LRI Gear Lubricants Review Committee
BRTRC Facility – Warren, Michigan
May 12, 2011
Meeting #161 Minutes

1.0 OPENING COMMENTS, CALL TO ORDER/QUORUM CHECK

1.1 The meeting was called to order by Chairperson, Wendy Grubbs. A quorum was established with the following representatives present.

ATTENDANCE
User members Present:

Allen Comfort	U.S. Army
John Dharte	American Axle & Manufacturing
Bridget Dwornick (ALT)	U.S. Army
Joe Guzikowski (ALT)	Dana Corporation
Thelma Marougy	Eaton Corporation
Bruce McGlone	Meritor
Troy Muransky	Meritor
Scott Parke	ASTM / TMC
Chintan Ved	Ford Motor Company
Khaled Zreik	General Motors

Other Participants/Members:

Don Bell	Afton Chemical Corporation
Mike Costello	Cognis Corporation
Hong Gao	Conoco Phillips
Galen Greene	The Lubrizol Corporation
Jerry Gropp	The Lubrizol Corporation
Sam Higuchi	Afton Chemical Corporation
Bill Kearney	Afton Chemical Corporation
Brian Koehler	Southwest Research Institute
Cory Koglin	Afton Chemical Corporation
Steve Lakes	Cognis Corporation
Pete Radonich	The Lubrizol Corporation
Art Sanchez	Southwest Research Institute
Dale Smith	Intertek PARC
Judy Stevenson	The Lubrizol Corporation
Mark Witschger	Cognis Corporation
Jack Zakarian	Chevron

PRI Staff
Wendy Grubbs

1.2 Review Code of Ethics and Conflict of Interest

The meeting attendees were reminded of their Code of Ethics and Conflict of Interest responsibilities and Anti-Trust notification which are intended to guide all in their participation in the meeting.

1.3 Confirmation of Guests – Determine Membership Status

ACTION ITEM: PRI to add M. Costello as an Alternate and M. Witschger as a Member of the LRI Committee representing the Cognis Corporation.

1.4 Review Members Completion of Confidentiality Forms

A completed Confidentiality Form was obtained from H. Giangrande. The following is a list of outstanding Confidentiality Forms: G. Fett (Dana), R. Fewkes (GM), and C. O'Brien (GM).

2.0 Approval of Previous Meeting #160 Minutes

B. McGlone made a motion, 2nd by J. Dharte to approve the LRI Meeting Minutes for Meeting #160 as written and amended. Unanimously approved.

3.0 Summary of ASTM Meetings

3.1 J. Gropp presented an update summary of the ASTM Meeting information. (Attachment #1)

4.0 Action Item Review

As noted in the Meeting Agenda, Action Items #4.1 thru 4.3 and 4.5 thru 4.7 were completed. Action Item 4.4 is addressed below in Agenda Item 6.0

5.0 LRI Meeting Attendance / Venue and 2011 LRI Meeting Schedule

5.1 Feedback on Current Meeting Logistics

LRI Committee Members were satisfied with the BRTRC facility.

5.2 Identify Next Meeting Venue

As agreed during the November 2010 LRI Meeting #159 to alternate the LRI Meeting venues between PRI Headquarters and the BRTRC Facility in Warren, Michigan, the next LRI Committee Meeting #162 will be held at the PRI Headquarters in Warrendale, Pennsylvania on Thursday, August 11, 2011.

5.3 Confirm Referee Rater for Next LRI Committee Meeting

B. Koehler confirmed that Art Sanchez will attend the LRI Committee Meeting #162 in the role of Referee Rater in August.

6.0 Status of Revision to J2360 – Remove the Requirement to Conduct the D5579 Test

a. Initiated the request – A. Comfort to B. Cain 3/1/10
b. Submitted a formal written request to Jerry Mount, SAE Tech 3 Committee Chairman 8/27/10

a. Followed up 9/30/10
c. Telephone call with B. Cain 10/20/10
d. Email request for status of J2360 Revision 11/1/10

Update February 10, 2011 LRI Meeting #160

Allen Comfort reported that the draft is still in process. Allen experienced difficulty reaching Bob Cain, Sponsor of the document. Allen has determined that there is quite an extensive amount of changes required to this document. He is also developing an Appendix for the document to address some items of clarification.

Allen's timeframe for the revision of this document is as follows:

1. A.Comfort to distribute the 1st draft to TC3 Committee Leads by March 1, 2011 requesting they return the document with their changes/revisions by March 15, 2011
2. PRI will distribute the draft to the LRI Committee Members by April 1, 2011 requesting that they return the document with their changes/revision by April 15, 2011.

Update May 12, 2011 LRI Meeting #161

A.Comfort reported that SAE plans to distribute a pre-ballot to the SAE TC3 Committee for review.

ACTION ITEM: PRI to distribute the latest revision of J2360 to all members of the LRI Committee and request comments be sent back to PRI within 2 weeks from the date of distribution.

ACTION ITEM: PRI to compile the comments received and forward to A. Comfort for disposition.

7.0 New Items/Open Discussion

7.1 PD4000 Rev E to Incorporate LRI Membership

ACTION ITEM: PRI to distribute a ballot of the proposed revision to the PD4000 document.

7.2 Fleet Test Viscosity Shear Requirements

A.Comfort reported on the data developed from the responses from the Presenters on the Field Tests conducted between 2001 and 2011. We have found that the 20-hour KRL is not doing a satisfactory job of predicting the loss in viscosity that lubricants exhibit in service in both light duty and heavy duty vehicles.

We are concerned that lubricants which exhibit minimal loss in viscosity in the KRL may shear significantly in the field, and that this may result in excessive wear, noise, and other types of undesirable performance. Because of this concern, we and the lubricant manufacturers, are looking for a bench test which will more accurately predict a loss in viscosity in field service of a lubricant.

The LRI would ask that the SAE TC3 Committee initiate the actions required to identify a test which will exhibit better correlation with the loss in viscosity that lubricants encounter in field service.

ACTION ITEM: PRI to include A. Comfort's data on the Fleet Test Viscosity Shear with the LRI Meeting #161 Minutes.

ACTION ITEM: LRI Committee Members to review the data and provide any comments and/or issues to the LRI Committee at the August, 2011 Meeting.

ACTION ITEM: PRI to include this subject on the August 2011 LRI Meeting Agenda to determine if shear limits need to be established.

ACTION ITEM: PRI to develop a letter to SAE TC3 Committee to the attention of Jerry Mount and copy Jim Linden of General Motors requesting that the SAE TC3 Committee identify a test which will exhibit better correlation with the loss in viscosity.

7.3 Removal of Channel Point Testing from J2360

ACTION ITEM: A.Comfort to remove the Channel Point Testing from the draft J2360 prior to PRI distributing the document for review and comment by the LRI Committee members.

8.0 Adjournment

NOTE: 40-Day Corrections are due to PRI by Tuesday, June 21, 2011.
The next LRI Committee Meeting will be held Thursday, August 11, 2011 at the PRI Headquarters in Warrendale, Pennsylvania.

Presenters are requested to provide an expected date of field test completion and presentation to the LRI Committee by contacting the PRI Staff (Wendy Grubbs – wendyg@sae.org or 724/772-8647).

Minutes prepared by Wendy Grubbs

***** For PRI Staff use only: ******		
Are procedural/form changes required based on changes/actions approved during this meeting? (select one) YES* ☒ NO ☐ *If yes, the following information is required:		
Documents requiring revision: PD4000	Who is responsible: W. Grubbs	Due date: 5/20/11

ASTM Update
to the
LRI Gear Oil Review Committee

May 12, 2011

J. L. Gropp

Chairman, ASTM Section D02.B0.03

Status of the ASTM D 7038 (L-33-1) Test

- Test availability and operation
  - Test stands available at multiple labs
  - No known test stand-related problems

- Hardware
  - Adequate supplies of hardware available

Status of the ASTM D 6121 (L-37) Test

- Test availability and operation
  - Test stands available at multiple labs
  - No known test stand-related problems
  - Test severity (with approved hardware) at historic levels

- Hardware: Non-lubrited
  - Adequate supplies of hardware available

Status of the ASTM D 6121 (L-37) Test, continued

- Hardware: Lubrited
  - Shortage of hardware continues to be a concern
  - Manufacturer produced a new pilot batch of hardware with optimized geometry, heat-treating, lapping, etc.
    - Results of initial evaluation mixed - Generally encouraging, but some failures on one of the good reference oils at one lab
    - Additional testing will be conducted
    - May conduct testing under modified test conditions as a contingency
  - Manufacturer also producing a “companion” batch of hardware where only the ring has been lubrited
    - Will conduct limited testing as a contingency
  - Manufacturer has been instructed to proceed with manufacture of the full batch of hardware
    - Approximately 2000 pinions and rings
    - Some portion of batch will be lubrited, remainder will remain as non-lubrited
    - Decision on lubriting – both pinion and ring or ring only – will be made based upon results of above testing
    - Intent is to have hardware available and approved before end of the year

Status of the ASTM D 6121 (L-37) Test, continued

- Next-generation Test
  - Surveillance Panel beginning work on development of next-generation test
  - Two laboratories have (independently) conducted some initial evaluations
    - One lab evaluated ground gears from Gleason using a fired engine test stand
      - Follow-up work will be conducted in an electric motor-driven test stand
    - One lab evaluated current production hardware from American Axle using an electric motor-driven test stand
    - Both labs evaluated both lubrited and non-lubrited hardware
    - Both labs were able to distinguish between good and poor-performing oils (as determined by performance in the L-37 test)
    - Additional testing will be conducted in each stand/procedure/hardware
  - Task Force has been formed to coordinate future investigations and test-development work
  - Goal is to have a procedural outline finalized in late CY 2011 or early CY 2012

Status of the ASTM D 7452 (L-42) Test

- Test availability and operation
  - Test stands available at multiple labs
  - No known test stand-related problems
  - Test severity at historic levels

- Hardware
  - Most labs have sufficient hardware to last through late CY 2011
    - Possibly somewhat longer
  - One lab has nearly depleted their inventory of hardware
  - Labs have placed order for new batch
    - Will be manufactured at same location as previous batches, but assembled at a new location
    - Task Force visited new assembly location and was very encouraged by the level of interest being expressed
  - New batch should be available and approved in 4th quarter of CY 2011

Status of the ASTM D 5704 (L-60-1) Test

- Test availability and operation
  - Test stands available at multiple labs
  - No known test stand-related problems

- Test severity
  - ASTM Test Monitoring Center visited labs to determine cause behind severity alarms (severe) for Insolubles
    - Identified several areas for improvement in ASTM D893 Test Method
    - Working within ASTM to incorporate changes/improvements in the ASTM D893 Test Method

- Hardware
  - Adequate supplies of hardware available
  - Surveillance Panel beginning process of ordering new batch of hardware

Status of the ASTM D 5579 (Cyclic Durability) Test

- Test availability and operation
  - Currently only one test stand available within the industry
    - Test stand at second lab being relocated
    - Timing for availability of second stand uncertain
  - No known stand-related problems
  - Test severity at historic levels

- Hardware
  - Adequate supplies of hardware available
    - Industry recently received new batch of hardware
    - Hardware being introduced as stands are due for calibration
    - Initial results on both good and poor reference oil fell within current reference oil acceptance bands

Status of the ASTM D 5662 (Oil Seal Compatibility) Test

- Test availability and operation
  - Baths available at two labs
  - No known “stand” (bath) related problems
  - Test severity at historic levels

- Hardware
  - Adequate supplies of elastomer available
  - Will evaluate new elastomers which may be more representative of current production materials

- Reference Oils
  - Adequate supplies of reference oils are available
  - Developing data on replacement for TMC 161 (which will not be available in the future)

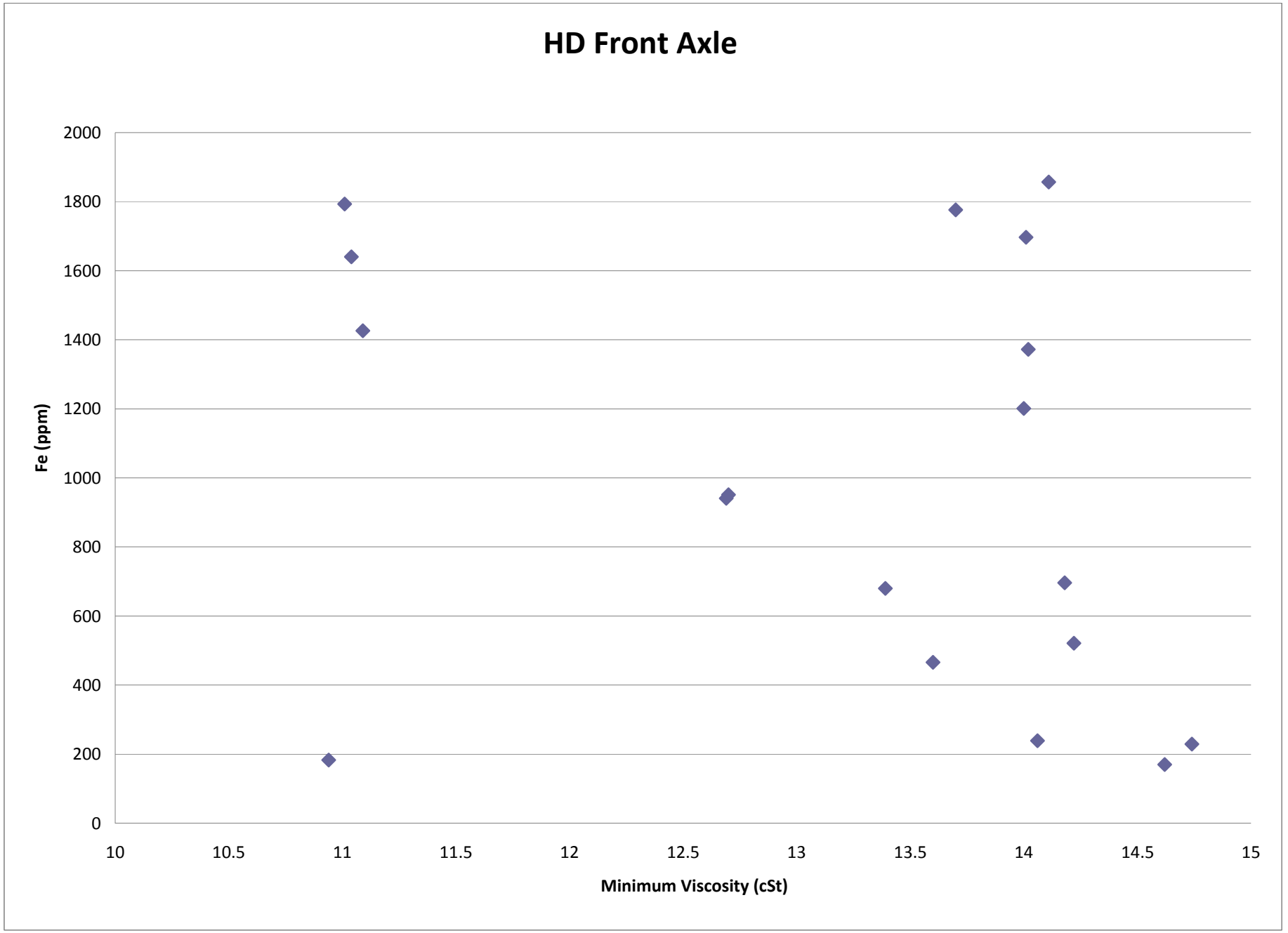
Update on Proposed Category PM-2

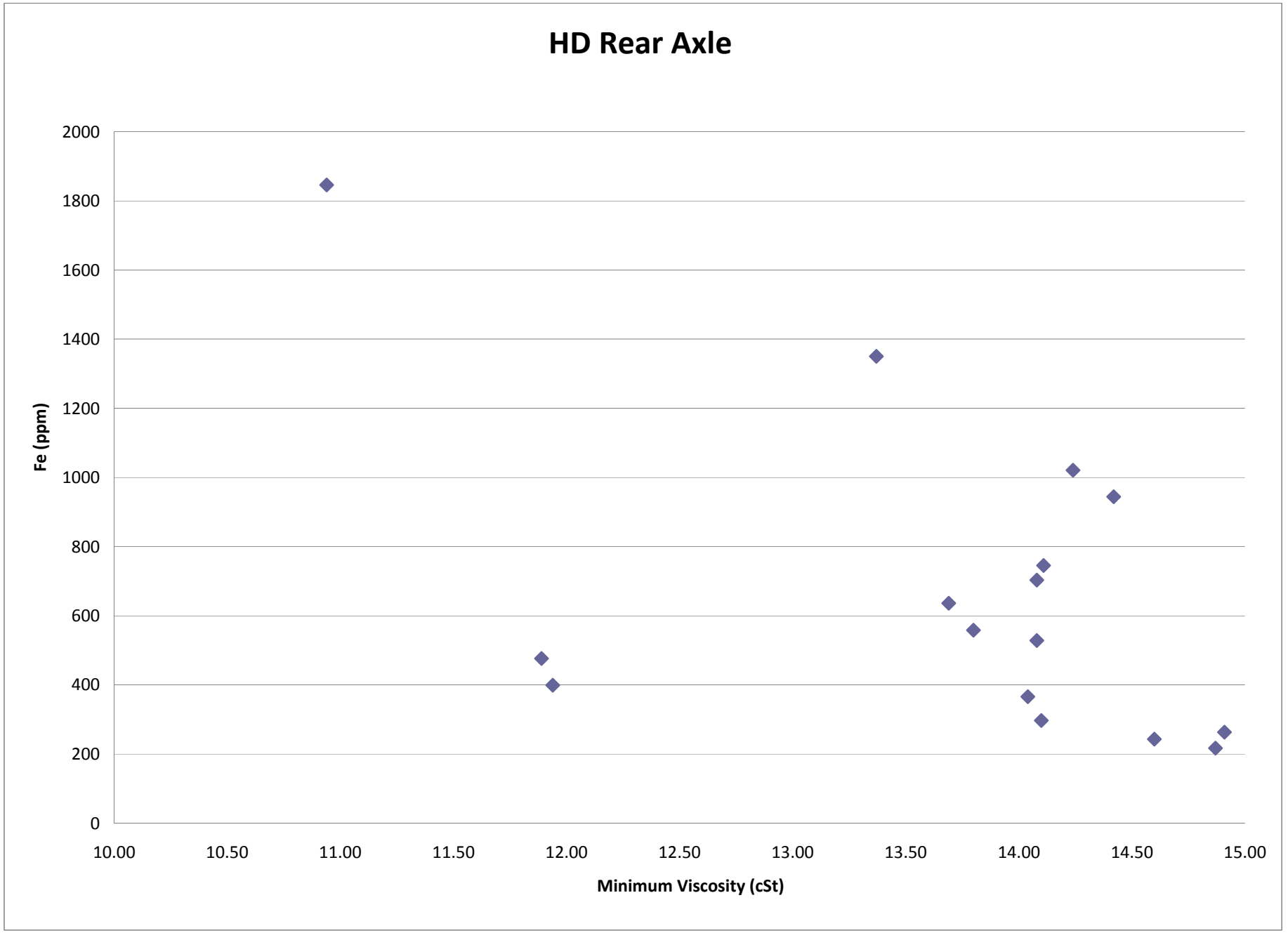
- New performance category to define lubricants for commercial vehicle synchromesh manual transmissions and transaxles
  - Service fill applications

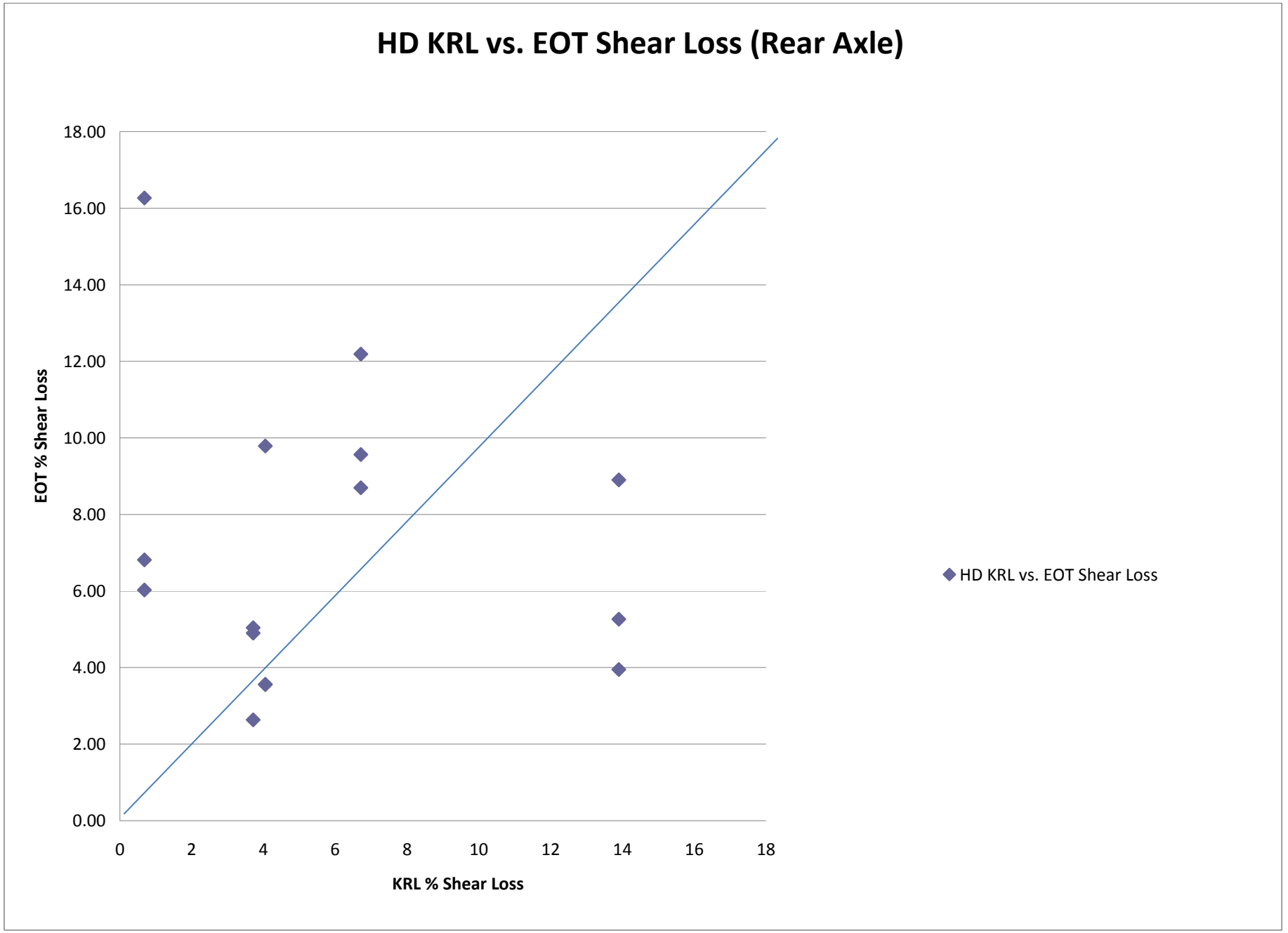
- Work on development of this Category has been suspended
  - Task Force unable to identify a standardized pitting test which will be universally accepted
  - Also unable to identify oils with known acceptable and unacceptable performance in the field
  - Response to industry requests for support/assistance on both items has been minimal

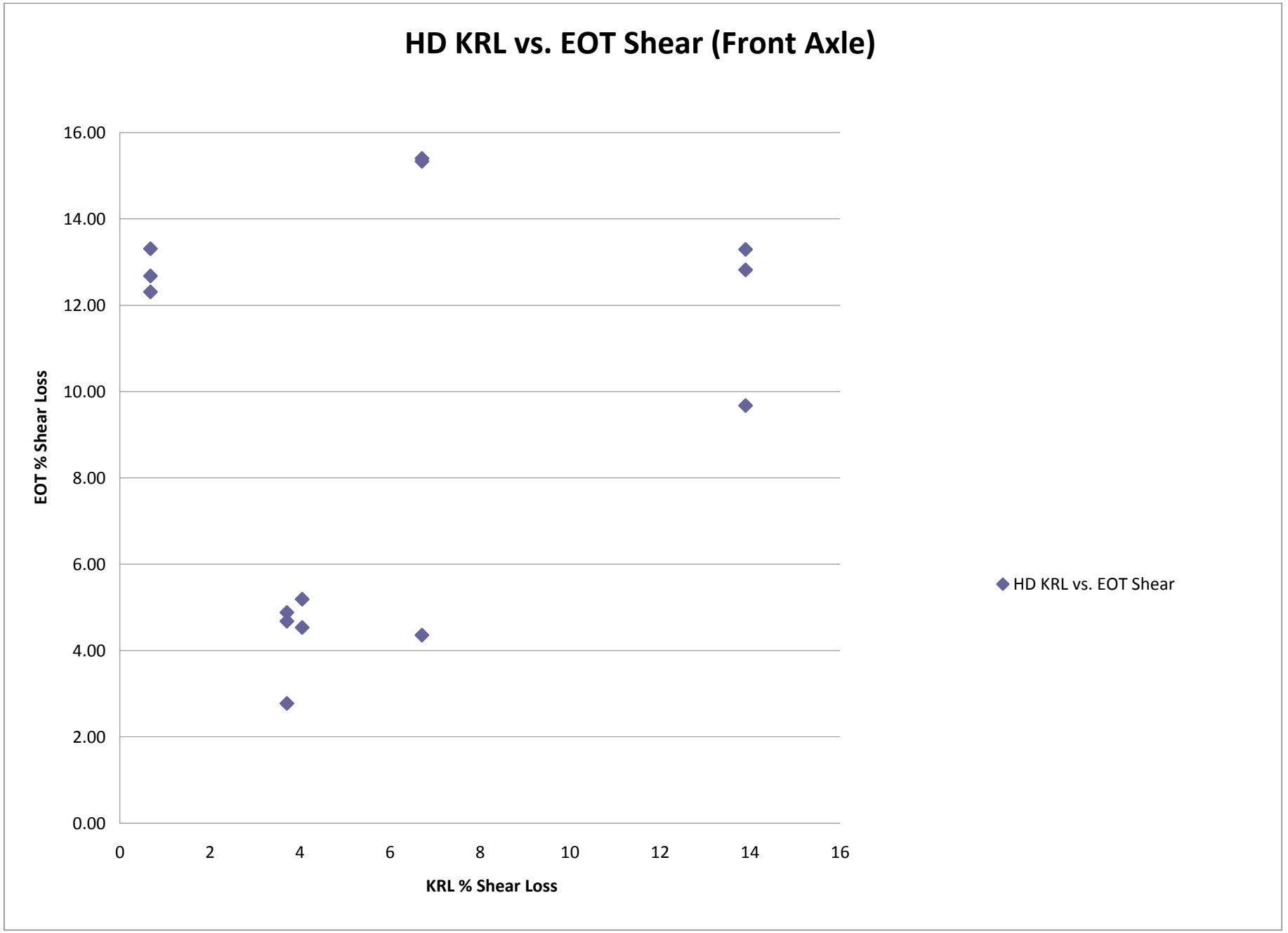
- SAE Technical Committee 3 has been requested to revalidate the interest in and need for this Category
  - Indications are that the need for this Category no longer exists
  - Awaiting formal response from SAE TC3

					Front Axle						Rear Axle					
Grade	Year	KV @100C	KRL % Shear	Truck No.	KV @100C 0 Miles	KV @100C 200K Miles	KV @100C Min.	% Shear	Fe @ EOT (PPM)	Cu @ EOT (PPM)	KV @100C 0 Miles	KV @100C 200K Miles	KV @100C Min.	% Shear	Fe @ EOT (PPM)	Cu @ EOT (PPM)
75W-90	2002	15.07	4.05	1	15.42	15.42	14.62	5.19	170	19	15.44	15.38	14.91	3.55	263	3
			4.05	2	15.44	14.78	14.74	4.53	229	17	15.48	14.91	14.10	9.79	297	5
			4.05	3	15.41	14.93	10.94	29.01	183	47	15.40	14.89	14.87	3.56	217	2
75W-90	2000	16.6	13.9	1	15.80	14.00	13.70	13.29	1776	9	16.00	15.20	15.20	5.26	150	1
			13.9	2	15.50	14.20	14.00	9.68	1201	6	15.80	15.40	15.20	3.95	235	2
			13.9	3	15.60	14.40	13.60	12.82	466	5	15.90	15.50	14.60	8.90	243	3
70W-85	2006	12.64	0.68	1	12.59	11.04	11.04	12.31	1640	460	12.66	11.96	11.94	6.03	399	2
			0.68	2	12.7	11.09	11.09	12.68	1426	520	12.70	11.89	11.89	6.81	476	2
			0.68	3	12.7	12.1	11.01	13.31	1793	276	12.72	10.94	10.94	16.27	1846	264
80W-90	2004	14.82	3.71	1	14.75	14.41	14.06	4.68	239	52	14.79	14.30	14.08	5.04	528	3
			3.71	2	14.41	14.16	14.01	2.78	1697	159	14.41	14.10	14.04	2.64	366	3
			3.71	3	14.74	14.08	14.02	4.88	1372	75	14.77	14.35	14.08	4.90	703	3
80W-90	2010	14.5		1	14.59	14.34	14.11	3.29	1857	4	14.48	14.11	14.11	2.62	745	258
				2	14.5	14.25	14.18	2.21	696	232	14.50	14.42	14.42	0.55	944	2
				3	14.5	14.22	14.22	1.93	521	242	14.51	14.24	14.24	1.90	1021	2
75W-90	2010	14.9	6.71	1	15.00	12.69	12.69	15.40	941	66	15.00	13.49	13.37	12.19	1350	8
			6.71	2	15.00	12.70	12.70	15.33	951	74	15.00	13.70	13.69	9.57	636	2
			6.71	3	14.00	13.39	13.39	4.36	680	83	15.00	13.85	13.80	8.70	558	3

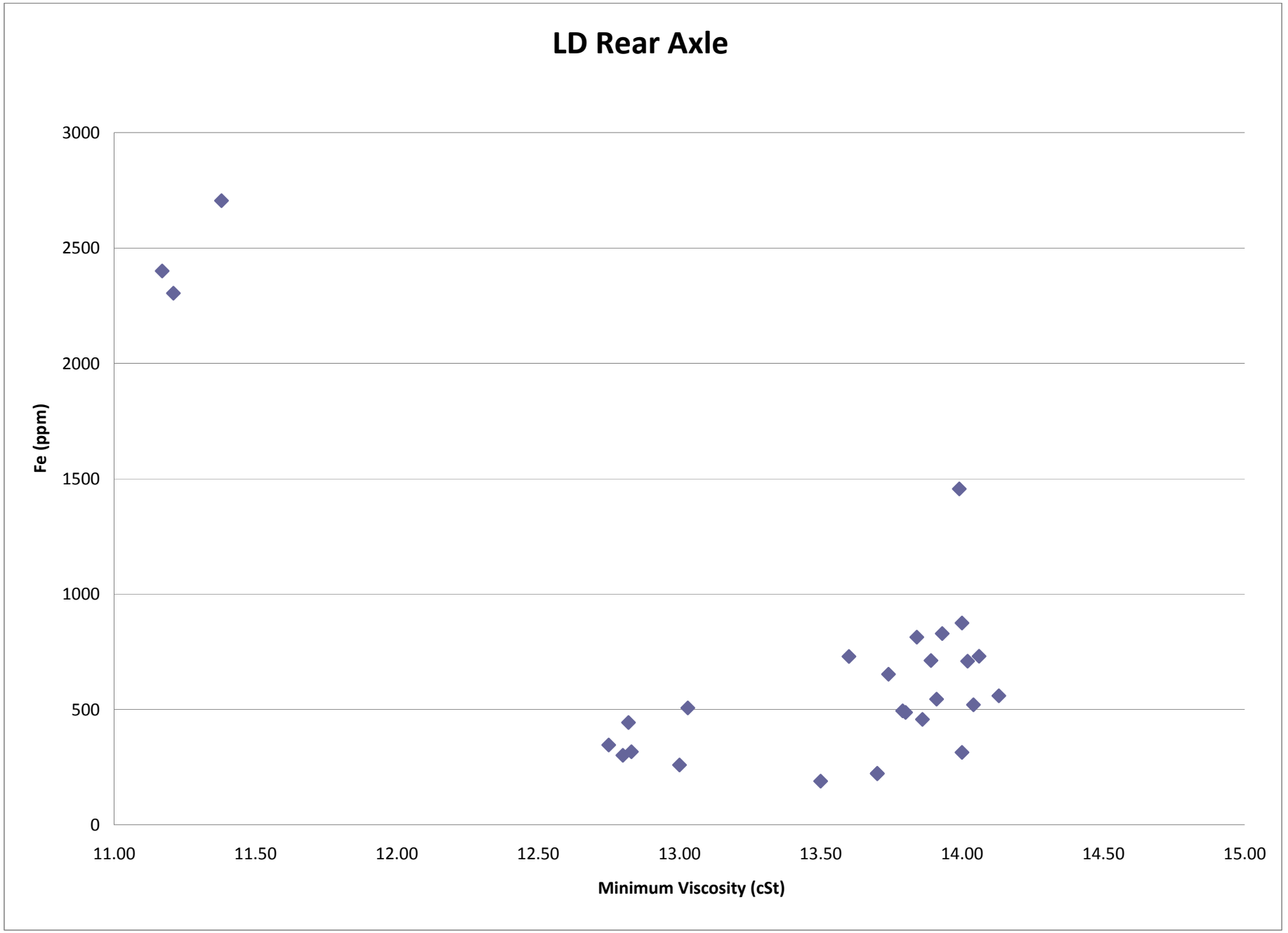

HD Front Axle
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Fe (ppm)
10
10.5
11
11.5
12
12.5
13
13.5
14
14.5
15
Minimum Viscosity (cSt)

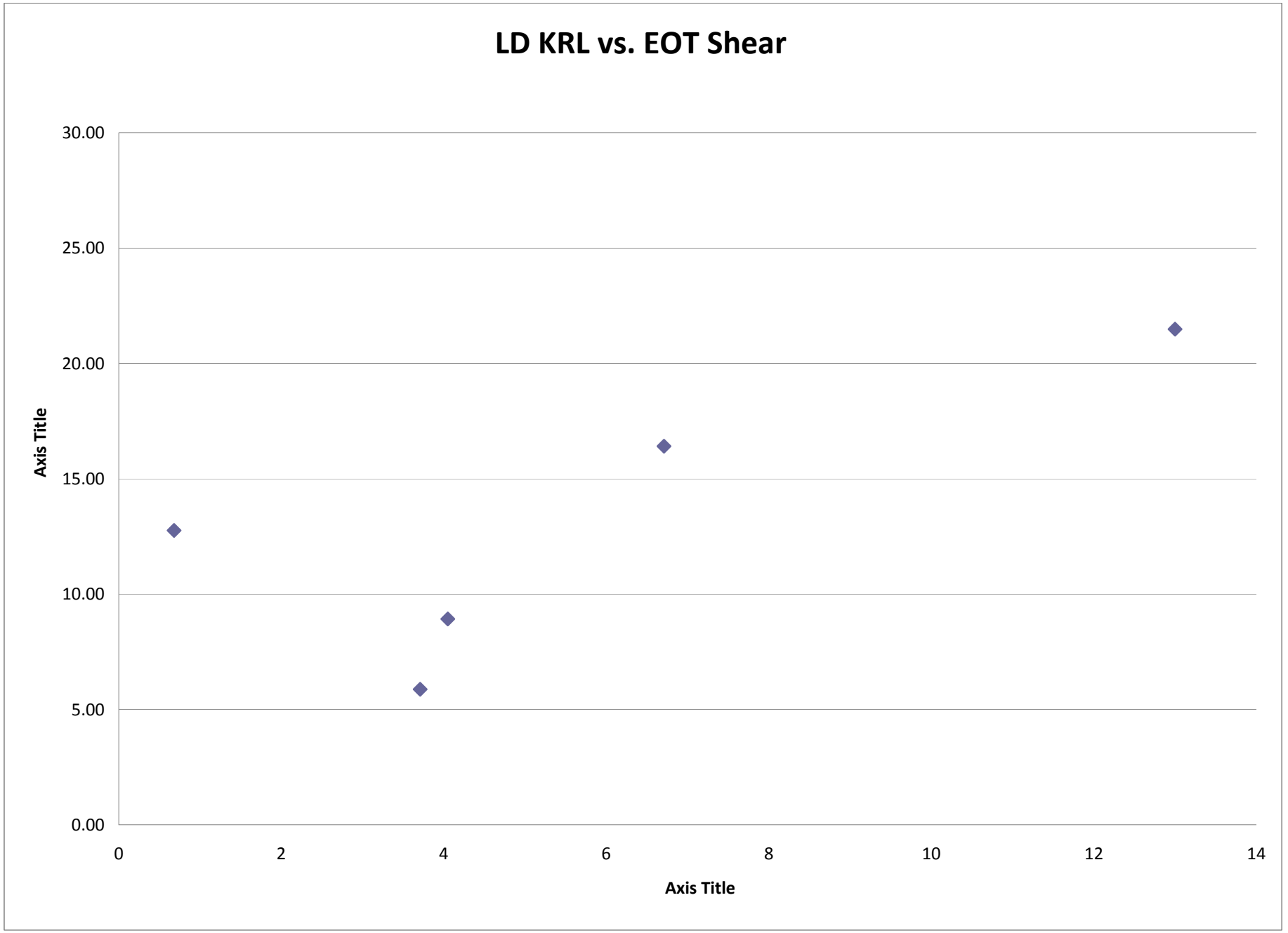

HD Rear Axle
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Fe (ppm)
10.00
10.50
11.00
11.50
12.00
12.50
13.00
13.50
14.00
14.50
15.00
Minimum Viscosity (cSt)


HD KRL vs. EOT Shear Loss (Rear Axle)
EOT % Shear Loss
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0
2
4
6
8
10
12
14
16
18
KRL % Shear Loss
HD KRL vs. EOT Shear Loss


HD KRL vs. EOT Shear (Front Axle)
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
EOT % Shear Loss
0
2
4
6
8
10
12
14
16
KRL % Shear Loss
HD KRL vs. EOT Shear

					Rear Axle					
Grade	**Date**	**KV @100C**	**KRL % Shear**	**Vehicle No.**	**KV @100C 0 Miles**	**KV @100C 100K Miles**	**KV @100C Min.**	**% Shear**	**Fe @ EOT (PPM)**	**Cu @ EOT (PPM)**
75W-90	2002	15.07	4.05	1	15.39	14.15	14.13	8.92	559	4
				2	15.42	14.33	14.04	9.83	520	4
				3	15.45	14.02	14.02	10.20	709	5
				4	15.41	13.74	13.74	12.15	652	5
				5	15.35	14.07	13.99	9.72	1456	5
75W-90	2000	16.6	13	1	16.40	13.50	13.50	21.48	189	0
				2	16.40	13.70	13.70	19.71	221	0
				3	16.40	13.00	13.00	26.15	259	0
				4	16.40	14.00	14.00	17.14	314	0
				5	16.40	13.70	13.70	19.71	223	0
70W-85	2006	12.64	0.68	1	12.64	11.21	11.21	12.76	2304	4
				2	12.64	11.17	11.17	13.16	2400	4
				3	12.64	11.38	11.38	11.07	2705	5
				4	12.64					
				5	12.64					
80W-90	2004	14.82	3.71	1	14.61	13.91	13.80	5.87	487	3
				2	14.60	13.94	13.79	5.87	494	4
				3	14.61	14.08	13.93	4.88	829	5
				4	14.60	13.89	13.86	5.34	457	4
				5	14.59	14.05	13.91	4.89	544	4
80W-90	2010	14.5		1	14.42	13.60	13.60	6.03	729	4
				2	14.42	13.84	13.84	4.19	813	2
				3	14.42	14.06	14.06	2.56	730	2
				4	14.42	13.89	13.89	3.82	712	3
				5	14.42	14.00	14.00	3.00	874	4
75W-90	2010	14.9	6.71	1	14.90	12.80	12.80	16.41	301	6
				2	14.99	12.90	12.82	16.93	443	8
				3	14.81	13.03	13.03	13.66	506	7
				4	15.16	12.75	12.75	18.90	346	6
				5	14.79	12.83	12.83	15.28	316	6


LD Rear Axle
3000
2500
2000
1500
1000
500
0
Fe (ppm)
11.00
11.50
12.00
12.50
13.00
13.50
14.00
14.50
15.00
Minimum Viscosity (cSt)


LD KRL vs. EOT Shear
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Axis Title
0
2
4
6
8
10
12
14
Axis Title