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Unapproved Minutes of the November 13, 2007
Sequence III Surveillance Panel Meeting
held in San Antonio, TX

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The meeting was called to order at 9:00 am by Chairman Dave Glaenzer. A membership list was circulated for members & guests to sign in. It's shown in Attachment 1.

Agenda Review

Bill Buscher is Action & Motion recorder.

The Agenda was accepted as shown on Attachment 2.

Membership Changes

Dan Domonkos will replace Joe Vujica for Lubrizol. Ron Romano will replace Mike Riley for Ford.

Meeting Minute Status

The November 7, 2006 meeting minutes were approved by the surveillance panel.

Review of Action Items from Last Meeting

As Recorded at the Meeting by Bill Buscher

1. Action Item – Test labs will solicit training for the ETW-E180 torque wrench from their local Ingersoll-Rand representative.

NOTE: Carryover from June 2006 Surveillance Panel meeting.

DONE. Snap-On torque wrench is being used by most labs. This wrench needs to be included in test method.

2. Action Item – Test labs to review current revision of the Sequence IIIF/G assembly manual to determine if any additional corrections are necessary.

DONE.

3. Action Item – In order for hardware suppliers to initiate hardware procurement for GF-4/5 testing through 2015, test labs and test users need to make an initial estimate of Sequence IIIG testing needs through the life of GF-5. Chairman to develop and distribute a survey form for this estimate. Chairman to also issue a letter to ILSAC/OIL asking for potential GF-5 test limits for the Sequence IIIG test, to assist in this estimate. Estimate to be completed by January 1, 2007.

DONE.

4. Action Item – Chairman to ask RSI to perform a “what-if” analysis on their current Sequence IIIG candidate database for different pass limits, tightened in ¼ of a standard deviation increments up to 1 standard deviation. Analysis should also be broken down by viscosity grade.

DONE – see Attachment 3. Letter from ACC explains other avenues to explore.

5. Action Item – Charlie Leverett, Sid Clark and any interested test labs to work together on conducting an experiment to determine torque plus angle values as replacements for current torque to yield requirements for any applicable fasteners in a Sequence IIIF/G build.

DONE.

6. Motion – Revise the Sequence IIIF and Sequence IIIG procedures as follows:

13.4.3.4 All raters of Sequence IIIG engine pistons shall attend a CRC Light Duty Rating Workshop every twelve months \pm 30 days and produce data that meets CRC’s definition of

Blue, Red or White for piston deposits. If a rater is unable to meet this requirement for reasons beyond the rater's control, the rater may follow the steps stated in 13.4.3.5. Note, the results from the most current workshop are effective 45 days from the completion of the workshop.

13.4.3.5 At any time (excluding one week after the most current CRC workshop and between re-tests) a rater may visit the TMC offices to attempt to generate data on Light Duty workshop hardware to assess his performance compared to workshop-produced data. The TMC will provide rating booths and lights for this purpose. The TMC will select a minimum of 6 pistons from a collection of workshop parts for the rater to rate; if he chooses, the rater may rate more than 6 parts if prior arrangement is made with the TMC. Provision of all rating aids necessary to rating the parts shall be the responsibility of the rater. The TMC will analyze the data in the same way as workshop data and determine which CRC color group definition it meets. If the data meets the CRC Blue, Red, or White requirements, ratings produced by the rater may be used for Sequence IIIG test results. Results from a rater's first or second re-test are effective immediately and void the 45 day grace period stated in Section 13.4.3.4.

Additional requests to use this procedure are permitted only after the rater receives training from experienced industry raters. After two attempts to complete this procedure, the rater shall attend a CRC Light Duty workshop before making another request.

NOTE: Sections numbers and test references will be different for the Sequence IIIF procedure.

Frank Farber / Sid Clark / 11 For 0 Against 0 Waive

DONE.

7.Action Item – OHT to supply a specification sheet for the replacement air starter.

DONE.

CPD Report

OHT has developed a one-piece rocker cover fill cap (blowby adapter) to eliminate leakage issues seen on some adapters. They are currently in stock. Dwight Bowden, motioned and Charlie Leverett seconded, that the assembly manual and procedure be modified to allow the use of both the 2-piece and one-piece blowby adapter. The motion was unanimously accepted. Jason Bowden presented the following report:

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1) **Rejections from 11/07/06 to 11/09/07 (Approx. 12 months):**

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>REASON REJECTED</u>	<u>QTY</u>	<u>DATE REPLACED</u>
OHT3F-008-6	CAMSHAFT, SPECIAL TEST, IIIF	SCRATCH	1	11/14/2006
OHT3F-008-6	CAMSHAFT, SPECIAL TEST, IIIF	RUST	2	10/25/2007
OHT3F-008-8	CAMSHAFT, SPECIAL TEST, IIIG	NOSE BROKEN / ROOT CAUSE UNKOWN	1	7/13/2007
OHT3F-008-8	CAMSHAFT, SPECIAL TEST, IIIG	RUST VETO BUILDUP	1	1/13/2007
OHT3F-011-2	THRUST PLATE	CRACKED	2	9/8/2006
OHT3F-029-3	LIFTER, TEST, ACI W/ FLAT	VISUAL DEFECTS	17	11/14/2006
OHT3F-030-2	OIL COOLER	FLAKING, NICKEL PLATING	2	1/2/2007
OHT3F051-4	RING, SECOND COMPRESSION	TWISTED	1	8/10/2007
OHT3F-054-1	PISTON	TIGHT IN CYLINDER	1	3/6/2007
OHT3F-054-1	PISTON	DENTED	1	10/3/2007
OHT3G-085-1	COVER, FRONT	MACHINING DEFECT	1	9/11/2007

2) **Technical Memos Issued**

NONE

3) **Batch Code Changes**

<u>IIIF</u>	<u>Batch Code</u>	<u>Date Introduced</u>
Rocker Arms	BC 11	4/27/2007
Cam Bearing	BC 14	6/27/2007
Conn. Rod Bearing	BC 15	5/25/2007
Main Bearing	BC13	7/27/2007
Oil Cooler Plating	061103	11/10/2006
	061220	12/22/2006
	070131	1/31/2007
	070215	3/6/2007
	070426	5/9/2007
	070706	7/20/2007
	070925	9/26/2007
	IIIF Rings	BC 9

<u>IIIG</u>	<u>Batch Code</u>	<u>Date Introduced</u>
Rocker Arms	BC 11	6/11/2007
Cam Bearing	BC 14	6/25/2007
Conn. Rod Bearing	BC 15	5/25/2007
Main Bearing	BC13	7/25/2007
Oil Cooler Plating	061103	12/12/2006
	061220	12/21/2006
	070131	2/1/2007
	070215	2/22/2007
	070426	4/27/2007
	070706	7/6/2007
	070925	9/26/2007


GM Special Test Part Report
 Sid Clark presented the following report:

**Sequence III Special Parts
 Supplier Report**

GM Racing, Oil Test Component Report


Presented to; Sequence III Surveillance Panel November 13,
 2007

Sid Clark, GM Powertrain

 GM Standard Template 1

Test Component Supply


- Cylinder Heads
 - Inventory levels building
 - Plant 36 & Schwartz Machine running monthly production
- Crankshafts and Connecting Rods
 - Inventory level normal
- Engine Blocks
 - Inventory level normal
 - Latest Batch 1H7 – 2H7 (85 pieces)
 - Contained 2007 mid-year change to Pb free balance shaft bushings

 GM Standard Template 2

Engine Block Rear Bushing

Corrective Action;

- Technical Memo 2007-001 issued to labs outlining bushing replacement guidelines
- Old bushing part number 24503193 supplied with 1H7 – 2H7 engine blocks with copy of Technical Memo 2007-001
- All future production runs of oil test blocks will have 24503193 bushing installed at Powertrain Plant 36

 GM Standard Template 1


Test Component Returns

- Two crankshafts
 - One for nicks on front journal
 - One for rusting

Lab reported rusted crankshaft did not have VCI paper wrap inside plastic bag.

Both crankshafts were replaced

GM Racing requests review of return policy and also requests Test Component Task Force add this topic to their agenda

 GM Standard Template 4

IIIF/IIIG TMC Test Status

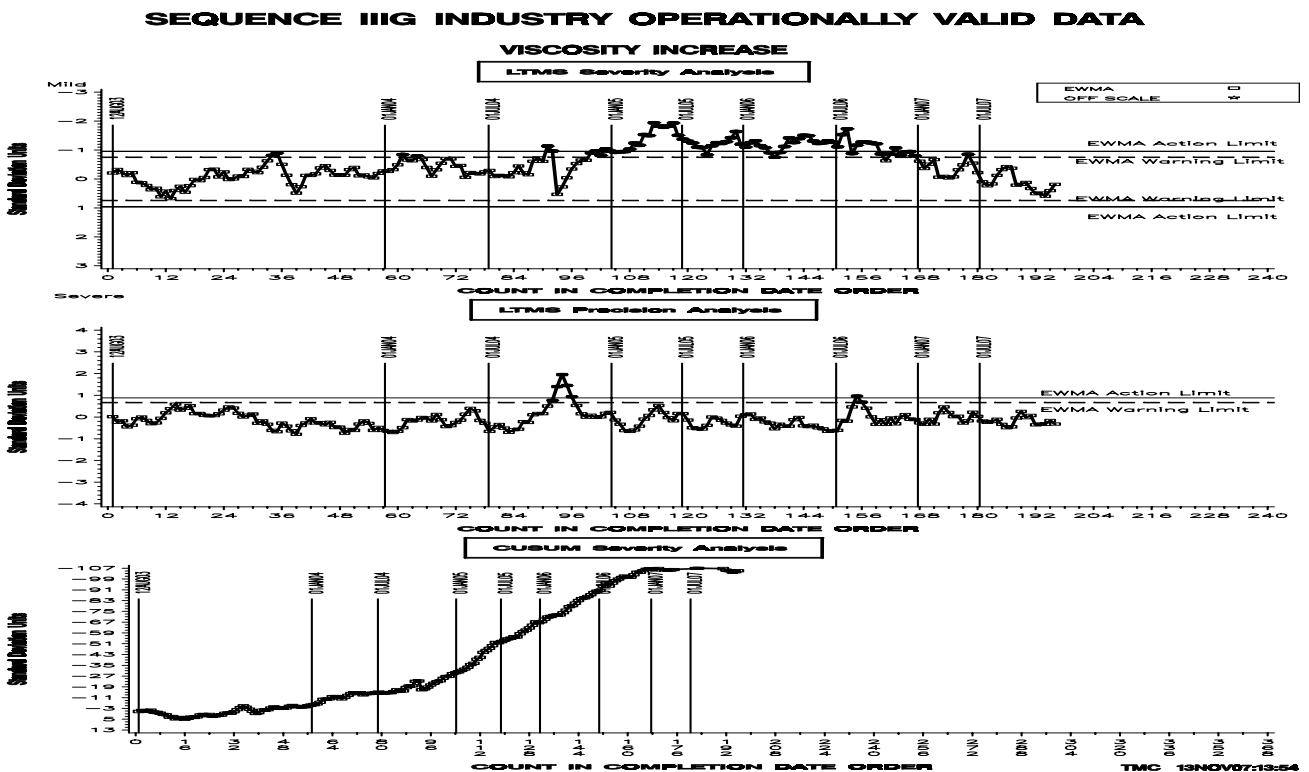
The complete TMC reports are posted to the TMC website.

Sequence IIIG			
Parameter	Δ/s	Average Δ , in Reported Units	Direction
PVIS	0.070	4.3 %	On Target
WPD	-0.341	-0.16 Merits	Severe
ALCW	<i>-0.928</i>	<i>-14.7 μm</i>	<i>Mild</i>

Sequence IIIIF			
Parameter	Δ / s	Average Δ , in Reported Units	Direction
PVIS	<i>-0.873</i>	127.8% VI	<i>Severe</i>
APV	<i>0.976</i>	<i>0.16 Merits</i>	<i>Mild</i>
WPD	0.076	0.07 Merits	Mild
PV60	<i>-0.867</i>	<i>29.5 % VI</i>	<i>Severe</i>

When Δ/s is in **RED Italic** the shift is significant!

The most notable item is the Viscosity Increase CUSUM chart which shows that the mild trend has ended. See below.



The TMC was requested to analyze the most recent reference data to explain this shift and report back to the O&H panel as soon as possible.

The most recent items on timeline are shown below:

- 20061003 06-3 Change in con rod type (PMNS) and updated part numbers
- 20061008 First occurrence of powdered metal non-slotted rods (PMNS)
- 20061107 06-4 Change in rater calibration requirements
- 20070319 07-1 Added IIIGVIS procedure to test method
- 20070401 Start of New Cylinder head torque Procedure
- 20070605 07-2 Revised designation of IIIGVIS to IIIGVS
- 20070605 07-2 Changed values in Table A4 to metric units
- 20070605 07-2 Revised ring gap delta values
- 20070605 07-2 Revised stand instrumentation requirements

RSI Report

Reports were previously emailed to panel members and posted to the RSI website. The Chairman reviewed the reports at the meeting.

ACC Selection of new monitoring agency: Frank Farber commented that the TMC has been awarded the ACC & ATC monitoring contracts and would assume registration duties on January 1, 2008.

CRC/SAE Rating Workshop Report

Frank Farber presented the following:

CRC Light Duty Rater Workshop

April 2007

Light Duty Workshop

- The TMC has implemented web based data entry at the workshop
- Raters now enter data via a web page through a browser
- Raters are encourage to bring laptops to enter data
- Math errors have been eliminated and data entry errors minimized

Rater Workshop

- CRC has handed-off the Workshop to SAE
 - CRC felt that the rating activity no longer fit their core services
 - CRC felt that the rating activity has matured and did not represent a “research activity”
- Kevin Perry from SAE is now overseeing workshop activities

Rating Manuals and Intensity Scales

- SAE is suppose to assume manual oversight and purchase of new scales

The panel expressed concern regarding whether SAE was the right organization to assume oversight of rating manuals and workshops. The Chair is to draft a letter to the B01 chairman requesting additional discussion on this topic. Frank also presented the TMC’s web based workshop data entry application for panel information.

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Fuel Supplier Report

Wayne Peterson presented the latest fuel batch analysis summaries (Attachment 4). Quarterly usage numbers are shown below.

Haltermann Products
Gasoline Lube Cert Fuel Use Summary 2007
Use rate in gallons
Update: 11-7-07, JEC

Fuel Description	Test Use	Q1	Q2	Q3	Q4 (thru Oct.)
EEE Lube Cert, HF-0003	Seq. III & VI	174,796	190,816	159,844	102,172

Haltermann's Sheldon Road, Texas site is no longer supplying fuel for Sequence IIIG testing. All Sequence IIIG fuel is coming from Haltermann's Detroit facility. The transition from Texas to Michigan occurred in the September - October 2007 timeframe. Feed stocks for the fuel have not changed however blending facilities/personnel are different.

Old Business

The chairman explained that Dual IIIF/IIIG referencing was accepted by the panel based on a review of past meeting minutes but no documentation exists in the test methods. Rich Grundza and the chair will develop drafts of information letters and forward to the panel for review prior to release.

New Business

The re-supply of oil 434 was discussed by the panel and it was unanimously agreed upon that a re-supply should be procured by the TMC to support the test until 2015.

Pat Lang discussed the ability to procure one-off part procurement from the CPD. Currently, only complete test kit purchases are sourced from the CPD. Pat Lang stated that a large part of his client work currently is made up of non-standard type tests. Pat's clients are requesting wear screeners tests and non-standard test lengths that require test kits to be broken up leaving part imbalances within the laboratories inventory. Dave Glaenzer added that there are times when parts are lost within laboratories as parts are sent to metrology or other locations. Dave suggested a one time parts purchase to reconcile incomplete kits that exist within labs.

OHT (Dwight Bowden) noted that this is a commercial issue and should not be discussed within this panel, but agreed to present OHT's commercial position to be documented in the meeting minutes for reference. Dwight stated that OHT supplies parts for ASTM Sequence IIIF, IIIG and IIIGA standardized testing only and does not supply parts to bench, experimental, R&D, etc. testing. Dwight continued on explaining that OHT has always supplied single parts when individual parts are rejected, short shipped and/or damaged upon installation with immediate shipment at no charge. OHT maintains a kit based hardware database that allows for immediate information (batch,

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serial numbers) on each kit component. The effectiveness of hardware control would be impaired if single parts were to be supplied. Dwight stated that once single part purchase is permitted OHT will never sell a complete test kit as labs break kits apart. This would result in increased inventory costs and impact OHT's ability to ship just-in-time. Dan Domonkos noted that allowing the parts batch sequencing to be changed by breaking kits is a bad idea and will prevent the panel from tracking severity issues with parts batches. Sid Clark stated that GM Powertrain will not support the use of Sequence III G parts for screener tests that have not been developed through the panel. If an approved screener test is developed, Sid stated a kit will be developed to address build needs. Andy Ritchie noted that he does not wish to waste unused parts when screener tests are run. Andy noted that screener/research tests are a real and necessary cost-effective option in lubricant testing.

Dwight stated that OHT will continue to address any imbalance with a shipped kit when received by the laboratory. OHT will not supply single request parts to address laboratory screener test/non standard-test part supply issues.

This item was tabled until after lunch when the Parts Task Force meets.

SCOPE & OBJECTIVES

SCOPE

The Sequence III Surveillance Panel is responsible for the surveillance and continual improvement of the Sequence IIIF and IIIFHD tests documented in ASTM Standard D6984-05 as update by the Information Letter System. The Sequence III Surveillance Panel is also responsible for the surveillance and continual improvement of the Sequence IIIG and IIIGA tests documented in ASTM Standard D7320 as updated by the Information Letter System. Data on test precision will be solicited and evaluated at least every six (6) months for Sequence III test procedures. The Surveillance Panel is to provide continual improvement of rating techniques, test operation, test monitoring and test validation through communication with the Test Sponsor, ASTM Test Monitoring Center, the Central Parts Distributor, Fuel Supplier, ASTM B0.01 Passenger Car Engine Oil Classification Panel, ASTM Committee B0.01, ACC Monitoring Agency and SAE Deposit/Distress Workshop. Actions to improve the process will be recommended when appropriate based on input to the Surveillance Panel from one or more of the previously stated groups. This process will provide the best possible Sequence III Type Test Procedure for evaluating engine oil performance with respect to it's ability to prevent oil thickening, varnish formation, oil consumption and engine wear.

OBJECTIVES

TARGET DATE

- | | |
|--|------------------|
| 1. Develop a plan to secure test components for Sequence IIIF/IIIG thru GF-5 (2015) | June 2008 |
| 2. Solicit reference oils for GF-4/GF-5 testing | June 2008 |
| 3. Make Subcommittee B aware of status of CRC rating aids | June 2008 |

The meeting was adjourned at 12:25 pm.

Motions and Action Items

1. Action Item – Sid Clark to check test procedure and assembly manual for requirements on torque wrenches and report back to the surveillance panel. Modify test procedure and assembly manual if necessary to accommodate current torque wrenches.
2. Action Item – Chairman to include ACC letter (response to action item #4 from the 11/07/06 surveillance panel meeting) in current surveillance panel meeting minutes.
3. Motion – Modify test procedure and/or assembly manual to allow for the use of replacement rocker cover bushing (OHT3F-028-2), in addition to the existing rocker cover bushing.

Dwight Bowden / Charlie Leverett / Passed Unanimously

4. Action Item – Rich Grundza to analyze reference oil data to determine if anything correlates to the recent change in industry viscosity increase performance. A follow-up surveillance panel conference call will be scheduled once the data analysis has been completed.
5. Action Item – Chairman to compose and send a letter to Ben Weber concerning the lack of any defined process for replacing rating aids (photos and manuals).
6. Action Item – TMC to reword section 12.4.3.4 of the IIIG test procedure to change the name of the rating workshop.
7. Action Item – Add wording to the IIIF and IIIG test procedures for dual calibration of IIIF and IIIG test stands, based off of the wording from the April 16, 2003 surveillance panel meeting minutes.

SEQUENCE III

Attachment 1

NAME	COMPANY	EMAIL
LARRY HAMILTON	LUBRIZOL	LARRY.HAMILTON@LUBRIZOL.COM
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Rich Grundza	ASTM TME	reg@astmtmc.emo.edu

AGENDA

SEQUENCE III SURVEILLANCE PANEL MEETING

Southwest Research Institute, San Antonio, Texas

November 13, 2007

9:00 AM to 3:00 PM

1. **APPOINTMENT OF RECORDER OF ACTIONS/MOTIONS**
2. **AGENDA REVIEW**
3. **MEMBERSHIP CHANGES; ROMANO & DOMONKOS**
4. **APPROVAL OF THE MINUTES FROM THE NOVEMBER 2006 MEETING**
5. **REVIEW OF ACTION ITEMS FROM THE LAST MEETING**

6. **SEQUENCE III CPD REPORTS**
OHT
GM MOTORSPORTS
TCTF MEETING TO FOLLOW THIS MEETING

7. **ASTM-TMC REPORTS**
D 6984 - SEQUENCE IIIF
D 7320 - SEQUENCE IIIG/IIIGA
RO 434 REBLEND INTRODUCTION
IIIG INFORMATION LETTER 07-2 CORRECTION

8. **CANDIDATE ACTIVITY REPORTS**
RSI REPORT - D6984 - SEQUENCE IIIF
RSI REPORT - D 7320 - SEQUENCE IIIG/IIIGA
ACC SELECTION OF NEW MONITORING AGENCY

9. **SEQUENCE III FUEL SUPPLIER REPORT - James Carter**
SUPPLY SOURCE, USEAGE, QUARTERLY REPORTS

10. **OLD BUSINESS**
DUAL REFERENCING STAND AS IIIF AND IIIG (04/16/2003)

11. **NEW BUSINESS**

12. **REVIEW OF SCOPE & OBJECTIVES**

13. **ADJOURNMENT**



April 17, 2007

David L. Glaenger
Sequence IIIF/IIIG Surveillance Panel Chairman
c/o Afton Chemical Corporation

Dear Mr. Glaenger,

The ACC PAPTG appreciates the proactive approach being taken by the Sequence III Surveillance Panel in their efforts to ensure an adequate future supply of parts for the Sequence IIIG test. We are absolutely dedicated to helping you and the panel in these efforts. We have given careful consideration to your request.

The first part of your request, relates to projections for GF-4 IIIG testing needs. You have requested that we have RSI send you Sequence IIIG pass/fail data, by parameter and overall, since the inception of the test.

There are a number of complexities and unknowns associated with making projections for GF-5 IIIG needs, and not all of them relate only to the pass limit. We feel that test needs projections based solely on theoretical pass limits, as solicited in the second part of your request, would be of very limited value, and could be misleading.

ACC PAPTG recommends that the Sequence IIIG surveillance panel take the following steps in determining future IIIG test part needs.

1. Send a written request on behalf of the Sequence IIIG Surveillance Panel to Doug Anderson, PAPTG Manager, for ACC PAPTG input.
2. Address the Sequence IIIG parts needs based on all uses of the Sequence IIIG globally for both PC and HD.
3. Try to take into consideration the future.
 - a. Take into account the potential use of the Sequence IIIG by ESCIT.
 - b. Determine the impact of potentially using ROBO to replace the Sequence IIIGA.
 - c. Will ACEA use the Sequence IIIG in future categories?
 - d. Will future passenger car diesel engine oils require Sequence IIIG testing?
4. Rather than try to determine test needs based on potential future pass/fail limits compared to current pass/fail limits the Sequence IIIG surveillance panel should consider asking all test sponsors to estimate their future needs based on individual company strategies.

Thank you and the Sequence III Surveillance Panel for your support of high quality and readily available testing to our industry.

Regards,

Lew Williams

Lew Williams
PAPTG Chair

W.D. Anderson

W.D. Anderson
PAPTG Manager



HALTERMANN November, 20 2007
 FUEL REPORT
 PRODUCT: EEE Unleaded Gasoline
 PRODUCT CODE: HF003
 Seq. III & VI

Batch No.: VJ2621LT10 VI2821LT10 VH1321LT10 VG1321LT10 VF1521LT10 VD1821LS10
 TMO No.: MTS MTS MTS MTS MTS MTS
 Tank No.: 110 110 110 110 110 110
 Analysis Date: 11/5/2007 10/11/2007 9/7/2007 7/24/2007 6/16/2007 5/10/2007
 Shipment Date:

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX						
Distillation - IBP	ASTM D86	°C	23.9		35.0	31.7	30.5	31.1	29.7	31.9	29.7
5%		°C				44.5	42.8	44.4	45.1	45.6	43.4
10%		°C	48.9		57.2	52.3	50.5	51.3	51.6	53.4	50.8
20%		°C				64.6	62.4	61.9	61.9	65.9	62.8
30%		°C				78.4	76.4	74.4	74.1	79.7	75.7
40%		°C				94.8	93.7	90.7	90.4	95.6	92.4
50%		°C	93.3		110.0	106.3	106.4	104.3	104.3	106.2	105.4
60%		°C				112.5	112.6	111.0	110.7	111.9	111.5
70%		°C				118.7	119.2	117.4	116.4	118.0	118.0
80%		°C				130.9	131.0	128.6	127.4	129.9	129.7
90%		°C	151.7		162.8	160.3	158.9	158.2	157.8	159.5	158.5
95%		°C				167.8	165.6	166.8	165.0	166.6	166.8
Distillation - EP		°C			212.8	194.8	199.8	194.7	194.3	190.5	194.3
Recovery		vol %		Report		96.8	97.5	97.4	98.1	97.4	97.3
Residue		vol %		Report		1.0	1.0	1.0	0.9	1.0	1.0
Loss		vol %		Report		2.2	1.5	1.6	1.0	1.6	1.7
Gravity @ 60°F/60°F	ASTM D4052	°API	58.7		61.2	58.8	59.0	58.9	59.2	59.0	59.3
Density @ 15° C	ASTM D4052	kg/l	0.734		0.744	0.743	0.743	0.743	0.742	0.743	0.742
Reid Vapor Pressure	ASTM D323	psi	8.7		9.2						
Reid Vapor Pressure	ASTM D5191	kPa	60.6		63.4	60.7	60.7	63.4	63.0	63.4	63.4
Carbon	ASTM D3343	wt fraction		Report		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Carbon	ASTM E191	wt fraction		Report		0.8630	0.8670	0.8646	0.8650	0.8636	0.8605
Hydrogen	ASTM E191	wt fraction		Report		0.1337	0.1309	0.1323	0.1314	0.1351	0.1363
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.845	1.799	1.823	1.810	1.864	1.887
Oxygen	ASTM D4815	wt %			0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfur	ASTM D5453	mg/kg	3		15	4	4	5	3	6	6
Sulfur	ASTM D2622	wt%		Report							
Lead	ASTM D3237	mg/l			2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
Phosphorous	ASTM D3231	mg/l			1.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Composition, aromatics	ASTM D1319	vol %	26.0		32.5	29.6	30.6	29.1	31.3	30.0	29.6
Composition, olefins	ASTM D1319	vol %			10.0	0.6	0.6	1.2	0.9	0.6	0.8
Composition, saturates	ASTM D1319	vol %		Report		69.8	68.8	69.7	67.8	69.4	69.6
Particulate matter	ASTM D5452	mg/l			1	0.9	0.7	0.5	0.6	0.4	0.4
Oxidation Stability	ASTM D525	minutes	1000			>1000	>1000	>1000	>1000	>1000	>1000
Copper Corrosion	ASTM D130				1	1	1	1	1	1	1
Gum content, washed	ASTM D381	mg/100mls			5.0	1.0	<0.5	<0.5	<0.5	<0.5	<0.5
Fuel Economy Numerator/C Factor	ASTM E191		2401		2441	0	0	0	0	0	0
C Factor	ASTM E191			Report		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Research Octane Number	ASTM D2699		96.0			98.1	97.7	97.2	96.9	97.8	97.3
Motor Octane Number	ASTM D2700			Report		88.5	87.8	87.7	87.5	88.1	87.9
			7.5			9.6	9.9	9.5	9.4	9.7	9.4
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		0	0	0	0	0	0
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18339	18503	18394	18417	18302	18470
Color	VISUAL	1.75 ptb		Red		RED	RED	RED	RED	RED	RED