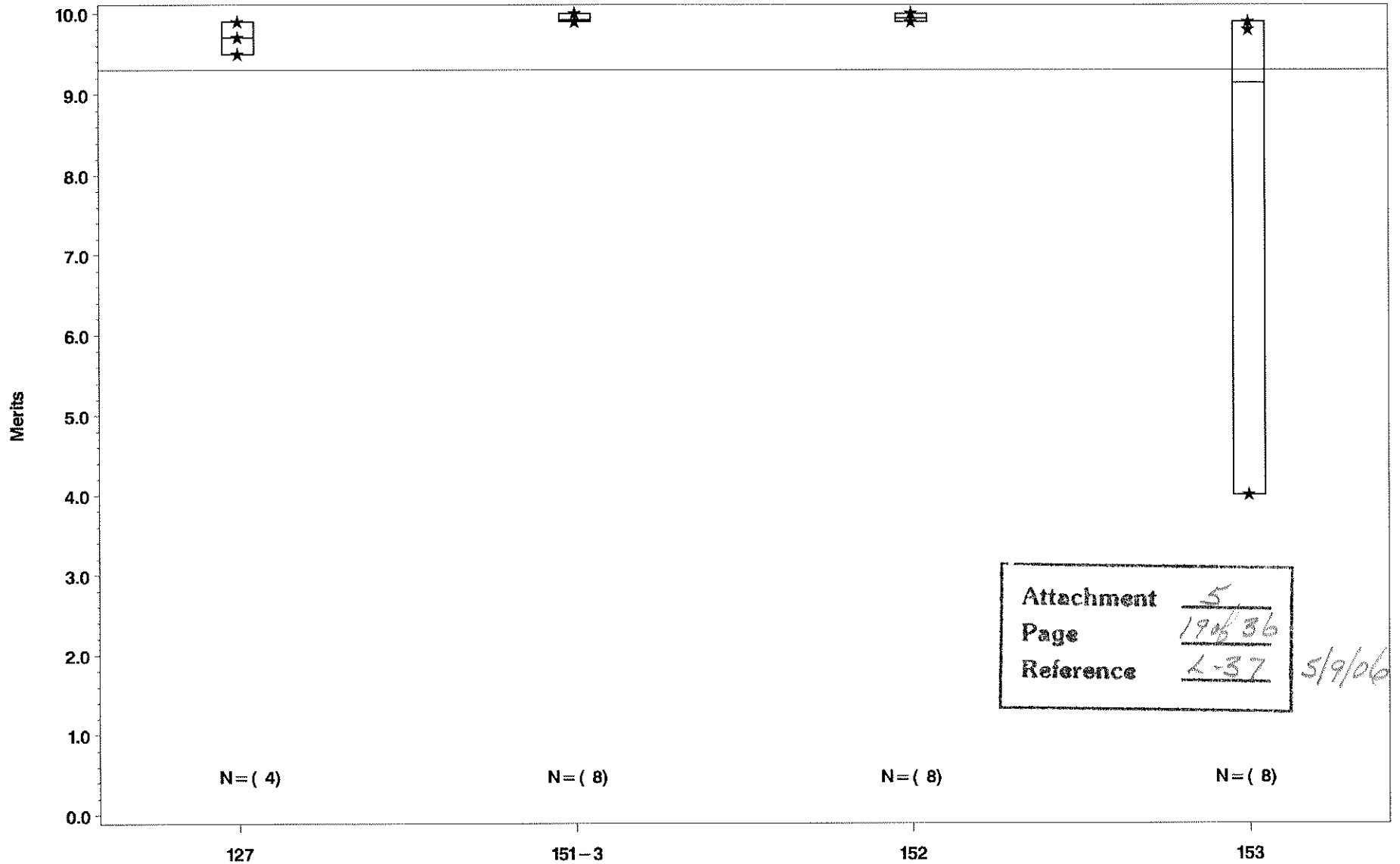
L-37 Reference Oil Comparison

Spitting – NON-LUBRITED – Standard

Gear Batch V1L417/P4L792



Attachment 5
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Reference L-37

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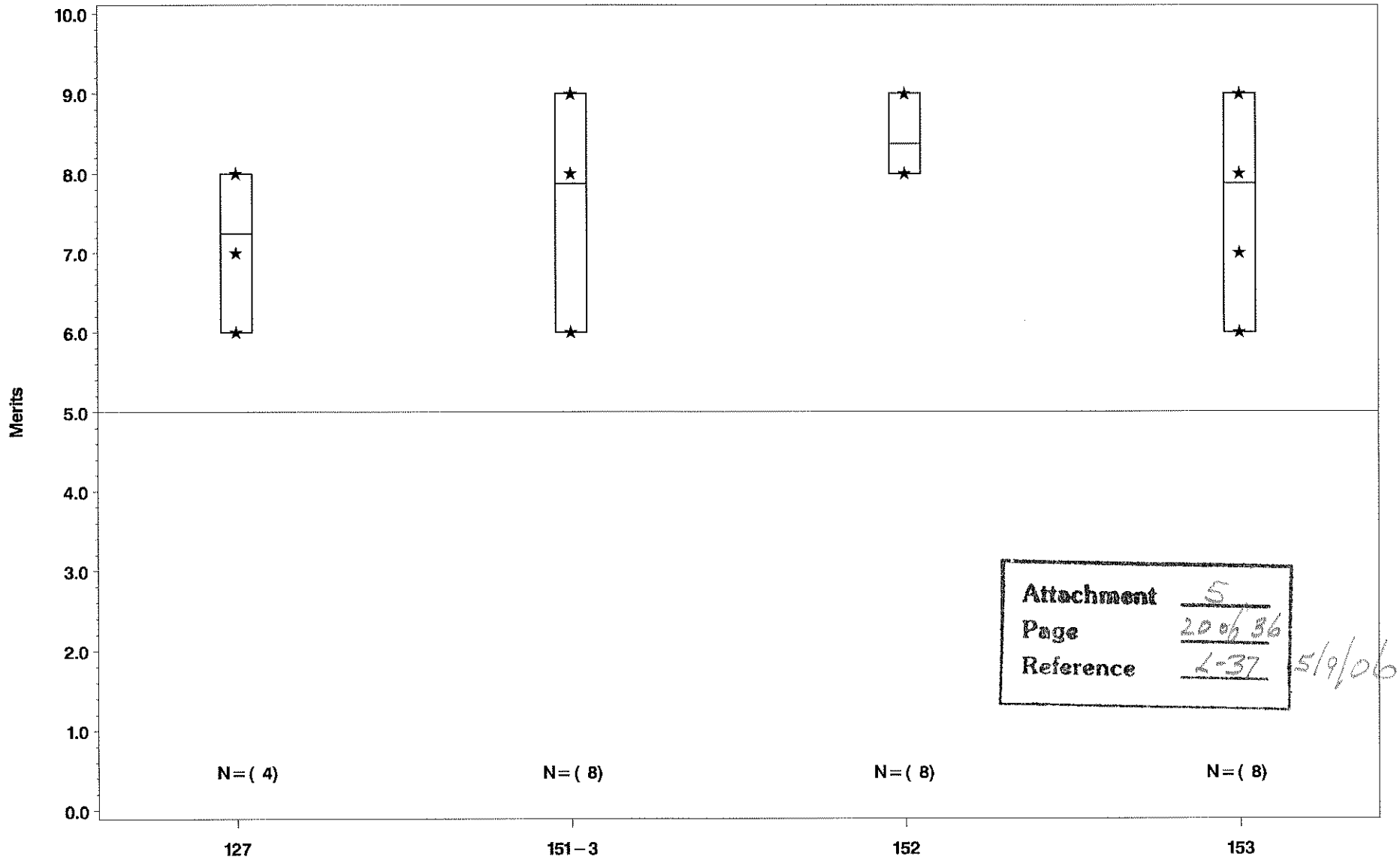
L-37 Reference Oil Comparison

Wear – NON-LUBRITED – Standard

Gear Batch V1L417/P4L792



Attachment 5
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Reference L-37
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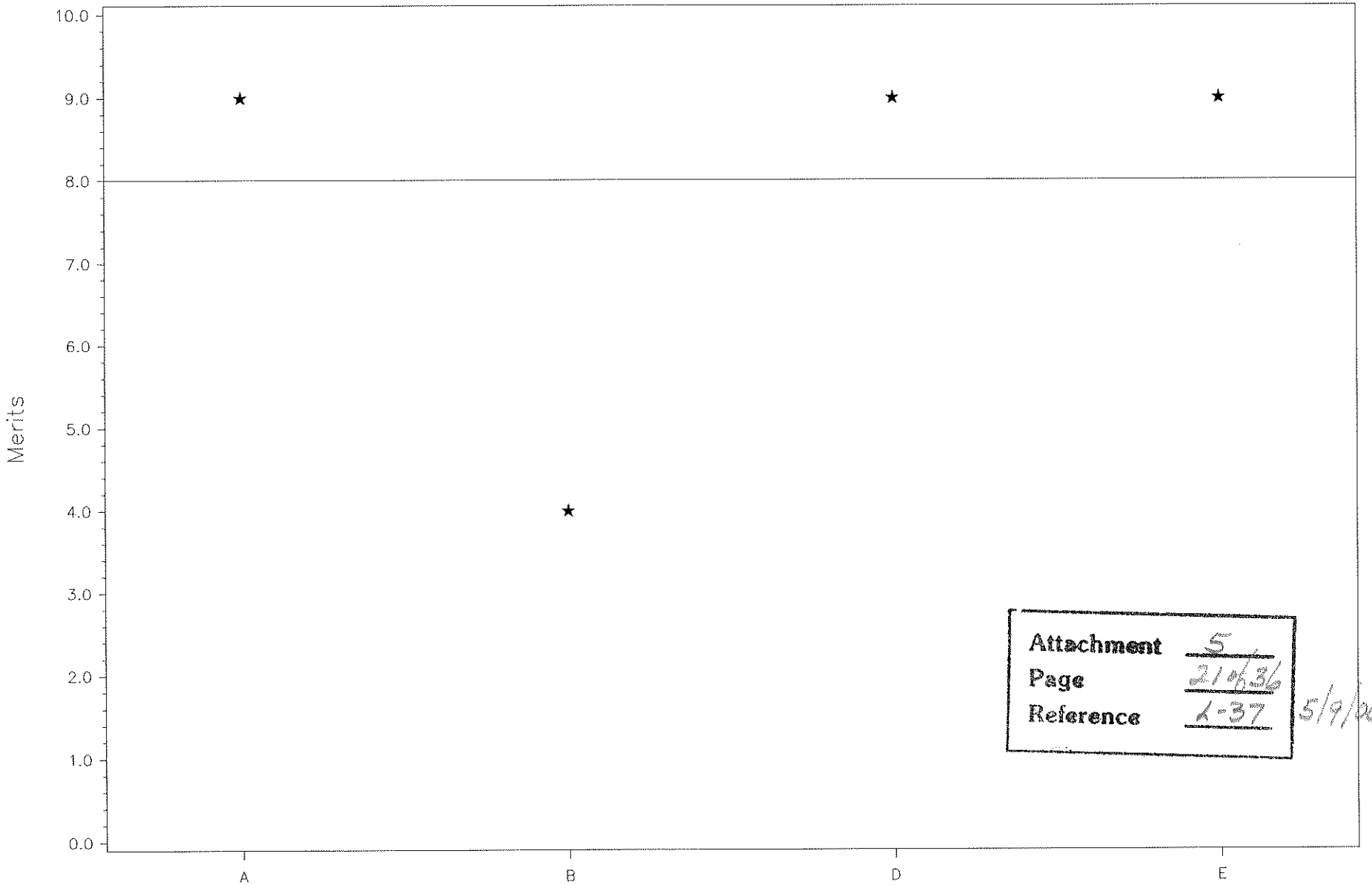
L-37 Reference Oil Performance by LTMSLAB

Ridging - NON-LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37
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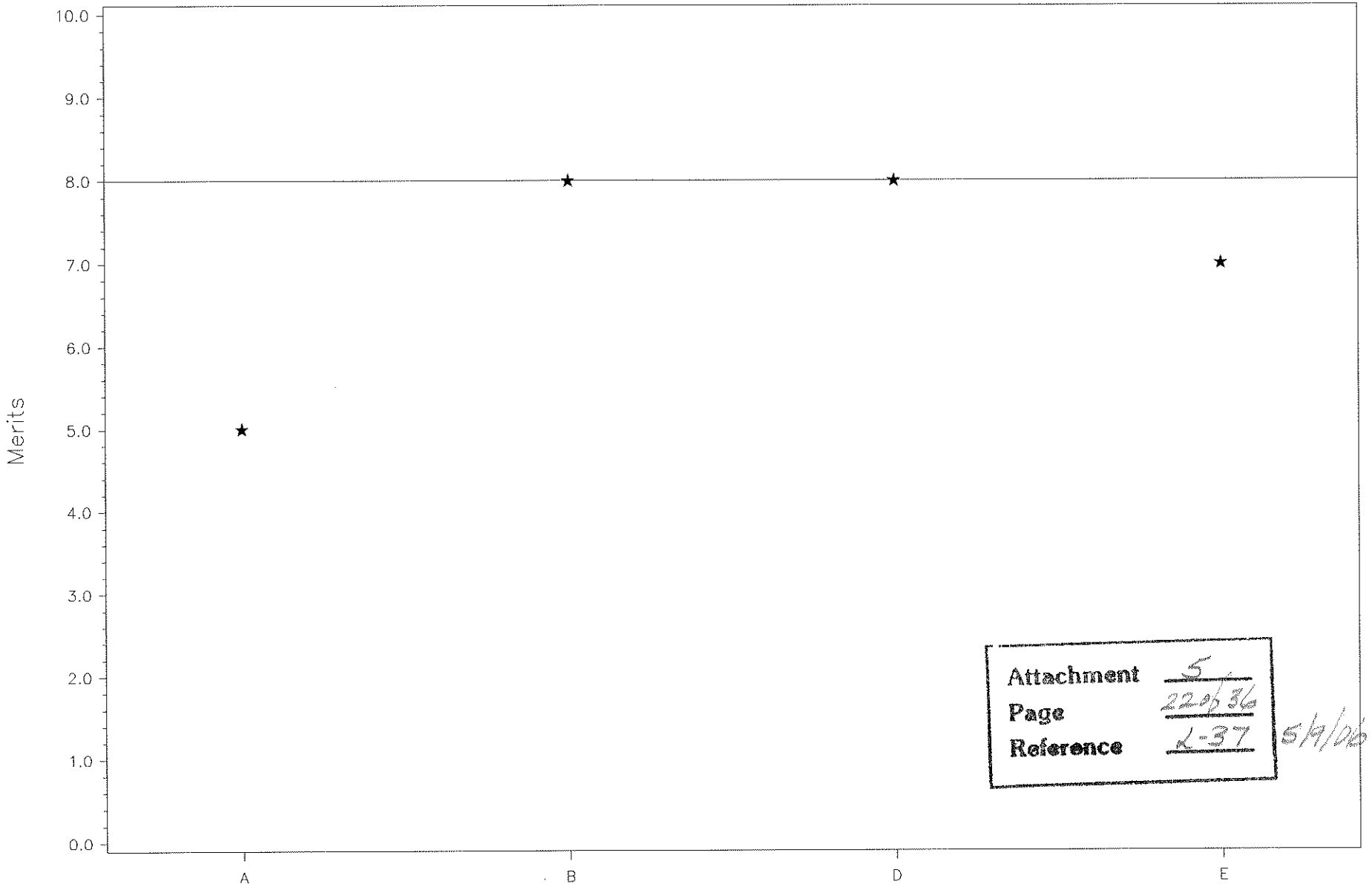
L–37 Reference Oil Performance by LTMSLAB

Rippling – NON–LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37
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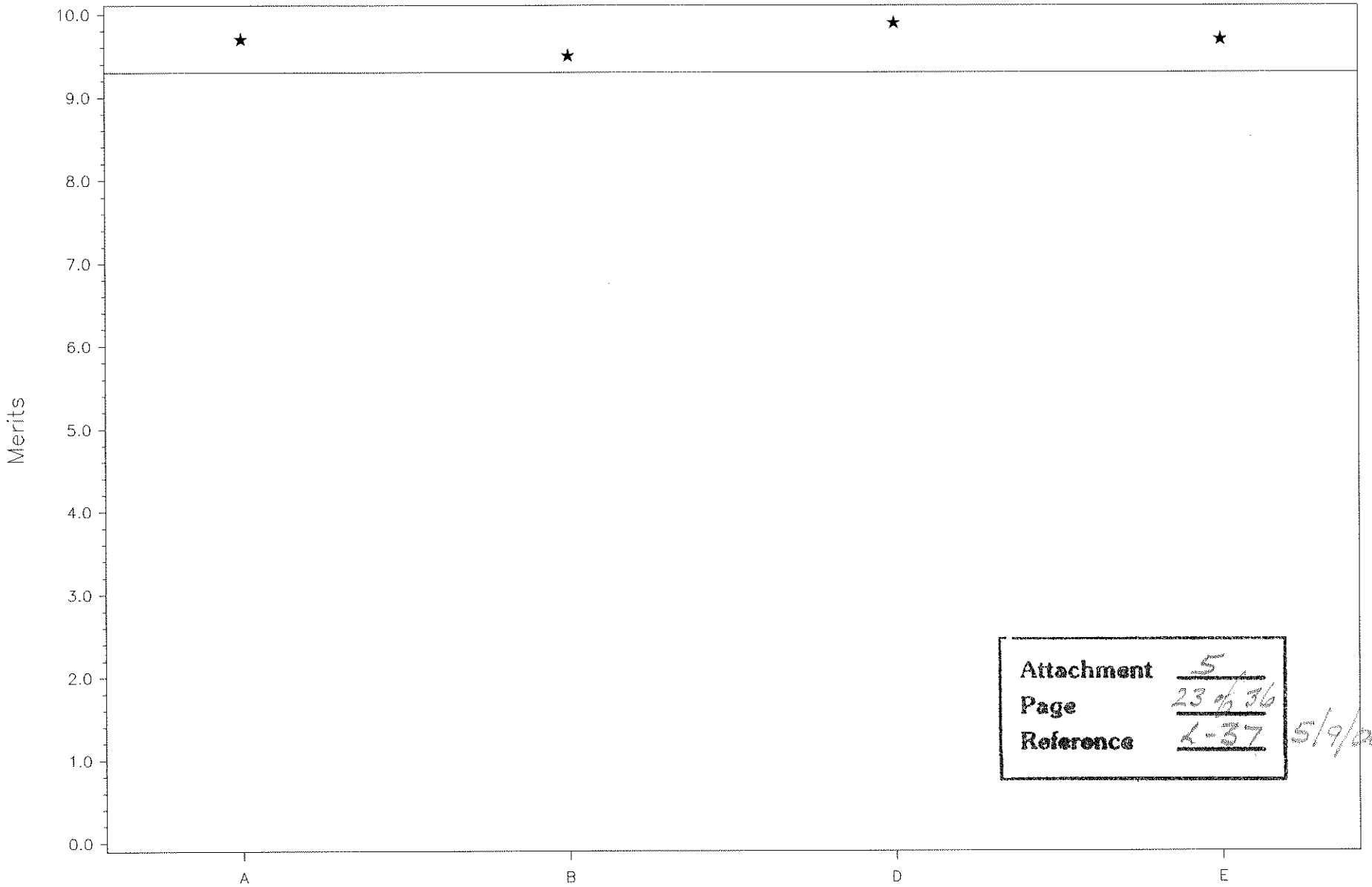
L-37 Reference Oil Performance by LTMSLAB

Spitting – NON-LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37

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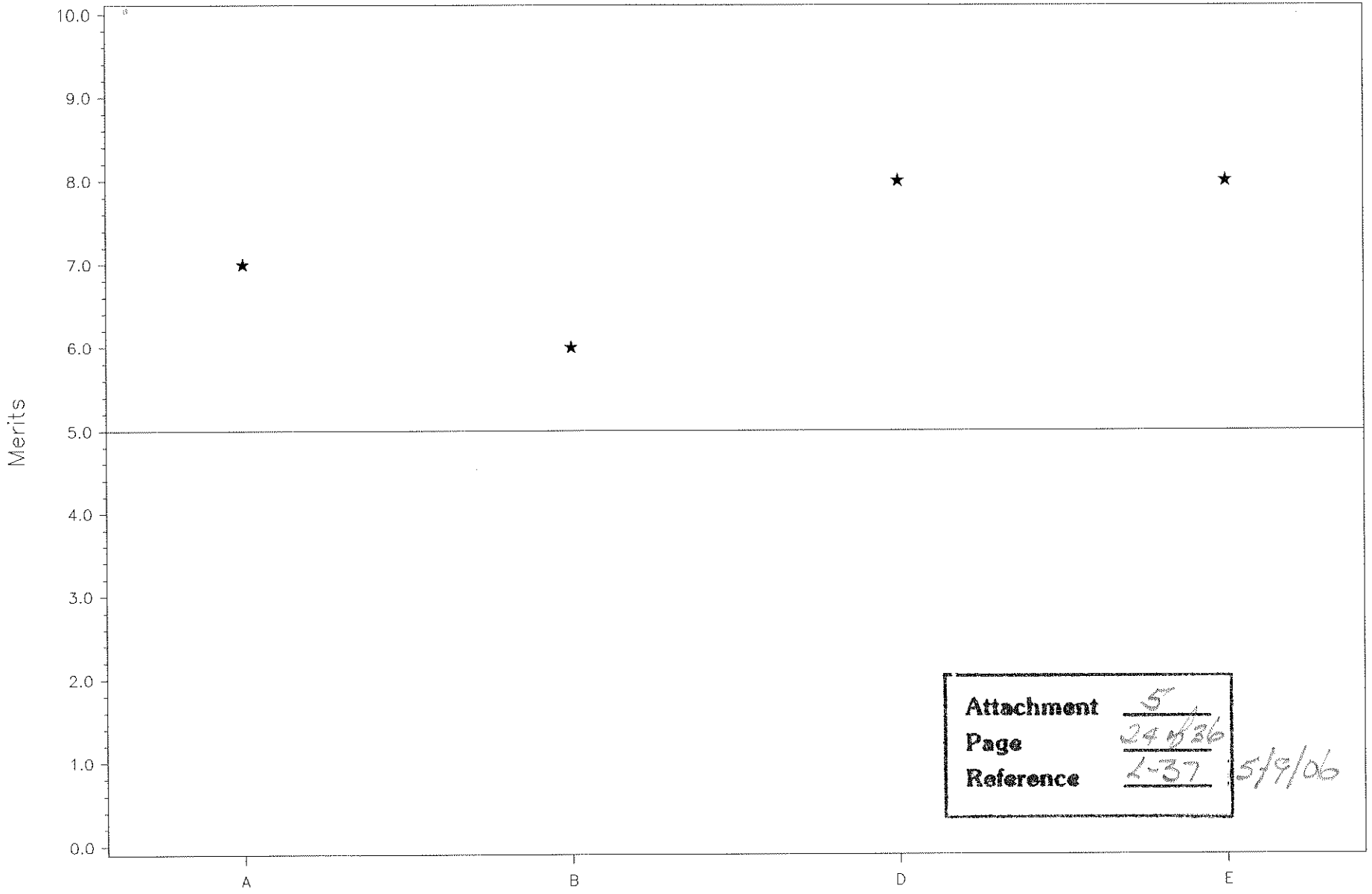
L–37 Reference Oil Performance by LTMSLAB

Wear – NON–LUBRITED

Reference Oil 127



Attachment 5
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Reference L-37

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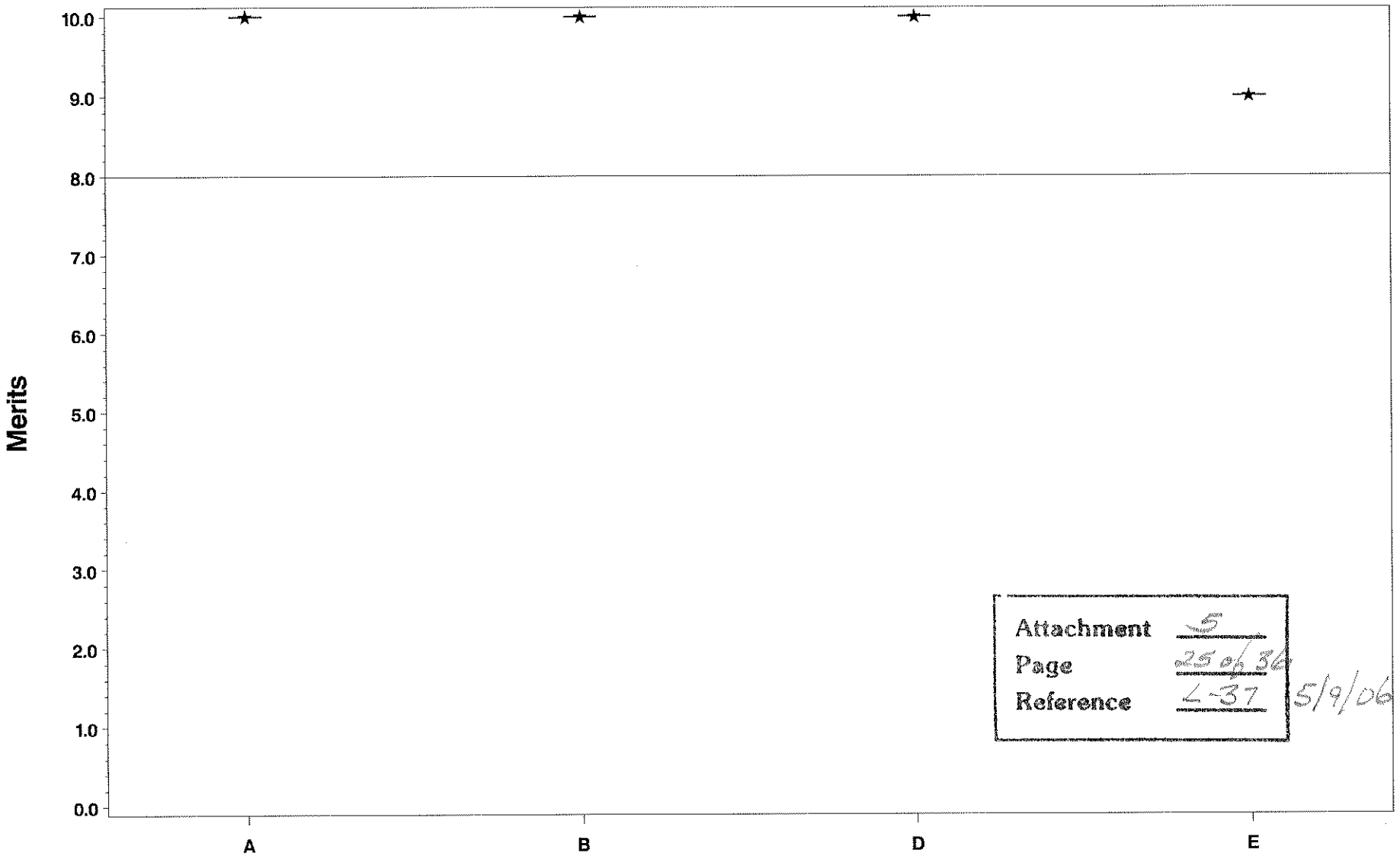
L-37 Reference Oil Performance by LTMSLAB

Ridging – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 151-3



Attachment 5
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Reference L-37
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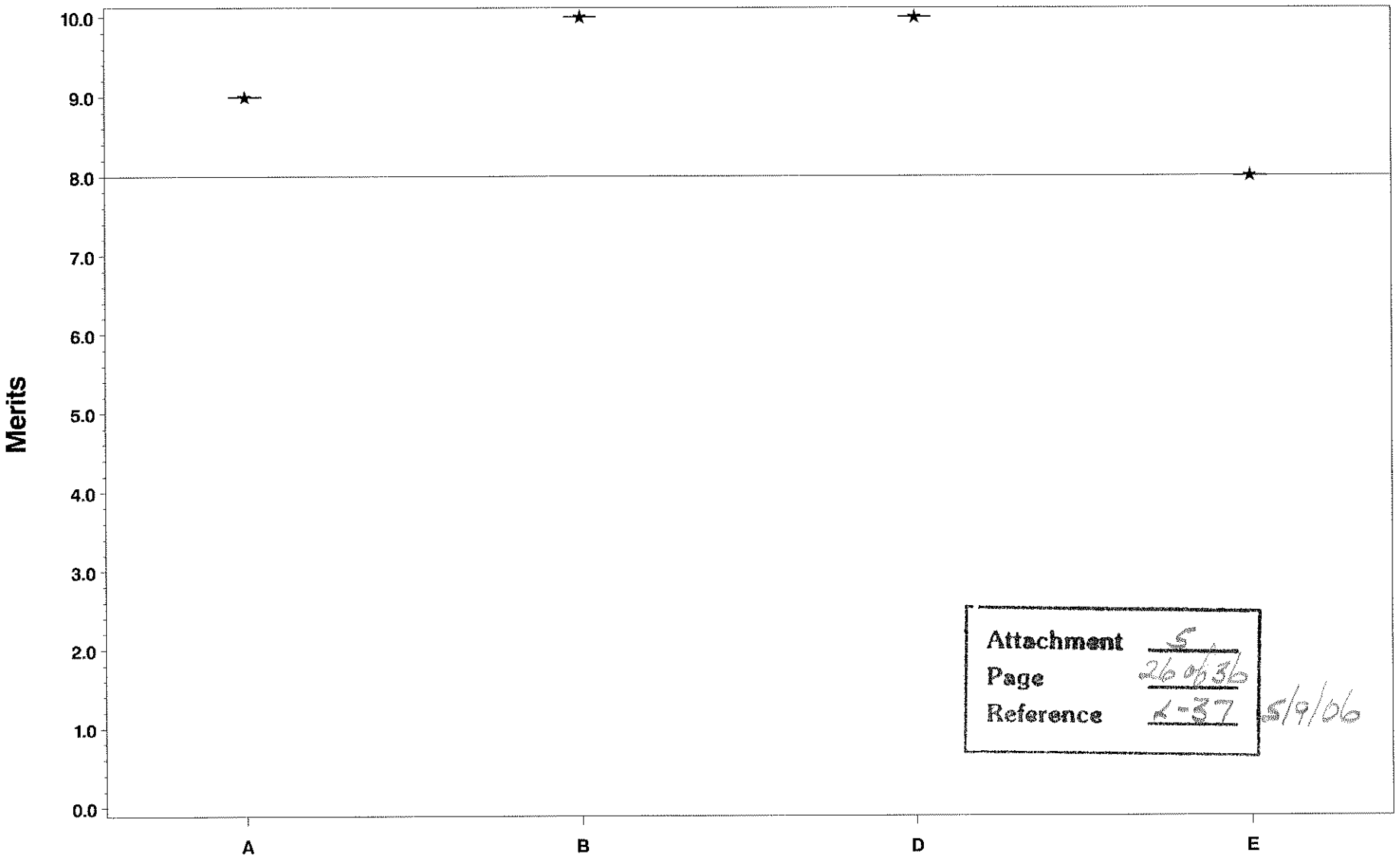
L-37 Reference Oil Performance by LTMSLAB

Rippling – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 151-3



Attachment 5
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Reference L-37
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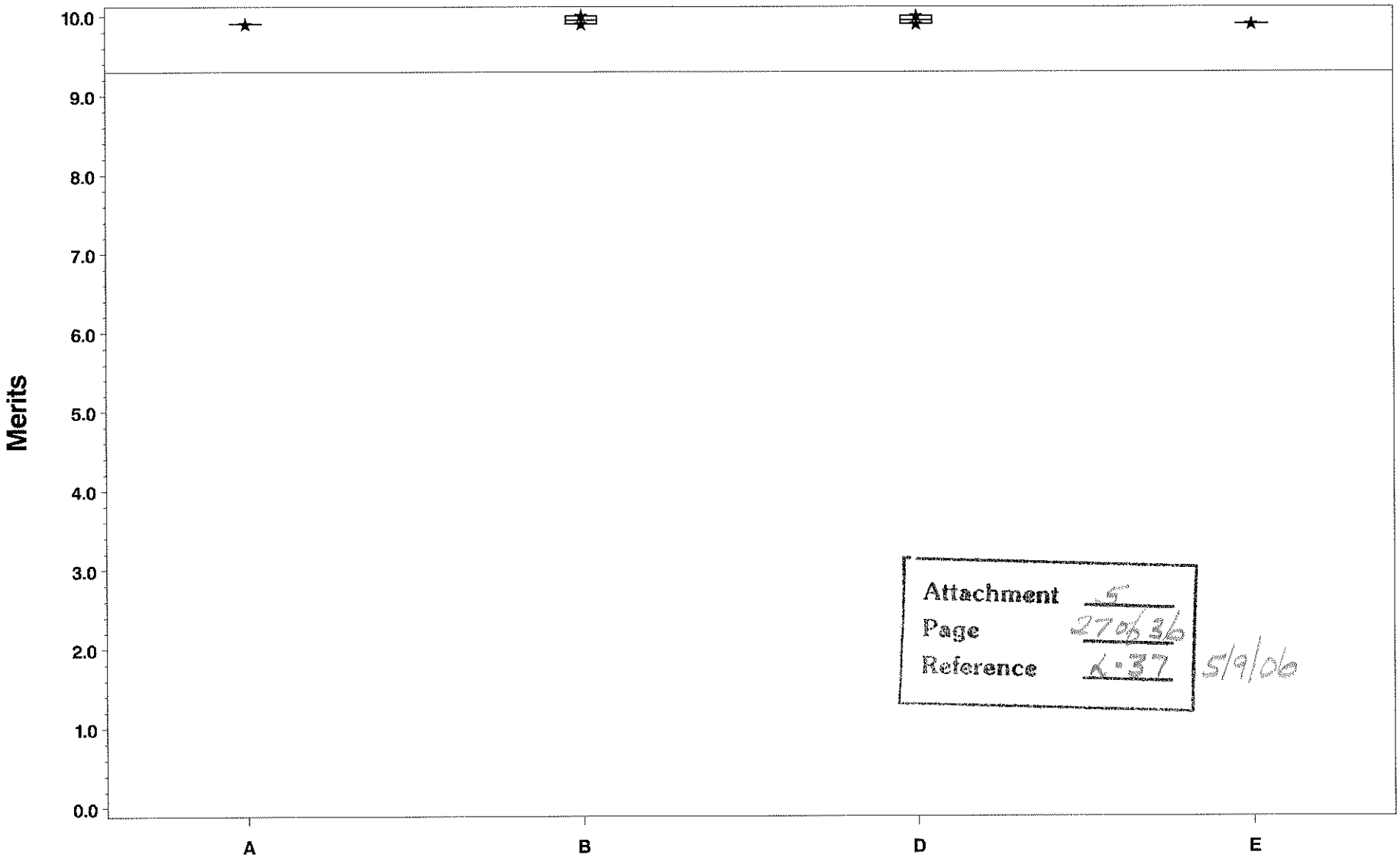
L-37 Reference Oil Performance by LTMSLAB

Spitting – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 151-3



Attachment 5
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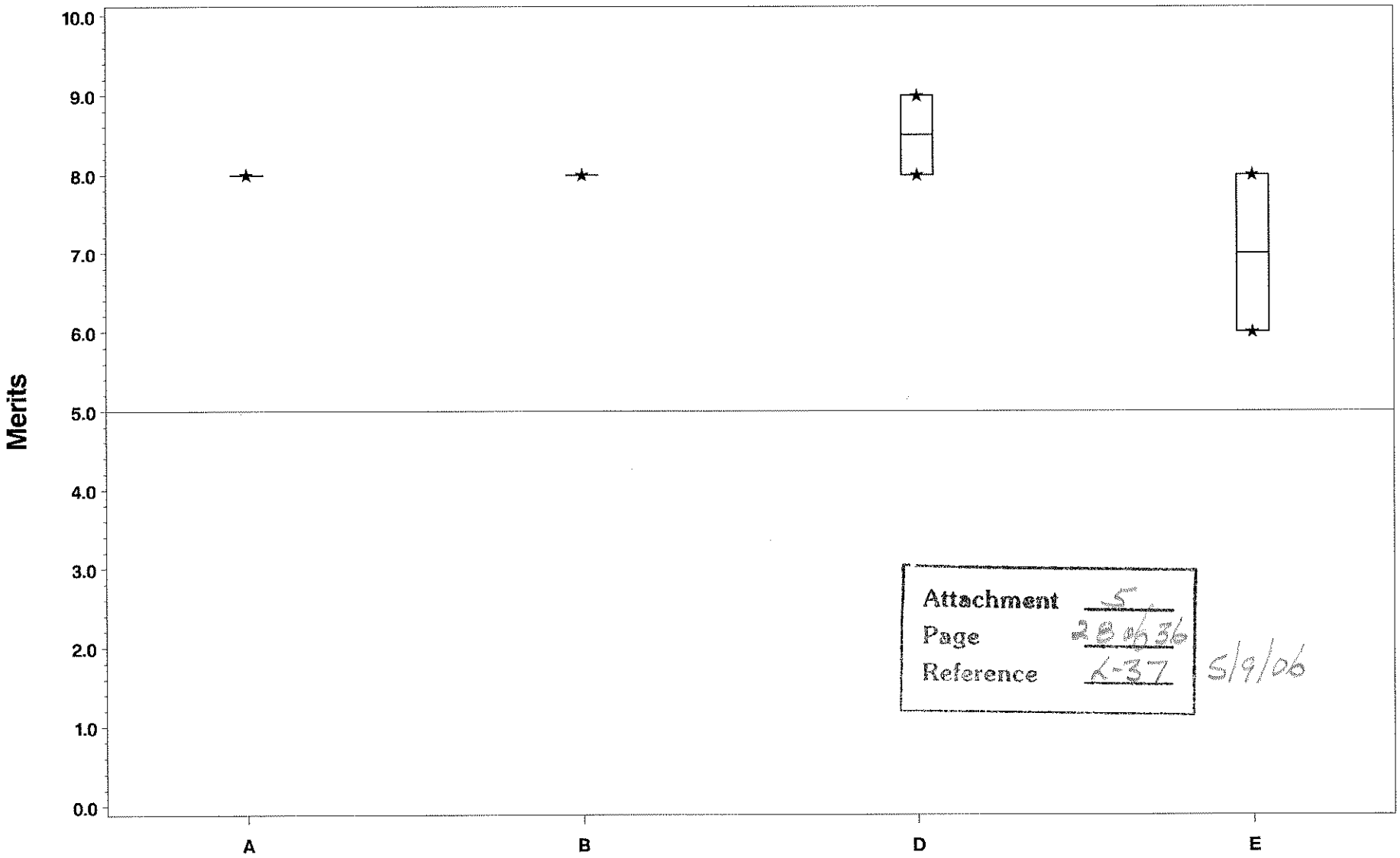
Reference L-37 5/9/06

L−37 Reference Oil Performance by LTMSLAB

Wear − NON−LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 151−3



Attachment 5
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Reference L-37
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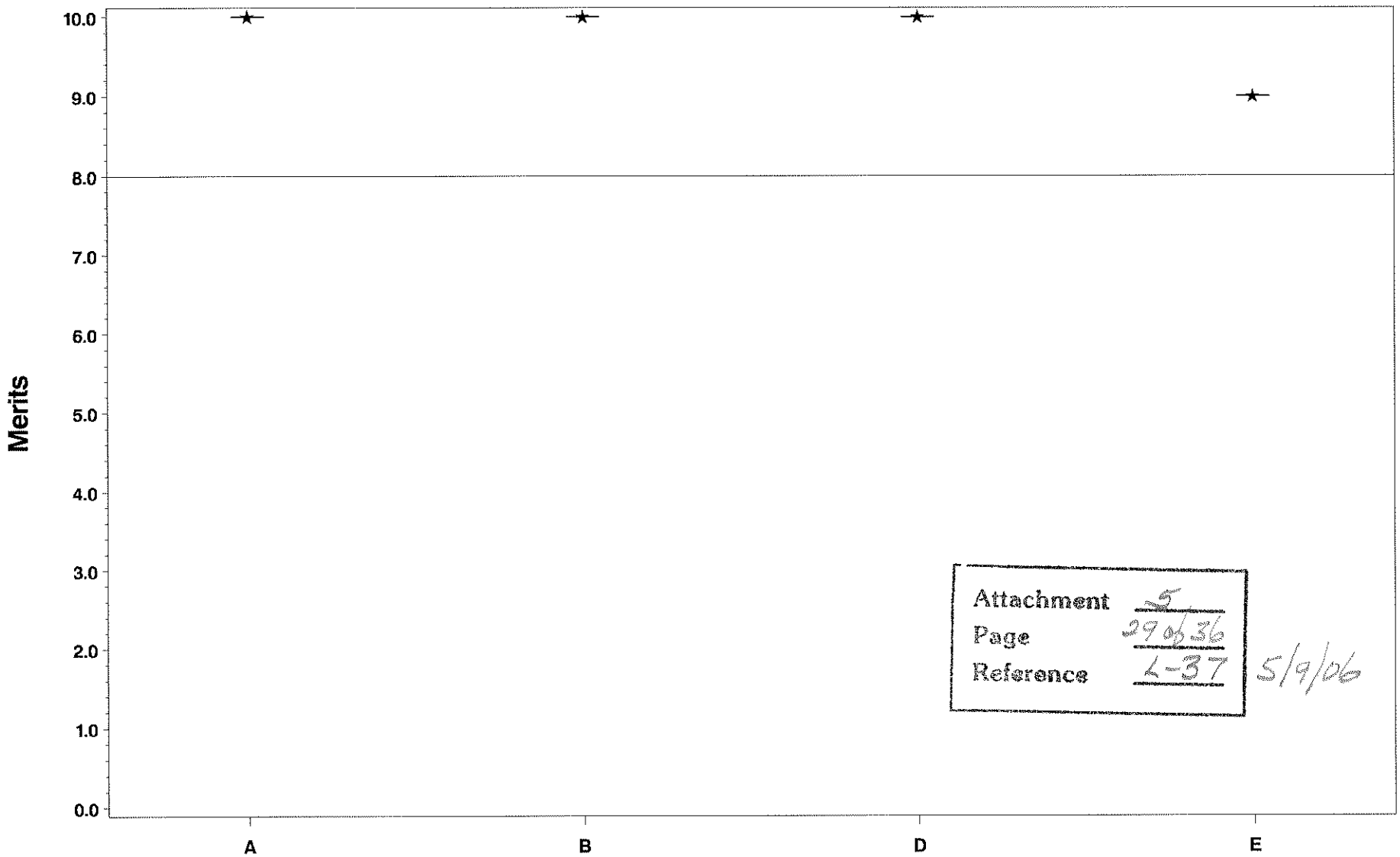
L-37 Reference Oil Performance by LTMSLAB

Ridging – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Standard Temperature



Attachment 5
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Reference L-37
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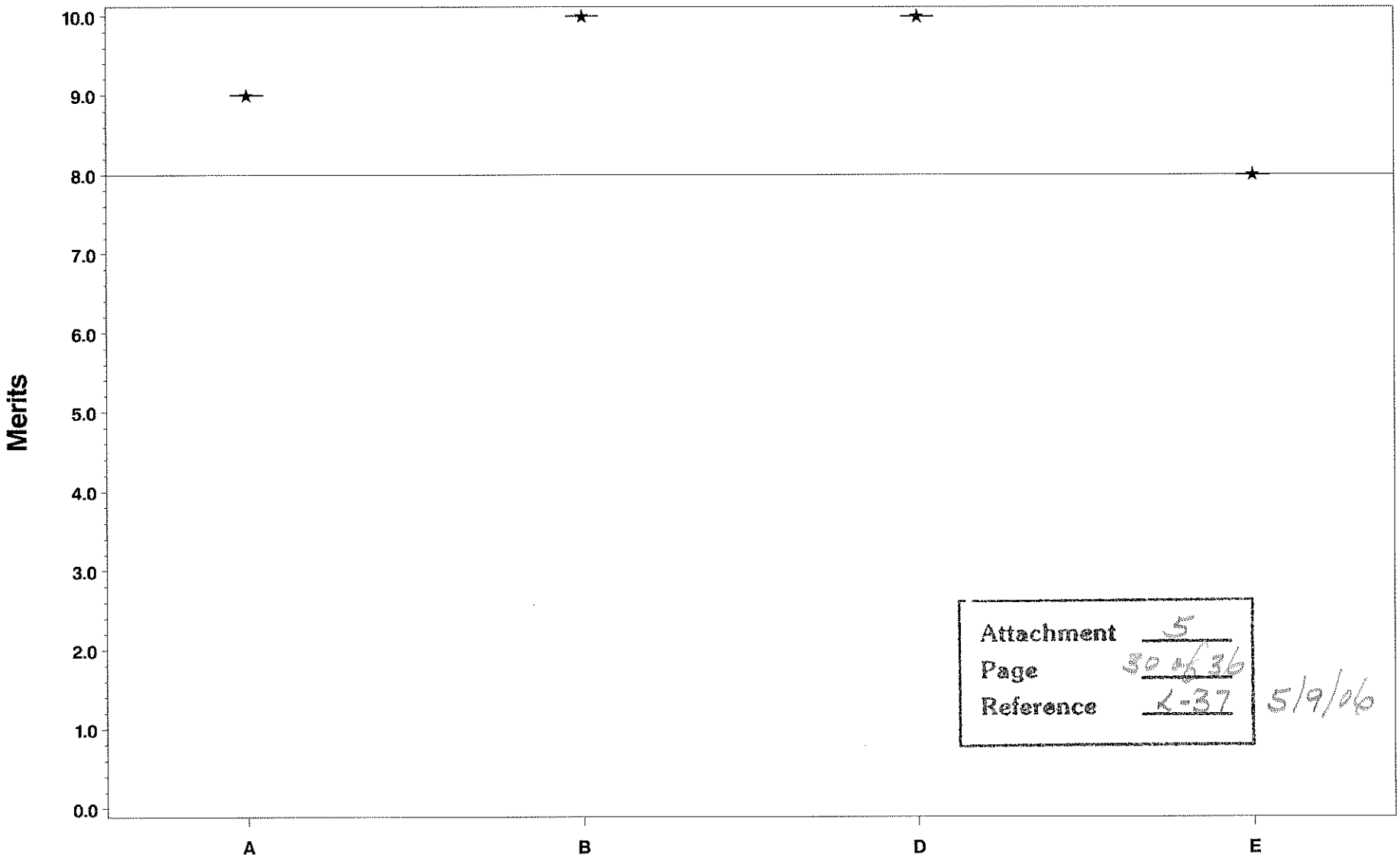
L-37 Reference Oil Performance by LTMSLAB

Rippling -- NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Standard Temperature



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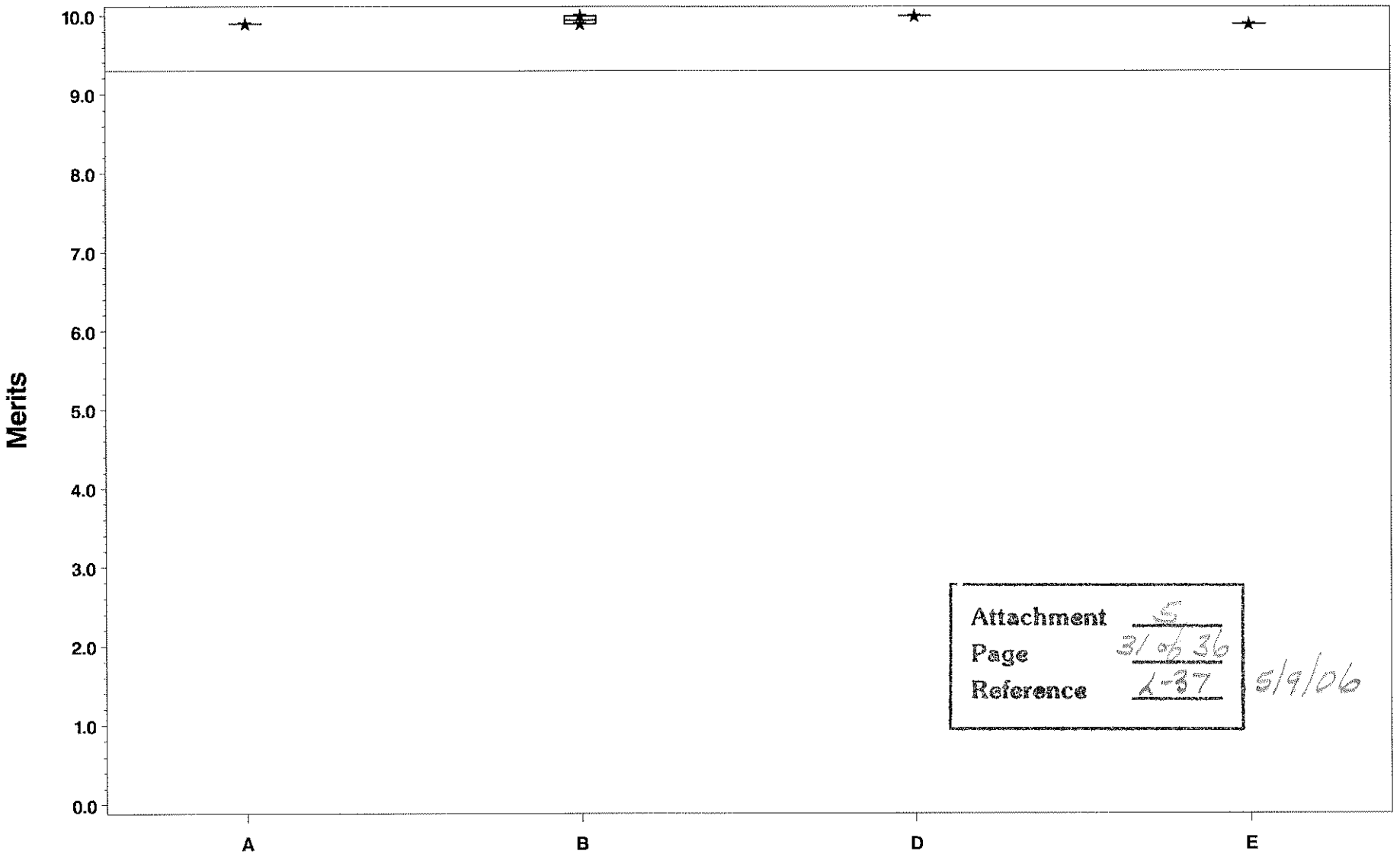
Reference L-37 5/9/96

L-37 Reference Oil Performance by LTMSLAB

Spitting – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Standard Temperature



Attachment 5
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Reference L-37
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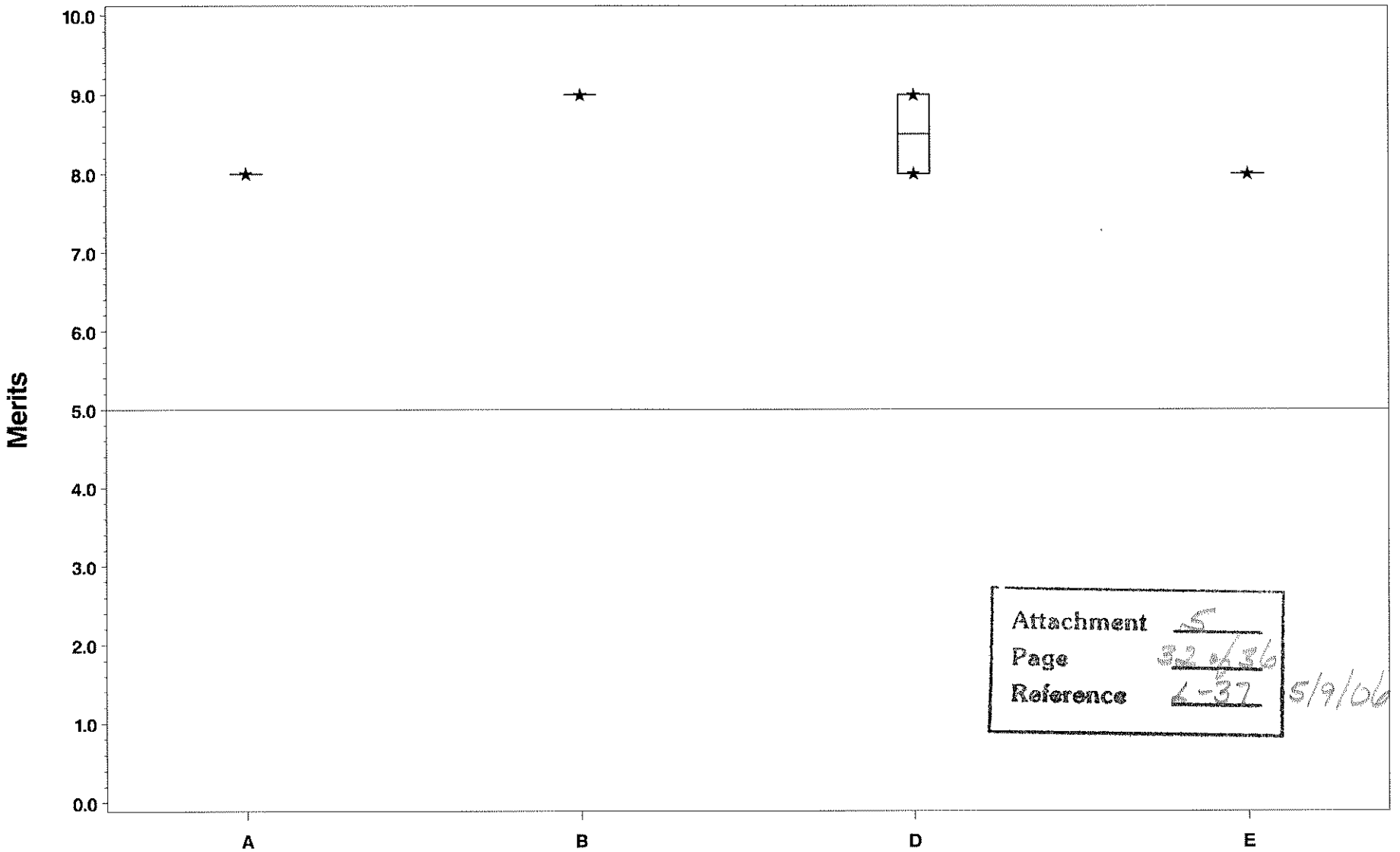
L-37 Reference Oil Performance by LTMSLAB

Wear – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Standard Temperature



Attachment 5
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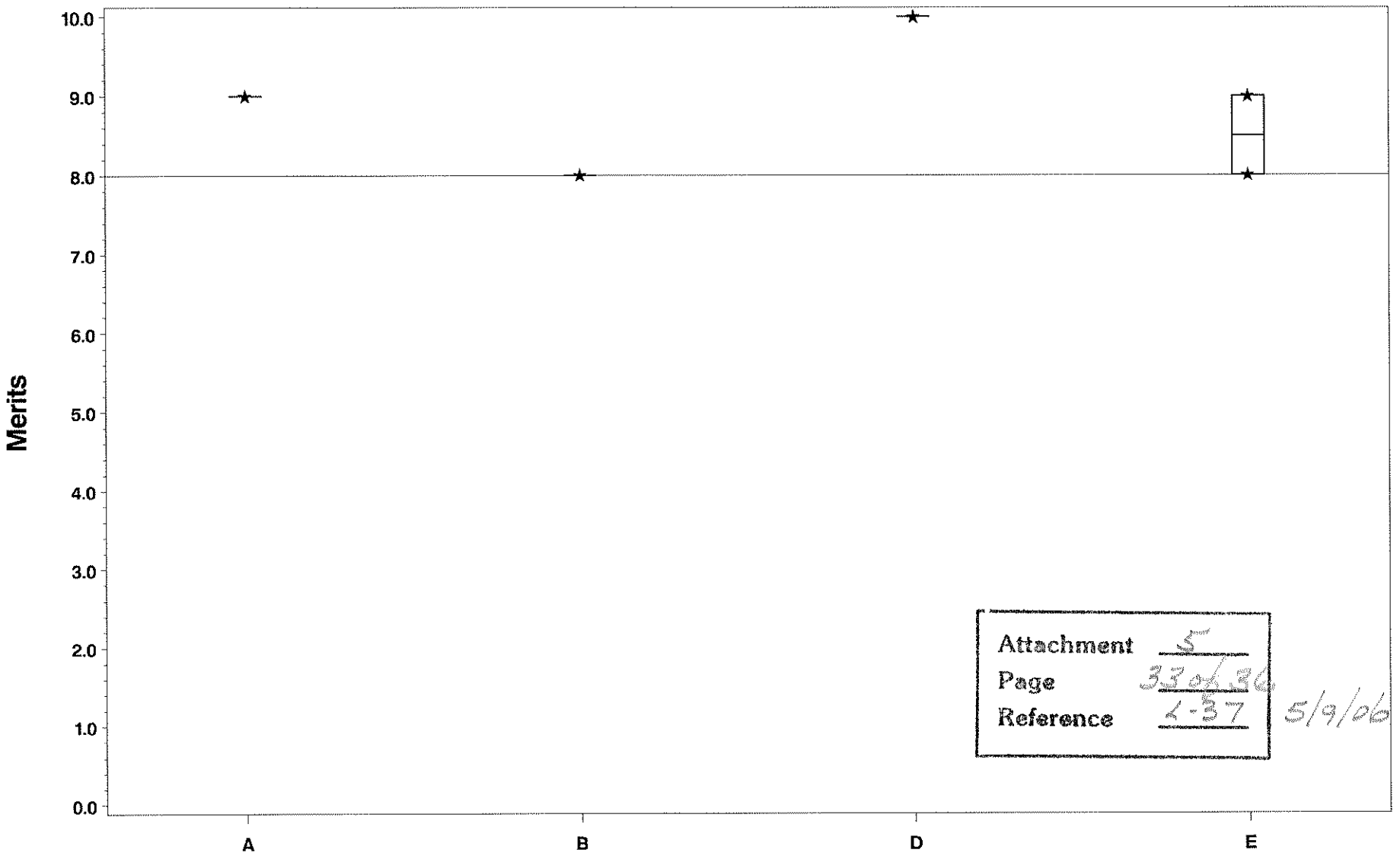
Reference L-37
5/9/06

L−37 Reference Oil Performance by LTMSLAB

Ridging – NON−LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Standard Temperature



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Reference L-37

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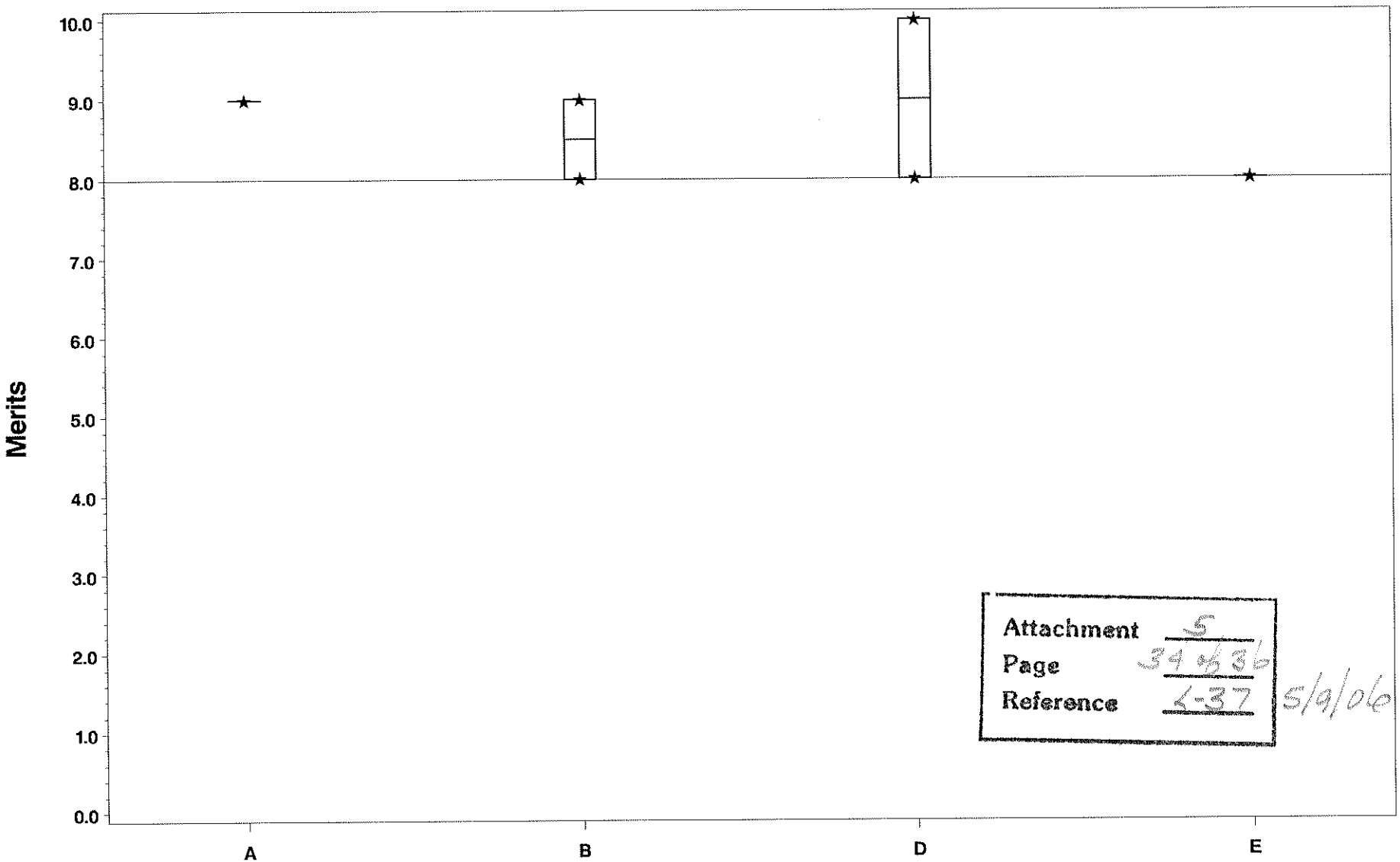
L-37 Reference Oil Performance by LTMSLAB

Rippling -- NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Standard Temperature



Attachment 5
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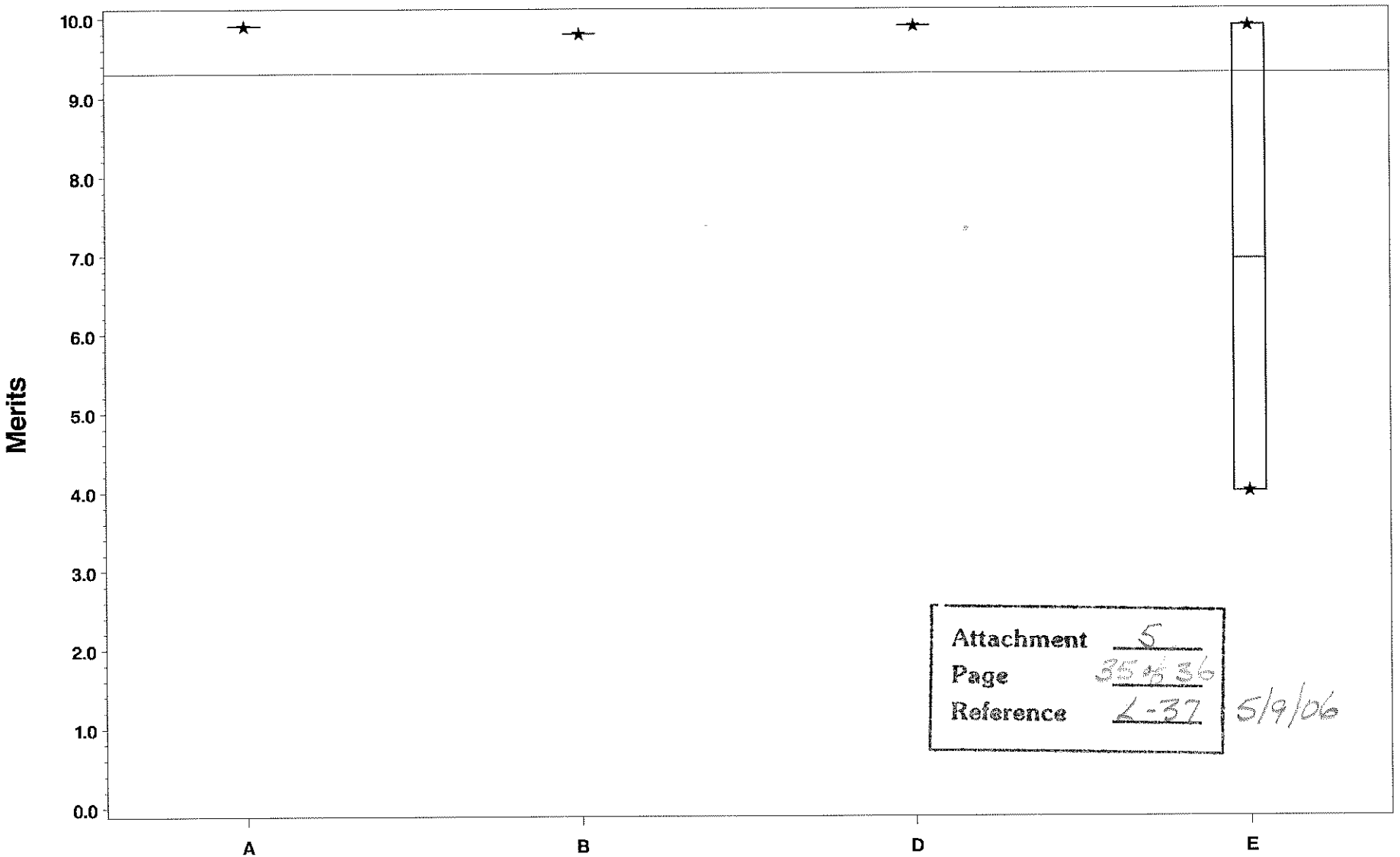
Reference L-37 5/9/06

L-37 Reference Oil Performance by LTMSLAB

Spitting -- NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Standard Temperature



Attachment 5
Page 35 & 36
Reference L-37
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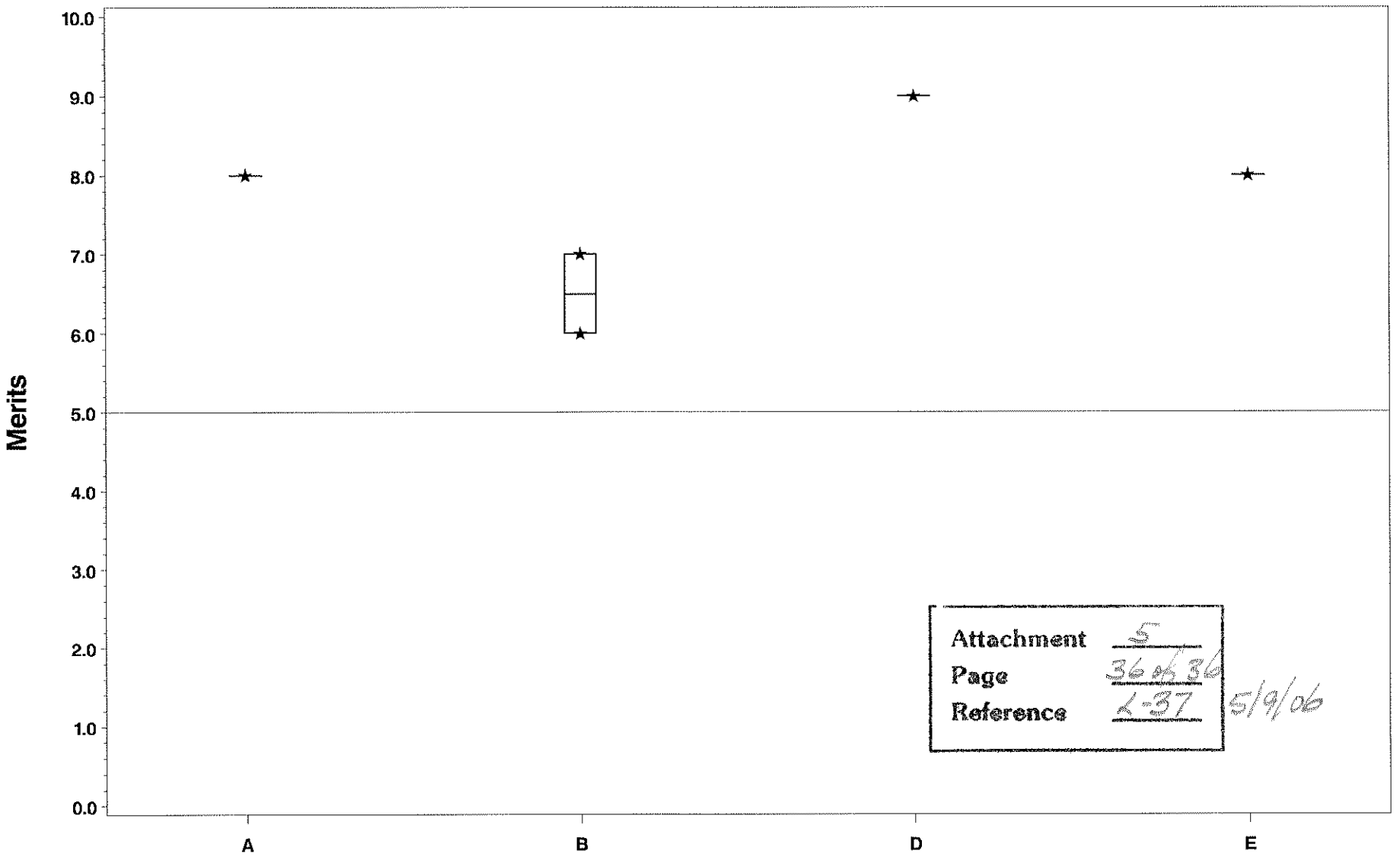
L−37 Reference Oil Performance by LTMSLAB

Wear − NON−LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Standard Temperature



Attachment 5
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Reference L-37
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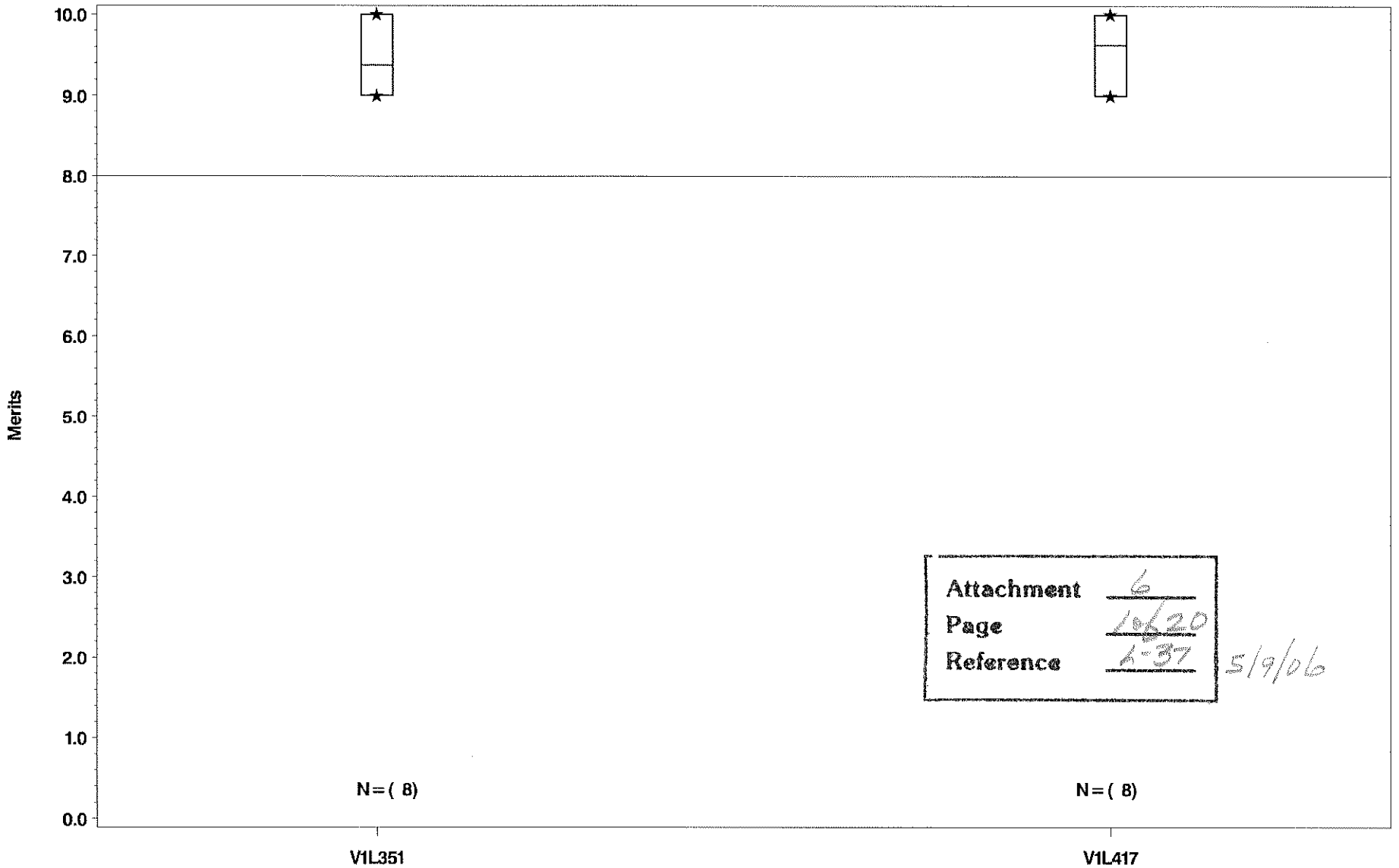
L−37 Reference Oil Performance by Pinion Batch

Ridging – NON−LUBRITED

Reference Oil 152 Low Temperature



Attachment 6
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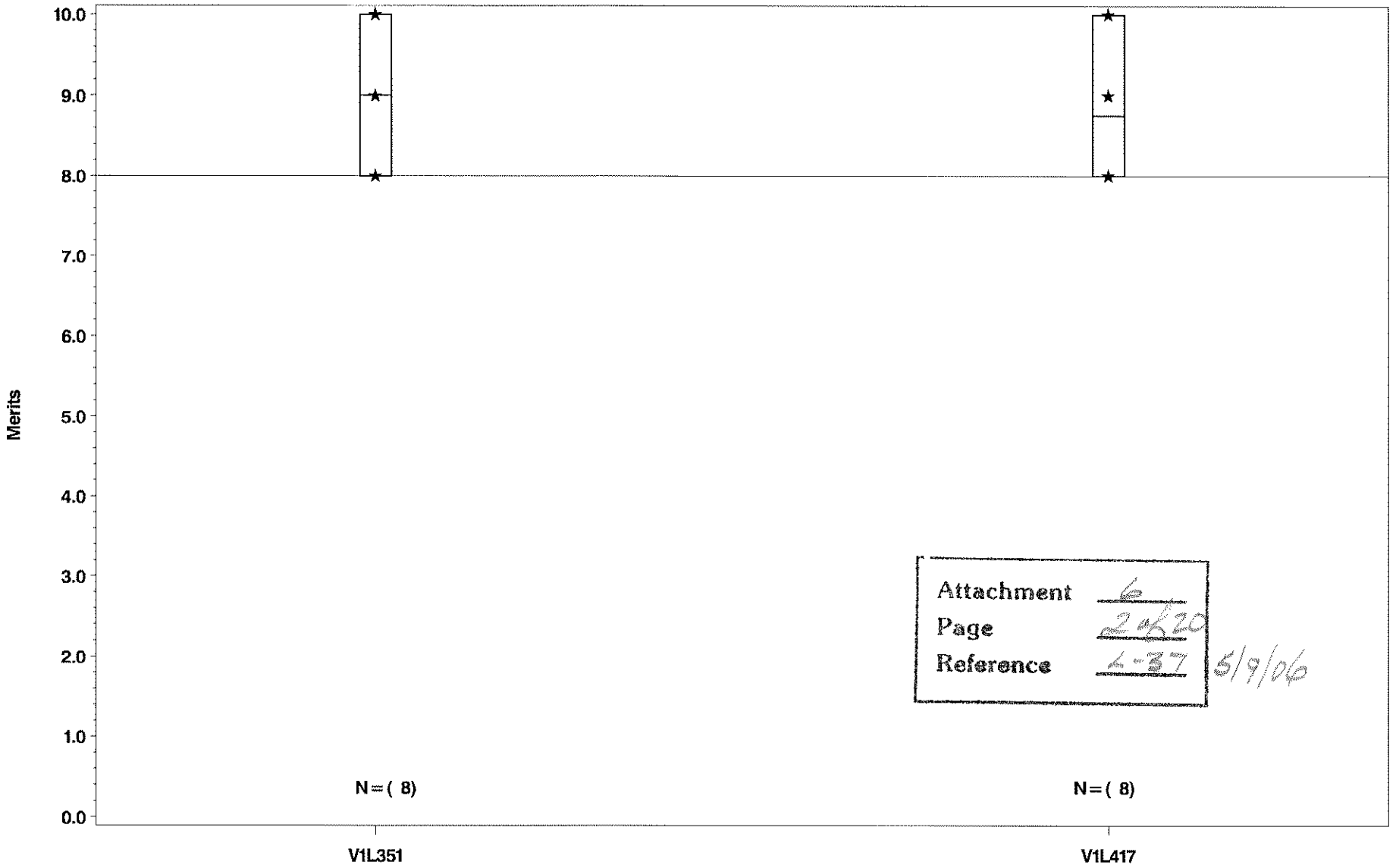
Reference L-37 5/9/06

L-37 Reference Oil Performance by Pinion Batch

Rippling – NON-LUBRITED

Reference Oil 152 Low Temperature



Attachment 6
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Reference L-37
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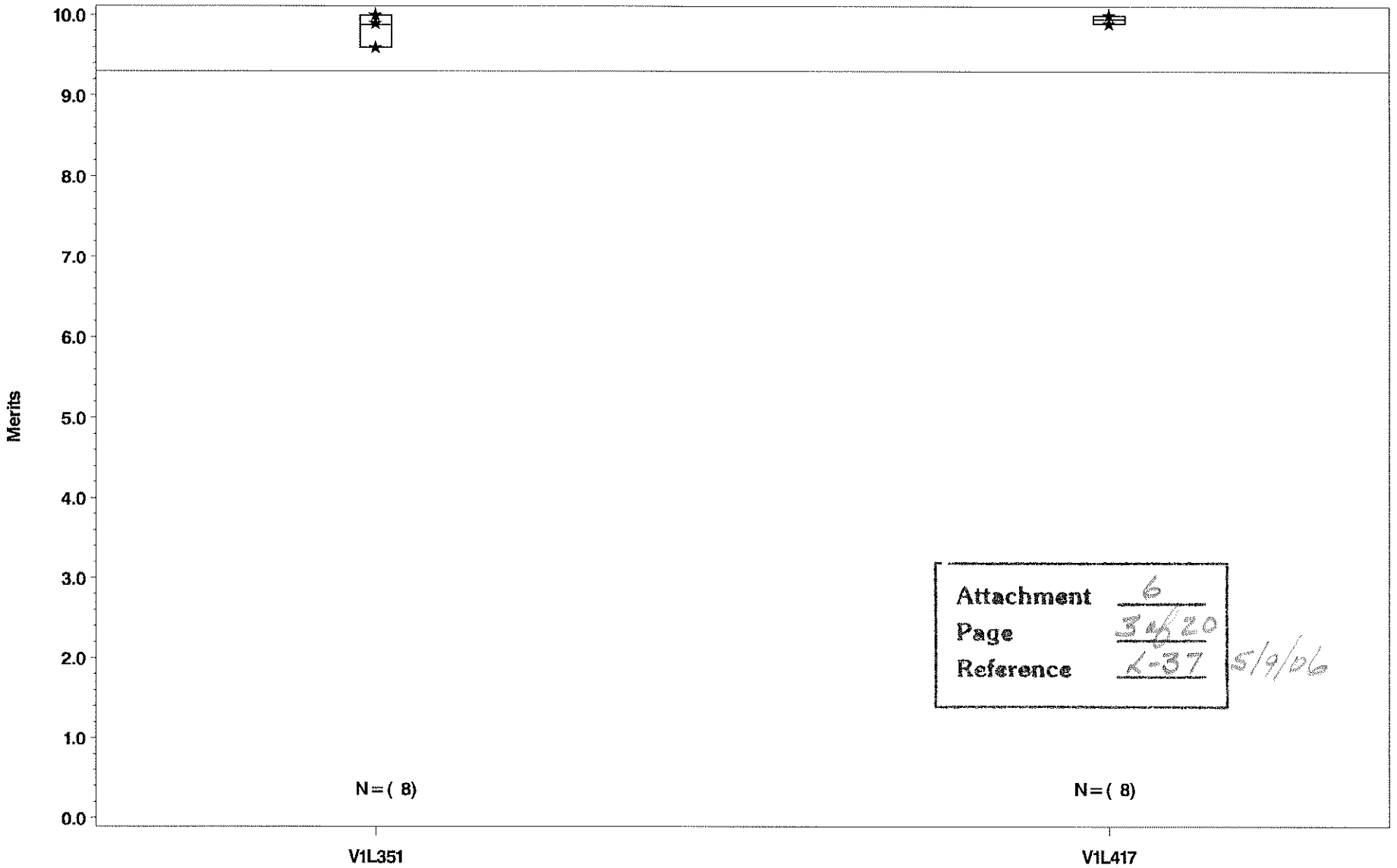
L-37 Reference Oil Performance by Pinion Batch

Spitting -- NON-LUBRITED

Reference Oil 152 Low Temperature



Attachment 6
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Reference L-37
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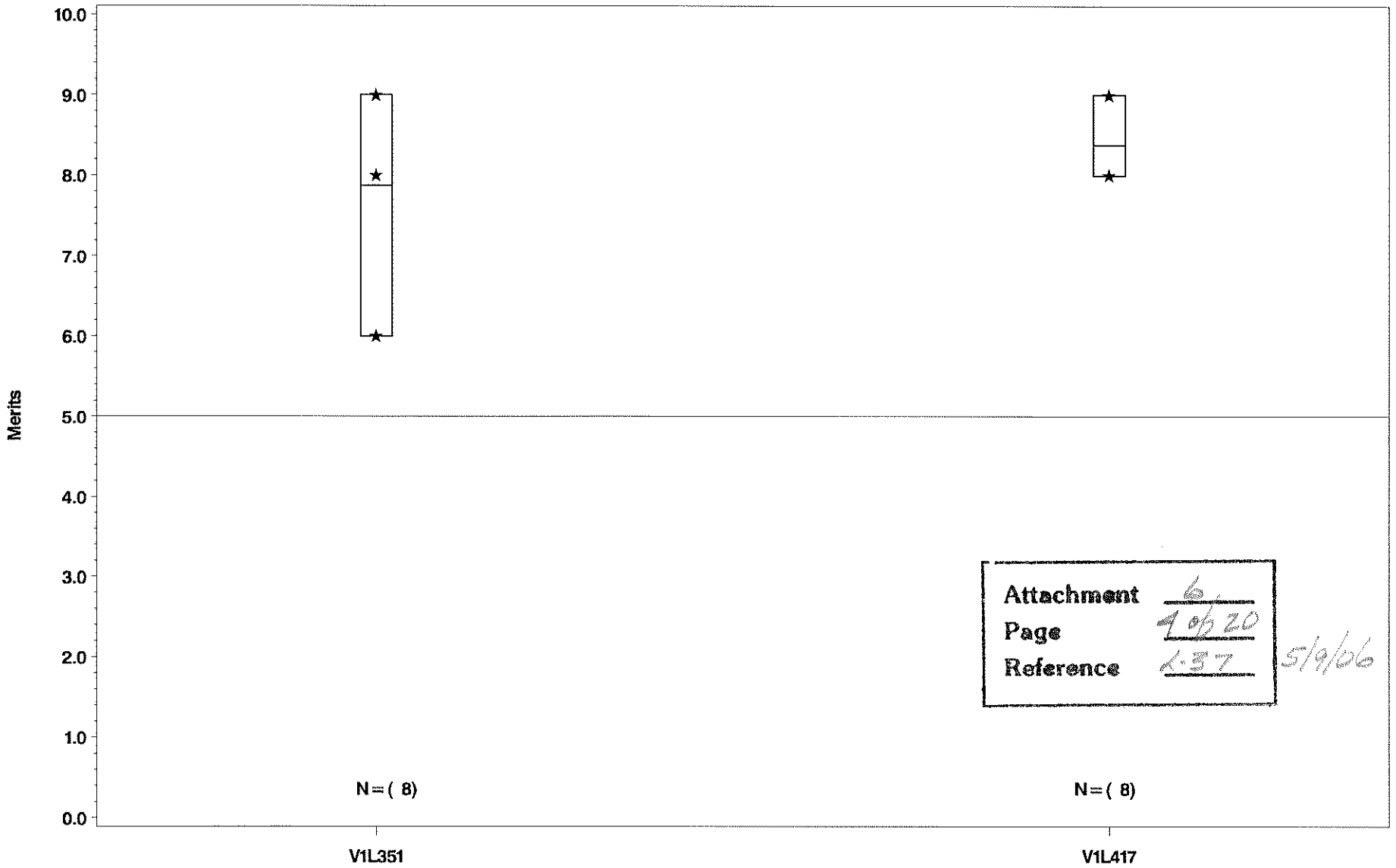
L-37 Reference Oil Performance by Pinion Batch

Wear - NON-LUBRITED

Reference Oil 152 Low Temperature



Attachment 6
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Reference L-37
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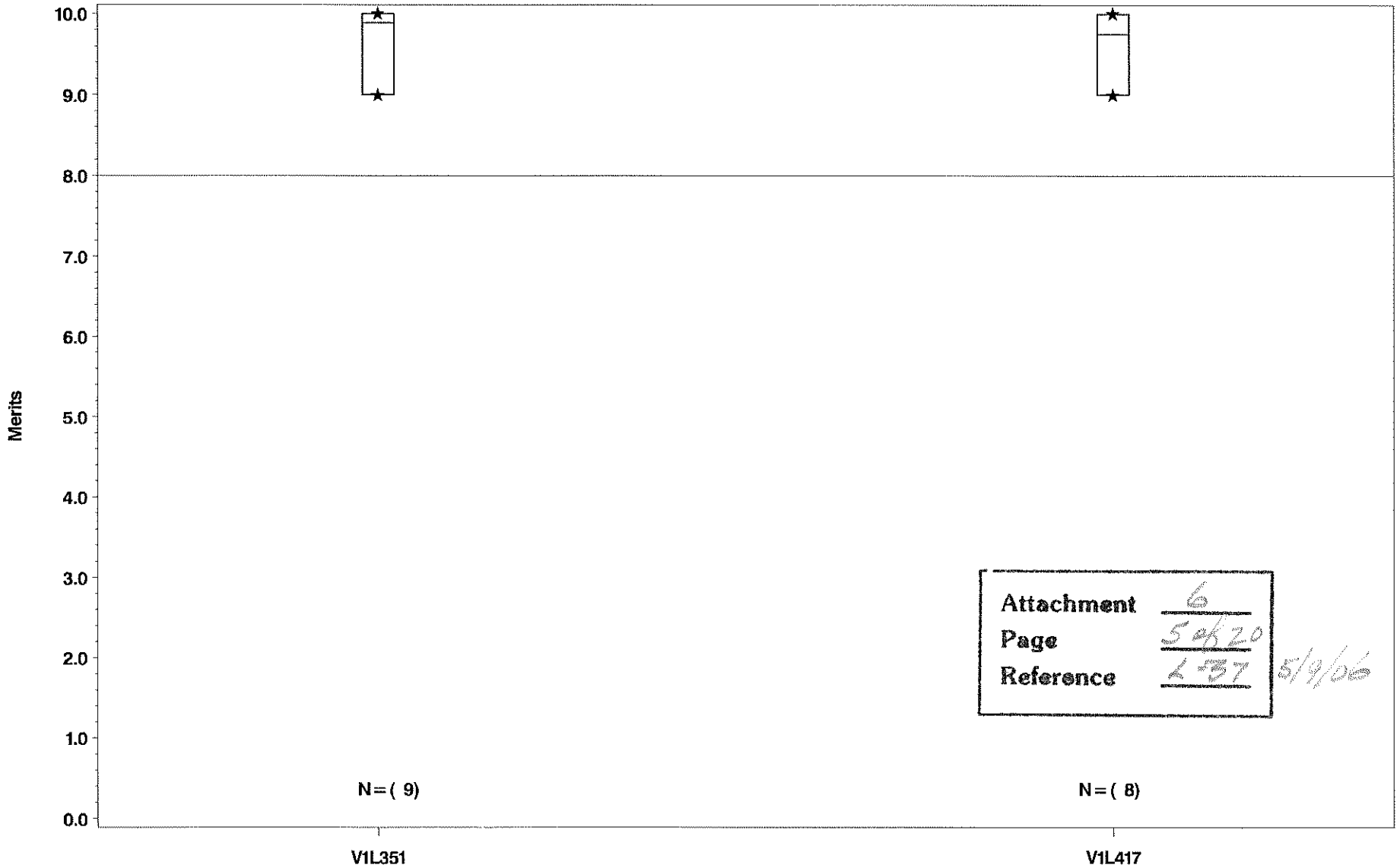
L-37 Reference Oil Performance by Pinion Batch

Ridging -- NON-LUBRITED

Reference Oil 153 Low Temperature



Attachment 6
Page 5 & 20
Reference L-37

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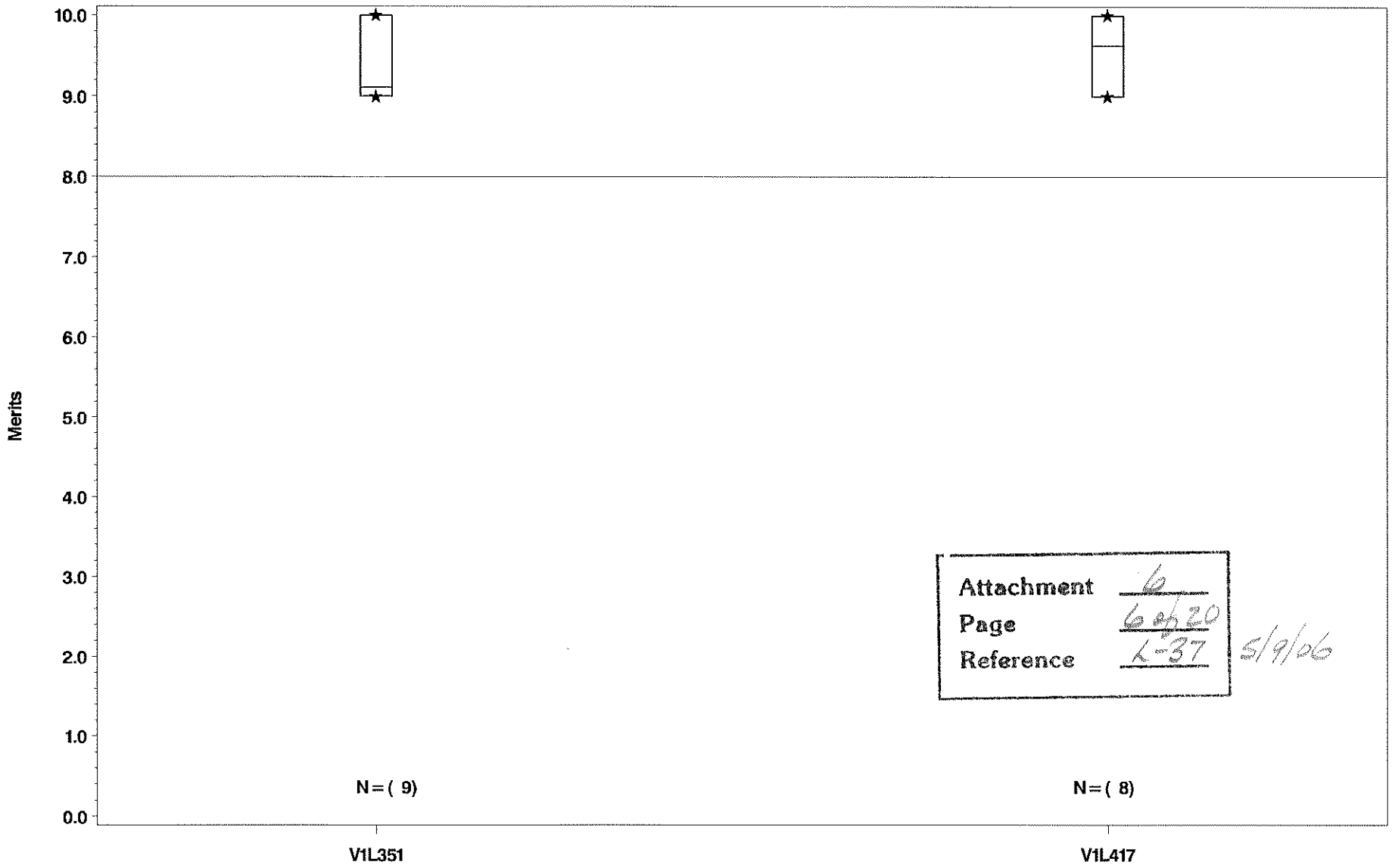
L-37 Reference Oil Performance by Pinion Batch

Rippling – NON-LUBRITED

Reference Oil 153 Low Temperature



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Reference L-37

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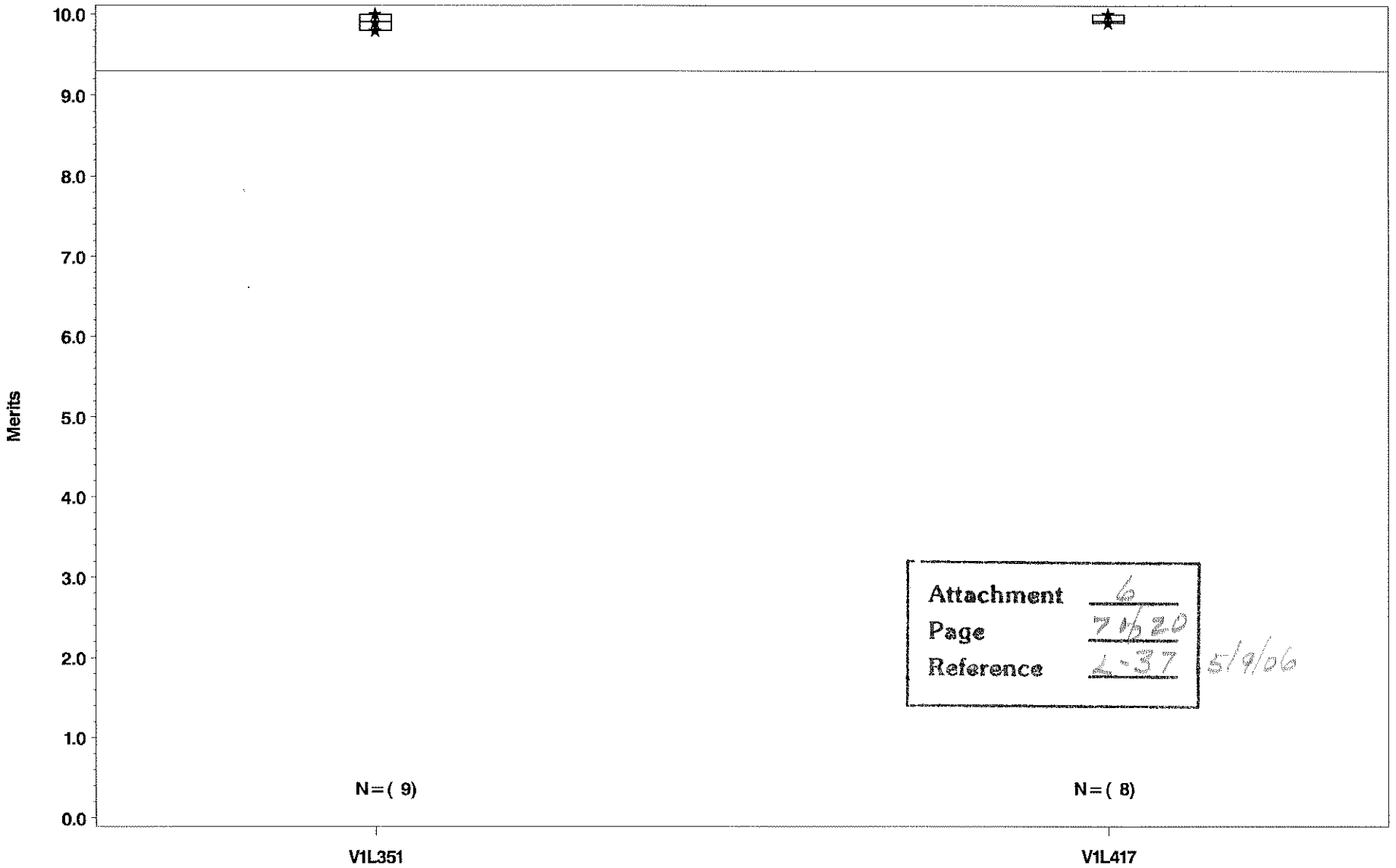
L-37 Reference Oil Performance by Pinion Batch

Spitting -- NON-LUBRITED

Reference Oil 153 Low Temperature

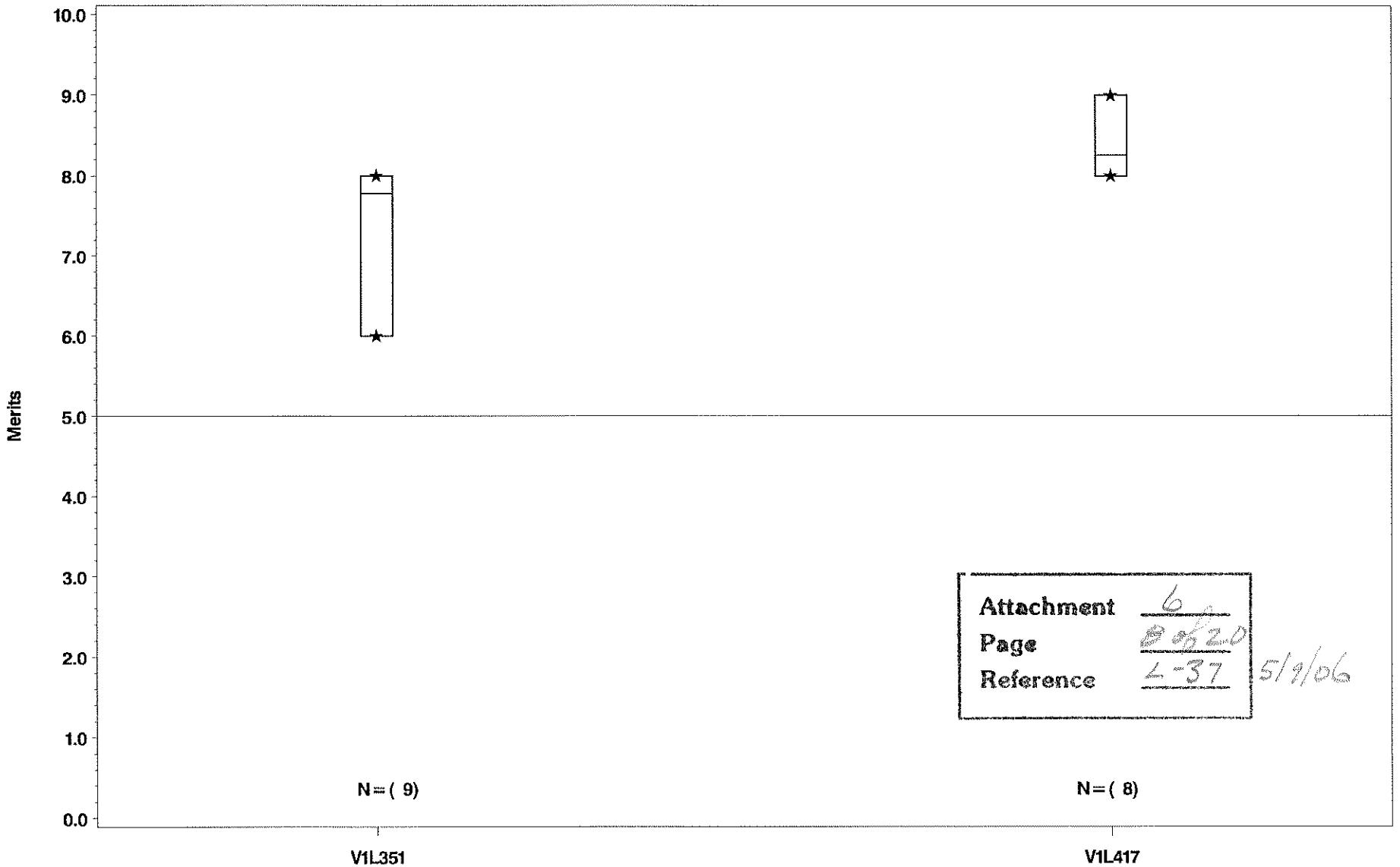


Attachment 6
Page 7 1/2 20
Reference L-37 5/9/06

L-37 Reference Oil Performance by Pinion Batch

Wear - NON-LUBRITED

Reference Oil 153 Low Temperature



Attachment 6
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Reference L-37
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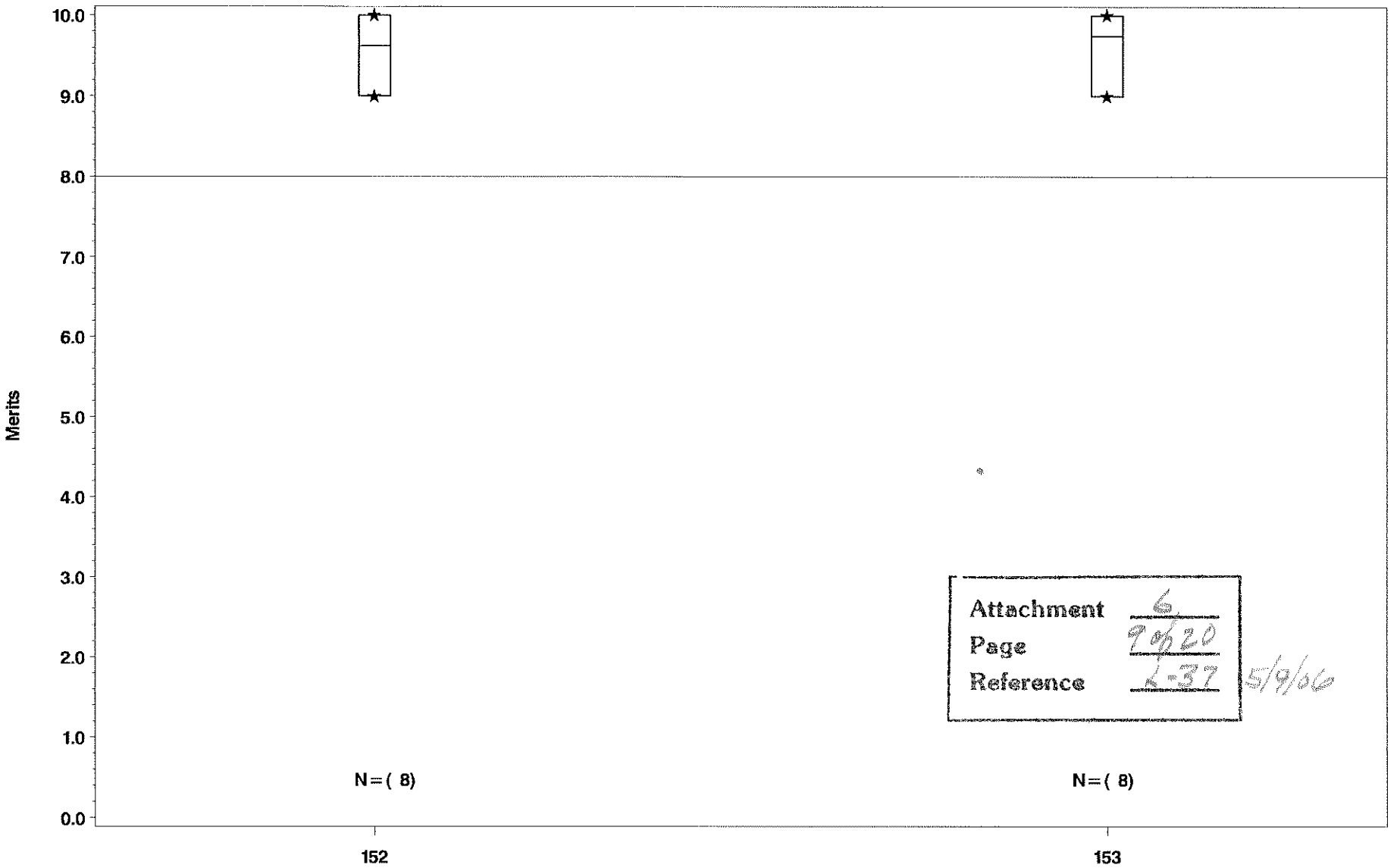
L-37 Reference Oil Comparison

Ridging – NON-LUBRITED – LowTemp

Gear Batch V1L417/P4L792

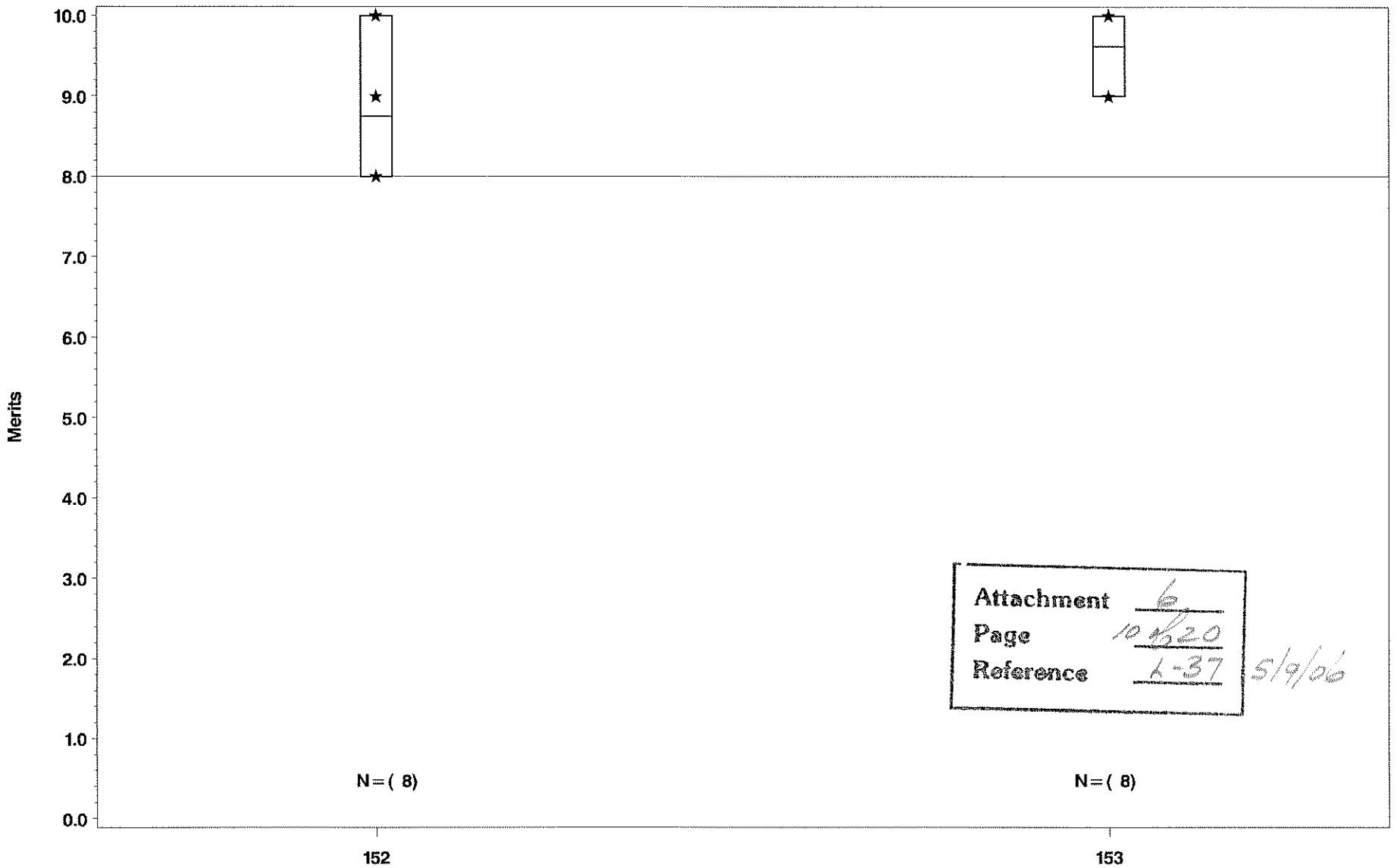


Attachment 6
Page 9 of 20
Reference L-37 5/9/06

L-37 Reference Oil Comparison

Rippling -- NON-LUBRITED -- LowTemp

Gear Batch V1L417/P4L792



Attachment 6
Page 10 & 20
Reference L-37
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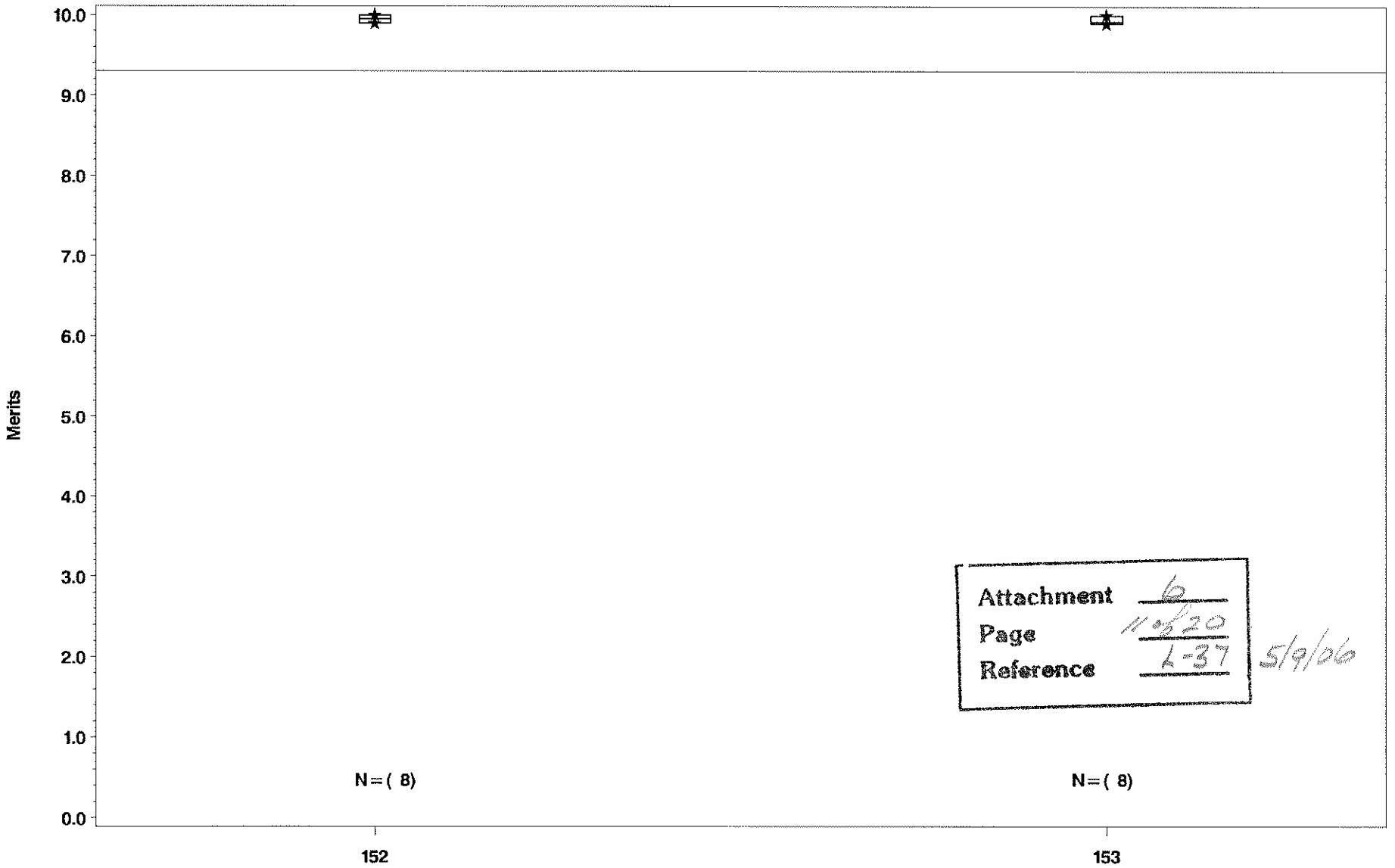
L-37 Reference Oil Comparison

Spitting -- NON-LUBRITED -- LowTemp

Gear Batch V1L417/P4L792



Attachment 6
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Reference L-37

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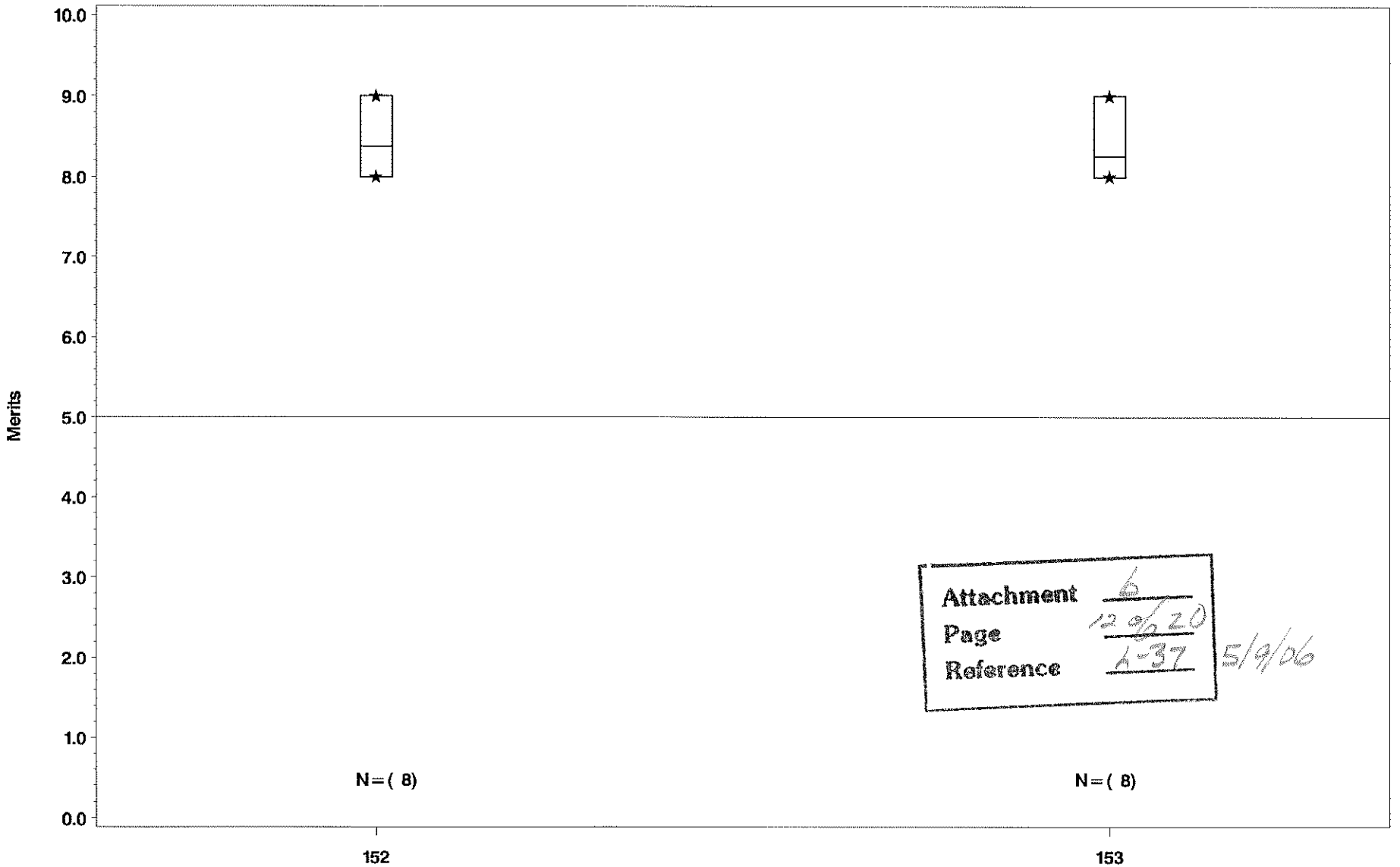
L-37 Reference Oil Comparison

Wear – NON-LUBRITED – LowTemp

Gear Batch V1L417/P4L792



Attachment 6
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Reference L-37

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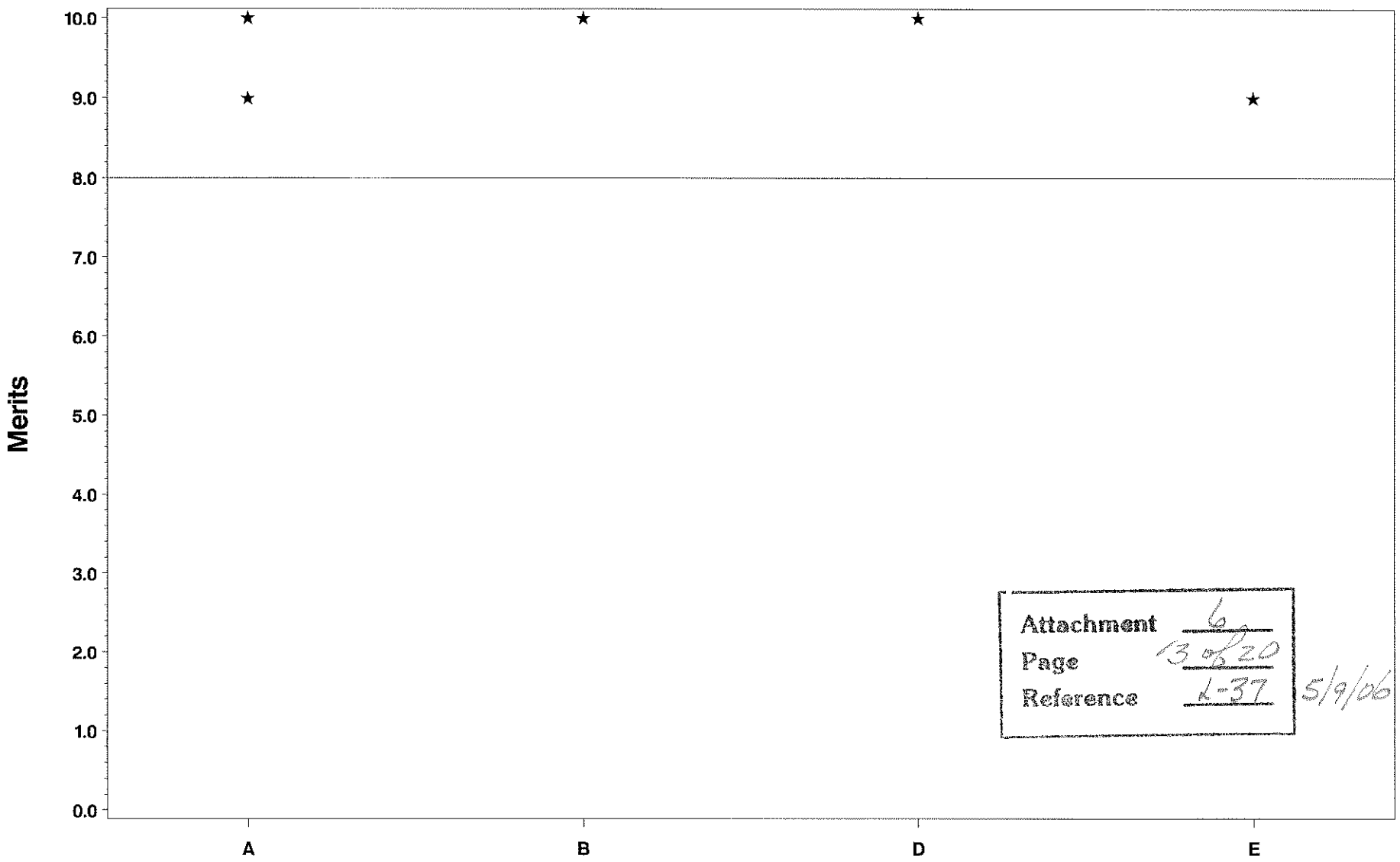
L-37 Reference Oil Performance by LTMSLAB

Ridging – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Low Temperature



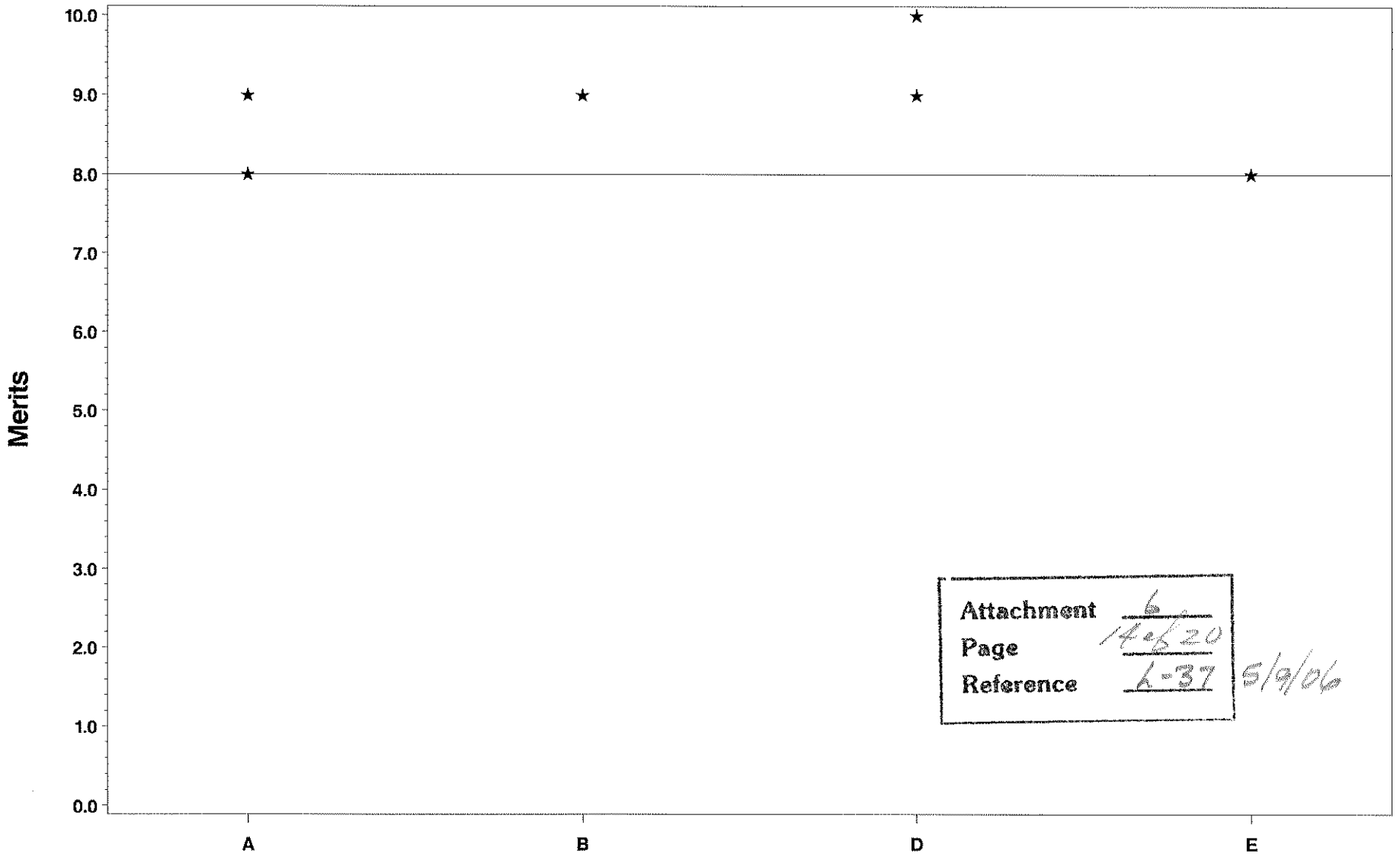
Attachment 6
Page 13 of 20
Reference L-37
5/9/06

L-37 Reference Oil Performance by LTMSLAB

Rippling – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Low Temperature



Attachment 6
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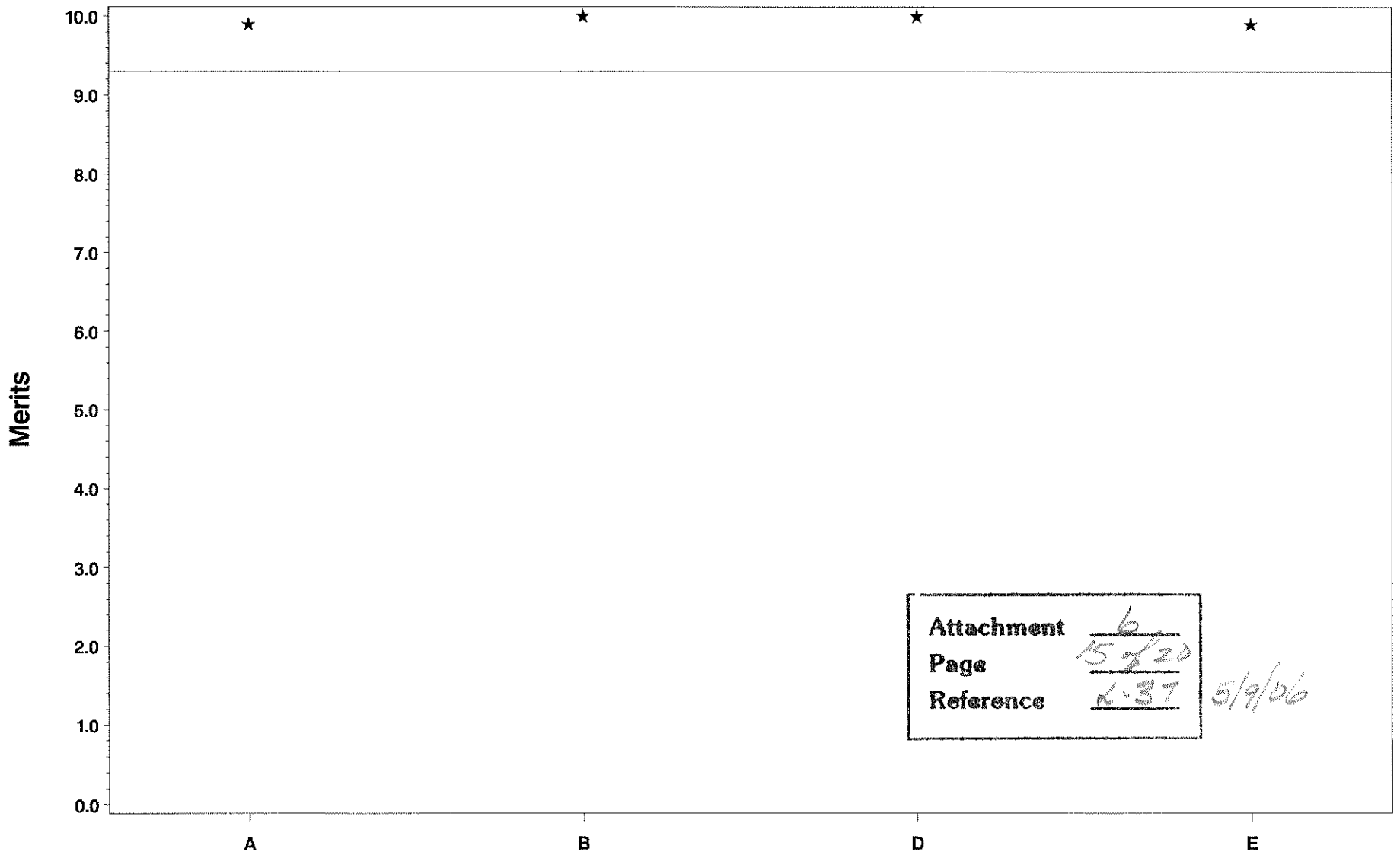
Reference L-37
5/9/06

L-37 Reference Oil Performance by LTMSLAB

Spittinging – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Low Temperature



Attachment 6
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Reference L-37
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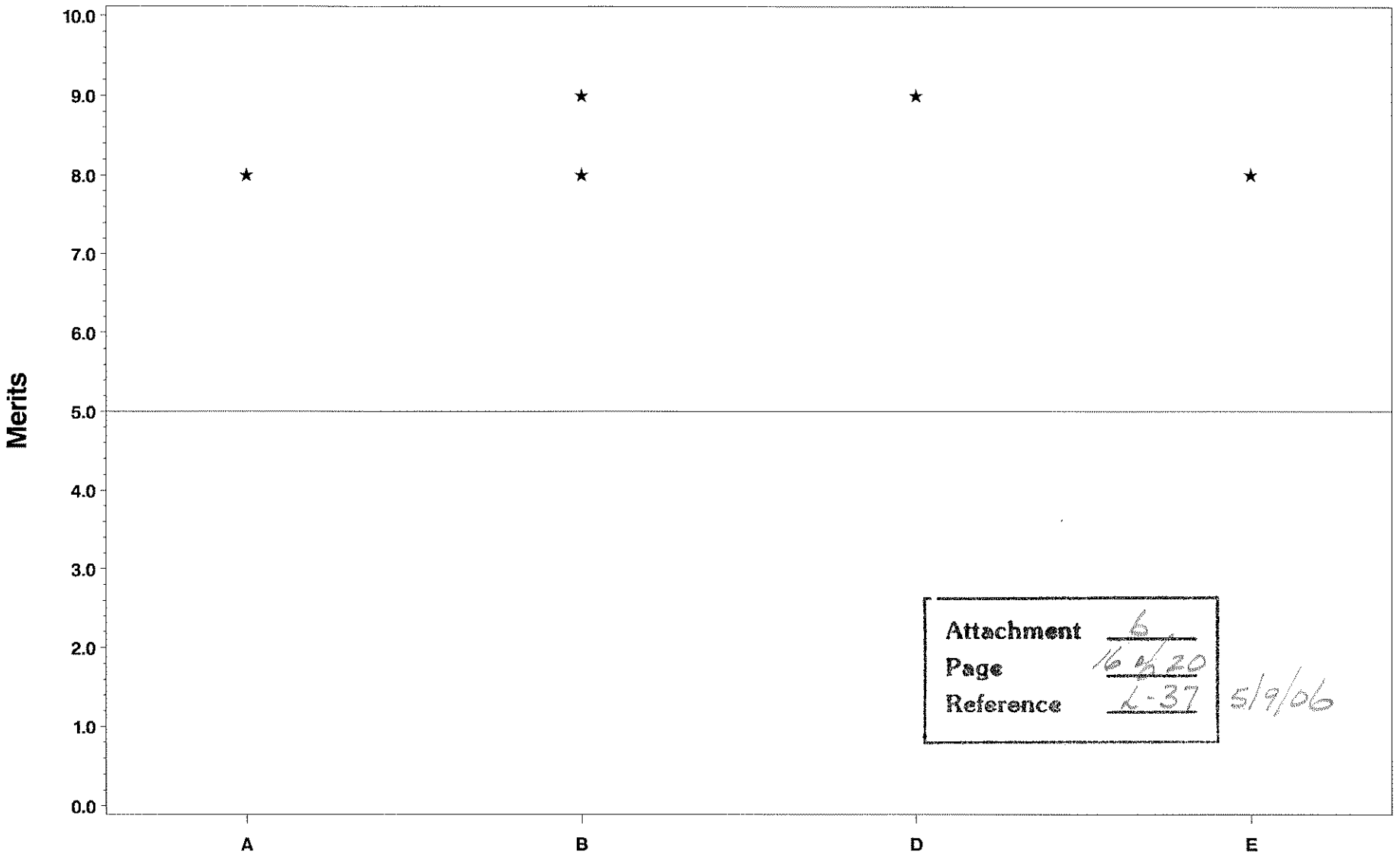
L-37 Reference Oil Performance by LTMSLAB

Wear – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 152 Low Temperature



Attachment 6
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Reference L-37
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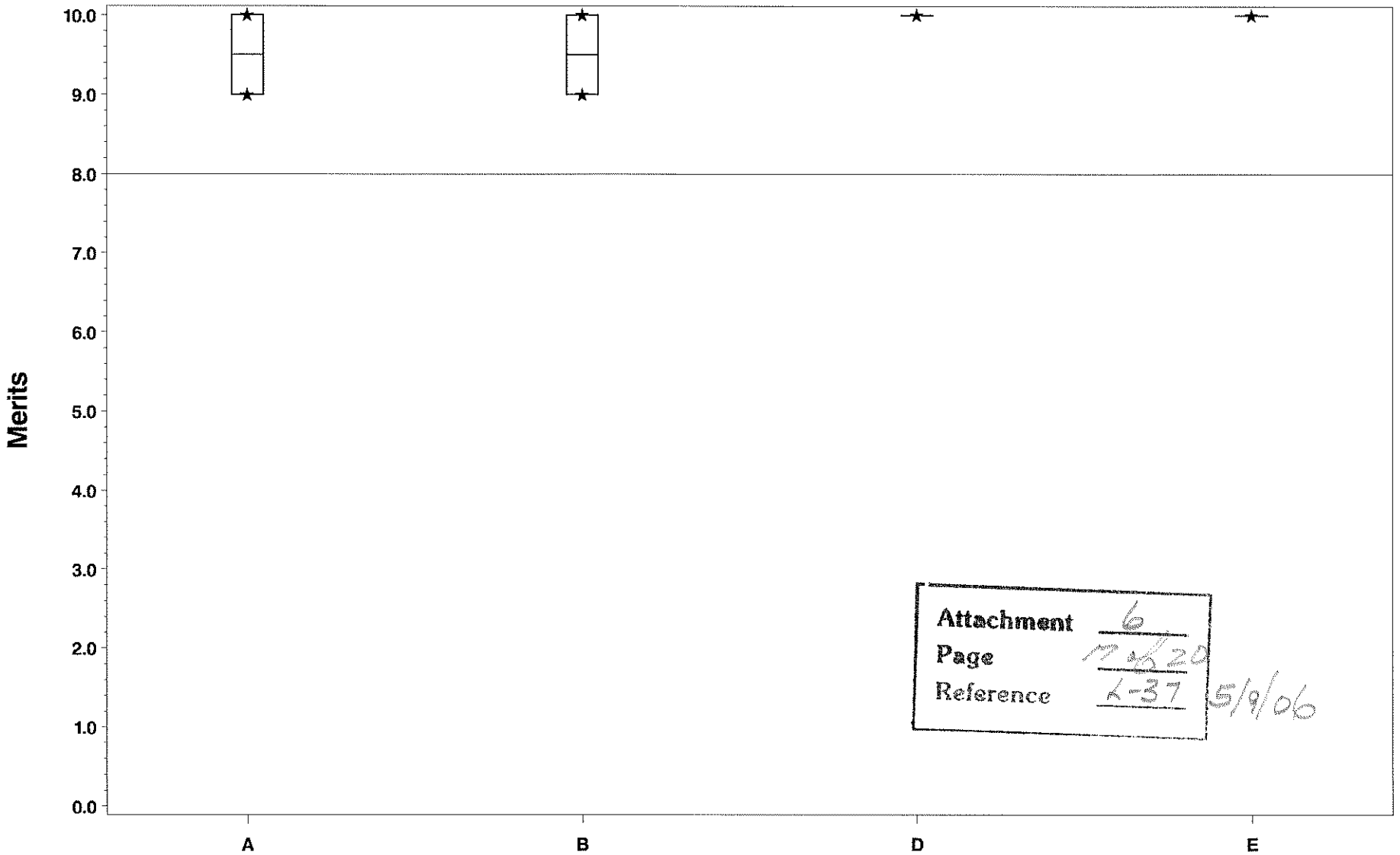
L-37 Reference Oil Performance by LTMSLAB

Ridging – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Low Temperature



Attachment 6
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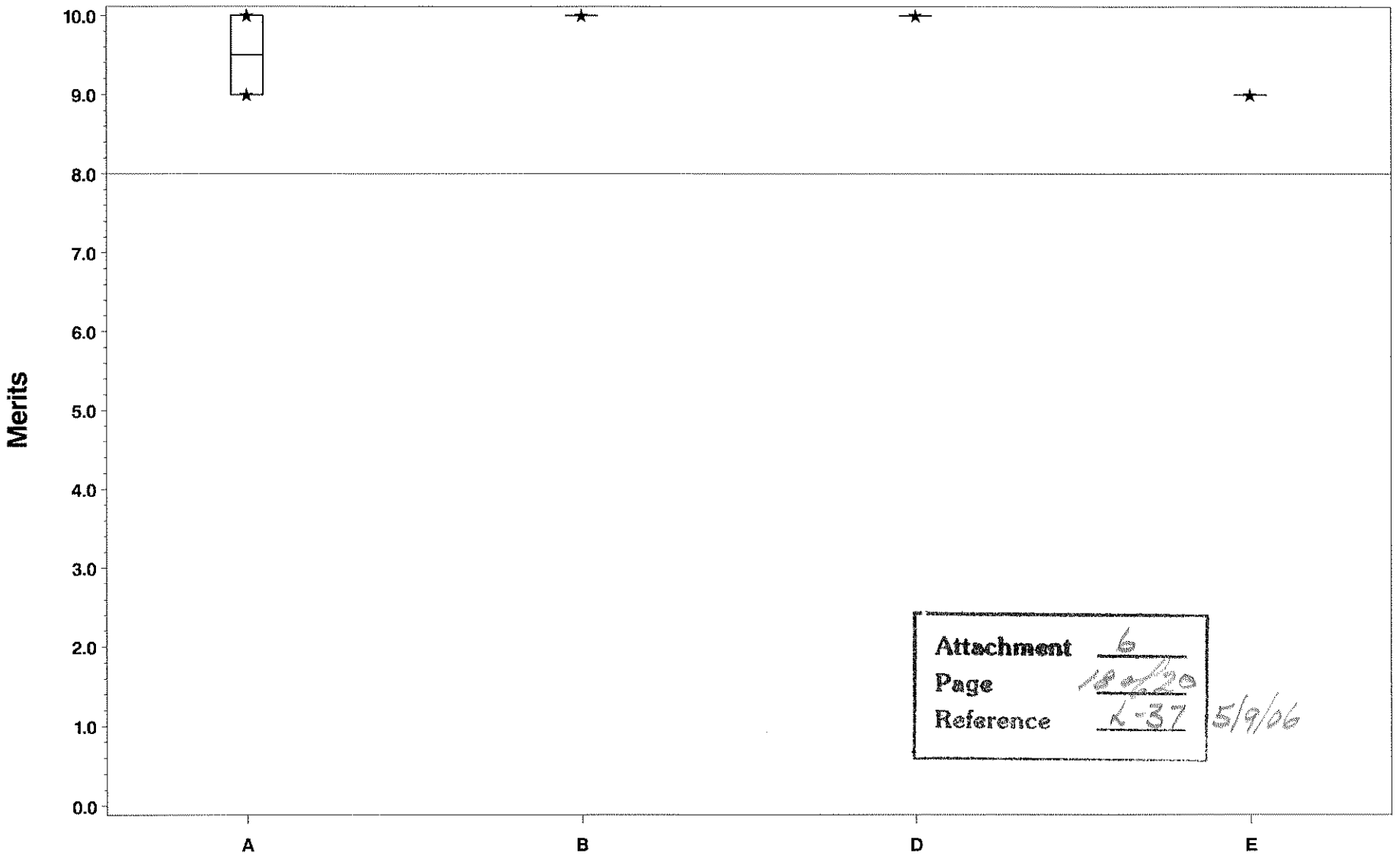
Reference L-37
5/9/06

L-37 Reference Oil Performance by LTMSLAB

Rippling – NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Low Temperature



Attachment 6
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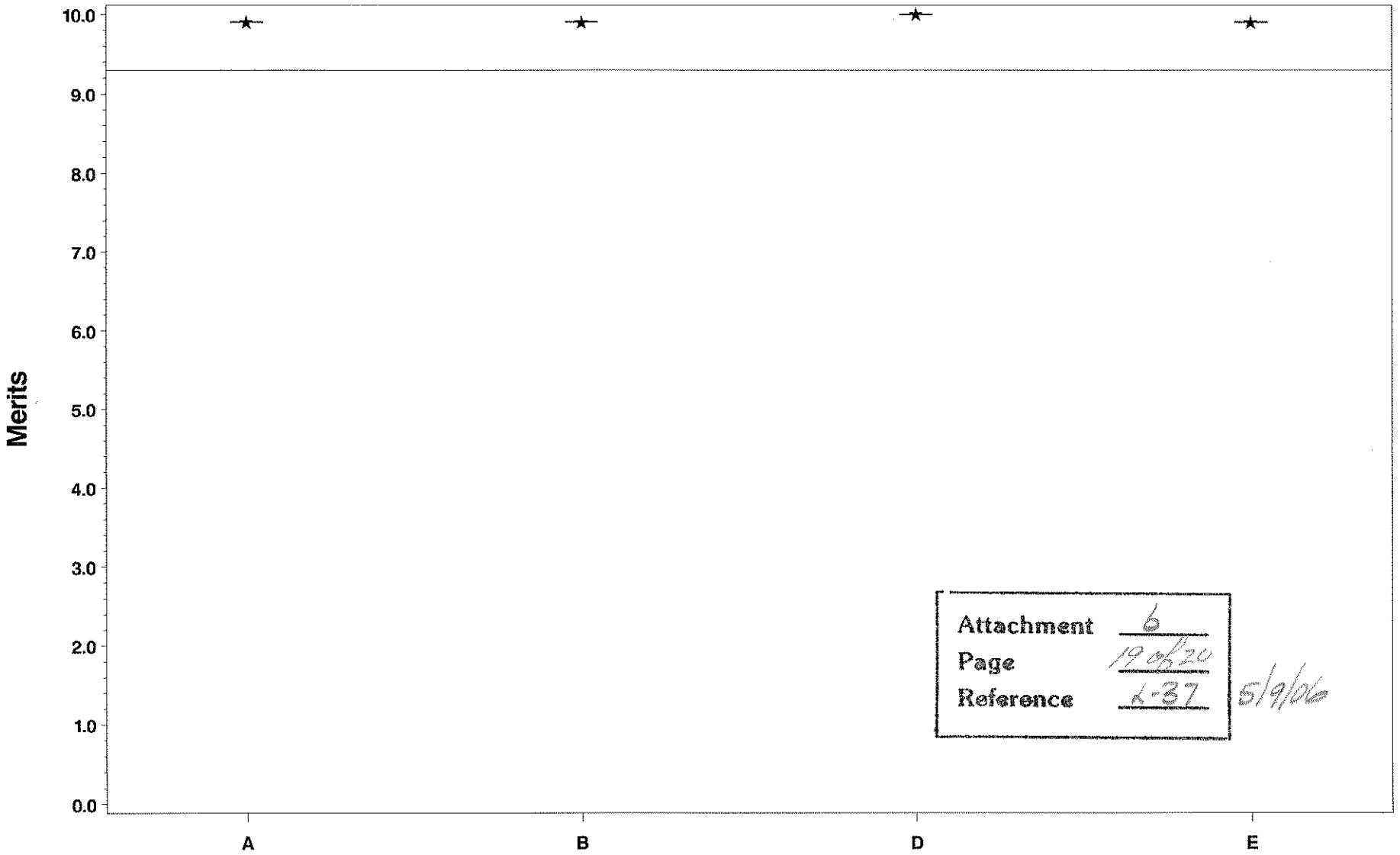
Reference L-37 5/9/06

L−37 Reference Oil Performance by LTMSLAB

Spitting -- NON-LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Low Temperature



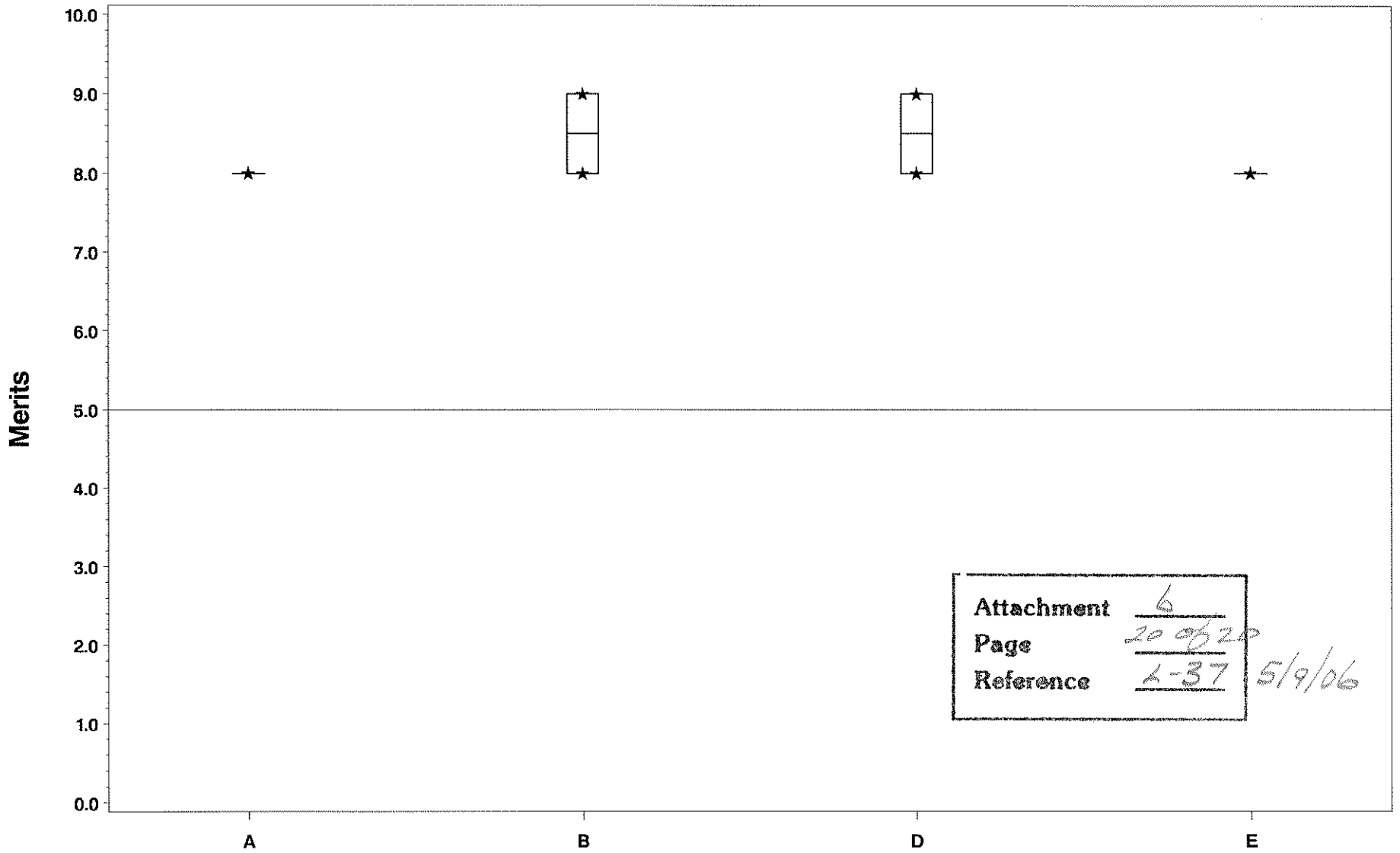
Attachment 6
Page 12 of 20
Reference L-37
5/9/06

L−37 Reference Oil Performance by LTMSLAB

Wear – NON−LUBRITED

Gear Batch V1L417/P4L792

Reference Oil 153 Low Temperature



Attachment 6
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Reference L-37
5/9/06

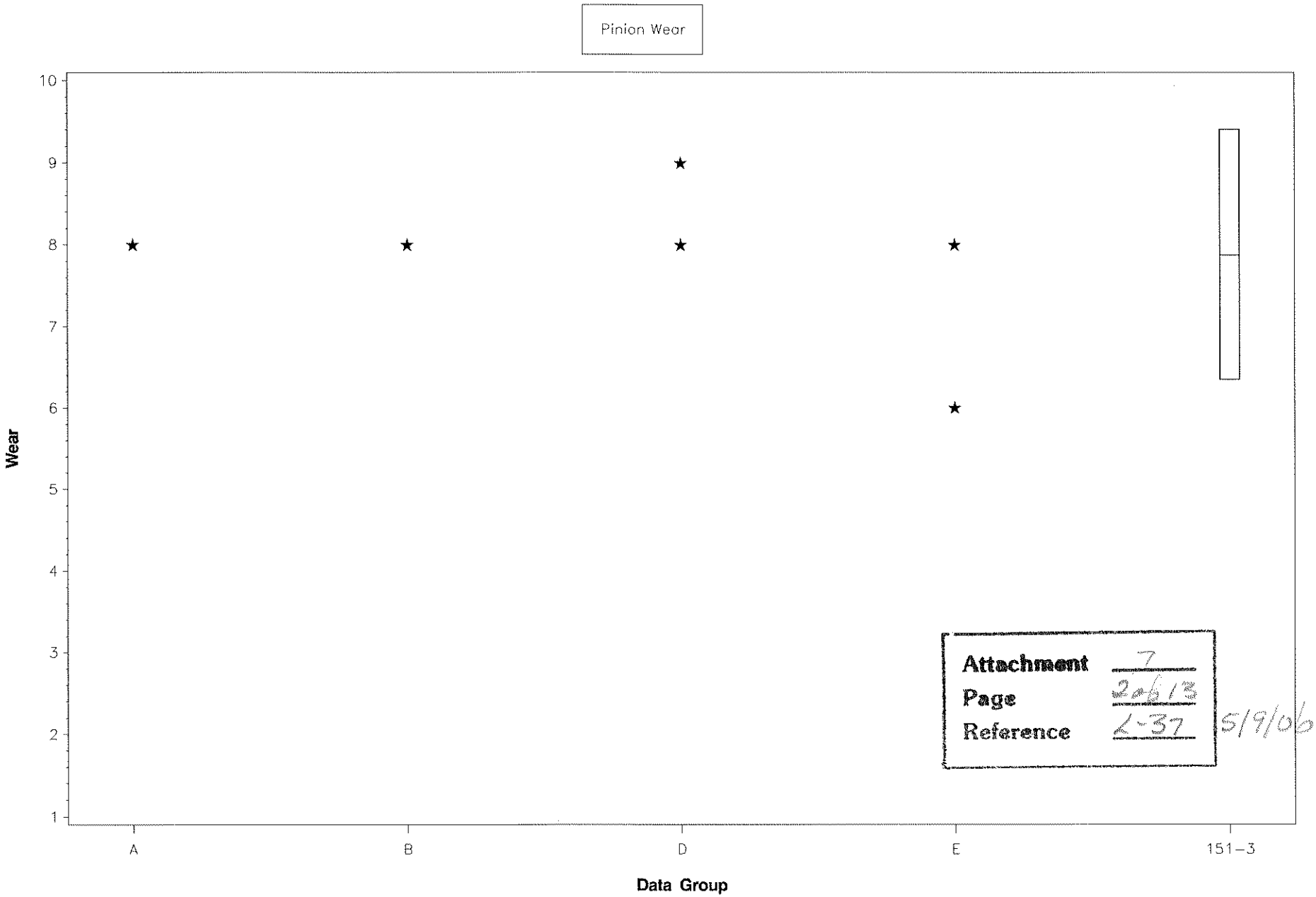
GEAR BATCH V1L417/P4L792										
REFERENCE OIL TEST TARGETS (PINION)										
	Reference Oil 151-3				Reference Oil 152				Reference Oil 153	
	N	Mean	S.D.		N	Mean	S.D.		N	Mean	S.D.
Wear	8	7.88	0.850		8	8.38	0.870		8	7.88	0.991
Ridging	8	0.418 (9.84)	0.5676		8	0.418 (9.84)	0.5573		8	-0.322 (9.12)	0.6775
Rippling	8	0.016 (9.52)	0.5300		8	0.016 (9.52)	0.6185		8	-0.524 (8.81)	0.6114
Spitting	8	0.556 (9.93)	0.3463		8	0.579 (9.94)	0.0880		8	0.174 (9.66)	0.5523

GEAR BATCH V1L417/P4L792										
REFERENCE OIL TEST TARGETS (RING)										
	Reference Oil 151-3				Reference Oil 152				Reference Oil 153	
	N	Mean	S.D.		N	Mean	S.D.		N	Mean	S.D.
Wear	8	8.00	0.771		8	7.88	0.834		8	7.75	0.697
Ridging	8	0.693 (10.0)	0.3747		8	0.693 (10.0)	0.1590		8	0.016 (9.52)	0.7322
Rippling	8	0.144 (9.63)	0.5230		8	0.281 (9.74)	0.5462		8	0.144 (9.63)	0.5636
Spitting	8	0.579 (9.94)	0.1002		8	0.583 (9.94)	0.1695		8	0.560 (9.93)	0.1663

Attachment 7
Page 10613
Reference L-37

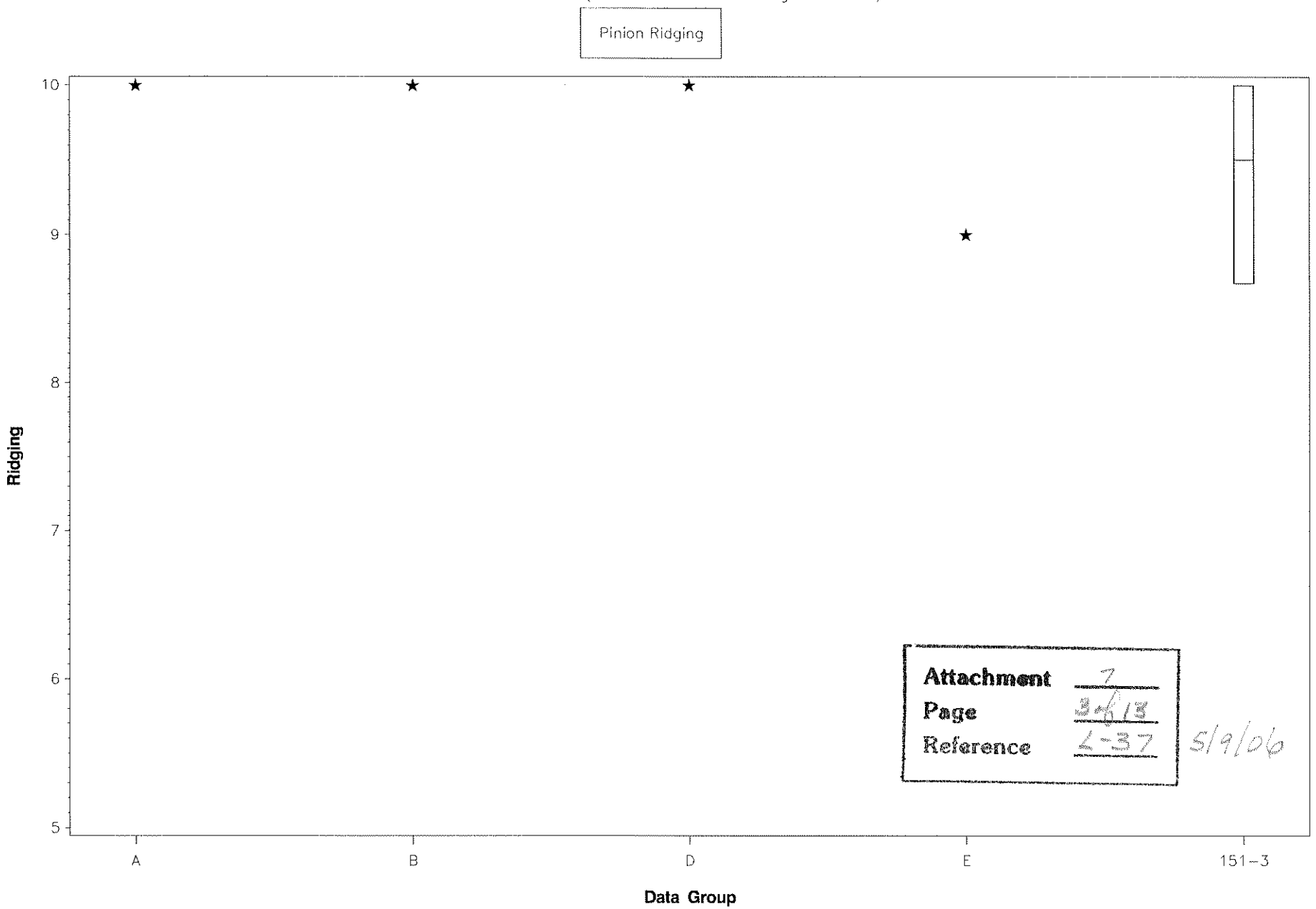
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 151-3 (Bands Include Merit Ratings of 7, 8 & 9)



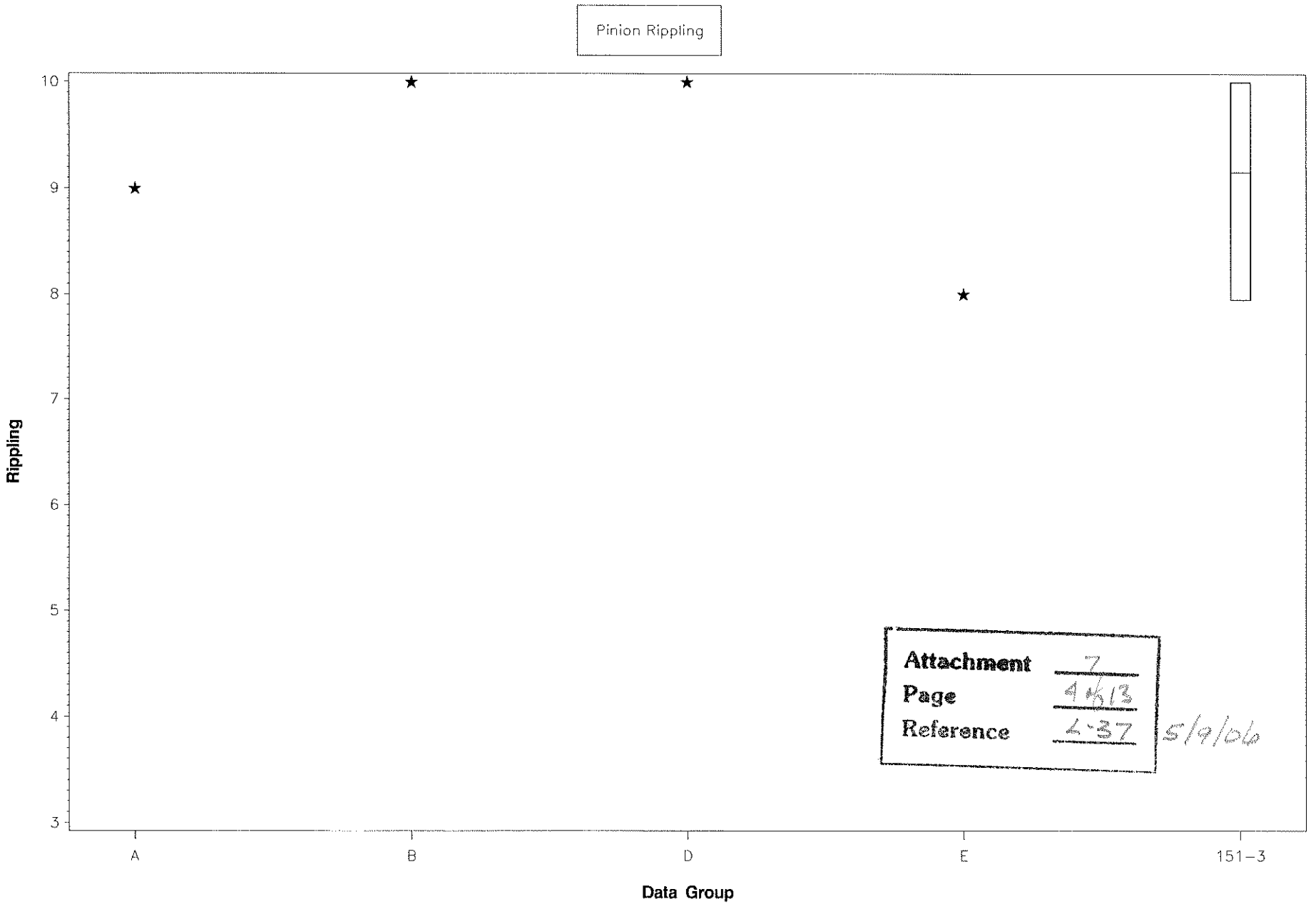
Attachment 7
Page 2 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 151-3 (Bands Include Merit Ratings of 9 & 10)



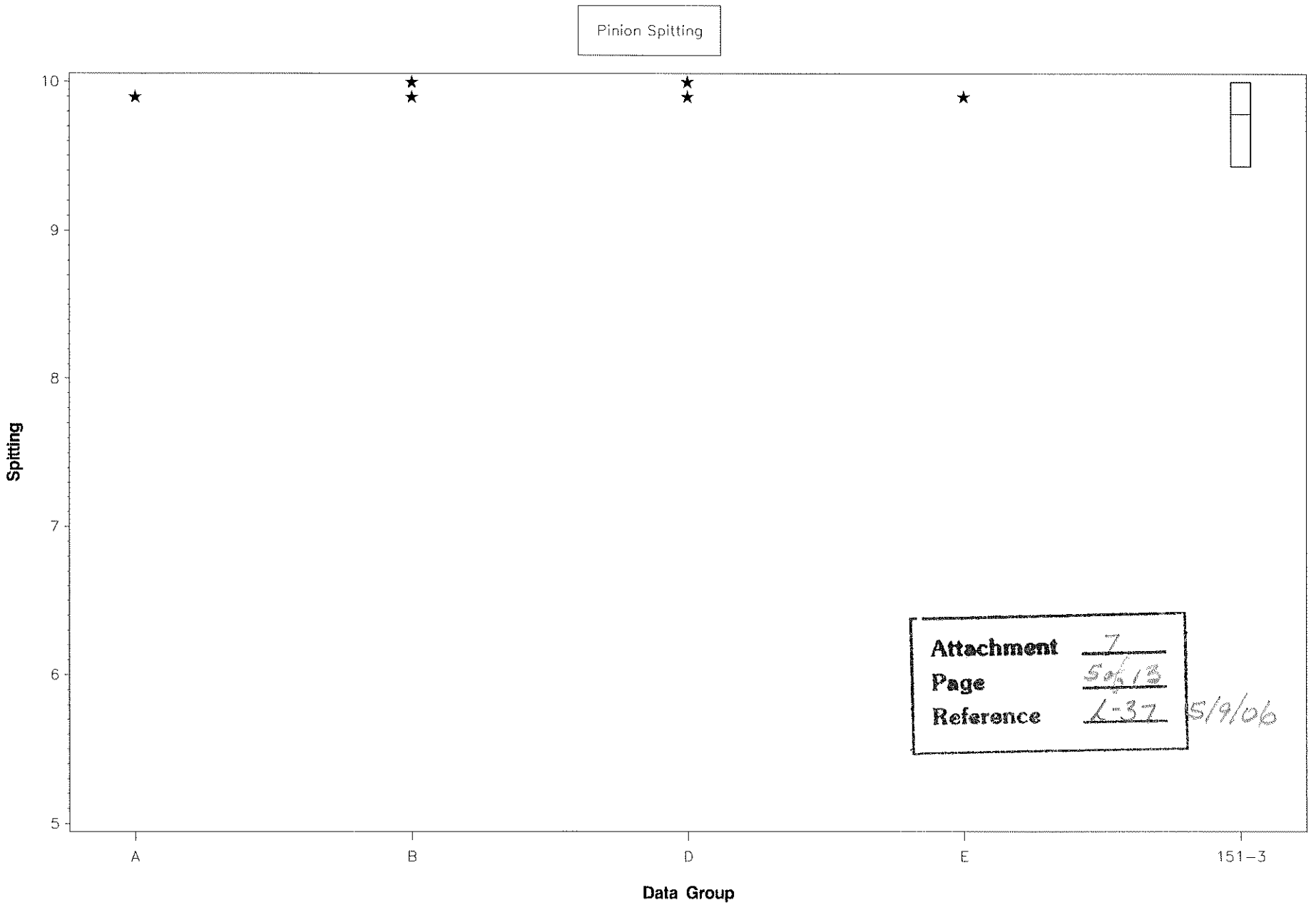
Attachment 7
Page 3 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417\P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 151-3 (Bands Include Merit Ratings of 8, 9, & 10)



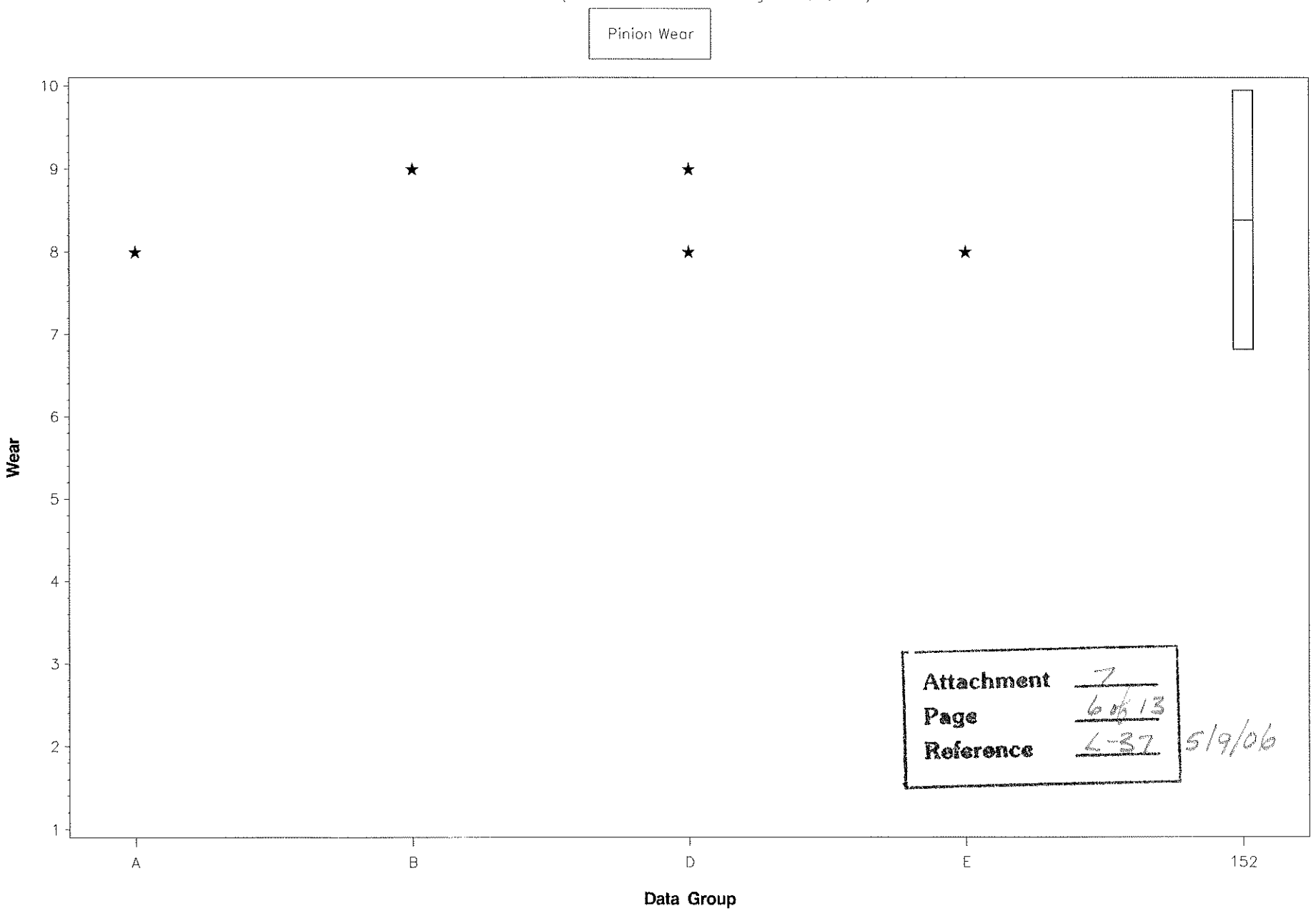
Attachment 7
Page 4 & 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 151-3 (Bands Include Merit Ratings of 9.5 Thru 10)



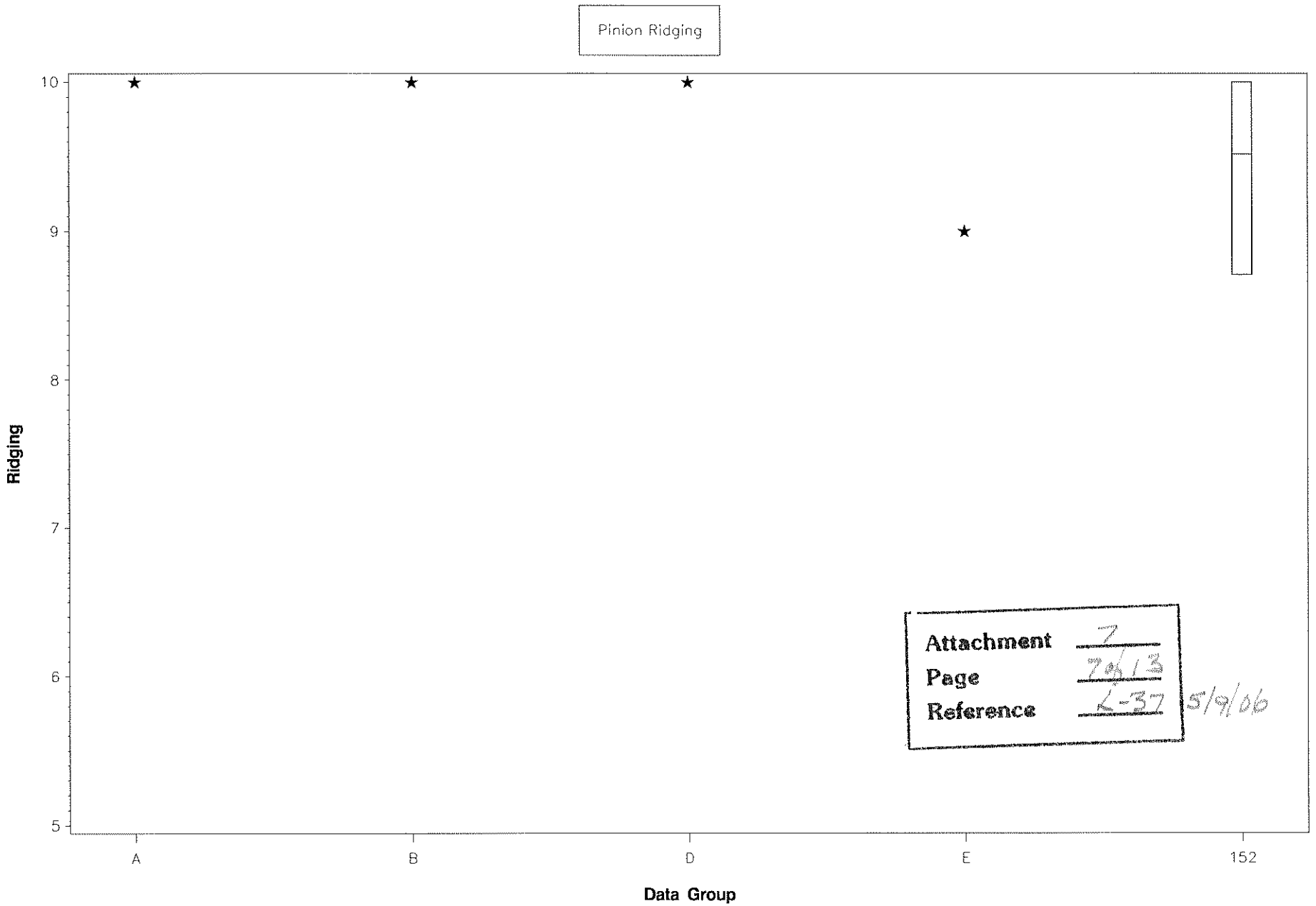
Attachment 7
Page 5 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 152 (Bands Include Merit Ratings of 7, 8, & 9)



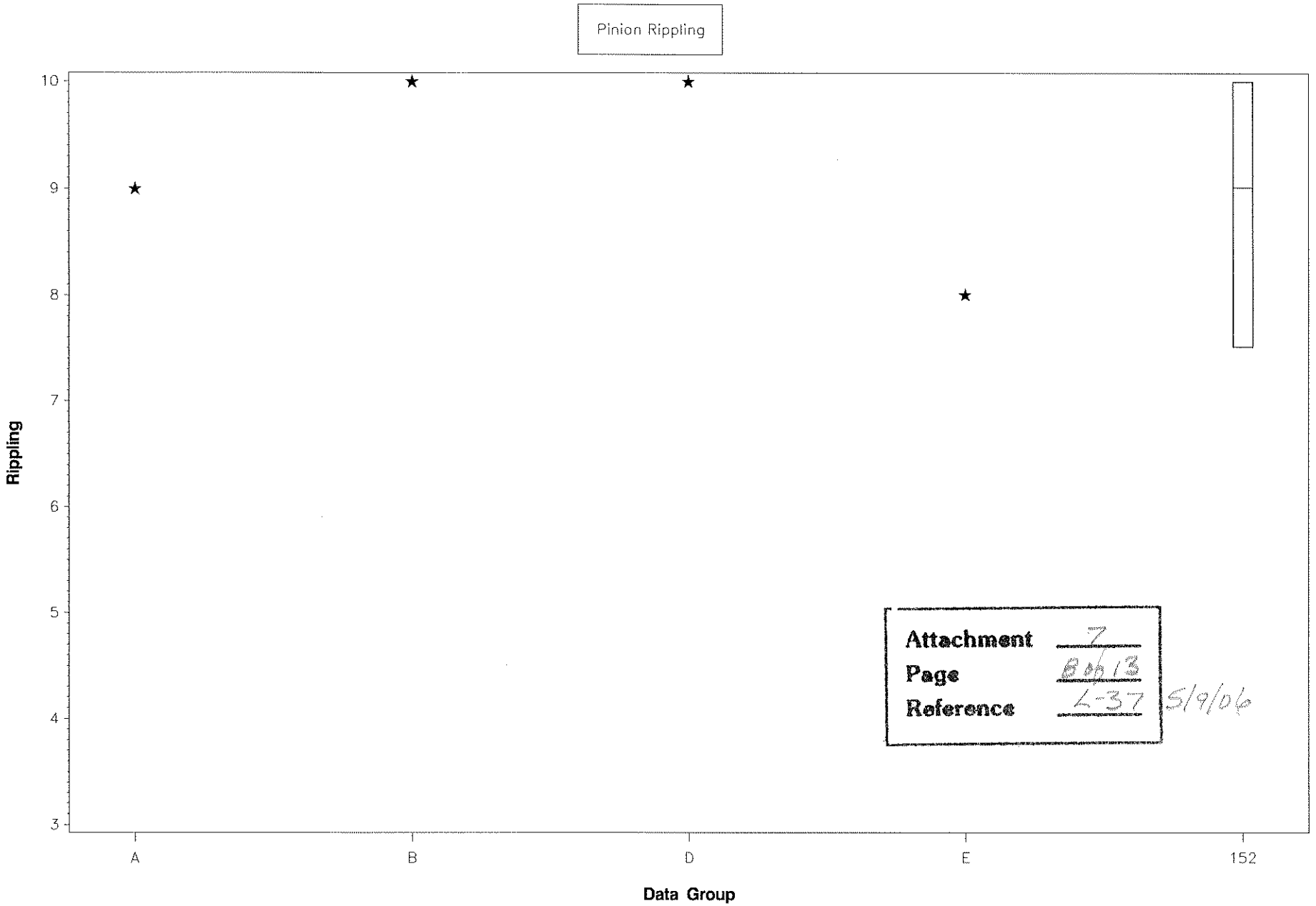
Attachment 7
Page 6 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 152 (Bands Include Merit Ratings of 9 & 10)



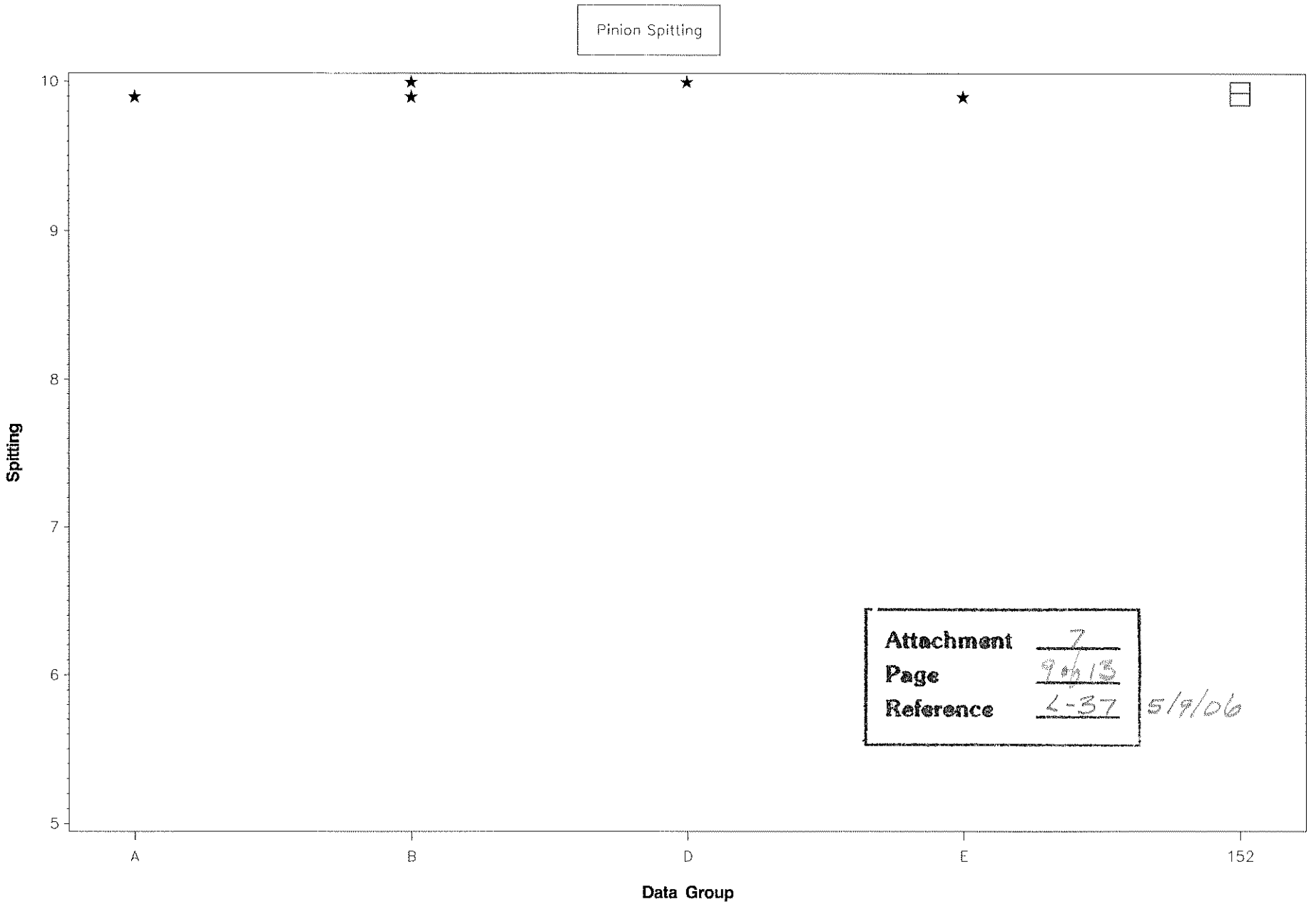
Attachment 7
Page 7 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417\P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 152 (Bands Include Merit Ratings of 8, 9, & 10)



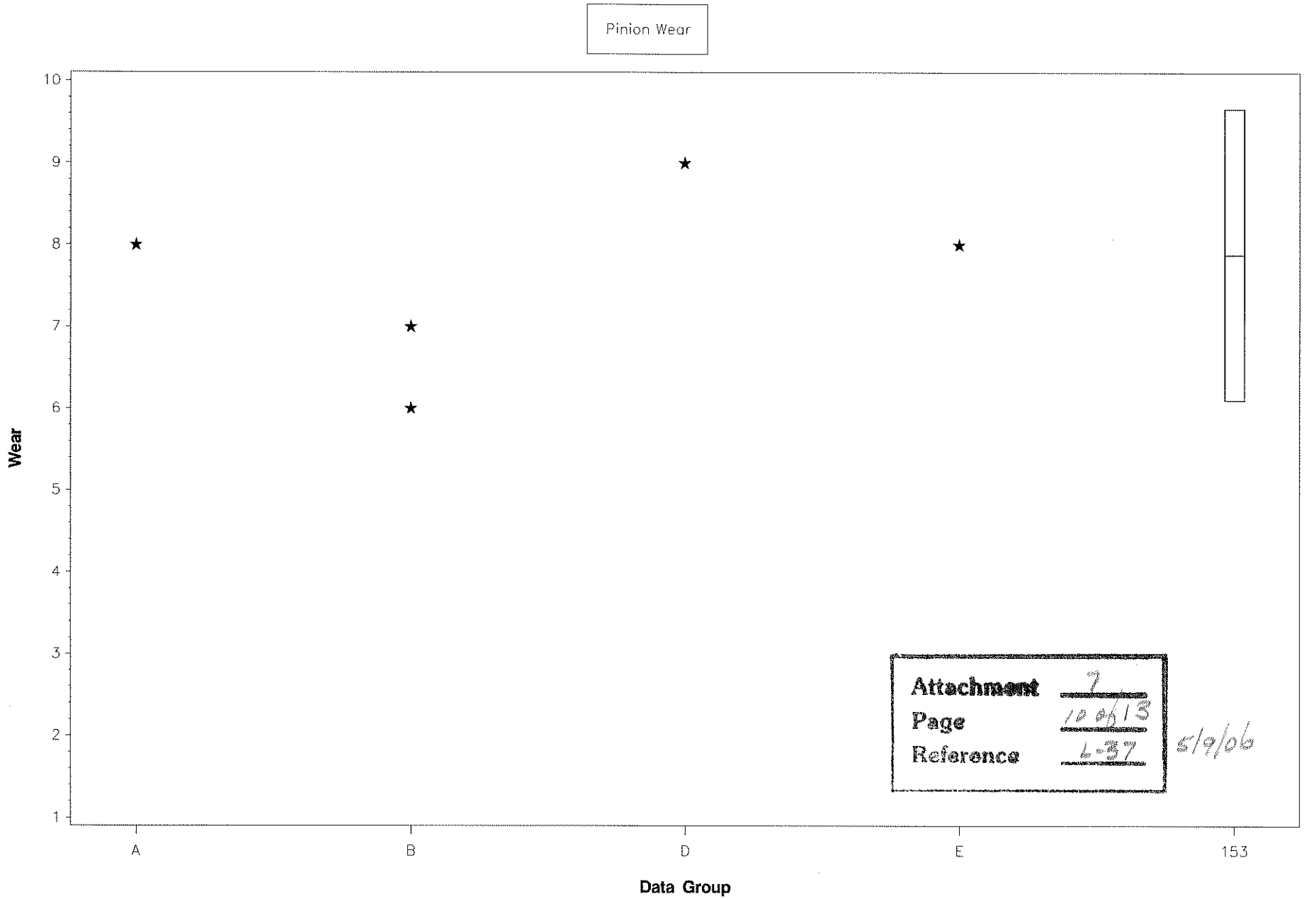
Attachment 7
Page 8 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 152 (Bands Include Merit Ratings of 9.9 & 10)



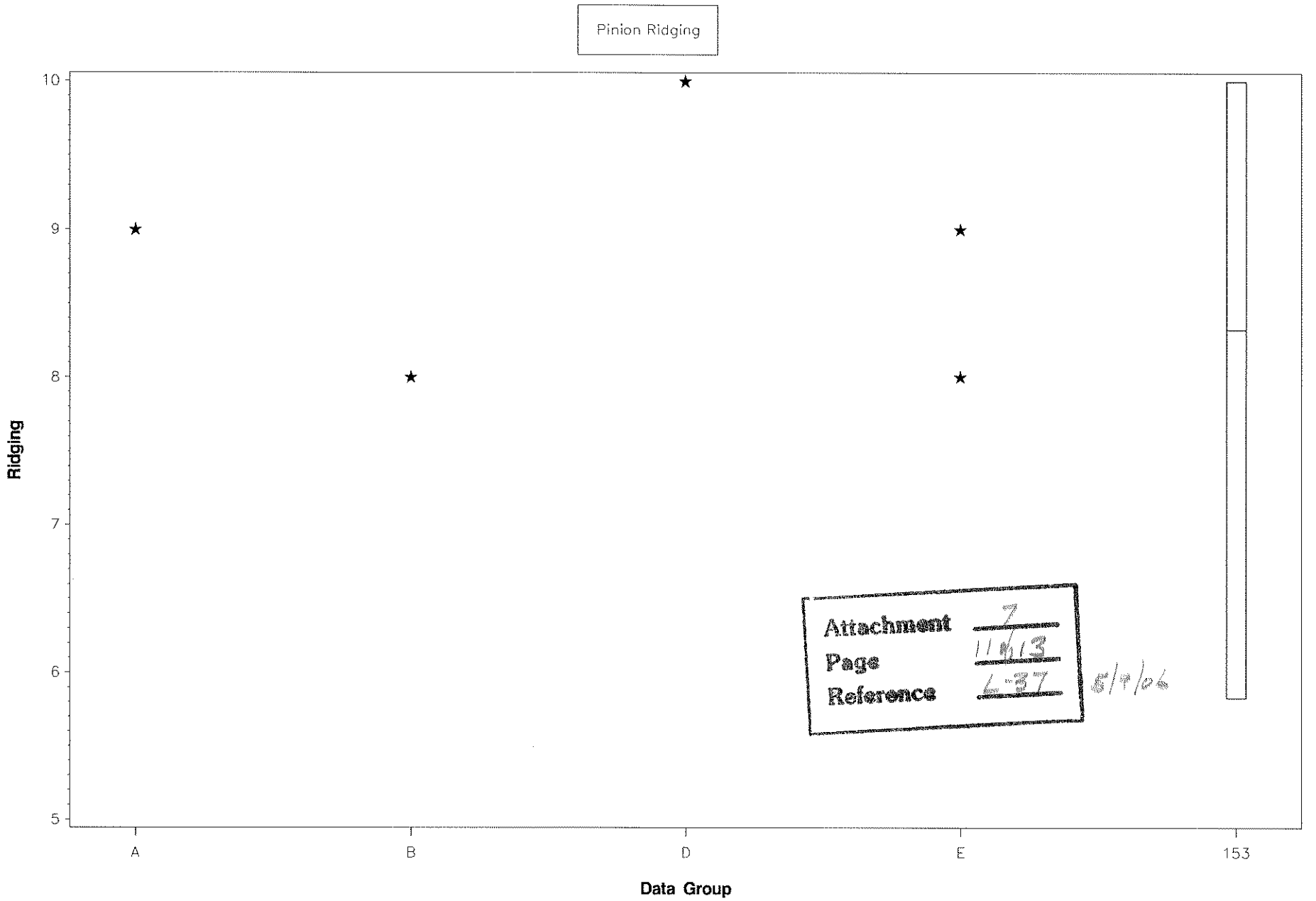
Attachment 7
Page 9 of 15
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 153 (Bands Include Merit Ratings of 7, 8, & 9)



Attachment 7
Page 12 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardwore, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 153 (Bands Include Merit Ratings of 6, 7, 8, 9, & 10)



Attachment 7
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Reference L-37
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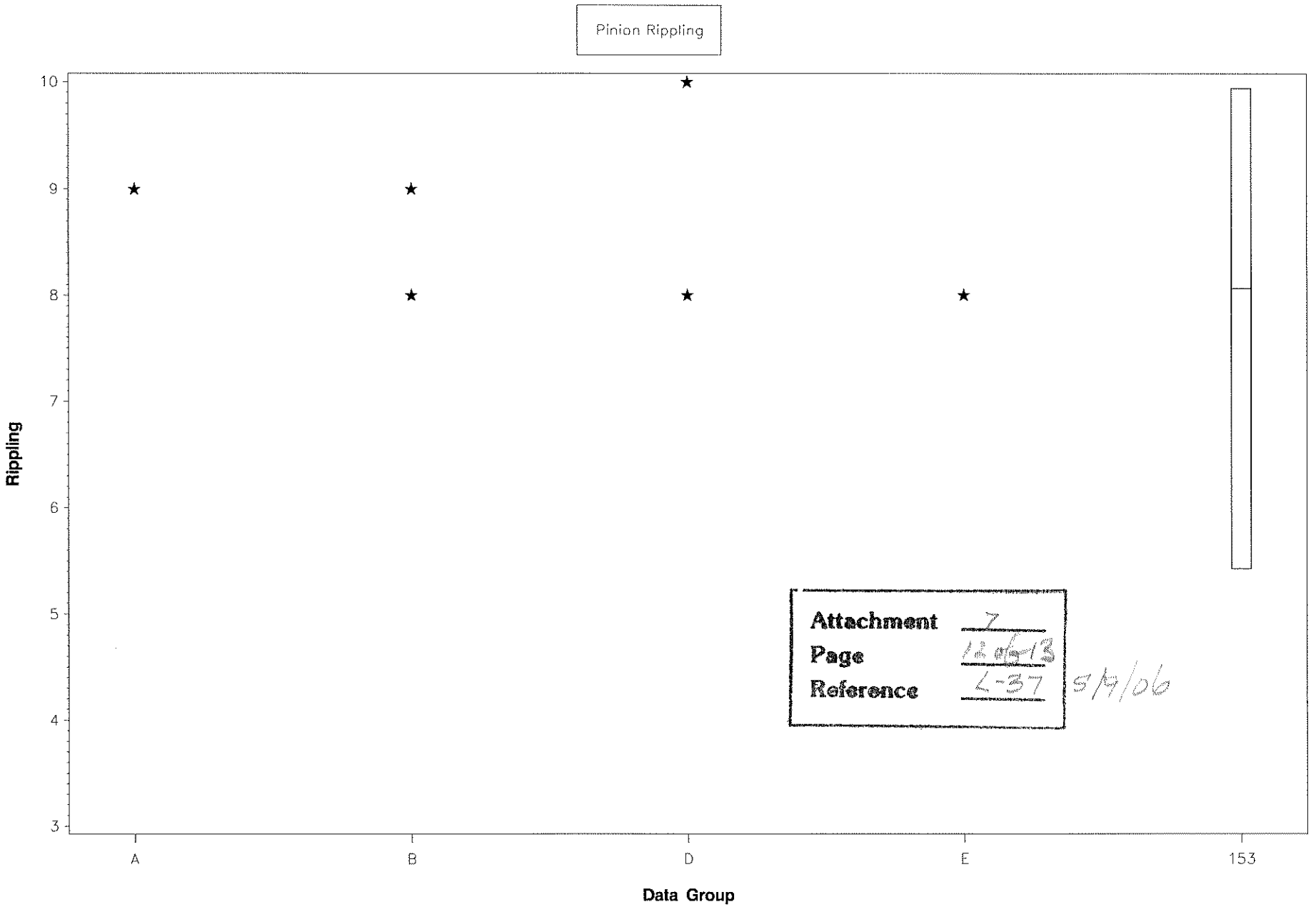
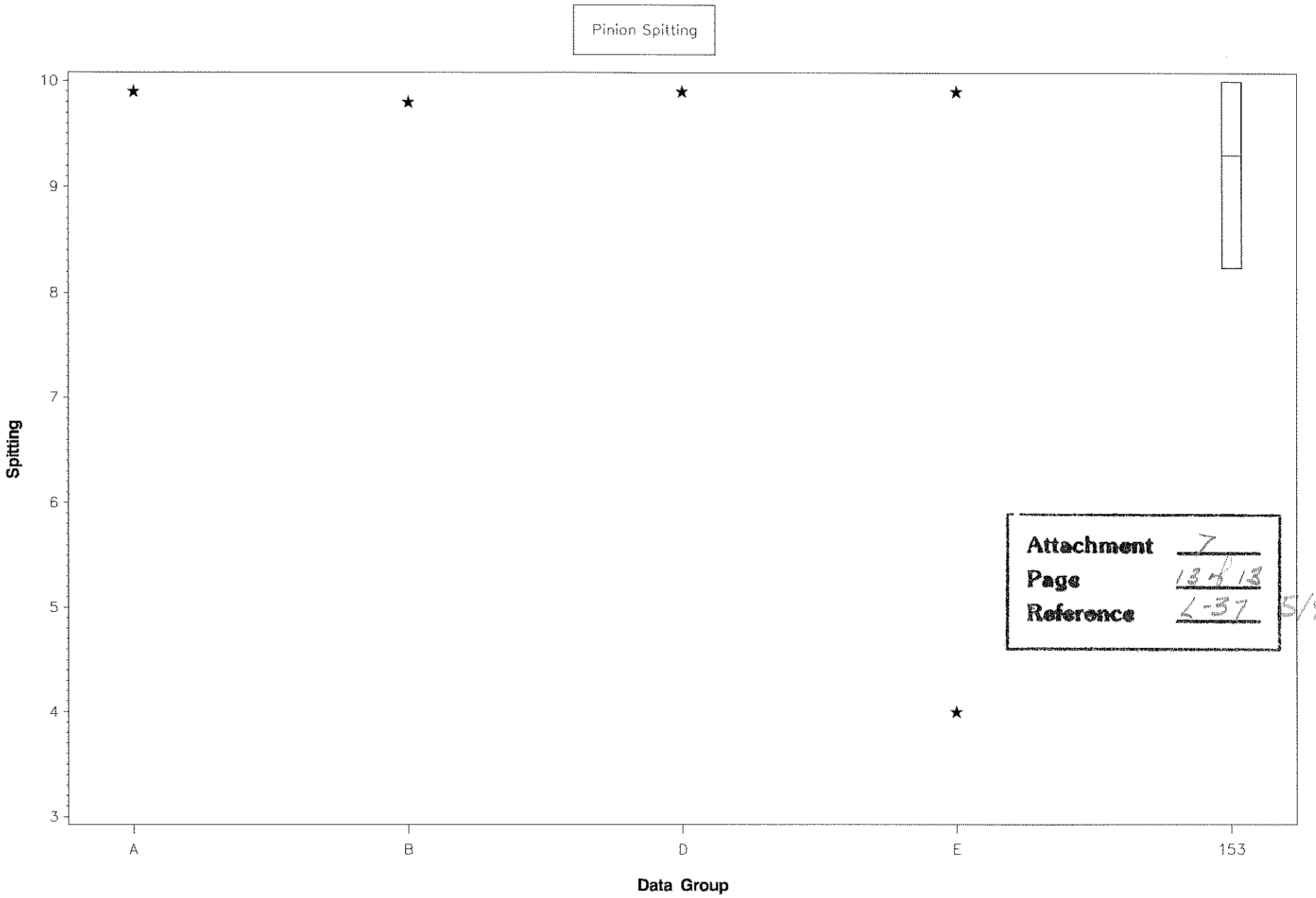
L-37 Non-lubrited Hardware, Pinion Batch V1L417\P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 153 (Bands Include Merit Ratings of 6, 7, 8, & 9)



Attachment 7
Page 12 of 13
Reference L-37
5/9/06

L-37 Non-lubrited Hardware, Pinion Batch V1L417/P4L792
Test Target Data Set and Shewhart Severity Limits
Reference Oil 153 (Bands Include Merit Ratings of 9 Thru 10)



Attachment 7
Page 13 of 13
Reference L-37
5/9/06

2006 Lubrited Hardware Order

☐ Afton	275
☐ Parc	220
☐ SwRI	275
☐ Lubrizol	300
Total	**1070**

- Update from Dana on Quote? Price reduced from $ 1055 to $ 931 each axle.
- Is there a need for a TF Visit to Ft. Wayne? Yes
- Is there a need for a TF Visit to Lugoff? Yes
- Binding PO's Due May 31, 2006.

Attachment 8
Page 1 of 1
Reference L-37 5/9/06