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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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February 24, 2011

Reply to:
Rick Graziano
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ricki.graziano@lubrizol.com

ASTM D02.B0.03 L-60-1 Surveillance Panel
Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the February 9, 2011 L-60-1 Surveillance Panel meeting held at the PRI Facility in Warrendale, PA. Please direct any corrections or comments to my attention.

Sincerely,

Rick Graziano
Chairman
L-60-1 Surveillance Panel

Attachments

Report of Meeting
L-60-1 Surveillance Panel Teleconference Call
May 12, 2010

Attendees

Galen Greene
Sam Higuchi (by phone)
Thelma Marougy
Don Bell
Rick Graziano
Dale Smith
Brian Koehler
Scott Parke
Jerry Gropp
Wes Vehhoff
Mike Birke (by phone)
John Dharte
Khaled Zreik
Carol Warner (by phone)

Note: L-60-1 SP voting members in **BOLD**

Sign in
The sign-in sheet is included (see attachment).

Review of Meeting Agenda
The meeting agenda is included (see attachment).

Approval of minutes

- May 12, 2010 L-60-1 Surveillance Panel Meeting

Motion 1 ⇒-Motion by Mr. Smith/Second Mr. Koehler, minutes approved. Vote 5-0-0.

Meeting Discussion

D893 Review by TMC:

Mr.Parke from the TMC reviewed and presented the findings from their TMC Lab Audit visit to the testing labs. There appears to be some ambiguities.
Mike Birke, from SWRI, offered to send around some proposed changes to the DD893 procedure that he has been working on for review by the Surveillance Panel.
Action Item: Findings (see attachment) will be sent out to the L-60-1 SP by Mr. Parke to allow the labs to comment on and propose any changes to the D893 procedure. Recommendations are to be made to the Chairman within 30 days of the minutes of going out. The SP will review proposed changes. Once agreement is reached the panel will make suggestions for revisions.

Review rating experiment and workshop data:

Mr.Parke from the TMC reviewed the workshop data (see attachment) comparing the current procedure and the proposed jig. Data has been compiled from three workshops (January 2010, July 2010 and January 2011). Present data shows no real difference in average ratings.
Motion 2 ⇒- Motion by Mr. Smith/Second by Mr. Graziano to conduct exercise at the July 2011 workshop and review at the November L-60-1 SP meeting. Vote 4-0-2.

Review section 8.4.1, carbide paper use for gear preparation:

Mr. Higuchi asked are the labs using one piece of carbide paper, or are they using a piece until it gets "dull", then getting a new piece? He stated that there technician says the carbide paper dulls fairly quickly and then is then forced to keep sanding using the same dull piece. Does this excessive sanding cause more harm than good?

Labs shared that they are currently using one sheet of paper per gear (per procedure) and a used or new paper for catalyst strip preparation.
Mr. Parke shared that during their visits to the labs they looked at samples from each lab with no differences or issues.
Action Item: Mr. Higuchi to write up a proposed revision to section 8.4. When completed the chairman will send out to the voting members for review.
From that point a teleconference will be scheduled to review change and vote on possible addition to the procedure as an information letter.

Discuss Test Gear inventory supply:

All labs report that they have sufficient inventory available. The labs will continue to report on inventory at future meetings.

New business

None

Adjournment

Being no further business, the meeting was adjourned.

Respectfully submitted,

Ricki P. Graziano
L-60-1 Surveillance Panel Chairman

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: May 12, 2010

Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
	Anderson, Greg	Non-voting	Falex Corporation 1020 Airpark Drive Sugar Grove, Illinois 60554-9585	Phone: 630-556-3669 Fax: 630-556-3679 E-Mail:
SP	Parke, Scott	Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pensylvania 15206	Phone: 412-365-1036 Fax: 412-365-1047 E-Mail: sdp@astmtmc.cmu.edu
	Bridget Dwornick	Non-voting	US Army RDECOM.TARDEC,TDTA-DP/MS110 6501 E 11 Mile Rd. Warren, MI 48397-5000	Phone: 586-282-4221 Fax: 586-282-4244 E-Mail: bridget.dwornick@us.army.mil
DB	Bell, Don	Non-voting	Afton Chemical Corporation 500 Spring Street Richmond, Virginia 23219	Phone: 804-788-6332 Fax: 804-788-6342 E-Mail: Don.Bell@aftonchemical.com
	Bryson, Tom	Voting	Mack Trucks 13302 Pennsylvania Avenue Hagerstown, Maryland 21740	Phone: 301-790-5454 Fax: 301-790-6744 E-Mail: tom.bryson@macktrucks.com
	Chambers, Harold	Non-voting	43945 Merrill Rd. Sterling Hts., MI 48314	Phone: (586) 770-4694 Fax: E-Mail: haroldchambers@gmail.com
	WES VENHOFF	NON	LUBRIZOL	440-347-4879 WVE@LUBRIZOL.COM
	SCOTT PARKE	VOTING	ASTM TMC	412-365-1036 SDP@ASTMTMC.CMU.EDU
	Mike Birke	Non (Guest)	SwRI	210-522-5310
	Khaled	Non voting	GM	248-977-9214

* Initial to indicate attendance at subject meeting

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: May 12, 2010

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	Kearney, Bill	Non-voting	Afton Chemical Southfield, MI	Phone: 248-302-8531 Fax: E-Mail: bill.kearney@aftonchemical.com
	Eliot, Stephen W.	Non-Voting	Commercial Vehicle Lubricants ExxonMobil Lubricants & Specialties Leesburg, Virginia	Phone: 703-669-9916 Fax: 703-669-9917 E-Mail: stephen.w.eliot@exxonmobil.com
	Farber, Frank	Non-voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pensylvania 15206	Phone: 412-365-1030 Fax: 412-365-1047 E-Mail: fmf@astmtmc.cmu.edu
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ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: May 12, 2010

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	Haire, Mike	~~Voting~~	Chevron ~~100 Chevron Way~~ Richmond, California, 94802	Phone: 510-242-2740 Fax: 804-788-6358 E-Mail: mhaire@chevron.com
SH	Higuchi, Sam	Voting	Afton Chemical Corporation 500 Spring Street Richmond, Virginia 23219	Phone: 804-788-5375 Fax: 804-788-6358 E-Mail: samuael.higuchi@aftonchemical.com

By Phone

* Initial to indicate attendance at subject meeting

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: May 12, 2010

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ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: May 12, 2010

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	Rettmann, Kevin	Non-voting	~~PerkinElmer Fluid Sciences~~ Intertek Automotive Research 5404 Bandera Road San Antonio, Texas 78238	Phone: 210-706-1546 Fax: 210-523-4614 E-Mail: Kevin.Rettmann@perkinelmer.com
	Shah, Rajesh	Non-voting	Koehler Instrument Company 1595 Sycamore Avenue Bohemia, New York 11716	Phone: 516-589-3800 Fax: 516-589-3815 E-Mail:
	Smith, Dale	~~Non-voting~~ Voting	~~Parc Technical Services Inc.~~ Intertek Automotive Research ~~100 William Pitt Way~~ ~~Pittsburgh, Pennsylvania 15238~~ 5404 Bandera Road San Antonio TX 78238	Phone: ~~412-423-1120 X 403~~ 412 826 6854 Fax: ~~412-826-5444~~ 210-523-4614 E-Mail: Dale.Smith@intertek.com
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Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
	Ved, shintan	Non-voting	Ford- Trans & Driveline Lubrication 35500 Plymouth Rd. Livonia, MI 48150	Phone: 313-805-9695 Fax: 267-220-7750 E-Mail: cved@ford.com
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	Mr. Wen Tung Lu	Non-voting	Research Institute of Petroleun (RIPP) No. 18 Xue Yuan Rd. PO Box 914-19 Beijing, China	Phone: 011-86-10-8236-8182 Fax: 011-86-139-1117-7663 E-Mail: luwt@ripp-sinopec.com
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	Mr. Jing Chun Xie	Non-voting	Engine Test Lab Lanzhou Lube Oil R&D Institute No. 369 Yu Men St. XiGu Dist. Lanzhou 730060 GanSu Prov. China	Phone: 011-86-931-793-3713 Fax: 011-86-139-9319-2560 E-Mail: xjc@luberdi.com.cn

* Initial to indicate attendance at subject meeting

L-60-1 Surveillance Panel

February 9th, 2011
10:30 am-12:00 pm EST
PRI Apollo Room – Warrendale, PA

Agenda

I. Call to order

II. Membership and agenda review

III. Approval of meeting minutes
- May 12th, 2010

IV. Discuss summary of findings for the D893 review conducted by the TMC.

V. Review Rating Experiment and workshop data.

VI. Review section 8.4.1. Carbide paper use for gear preparation.

VII. Discuss Test Gear inventory supply.

VIII. New business

IX. Adjournment

*** For those not traveling to Warrendale, the call in number will be 216-706-7052 code 324160**

D 893 Comparison Across Labs

	X	Y	Z	D 893
Oil drain interval	30 min drain	30 min from EOT	30 min drain	30 min drain (D 5704)
Sample collection bottle	Glass	Glass	Nalgene	8.2 Heat the sample of used oil to 60 ± 5°C in the original container and agitate until all sediment is homogeneously suspended in the oil. If the original container is of opaque material, or if it is more than three-fourths full, transfer the entire sample to a clear glass bottle having a capacity at least one third greater than the volume of the sample, and transfer all traces of sediment from the original container to the bottle by violent agitation of portions of the sample in the original container. After complete suspension of all sediment, strain the sample or a convenient aliquot through a 150-µm (No. 100) sieve to remove large contaminating particles.
Homogenization	Heated at 60C for 30-40 min; shaken vigorously by hand for 3 minutes	Heated at 60C in shaker table for 60 min then allowed to cool for 20 minutes.	Heated at 60C for 30 min; shaken vigorously by hand then placed on shaker table for 3 min.	
Straining	Apx 40ml poured from sample jar through strainer into a plastic cup.	Sample drawn from sample jar into syringe. Millipore filter attached to syringe and sample is forced through filter until 10mg is collected in weighed centrifuge tube.	Sample drawn from sample jar into syringe. Millipore filter attached to syringe and sample is forced through filter into a sample cup until 25ml of strained sample is collected.	
1st centrifuge tube pentane fill	Filled to 100ml, stoppered, and shaken. Stoppers not rinsed when removed; they will be returned to the same tube.	Filled short of 100ml, stoppered, and shaken. Stopper removed and rinsed with pentane until 100ml mark is met.	Filled to 100ml, stoppered, and shaken. Stopper removed and rinsed into tube. Each of two tubes placed in balance and additional pentane added to the lighter tube until tubes balance.	9.1.1 … fill to the 100-mL mark with pentane. Stopper the tube and shake until the mixture is homogeneous. 9.1.2 Remove the stopper, and using a wash bottle having a fine jet, wash all insolubles from the stopper into the centrifuge tube with a minimum of pentane. Balance the weights of each pair of filled centrifuge tubes, place them in the centrifuge on opposite sides of the head, and centrifuge for 20 ± 1 min….
2nd and 3rd centrifuge tube pentane fill	50ml of pentane added to tubes; solids broken up with wire; tube stoppered and shaken. No rinse of wire or stoppers.	10ml of pentane added to tubes; solids broken up with wire; wire rinsed into tube; tube filled short of 50ml; stoppered and shaken. Stopper	50ml of pentane added to tubes; solids broken up with wire; wire rinsed into tube; tube stoppered and shaken. Stopper removed and rinsed with	9.1.3 Add 10 ± 1 mL of pentane to the tube. Dislodge and break up all of the insolubles from the bottom of the tube by means of a clean stiff wire. Wash all insolubles adhering to the wire back into the tube with pentane, filling the tube to the 50-mL mark. Stopper

	X	Y	Z	D 893
		removed and rinsed with pentane until 50ml mark is met.	pentane. Each of two tubes placed in balance and additional pentane added to the lighter tube until tubes balance. Final volume: 53~57ml.	the tube and shake until the mixture is homogeneous. Remove and wash the stopper.
Drying of pentane sample	Centrifuge tube placed in dessicator to await completion of toluene sample.	Centrifuge tube placed in oven at 105C to dry for 30 min.	Centrifuge tube placed in oven at 105C to dry for 30 min.	9.1.5 Dry the centrifuge tube containing the washed precipitate for 30 min at 105 ± 3°C, cool in desiccator, and weigh to the nearest 1 mg.
1st centrifuge toluene fill	50ml of toluene/alcohol added to tube; solids broken up with wire; tube stoppered and shaken. No rinse of wire or stopper.	10ml of toluene/alcohol added to tube; solids broken up with wire; wire rinsed into tube; tube filled short of 50ml; stoppered and shaken. Stopper removed and rinsed with toluene/alcohol until 50ml mark is met.	50ml of toluene/alcohol added to tube; solids broken up with wire; wire rinsed into tube with toluene; tube stoppered and shaken. Stopper removed and rinsed with toluene. The tube and a dummy containing 50ml of water are placed in balance and additional toluene or water (as appropriate) are added to the lighter tube until tubes balance. Final volume: 53~57ml.	9.2.2 Add 10 ± 1 mL of toluene-alcohol solution. Break up and dislodge all of the insolubles from the bottom of the centrifuge tube by means of a clean, stiff wire. Wash any insolubles adhering to the wire back into the tube with toluene-alcohol solution, using a sufficient amount of this solvent to fill the tube to the 50-mL mark. Stopper the tube and shake until the mixture is homogeneous. Remove the stopper and wash the adhering insolubles back into the tube with a minimum amount of toluene.
1st toluene centrifuge duration	20 min.	20 min.	15 min.	9.2.2 (cont.) Centrifuge until no visible insolubles remain in suspension in the solvent; 10 to 20 min are usually sufficient.
2nd centrifuge toluene fill	50ml of toluene added to tube; solids broken up with wire; tube stoppered and shaken. If necessary, stopper is rinsed with toluene.	10ml of toluene added to tube; solids broken up with wire; wire rinsed into tube with toluene; tube filled short of 50ml; stoppered and shaken. Stopper removed and	50ml of toluene added to tube; solids broken up with wire; wire rinsed into tube with toluene; tube stoppered and shaken. Stopper removed and rinsed with toluene.	9.2.3 Repeat the washing procedure described in 9.2.2, substituting toluene for the toluene-alcohol solution.

	X	Y	Z	D 893
		rinsed with toluene until 50ml mark is met.	The tube and a dummy containing 50ml of water are placed in balance and additional toluene or water (as appropriate) are added to the lighter tube until tubes balance. Final volume: 53~57ml.	
2nd toluene centrifuge duration	20 min.	20 min.	15 min.	9.2.2 (cont.) Centrifuge until no visible insolubles remain in suspension in the solvent; 10 to 20 min are usually sufficient.
Drying of toluene sample	Both pentane and toluene centrifuge tubes placed in oven at 105C to dry for 30 min. Oven temp fluctuated, regularly dropping as low as 98C.	Centrifuge tube placed in oven at 105C to dry for 60 min.	Centrifuge tube placed in oven at 105C to dry for 60 min.	9.2.4 Dry for 1 h at 105 ± 3 °C…
Cool and weigh	Samples placed in dessicator overnight to cool. Weighed the next morning.	Samples placed in dessicator to cool.	Samples placed in dessicator to cool.	9.2.4 (cont.) …cool in a desiccator, and weigh to the nearest 1 mg.

L60-1 Rating Jig Comparison

			Raters														
workshop	method	id	7	10	11	16	22	25	27	29	30	33	34	35	MIN	MAX	AVG	Std Dev
2010 July	Current	1		8.45	9.35			8.88		9.55	9.28				8.45	9.55	9.10	0.438
2010 July	Jig	1		9.08	9.30			8.94		9.35	9.08				8.94	9.35	9.15	0.171
2010 July	Current	2		8.10	8.40			8.75		8.70	9.01		9.40		8.10	9.40	8.73	0.455
2010 July	Jig	2		7.80	8.15			8.11		7.90	8.18				7.80	8.18	8.03	0.168
2010 July	Current	3		9.03	8.65			8.97		8.48	9.05		9.19		8.48	9.19	8.90	0.271
2010 July	Jig	3		8.57	8.87			8.60		8.70	8.98		9.67		8.57	9.67	8.90	0.410
2010 July	Current	4		8.95	8.50			8.45		8.15	8.40		8.85		8.15	8.95	8.55	0.298
2010 July	Jig	4		8.00	8.23			7.98		7.65	8.50		9.57		7.65	9.57	8.32	0.674
2010 July	Current	6		8.25	9.10			8.78		8.40	9.08				8.25	9.10	8.72	0.388
2010 July	Jig	6		8.38	9.10			8.83		9.00	8.77				8.38	9.10	8.82	0.277
2010 July	Current	7		8.25	9.05			8.74		9.00	9.15				8.25	9.15	8.84	0.362
2010 July	Jig	7		8.68	9.25			8.83		9.00	9.02				8.68	9.25	8.96	0.215
2010 July	Current	12		7.48	7.60			8.28		8.00	7.85				7.48	8.28	7.84	0.319
2010 July	Jig	12		7.45	7.75			8.32		7.60	7.25				7.25	8.32	7.67	0.406
2010 July	Current	19		8.10	8.70			8.28		8.29	8.86		8.88		8.10	8.88	8.52	0.336
2010 July	Jig	19		7.76	8.90			8.65		8.23	8.27		9.73		7.76	9.73	8.59	0.681
2010 July	Current	20		7.75	8.20			7.89		8.25	8.47		8.80		7.75	8.80	8.23	0.382
2010 July	Jig	20		7.60	8.60			8.49		8.08	7.98		9.60		7.60	9.60	8.39	0.694
2010 July	Current	21		9.10	9.30			8.85		9.10	9.22		9.25		8.85	9.30	9.14	0.162
2010 July	Jig	21		8.23	9.25			8.69		9.00	8.83		9.69		8.23	9.69	8.95	0.498

L60-1 Rating Jig Comparison

			Raters														
workshop	method	id	7	10	11	16	22	25	27	29	30	33	34	35	MIN	MAX	AVG	Std Dev
2011 January	Current	8	7.92	8.00		8.00	7.80		7.90		8.06		7.72	9.03	7.72	9.03	8.05	0.410
2011 January	Jig	8		8.06		7.80	7.75		7.80		7.55		9.00		7.55	9.00	7.99	0.519
2011 January	Current	9	7.96	8.51		8.06	6.98		6.8		8.13		7.4	8.3	6.8	8.51	7.77	0.630
2011 January	Jig	9		8.23		8.08	7		7.18		7.64		7.42		7	8.23	7.59	0.489
2011 January	Current	10	4.85	5.82		6.22	4.88		3.45		3.85		4.55	5.3	3.45	6.22	4.86	0.928
2011 January	Jig	10		5.29		4.95	5.1		3.22		3.84		5.2		3.22	5.29	4.60	0.859
2011 January	Current	11	5.82	5.29		5.70	5.10		5.75		5.36	0.60	5.82	4.40	4.40	5.82	5.34	0.459
2011 January	Jig	11		3.79		5.30	4.66		5.93		5.06		5.60		3.79	5.93	5.06	0.759
2011 January	Current	16	9.3	9.45		9	9.35		9.2		9.3		9.4	9.5	9	9.5	9.31	0.158
2011 January	Jig	16		9.35		9.3	9.65		9.7		9.26		9.66		9.26	9.7	9.49	0.204
2011 January	Current	18	9.00	9.35		9.80	9.00		9.80		9.75	9.00	9.80	9.00	9.00	9.80	9.39	0.364
2011 January	Jig	18		9.35		9.40	9.70		9.73		9.41		9.70		9.35	9.73	9.55	0.179
2011 January	Current	21	9.10	9.23		9.20	8.70		9.70		9.48	8.50	9.70	8.50	8.50	9.70	9.14	0.387
2011 January	Jig	21		9.10		9.10	9.30		9.65		9.00		9.70		9.00	9.70	9.31	0.301
2011 January	Current	24	9.6	9.4		9.3	9.65		9.7		9.28		9.38	9.9	9.28	9.9	9.53	0.220
2011 January	Jig	24		9.25		9.3	9.8		9.8		9.27		9.7		9.25	9.8	9.52	0.273
2011 January	Current	26	7.80	8.00		8.00	7.50		7.80		7.65	7.00	8.11	7.00	7.00	8.11	7.73	0.357
2011 January	Jig	26		8.20		8.10	7.70		7.90		8.04		7.62		7.62	8.20	7.93	0.230
2011 January	Current	28	8.1	8.1		7.93	7.65		7.9		7.56		7.45	8	7.45	8.1	7.83	0.246
2011 January	Jig	28		7.80		7.80	7.80		7.90		7.48		7.70		7.48	7.90	7.75	0.145

L60-1 Rating Jig Comparison

			Raters																
workshop	method	id	7	10	11	16	22	25	27	29	30	33	34	35	MIN	MAX	AVG	range	Std Dev	Std delta
2010 July	Current	2		8.10	8.40			8.75		8.70	9.01		9.40		8.10	9.40	8.73	1.30	0.455	0.287
2010 July	Jig	2		7.80	8.15			8.11		7.90	8.18				7.80	8.18	8.03	0.38	0.168	0.287
2010 July	Current	1		8.45	9.35			8.88		9.55	9.28				8.45	9.55	9.10	1.10	0.438	0.268
2010 July	Jig	1		9.08	9.30			8.94		9.35	9.08				8.94	9.35	9.15	0.41	0.171	0.268
2011 January	Current	18	9.00	9.35		9.80	9.00		9.80		9.75	9.00	9.80	9.00	9.00	9.80	9.39	0.80	0.364	0.185
2011 January	Jig	18		9.35		9.40	9.70		9.73		9.41		9.70		9.35	9.73	9.55	0.38	0.179	0.185
2010 July	Current	7		8.25	9.05			8.74		9.00	9.15				8.25	9.15	8.84	0.90	0.362	0.147
2010 July	Jig	7		8.68	9.25			8.83		9.00	9.02				8.68	9.25	8.96	0.57	0.215	0.147
2011 January	Current	9	7.96	8.51		8.06	6.98		6.8		8.13		7.4	8.3	6.8	8.51	7.77	1.71	0.630	0.141
2011 January	Jig	9		8.23		8.08	7		7.18		7.64		7.42		7	8.23	7.59	1.23	0.489	0.141
2011 January	Current	26	7.80	8.00		8.00	7.50		7.80		7.65	7.00	8.11	7.00	7.00	8.11	7.73	1.11	0.357	0.127
2011 January	Jig	26		8.20		8.10	7.70		7.90		8.04		7.62		7.62	8.20	7.93	0.58	0.230	0.127
2010 July	Current	6		8.25	9.10			8.78		8.40	9.08				8.25	9.10	8.72	0.85	0.388	0.111
2010 July	Jig	6		8.38	9.10			8.83		9.00	8.77				8.38	9.10	8.82	0.72	0.277	0.111
2011 January	Current	28	8.1	8.1		7.93	7.65		7.9		7.56		7.45	8	7.45	8.1	7.83	0.65	0.246	0.101
2011 January	Jig	28		7.80		7.80	7.80		7.90		7.48		7.70		7.48	7.90	7.75	0.42	0.145	0.101
2011 January	Current	21	9.10	9.23		9.20	8.70		9.70		9.48	8.50	9.70	8.50	8.50	9.70	9.14	1.20	0.387	0.086
2011 January	Jig	21		9.10		9.10	9.30		9.65		9.00		9.70		9.00	9.70	9.31	0.70	0.301	0.086
2011 January	Current	10	4.85	5.82		6.22	4.88		3.45		3.85		4.55	5.3	3.45	6.22	4.86	2.77	0.928	0.069
2011 January	Jig	10		5.29		4.95	5.1		3.22		3.84		5.2		3.22	5.29	4.60	2.07	0.859	0.069

L60-1 Rating Jig Comparison

			Raters																
workshop	method	id	7	10	11	16	22	25	27	29	30	33	34	35	MIN	MAX	AVG	range	Std Dev	Std delta
2011 January	Current	16	9.3	9.45		9	9.35		9.2		9.3		9.4	9.5	9	9.5	9.31	0.50	0.158	-0.046
2011 January	Jig	16		9.35		9.3	9.65		9.7		9.26		9.66		9.26	9.7	9.49	0.44	0.204	-0.046
2011 January	Current	24	9.6	9.4		9.3	9.65		9.7		9.28		9.38	9.9	9.28	9.9	9.53	0.62	0.220	-0.053
2011 January	Jig	24		9.25		9.3	9.8		9.8		9.27		9.7		9.25	9.8	9.52	0.55	0.273	-0.053
2010 July	Current	12		7.48	7.60			8.28		8.00	7.85				7.48	8.28	7.84	0.80	0.319	-0.087
2010 July	Jig	12		7.45	7.75			8.32		7.60	7.25				7.25	8.32	7.67	1.07	0.406	-0.087
2011 January	Current	8	7.92	8.00		8.00	7.80		7.90		8.06		7.72	9.03	7.72	9.03	8.05	1.31	0.410	-0.109
2011 January	Jig	8		8.06		7.80	7.75		7.80		7.55		9.00		7.55	9.00	7.99	1.45	0.519	-0.109
2010 July	Current	3		9.03	8.65			8.97		8.48	9.05		9.19		8.48	9.19	8.90	0.71	0.271	-0.139
2010 July	Jig	3		8.57	8.87			8.60		8.70	8.98		9.67		8.57	9.67	8.90	1.10	0.410	-0.139
2011 January	Current	11	5.82	5.29		5.70	5.10		5.75		5.36	0.60	5.82	4.40	4.40	5.82	5.34	1.42	0.459	-0.300
2011 January	Jig	11		3.79		5.30	4.66		5.93		5.06		5.60		3.79	5.93	5.06	2.14	0.759	-0.300
2010 July	Current	20		7.75	8.20			7.89		8.25	8.47		8.80		7.75	8.80	8.23	1.05	0.382	-0.312
2010 July	Jig	20		7.60	8.60			8.49		8.08	7.98		9.60		7.60	9.60	8.39	2.00	0.694	-0.312
2010 July	Current	21		9.10	9.30			8.85		9.10	9.22		9.25		8.85	9.30	9.14	0.45	0.162	-0.336
2010 July	Jig	21		8.23	9.25			8.69		9.00	8.83		9.69		8.23	9.69	8.95	1.46	0.498	-0.336
2010 July	Current	19		8.10	8.70			8.28		8.29	8.86		8.88		8.10	8.88	8.52	0.78	0.336	-0.345
2010 July	Jig	19		7.76	8.90			8.65		8.23	8.27		9.73		7.76	9.73	8.59	1.97	0.681	-0.345
2010 July	Current	4		8.95	8.50			8.45		8.15	8.40		8.85		8.15	8.95	8.55	0.80	0.298	-0.375
2010 July	Jig	4		8.00	8.23			7.98		7.65	8.50		9.57		7.65	9.57	8.32	1.92	0.674	-0.375