Sequence IX Aged Oil
Form 1
Version
IXAGED VERSION 20241029 Beta
Conducted For
TSTSPON1
TSTSPON2

LABVALID	V = Valid
	I = Invalid
	N = Results cannot be interpreted as representative of oil performance (Non-reference oil) and shall not be Aged for multiple test acceptance

TSTOIL	NR = Non-reference oil
	RO = Reference oil

Test Number, Aging							
Stand	STANDA	# of Runs since last Calibration	CALCOI	Total runs on stand	TOTSTRUN		
Test Number, LSPI							
Stand	STANDL	Stand Run	STRUN	Engine	ENGNOL	Engine Run	ENRUN
Oil Code:		OILCODE		# of runs since last calibration LSPI			CALCON
Formulation Stand Code		FORM					
Alternate Codes		ALTCODE1		ALTCODE2		ALTCODE3	
Date Started, Aging		DTSTRT		Time Started, Aging		STRTTIME	
Date Started, LSPI		DTSTRTL		Time Started, LSPI		STRTTIML	
Date Completed, Aging		DTCOMP		Time Completed, Aging		EOTTIME	
Date Completed, LSPI		DTCOMPL		Time Completed, LSPI		EOTTIMEL	
Test Length, Aging		TESTLEN		Total Downtime, Aging		TOTLDOWN	
Test Length, LSPI		TESTLENL		Total Downtime, LSPI		TOTDOWNL	
Ref Oil Code[A]:		IND					
SAE Viscosity		SAEVISC					

[A] Reference Tests Only

In my opinion this test OPVALID been conducted in a valid manner in accordance with test Method D8291 and appropriate amendments. The remarks included in the report describe the anomalies associated with this test.

Submitted By: SUBLAB
Testing Laboratory

SUBSIGIM
Signature

SUBNAME
Typed Name

SUBTITLE
Title

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Summary of Test Method

The Sequence IX Aged Oil test is a fired engine dynamometer lubricant test which evaluates the ability of a test lubricant to reduce pre-ignition events on an aged oil. The test method consists of a is a cyclic test for aging and a steady state test for preignition.

The Pre-ignition test uses a Ford water cooled, 4 cycle, in-line cylinder, 2.0 liter EcoBoost engine as the test apparatus. The engine incorporates a dual overhead cam, four valves per cylinder (2 intake; 2 exhaust), and direct acting mechanical bucket lifter valve train design. The engine is monitored for pre-ignition events and total number of pre-ignition events. Results are tabulated at the end of test.

The test sequence for aging is summarized below and runs for 72 hours.

Parameter	Units	Quantity
Duration	H	72
Engine Speed	r/min	2500
Engine Torque	N·m	128
Oil Gallery Temperature	°C	100
Coolant Out Temperature	°C	85
Coolant Flow	L/min	70
Intake Air Temperature	°C	32
Intake Air Pressure	kPa	0.05
Intake Air Humidity	g/kg	11.4
Coolant Pressure	kPa	70
Air Charge Temperature	°C	30
Air-Fuel Ratio	λ	1.0
Exhaust Backpressure	kPa	107
Blowby Flowrate	L/min	65-75

The test sequence for LSPI is repeated for 4 test iterations. Each iteration is outlined in the table below:

		Iteration			
Parameters	**Units**	**A**	**B**	**C**	**D**
Duration	cycles	175000	175000	175000	175000
Engine Speed	r/min	1750	1750	1750	1750
Torque	Nm	269	269	269	269
Equivalence Ratio	λ	1.00	1.00	1.00	1.00
Coolant Out Temperature	°C	95	95	95	95
Coolant Flow	L/min	55	55	55	55
Oil Gallery Temperature	°C	95	95	95	95
Inlet Air Temperature	°C	30	30	30	30
Air Charge Temperature	°C	43	43	43	43
Fuel Temperature	°C	30	30	30	30
Inlet Air Pressure	kPa	0.05	0.05	0.05	0.05
Exhaust Back Pressure	kPaA	104	104	104	104

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Test Result Summary, Aging

Lab	LAB	Oil Code	OILCODE		
Stand	STANDA	Test No.	TESTNUM		
Laboratory Oil Code			LABOCODE		
Engine No.		ENGNOAGE		Fuel Batch	FUELBTID
SAE Viscosity		SAEVISC		Reference Oil	IND

Critical Oil Analysis Results

Analysis Parameter	New Oil	End of Test
Total Acid Number	TAN_NEW	TANEOT
Total Base Number	TBNNEW	TBNEOT
Kinematic Viscosity @ 40 °C	V40NEW	V40EOT
Kinematic Viscosity @ 100 °C	V100NEW	V100EOT
Soot Concentration		EOTSOOT
Oxidation, FTIR by D7414		IROEOT
Nitration, FTIR by D7624		IRNEOT
Fuel dilution, D3525		FUELEOT
Weight of Oil Drain @ End of Test		OILWTEOT

Blowby	
Test Hours	**Blowby, L/min**
23.5 to 23.75	BBY_H023
47.5 to 47.75	BBY_H047
71.5 to 71.75	BBY_H071
Maximum	BBYMAX
Minimum	BBYMIN
Average	ABLOWBY

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Test Results Summary, LSPI

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Summary of Valid Iterations		
Iteration	**Number of Events***	
A	NOEVENTA	
B	NOEVENTB	
C	NOEVENTC	
D	NOEVENTD	
Total Number of Pre-ignitions, Valid Iterations	TOTNOPRE	
Pass/Fail Parameters		
	Average	**Maximum**
Results from Valid Iterations	AVGNOPRE	MAXNOPRE
Transformed results Valid Iterations	TAVGPRE	TMAXPRE
Industry Correction Factor	AVGPRECF	MAXPRECF
Corrected Transformed Pre-ignitions	AVGPICOR	MAXPICOR
Severity Adjustment	AVGPRESA	MAXPRESA
Final Transformed Result	TAVGPFNL	TMAXPFNL
Final Original Unit Result	AVGPIFNL	MAXPIFNL

Iteration	Number of Events*	Number of Cycles (per cylinder) #								Iteration Validity
		Cylinder 1		Cylinder 2		Cylinder 3		Cylinder 4		
		Invalid	Valid	Invalid	Valid	Invalid	Valid	Invalid	Valid	
ITERR001	NEVIR001	ICC1R001	VCC1R00	ICC2R001	VCC2R00	ICC3R001	VCC3R0(	ICC4R001	VCC4R0(	VAL_R001
ITERR002	NEVIR002	ICC1R002	VCC1R00	ICC2R002	VCC2R00	ICC3R002	VCC3R0(	ICC4R002	VCC4R0(	VAL_R002
ITERR003	NEVIR003	ICC1R003	VCC1R00	ICC2R003	VCC2R00	ICC3R003	VCC3R0(	ICC4R003	VCC4R0(	VAL_R003
ITERR004	NEVIR004	ICC1R004	VCC1R00	ICC2R004	VCC2R00	ICC3R004	VCC3R0(	ICC4R004	VCC4R0(	VAL_R004
ITERR005	NEVIR005	ICC1R005	VCC1R00	ICC2R005	VCC2R00	ICC3R005	VCC3R0(	ICC4R005	VCC4R0(	VAL_R005
ITERR006	NEVIR006	ICC1R006	VCC1R00	ICC2R006	VCC2R00	ICC3R006	VCC3R0(	ICC4R006	VCC4R0(	VAL_R006
ITERR007	NEVIR007	ICC1R007	VCC1R00	ICC2R007	VCC2R00	ICC3R007	VCC3R0(	ICC4R007	VCC4R0(	VAL_R007
ITERR008	NEVIR008	ICC1R008	VCC1R00	ICC2R008	VCC2R00	ICC3R008	VCC3R0(	ICC4R008	VCC4R0(	VAL_R008
ITERR009	NEVIR009	ICC1R009	VCC1R00	ICC2R009	VCC2R00	ICC3R009	VCC3R0(	ICC4R009	VCC4R0(	VAL_R009
ITERR010	NEVIR010	ICC1R010	VCC1R01	ICC2R010	VCC2R01	ICC3R010	VCC3R0	ICC4R010	VCC4R01	VAL_R010
ITERR011	NEVIR011	ICC1R011	VCC1R01	ICC2R011	VCC2R01	ICC3R011	VCC3R0	ICC4R011	VCC4R01	VAL_R011
ITERR012	NEVIR012	ICC1R012	VCC1R01	ICC2R012	VCC2R01	ICC3R012	VCC3R0	ICC4R012	VCC4R01	VAL_R012
ITERR013	NEVIR013	ICC1R013	VCC1R01	ICC2R013	VCC2R01	ICC3R013	VCC3R0	ICC4R013	VCC4R01	VAL_R013

*Events are defined as the total number of pre-ignition events from all four cylinders during each iteration.

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Operational Summary, Aging

Lab	LAB	Oil Code	OILCODE
Stand	STANDA	Test No.	TESTNUM
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000	QRPM	2500	ARPM	NRPM	BRPM
	Torque	N·m	0.000	QTORQUE	128	ATORQUE	NTORQUE	BTORQUE
	Oil Gallery Temperature	°C	0.000	QOILGAL	100	AOILGAL	NOILGAL	BOILGAL
	Coolant Out Temperature	°C	0.000	QCOOLOU	85	ACOOLOUT	NCOOLOUT	BCOOLOUT
	Coolant System Pressure	kPa	0.000	QCOOLPRI	70	ACOLPRE	NCOLPRE	BCOLPRE
	Engine Coolant Flow	L/min	0.000	QENGFLO	70	AENGFLO	NENGFLO	BENGFLO
	Intake Air Humidity	g/kg	0.000	QAIRHUM	11.4	AAIRHUM	NAHUM	BAHUM
	Intake Air Pressure	kPa	0.000	QINAIRP	0.05	AINAIRP	NINAIRP	BINAIRP
	Exhaust Back Pressure	kPa abs.	0.000	QEXHBP	107	AEXHBP	NEXHBP	BEXHBP
	Intake Air Temperature	°C	0.000	QINAIRT	32	AINAIRT	NINAIRT	BINAIRT
	Air Charge Temperature	°C	0.000	QAIRCHT	30	AAIRCHT	NAIRCHT	BAIRCHT
	Lambda	λ	0.000	QLAMBDA	1	ALAMBDA	NLAMBDA	BLAMBDA
	Blowby Flowrate	L/min			65-75	ABLOWBY		

	Parameter	Units	Average	Number of Samples	Number of BQD
Non Controlled	Ambient Cell	°C	ACELAMBT	NCELAMBT	BCELAMBT
	Fuel Flow	kg/h	AFUELRT	NFUELRT	BFUELRT
	Ignition Voltage	V	AIGNVOLT	NIGNVOLT	BIGNVOLT
	Fuel Temperature	°C	AFUELT	NFUELT	BFUELT
	Coolant In Temperature	°C	AECOLIN	NECOLIN	BECOLIN
	Oil Filter In Temperature	°C	AOTEMP	NOTEMP	BOTEMP
	Exhaust Temperature	°C	AEXTEMP	NEXTEMP	BEXTEMP
	Manifold Absolute Pressure	kPa abs.	AINMAP	NINMAP	BINMAP
	Boost Pressure	kPa abs.	ABPRES	NBPRES	BBPRES
	Barometric Pressure	kPa abs.	ABARO	NBARO	BBARO
	Oil Gallery Pressure	kPa	AOGALP	NOGALP	BOGALP
	Oil Head Pressure	kPa	AOHEADP	NOHEADP	BOHEADP
	Crankcase Pressure	kPa	ACCASEP	NCCASEP	BCCASEP
	Fuel Pressure	kPa	APFUEL	NPFUEL	BPFUEL
	Pre-Intercooler Pressure	kPa abs.	APREINTP	NPREINTP	BPREINTP

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Operational Summary – Iteration A

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	
Fuel Batch		FUELBATA	

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000	QRPMITA	1750	ARPMITA	SRPMITA	NRPMITA	BRPMITA
	Torque	Nm	0.000	QTORQITA	269	ATORQITA	STORQITA	NTORQITA	BTORQITA
	Coolant Out	ºC	0.000	QCOUTITA	95	ACOUTITA	SCOUTITA	NCOUTITA	BCOUTITA
	Oil Gallery	ºC	0.000	QOILGITA	95	AOILGITA	SOILGITA	NOILGITA	BOILGITA
	Inlet Air	ºC	0.000	QILATITA	30	AILATITA	SILATITA	NILATITA	BILATITA
	Air Charge	ºC	0.000	QACTITA	43	AACTITA	SACTITA	NACTITA	BACTITA
	Fuel	ºC	0.000	QFUELITA	30	AFUELITA	SFUELITA	NFUELITA	BFUELITA
	Inlet Air	kPaA	0.000	QIAPITA	0.05	AIAPITA	SIAPITA	NIAPITA	BIAPITA
	Exhaust Back	kPaA	0.000	QEBPITA	104	AEBPITA	SEBPITA	NEBPITA	BEBPITA
	Coolant	kPa	0.000	QCOLPITA	70	ACOLPITA	SCOLPITA	NCOLPITA	BCOLPITA
	Humidity	g/kg	0.000	QHUMITA	11.4	AHUMITA	SHUMITA	NHUMITA	BHUMITA
	Coolant Flow	L/min	0.000	QCFLOITA	55	ACFLOITA	SCFLOITA	NCFLOITA	BCFLOITA

	Parameter	Units	Average	Standard Deviation	Number of Samples	Number of BQD
Non-controlled Parameters	Coolant In	ºC	ACOINITA	SCOINITA	NCOINITA	BCOINITA
	Oil Sump (optional)	ºC	ASUMPITA	SSUMPITA	NSUMPITA	BSUMPITA
	Exhaust	ºC	AEXHTITA	SEXHTITA	NEXHTITA	BEXHTITA
	Boost Pressure	kPaA	ABPITA	SBPITA	NBPITA	BBPITA
	Intake Manifold	kPaA	AIMPITA	SIMPITA	NIMPITA	BIMPITA
	Barometric	kPaA	ABAROITA	SBAROITA	NBAROITA	BBAROITA
	Crankcase	kPa	ACCPITA	SCCPITA	NCCPITA	BCCPITA
	Fuel	kPa	AFPRITA	SFPRITA	NFPRITA	BFPRITA
	Fuel Flow	kg/h	AFFLOITA	SFFLOITA	NFFLOITA	BFFLOITA
	Power	kW	APWRITA	SPWRITA	NPWRITA	BPWRITA
	Equivalence Ratio	ʎ	ALAMBITA	SLAMBITA	NLAMBITA	BLAMBITA

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Operational Summary – Iteration B

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	
Fuel Batch		FUELBATB	

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000	QRPMITB	1750	ARPMITB	SRPMITB	NRPMITB	BRPMITB
	Torque	Nm	0.000	QTORQITB	269	ATORQITB	STORQITB	NTORQITE	BTORQITE
	Coolant Out	ºC	0.000	QCOUTITB	95	ACOUTITB	SCOUTITB	NCOUTITE	BCOUTITE
	Oil Gallery	ºC	0.000	QOILGITB	95	AOILGITB	SOILGITB	NOILGITB	BOILGITB
	Inlet Air	ºC	0.000	QILATITB	30	AILATITB	SILATITB	NILATITB	BILATITB
	Air Charge	ºC	0.000	QACTITB	43	AACTITB	SACTITB	NACTITB	BACTITB
	Fuel	ºC	0.000	QFUELITB	30	AFUELITB	SFUELITB	NFUELITB	BFUELITB
	Inlet Air	kPaA	0.000	QIAPITB	0.05	AIAPITB	SIAPITB	NIAPITB	BIAPITB
	Exhaust Back	kPaA	0.000	QEBPITB	104	AEBPITB	SEBPITB	NEBPITB	BEBPITB
	Coolant	kPa	0.000	QCOLPITB	70	ACOLPITB	SCOLPITB	NCOLPITB	BCOLPITB
	Humidity	g/kg	0.000	QHUMITB	11.4	AHUMITB	SHUMITB	NHUMITB	BHUMITB
	Coolant Flow	L/min	0.000	QCFLOITB	55	ACFLOITB	SCFLOITB	NCFLOITB	BCFLOITB

	Parameter	Units	Average	Standard Deviation	Number of Samples	Number of BQD
Non-controlled Parameters	Coolant In	ºC	ACOINITB	SCOINITB	NCOINITB	BCOINITB
	Oil Sump (optional)	ºC	ASUMPITB	SSUMPITB	NSUMPITB	BSUMPITB
	Exhaust	ºC	AEXHTITB	SEXHTITB	NEXHTITB	BEXHTITB
	Boost Pressure	kPaA	ABPITB	SBPITB	NBPITB	BBPITB
	Intake Manifold	kPaA	AIMPITB	SIMPITB	NIMPITB	BIMPITB
	Barometric	kPaA	ABAROITB	SBAROITB	NBAROITB	BBAROITB
	Crankcase	kPa	ACCPITB	SCCPITB	NCCPITB	BCCPITB
	Fuel	kPa	AFPRITB	SFPRITB	NFPRITB	BFPRITB
	Fuel Flow	kg/h	AFFLOITB	SFFLOITB	NFFLOITB	BFFLOITB
	Power	kW	APWRITB	SPWRITB	NPWRITB	BPWRITB
	Equivalence Ratio	ʎ	ALAMBITB	SLAMBITB	NLAMBITB	BLAMBITB

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Operational Summary – Iteration C

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	
Fuel Batch		FUELBATC	

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000	QRPMITC	1750	ARPMITC	SRPMITC	NRPMITC	BRPMITC
	Torque	Nm	0.000	QTORQITC	269	ATORQITC	STORQITC	NTORQITC	BTORQITC
	Coolant Out	ºC	0.000	QCOUTITC	95	ACOUTITC	SCOUTITC	NCOUTITC	BCOUTITC
	Oil Gallery	ºC	0.000	QOILGITC	95	AOILGITC	SOILGITC	NOILGITC	BOILGITC
	Inlet Air	ºC	0.000	QILATITC	30	AILATITC	SILATITC	NILATITC	BILATITC
	Air Charge	ºC	0.000	QACTITC	43	AACTITC	SACTITC	NACTITC	BACTITC
	Fuel	ºC	0.000	QFUELITC	30	AFUELITC	SFUELITC	NFUELITC	BFUELITC
	Inlet Air	kPaA	0.000	QIAPITC	0.05	AIAPITC	SIAPITC	NIAPITC	BIAPITC
	Exhaust Back	kPaA	0.000	QEBPITC	104	AEBPITC	SEBPITC	NEBPITC	BEBPITC
	Coolant	kPa	0.000	QCOLPITC	70	ACOLPITC	SCOLPITC	NCOLPITC	BCOLPITC
	Humidity	g/kg	0.000	QHUMITC	11.4	AHUMITC	SHUMITC	NHUMITC	BHUMITC
	Coolant Flow	L/min	0.000	QCFLOITC	55	ACFLOITC	SCFLOITC	NCFLOITC	BCFLOITC

	Parameter	Units	Average	Standard Deviation	Number of Samples	Number of BQD
Non-controlled Parameters	Coolant In	ºC	ACOINITC	SCOINITC	NCOINITC	BCOINITC
	Oil Sump (optional)	ºC	ASUMPITC	SSUMPITC	NSUMPITC	BSUMPITC
	Exhaust	ºC	AEXHTITC	SEXHTITC	NEXHTITC	BEXHTITC
	Boost Pressure	kPaA	ABPITC	SBPITC	NBPITC	BBPITC
	Intake Manifold	kPaA	AIMPITC	SIMPITC	NIMPITC	BIMPITC
	Barometric	kPaA	ABAROITC	SBAROITC	NBAROITC	BBAROITC
	Crankcase	kPa	ACCPITC	SCCPITC	NCCPITC	BCCPITC
	Fuel	kPa	AFPRITC	SFPRITC	NFPRITC	BFPRITC
	Fuel Flow	kg/h	AFFLOITC	SFFLOITC	NFFLOITC	BFFLOITC
	Power	kW	APWRITC	SPWRITC	NPWRITC	BPWRITC
	Equivalence Ratio	ʎ	ALAMBITC	SLAMBITC	NLAMBITC	BLAMBITC

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Operational Summary – Iteration D

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	
Fuel Batch		FUELBATD	

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000	QRPMITD	1750	ARPMITD	SRPMITD	NRPMITD	BRPMITD
	Torque	Nm	0.000	QTORQITD	269	ATORQITD	STORQITD	NTORQITD	BTORQITD
	Coolant Out	ºC	0.000	QCOUTITD	95	ACOUTITD	SCOUTITD	NCOUTITD	BCOUTITD
	Oil Gallery	ºC	0.000	QOILGITD	95	AOILGITD	SOILGITD	NOILGITD	BOILGITD
	Inlet Air	ºC	0.000	QILATITD	30	AILATITD	SILATITD	NILATITD	BILATITD
	Air Charge	ºC	0.000	QACTITD	43	AACTITD	SACTITD	NACTITD	BACTITD
	Fuel	ºC	0.000	QFUELITD	30	AFUELITD	SFUELITD	NFUELITD	BFUELITD
	Inlet Air	kPaA	0.000	QIAPITD	0.05	AIAPITD	SIAPITD	NIAPITD	BIAPITD
	Exhaust Back	kPaA	0.000	QEBPITD	104	AEBPITD	SEBPITD	NEBPITD	BEBPITD
	Coolant	kPa	0.000	QCOLPITD	70	ACOLPITD	SCOLPITD	NCOLPITD	BCOLPITD
	Humidity	g/kg	0.000	QHUMITD	11.4	AHUMITD	SHUMITD	NHUMITD	BHUMITD
	Coolant Flow	L/min	0.000	QCFLOITD	55	ACFLOITD	SCFLOITD	NCFLOITD	BCFLOITD

	Parameter	Units	Average	Standard Deviation	Number of Samples	Number of BQD
Non-controlled Parameters	Coolant In	ºC	ACOINITD	SCOINITD	NCOINITD	BCOINITD
	Oil Sump (optional)	ºC	ASUMPITD	SSUMPITD	NSUMPITD	BSUMPITD
	Exhaust	ºC	AEXHTITD	SEXHTITD	NEXHTITD	BEXHTITD
	Boost Pressure	kPaA	ABPITD	SBPITD	NBPITD	BBPITD
	Intake Manifold	kPaA	AIMPITD	SIMPITD	NIMPITD	BIMPITD
	Barometric	kPaA	ABAROITD	SBAROITD	NBAROITD	BBAROITD
	Crankcase	kPa	ACCPITD	SCCPITD	NCCPITD	BCCPITD
	Fuel	kPa	AFPRITD	SFPRITD	NFPRITD	BFPRITD
	Fuel Flow	kg/h	AFFLOITD	SFFLOITD	NFFLOITD	BFFLOITD
	Power	kW	APWRITD	SPWRITD	NPWRITD	BPWRITD
	Equivalence Ratio	ʎ	ALAMBITD	SLAMBITD	NLAMBITD	BLAMBITD

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Form 11
Operational Summary – CAN BUS, Iterations A and B

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

PCM CAN BUS Channels	Iteration A	Units	Average	Standard Deviation	Number of Samples	Number of BQD
	Ignition Timing Advance for #1 Cylinder	º	ACBITIMA	SCBITIMA	NCBITIMA	BCBITIM
	Absolute Throttle Position	%	ACBATPSA	SCBATPSA	NCBATPSA	BCBATPS
	Engine Coolant Temperature	ºC	ACBECTA	SCBECTA	NCBECTA	BCBECTA
	Intake Air Temperature	ºC	ACBIATA	SCBIATA	NCBIATA	BCBIATA
	Equivalence Ratio (Lambda)	ʎ	ACBLAMB	SCBLAMB	NCBLAMBA	BCBLAM
	Absolute Load Value	%	ACBALDA	SCBALDA	NCBALDA	BCBALDA
	Intake Manifold Absolute Pressure	kPaA	ACBMAPA	SCBMAPA	NCBMAPA	BCBMAP
	Fuel Rail Pressure	kPa	ACBFPA	SCBFPA	NCBFPA	BCBFPA
	Boost Absolute Pressure - Raw Value	kPaA	ACBBAPA	SCBBAPA	NCBBAPA	BCBBAPA
	Turbocharger/Supercharger Wastegate	%	ACBWGA	SCBWGA	NCBWGA	BCBWGA
	Actual Intake (A) Camshaft Position	º	ACBICPA	SCBICPA	NCBICPA	BCBICPA
	Actual Exhaust (B) Camshaft Position	º	ACBECPA	SCBECPA	NCBECPA	BCBECPA
	Intake (A) Camshaft Position Actuator Duty	%	ACBICDCA	SCBICDCA	NCBICDCA	BCBICDC
	Exhaust (B) Camshaft Position Actuator Duty	%	ACBECDC	SCBECDCA	NCBECDCA	BCBECDC
	Charge Air Cooler Temperature	ºC	ACBACTA	SCBACTA	NCBACTA	BCBACTA

PCM CAN BUS Channels	Iteration B	Units	Average	Standard Deviation	Number of Samples	Number of BQD
	Ignition Timing Advance for #1 Cylinder	º	ACBITIMB	SCBITIMB	NCBITIMB	BCBITIM
	Absolute Throttle Position	%	ACBATPSB	SCBATPSB	NCBATPSB	BCBATPS
	Engine Coolant Temperature	ºC	ACBECTB	SCBECTB	NCBECTB	BCBECTB
	Intake Air Temperature	ºC	ACBIATB	SCBIATB	NCBIATB	BCBIATB
	Equivalence Ratio (Lambda)	ʎ	ACBLAMB	SCBLAMB	NCBLAMBB	BCBLAM
	Absolute Load Value	%	ACBALDB	SCBALDB	NCBALDB	BCBALDB
	Intake Manifold Absolute Pressure	kPaA	ACBMAPB	SCBMAPB	NCBMAPB	BCBMAP
	Fuel Rail Pressure	kPa	ACBFPB	SCBFPB	NCBFPB	BCBFPB
	Boost Absolute Pressure - Raw Value	kPaA	ACBBAPB	SCBBAPB	NCBBAPB	BCBBAPB
	Turbocharger/Supercharger Wastegate	%	ACBWGB	SCBWGB	NCBWGB	BCBWGB
	Actual Intake (A) Camshaft Position	º	ACBICPB	SCBICPB	NCBICPB	BCBICPB
	Actual Exhaust (B) Camshaft Position	º	ACBECPB	SCBECPB	NCBECPB	BCBECPB
	Intake (A) Camshaft Position Actuator Cycle	%	ACBICDCB	SCBICDCB	NCBICDCB	BCBICDC
	Exhaust (B) Camshaft Position Actuator Duty	%	ACBECDCB	SCBECDCB	NCBECDCB	BCBECDC
	Charge Air Cooler Temperature	ºC	ACBACTB	SCBACTB	NCBACTB	BCBACTB

Sequence IX Aged Oil
Form 12
Operational Summary – CAN BUS, Iterations C and D

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

PCM CAN BUS Channels	Iteration C	Units	Average	Standard Deviation	Number of Samples	Number of BQD
	Ignition Timing Advance for #1 Cylinder	º	ACBITIMC	SCBITIMC	NCBITIMC	BCBITIMC
	Absolute Throttle Position	%	ACBATPSC	SCBATPSC	NCBATPSC	BCBATPSC
	Engine Coolant Temperature	ºC	ACBECTC	SCBECTC	NCBECTC	BCBECTC
	Intake Air Temperature	ºC	ACBIATC	SCBIATC	NCBIATC	BCBIATC
	Equivalence Ratio (Lambda)	ʎ	ACBLAMB	SCBLAMB	NCBLAMBC	BCBLAMB
	Absolute Load Value	%	ACBALDC	SCBALDC	NCBALDC	BCBALDC
	Intake Manifold Absolute Pressure	kPaA	ACBMAPC	SCBMAPC	NCBMAPC	BCBMAPC
	Fuel Rail Pressure	kPa	ACBFPC	SCBFPC	NCBFPC	BCBFPC
	Boost Absolute Pressure - Raw Value	kPaA	ACBBAPC	SCBBAPC	NCBBAPC	BCBBAPC
	Turbocharger/Supercharger Wastegate	%	ACBWGC	SCBWGC	NCBWGC	BCBWGC
	Actual Intake (A) Camshaft Position	º	ACBICPC	SCBICPC	NCBICPC	BCBICPC
	Actual Exhaust (B) Camshaft Position	º	ACBECPC	SCBECPC	NCBECPC	BCBECPC
	Intake (A) Camshaft Position Actuator Duty	%	ACBICDCC	SCBICDCC	NCBICDCC	BCBICDCC
	Exhaust (B) Camshaft Position Actuator	%	ACBECDCC	SCBECDCC	NCBECDCC	BCBECDCC
	Charge Air Cooler Temperature	ºC	ACBACTC	SCBACTC	NCBACTC	BCBACTC

PCM CAN BUS Channels	Iteration D	Units	Average	Standard Deviation	Number of Samples	Number of BQD
	Ignition Timing Advance for #1 Cylinder	º	ACBITIMD	SCBITIMD	NCBITIMD	BCBITIMD
	Absolute Throttle Position	%	ACBATPSD	SCBATPSD	NCBATPSD	BCBATPSD
	Engine Coolant Temperature	ºC	ACBECTD	SCBECTD	NCBECTD	BCBECTD
	Intake Air Temperature	ºC	ACBIATD	SCBIATD	NCBIATD	BCBIATBD
	Equivalence Ratio (Lambda)	ʎ	ACBLAMB	SCBLAMB	NCBLAMBD	BCBLAMB
	Absolute Load Value	%	ACBALDD	SCBALDD	NCBALDD	BCBALDD
	Intake Manifold Absolute Pressure	kPaA	ACBMAPD	SCBMAPD	NCBMAPD	BCBMAPD
	Fuel Rail Pressure	kPa	ACBFPD	SCBFPD	NCBFPD	BCBFPD
	Boost Absolute Pressure - Raw Value	kPaA	ACBBAPD	SCBBAPD	NCBBAPD	BCBBAPD
	Turbocharger/Supercharger Wastegate	%	ACBWGD	SCBWGD	NCBWGD	BCBWGD
	Actual Intake (A) Camshaft Position	º	ACBICPD	SCBICPD	NCBICPD	BCBICPD
	Actual Exhaust (B) Camshaft Position	º	ACBECPD	SCBECPD	NCBECPD	BCBECPD
	Intake (A) Camshaft Position Actuator Cycle	%	ACBICDCD	SCBICDCD	NCBICDCD	BCBICDCD
	Exhaust (B) Camshaft Position Actuator	%	ACBECDCD	SCBECDCD	NCBECDCD	BCBECDCD
	Charge Air Cooler Temperature	ºC	ACBACTD	SCBACTD	NCBACTD	BCBACTD

Sequence IX Aged Oil
Form 13
Cycle Count and Type Summary

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

	Iteration A			Iteration B			Iteration C			Iteration D		
Cylinder	**PP Only**	**MFB2 Only**	**PP and MFB2**	**PP Only**	**MFB2 Only**	**PP and MFB2**	**PP Only**	**MFB2 Only**	**PP and MFB2**	**PP Only**	**MFB2 Only**	**PP and MFB2**
1	PPEVT1T	MFEVT1	BEV1ITA	PPEVT1T	MFEVT1	BEV1ITE	PPEVT1T	MFEVT1	BEV1ITC	PPEVT1T	MFEVT1	BEV1ITL
2	PPEVT2T	MFEVT2	BEV2ITA	PPEVT2T	MFEVT2	BEV2ITE	PPEVT2T	MFEVT2	BEV2ITC	PPEVT2T	MFEVT2	BEV2ITL
3	PPEVT3T	MFEVT3	BEV3ITA	PPEVT3T	MFEVT3	BEV3ITE	PPEVT3T	MFEVT3	BEV3ITC	PPEVT3T	MFEVT3	BEV3ITL
4	PPEVT4T	MFEVT4	BEV4ITA	PPEVT4T	MFEVT4	BEV4ITE	PPEVT4T	MFEVT4	BEV4ITC	PPEVT4T	MFEVT4	BEV4ITL
All	PPEVTA'	MFEVTA	BEVAITA	PPEVTA'	MFEVTA	BEVAITI	PPEVTA'	MFEVTA	BEVAITC	PPEVTA'	MFEVTA	BEVAITI

Evaluation Criteria

	Iteration A				Iteration B				Iteration C				Iteration D			
Parameter	**Cyl 1**	**Cyl 2**	**Cyl 3**	**Cyl 4**	**Cyl 1**	**Cyl 2**	**Cyl 3**	**Cyl 4**	**Cyl 1**	**Cyl 2**	**Cyl 3**	**Cyl 4**	**Cyl 1**	**Cyl 2**	**Cyl 3**	**Cyl 4**
PP Mean	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM	PPEVM
PP Std Dev	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVSC	PPEVC1	PPEVC2	PPEVC3	PPEVC4
PP F Value	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC	PPEVFC
PP Thresh	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC	PPEVTC
MFB2 Mean	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM	MFEVM
MFB2 Std Dev	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVS	MFEVC	MFEVC	MFEVC	MFEVC
MFB2 F Value	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF	MFEVF
MFB2 Thresh	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT	MFEVT

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP& MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 14
Summary of Pre-ignition Events, Iteration A

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLAR00	PCYAR001	PRPAR001	PMFAR00	PCTAR001
PCLAR00	PCYAR002	PRPAR002	PMFAR00	PCTAR002
PCLAR00	PCYAR003	PRPAR003	PMFAR00	PCTAR003
PCLAR00	PCYAR004	PRPAR004	PMFAR00	PCTAR004
PCLAR00	PCYAR005	PRPAR005	PMFAR00	PCTAR005
PCLAR00	PCYAR006	PRPAR006	PMFAR00	PCTAR006
PCLAR00	PCYAR007	PRPAR007	PMFAR00	PCTAR007
PCLAR00	PCYAR008	PRPAR008	PMFAR00	PCTAR008
PCLAR00	PCYAR009	PRPAR009	PMFAR00	PCTAR009
PCLAR01	PCYAR010	PRPAR010	PMFAR01	PCTAR010
PCLAR01	PCYAR011	PRPAR011	PMFAR01	PCTAR011
PCLAR01	PCYAR012	PRPAR012	PMFAR01	PCTAR012
PCLAR01	PCYAR013	PRPAR013	PMFAR01	PCTAR013
PCLAR01	PCYAR014	PRPAR014	PMFAR01	PCTAR014
PCLAR01	PCYAR015	PRPAR015	PMFAR01	PCTAR015
PCLAR01	PCYAR016	PRPAR016	PMFAR01	PCTAR016
PCLAR01	PCYAR017	PRPAR017	PMFAR01	PCTAR017
PCLAR01	PCYAR018	PRPAR018	PMFAR01	PCTAR018
PCLAR01	PCYAR019	PRPAR019	PMFAR01	PCTAR019
PCLAR02	PCYAR020	PRPAR020	PMFAR02	PCTAR020
PCLAR02	PCYAR021	PRPAR021	PMFAR02	PCTAR021
PCLAR02	PCYAR022	PRPAR022	PMFAR02	PCTAR022
PCLAR02	PCYAR023	PRPAR023	PMFAR02	PCTAR023
PCLAR02	PCYAR024	PRPAR024	PMFAR02	PCTAR024
PCLAR02	PCYAR025	PRPAR025	PMFAR02	PCTAR025
PCLAR02	PCYAR026	PRPAR026	PMFAR02	PCTAR026
PCLAR02	PCYAR027	PRPAR027	PMFAR02	PCTAR027
PCLAR02	PCYAR028	PRPAR028	PMFAR02	PCTAR028

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLAR02	PCYAR029	PRPAR029	PMFAR029	PCTAR029
PCLAR03	PCYAR030	PRPAR030	PMFAR030	PCTAR030
PCLAR03	PCYAR031	PRPAR031	PMFAR031	PCTAR031
PCLAR03	PCYAR032	PRPAR032	PMFAR032	PCTAR032
PCLAR03	PCYAR033	PRPAR033	PMFAR033	PCTAR033
PCLAR03	PCYAR034	PRPAR034	PMFAR034	PCTAR034
PCLAR03	PCYAR035	PRPAR035	PMFAR035	PCTAR035
PCLAR03	PCYAR036	PRPAR036	PMFAR036	PCTAR036
PCLAR03	PCYAR037	PRPAR037	PMFAR037	PCTAR037
PCLAR03	PCYAR038	PRPAR038	PMFAR038	PCTAR038
PCLAR03	PCYAR039	PRPAR039	PMFAR039	PCTAR039
PCLAR04	PCYAR040	PRPAR040	PMFAR040	PCTAR040
PCLAR04	PCYAR041	PRPAR041	PMFAR041	PCTAR041
PCLAR04	PCYAR042	PRPAR042	PMFAR042	PCTAR042
PCLAR04	PCYAR043	PRPAR043	PMFAR043	PCTAR043
PCLAR04	PCYAR044	PRPAR044	PMFAR044	PCTAR044
PCLAR04	PCYAR045	PRPAR045	PMFAR045	PCTAR045
PCLAR04	PCYAR046	PRPAR046	PMFAR046	PCTAR046
PCLAR04	PCYAR047	PRPAR047	PMFAR047	PCTAR047
PCLAR04	PCYAR048	PRPAR048	PMFAR048	PCTAR048
PCLAR04	PCYAR049	PRPAR049	PMFAR049	PCTAR049
PCLAR05	PCYAR050	PRPAR050	PMFAR050	PCTAR050
PCLAR05	PCYAR051	PRPAR051	PMFAR051	PCTAR051
PCLAR05	PCYAR052	PRPAR052	PMFAR052	PCTAR052
PCLAR05	PCYAR053	PRPAR053	PMFAR053	PCTAR053
PCLAR05	PCYAR054	PRPAR054	PMFAR054	PCTAR054
PCLAR05	PCYAR055	PRPAR055	PMFAR055	PCTAR055
PCLAR05	PCYAR056	PRPAR056	PMFAR056	PCTAR056

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn @2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn @ 2%**

Sequence IX Aged Oil
Form 14A
Summary of Pre-ignition Events, Iteration A

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLAR057	PCYAR057	PRPAR057	PMFAR057	PCTAR057
PCLAR058	PCYAR058	PRPAR058	PMFAR058	PCTAR058
PCLAR059	PCYAR059	PRPAR059	PMFAR059	PCTAR059
PCLAR060	PCYAR060	PRPAR060	PMFAR060	PCTAR060
PCLAR061	PCYAR061	PRPAR061	PMFAR061	PCTAR061
PCLAR062	PCYAR062	PRPAR062	PMFAR062	PCTAR062
PCLAR063	PCYAR063	PRPAR063	PMFAR063	PCTAR063
PCLAR064	PCYAR064	PRPAR064	PMFAR064	PCTAR064
PCLAR065	PCYAR065	PRPAR065	PMFAR065	PCTAR065
PCLAR066	PCYAR066	PRPAR066	PMFAR066	PCTAR066
PCLAR067	PCYAR067	PRPAR067	PMFAR067	PCTAR067
PCLAR068	PCYAR068	PRPAR068	PMFAR068	PCTAR068
PCLAR069	PCYAR069	PRPAR069	PMFAR069	PCTAR069
PCLAR070	PCYAR070	PRPAR070	PMFAR070	PCTAR070
PCLAR071	PCYAR071	PRPAR071	PMFAR071	PCTAR071
PCLAR072	PCYAR072	PRPAR072	PMFAR072	PCTAR072
PCLAR073	PCYAR073	PRPAR073	PMFAR073	PCTAR073
PCLAR074	PCYAR074	PRPAR074	PMFAR074	PCTAR074
PCLAR075	PCYAR075	PRPAR075	PMFAR075	PCTAR075
PCLAR076	PCYAR076	PRPAR076	PMFAR076	PCTAR076
PCLAR077	PCYAR077	PRPAR077	PMFAR077	PCTAR077
PCLAR078	PCYAR078	PRPAR078	PMFAR078	PCTAR078
PCLAR079	PCYAR079	PRPAR079	PMFAR079	PCTAR079
PCLAR080	PCYAR080	PRPAR080	PMFAR080	PCTAR080
PCLAR081	PCYAR081	PRPAR081	PMFAR081	PCTAR081
PCLAR082	PCYAR082	PRPAR082	PMFAR082	PCTAR082
PCLAR083	PCYAR083	PRPAR083	PMFAR083	PCTAR083
PCLAR084	PCYAR084	PRPAR084	PMFAR084	PCTAR084

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLAR085	PCYAR085	PRPAR085	PMFAR085	PCTAR085
PCLAR086	PCYAR086	PRPAR086	PMFAR086	PCTAR086
PCLAR087	PCYAR087	PRPAR087	PMFAR087	PCTAR087
PCLAR088	PCYAR088	PRPAR088	PMFAR088	PCTAR088
PCLAR089	PCYAR089	PRPAR089	PMFAR089	PCTAR089
PCLAR090	PCYAR090	PRPAR090	PMFAR090	PCTAR090
PCLAR091	PCYAR091	PRPAR091	PMFAR091	PCTAR091
PCLAR092	PCYAR092	PRPAR092	PMFAR092	PCTAR092
PCLAR093	PCYAR093	PRPAR093	PMFAR093	PCTAR093
PCLAR094	PCYAR094	PRPAR094	PMFAR094	PCTAR094
PCLAR095	PCYAR095	PRPAR095	PMFAR095	PCTAR095
PCLAR096	PCYAR096	PRPAR096	PMFAR096	PCTAR096
PCLAR097	PCYAR097	PRPAR097	PMFAR097	PCTAR097
PCLAR098	PCYAR098	PRPAR098	PMFAR098	PCTAR098
PCLAR099	PCYAR099	PRPAR099	PMFAR099	PCTAR099
PCLAR100	PCYAR100	PRPAR100	PMFAR100	PCTAR100
PCLAR101	PCYAR101	PRPAR101	PMFAR101	PCTAR101
PCLAR102	PCYAR102	PRPAR102	PMFAR102	PCTAR102
PCLAR103	PCYAR103	PRPAR103	PMFAR103	PCTAR103
PCLAR104	PCYAR104	PRPAR104	PMFAR104	PCTAR104
PCLAR105	PCYAR105	PRPAR105	PMFAR105	PCTAR105
PCLAR106	PCYAR106	PRPAR106	PMFAR106	PCTAR106
PCLAR107	PCYAR107	PRPAR107	PMFAR107	PCTAR107
PCLAR108	PCYAR108	PRPAR108	PMFAR108	PCTAR108
PCLAR109	PCYAR109	PRPAR109	PMFAR109	PCTAR109
PCLAR110	PCYAR110	PRPAR110	PMFAR110	PCTAR110
PCLAR111	PCYAR111	PRPAR111	PMFAR111	PCTAR111
PCLAR112	PCYAR112	PRPAR112	PMFAR112	PCTAR112

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn @2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn @ 2%**

Sequence IX Aged Oil
Form 14B
Summary of Pre-ignition Events, Iteration A

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLAR11	PCYAR113	PRPAR113	PMFAR11	PCTAR113
PCLAR11	PCYAR114	PRPAR114	PMFAR11	PCTAR114
PCLAR11	PCYAR115	PRPAR115	PMFAR11	PCTAR115
PCLAR11	PCYAR116	PRPAR116	PMFAR11	PCTAR116
PCLAR11	PCYAR117	PRPAR117	PMFAR11	PCTAR117
PCLAR11	PCYAR118	PRPAR118	PMFAR11	PCTAR118
PCLAR11	PCYAR119	PRPAR119	PMFAR11	PCTAR119
PCLAR12	PCYAR120	PRPAR120	PMFAR12	PCTAR120
PCLAR12	PCYAR121	PRPAR121	PMFAR12	PCTAR121
PCLAR12	PCYAR122	PRPAR122	PMFAR12	PCTAR122
PCLAR12	PCYAR123	PRPAR123	PMFAR12	PCTAR123
PCLAR12	PCYAR124	PRPAR124	PMFAR12	PCTAR124
PCLAR12	PCYAR125	PRPAR125	PMFAR12	PCTAR125
PCLAR12	PCYAR126	PRPAR126	PMFAR12	PCTAR126
PCLAR12	PCYAR127	PRPAR127	PMFAR12	PCTAR127
PCLAR12	PCYAR128	PRPAR128	PMFAR12	PCTAR128
PCLAR12	PCYAR129	PRPAR129	PMFAR12	PCTAR129
PCLAR13	PCYAR130	PRPAR130	PMFAR13	PCTAR130
PCLAR13	PCYAR131	PRPAR131	PMFAR13	PCTAR131
PCLAR13	PCYAR132	PRPAR132	PMFAR13	PCTAR132
PCLAR13	PCYAR133	PRPAR133	PMFAR13	PCTAR133
PCLAR13	PCYAR134	PRPAR134	PMFAR13	PCTAR134
PCLAR13	PCYAR135	PRPAR135	PMFAR13	PCTAR135
PCLAR13	PCYAR136	PRPAR136	PMFAR13	PCTAR136
PCLAR13	PCYAR137	PRPAR137	PMFAR13	PCTAR137
PCLAR13	PCYAR138	PRPAR138	PMFAR13	PCTAR138
PCLAR13	PCYAR139	PRPAR139	PMFAR13	PCTAR139
PCLAR14	PCYAR140	PRPAR140	PMFAR14	PCTAR140

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLAR14	PCYAR141	PRPAR141	PMFAR141	PCTAR141
PCLAR14	PCYAR142	PRPAR142	PMFAR142	PCTAR142
PCLAR14	PCYAR143	PRPAR143	PMFAR143	PCTAR143
PCLAR14	PCYAR144	PRPAR144	PMFAR144	PCTAR144
PCLAR14	PCYAR145	PRPAR145	PMFAR145	PCTAR145
PCLAR14	PCYAR146	PRPAR146	PMFAR146	PCTAR146
PCLAR14	PCYAR147	PRPAR147	PMFAR147	PCTAR147
PCLAR14	PCYAR148	PRPAR148	PMFAR148	PCTAR148
PCLAR14	PCYAR149	PRPAR149	PMFAR149	PCTAR149
PCLAR15	PCYAR150	PRPAR150	PMFAR150	PCTAR150
PCLAR15	PCYAR151	PRPAR151	PMFAR151	PCTAR151
PCLAR15	PCYAR152	PRPAR152	PMFAR152	PCTAR152
PCLAR15	PCYAR153	PRPAR153	PMFAR153	PCTAR153
PCLAR15	PCYAR154	PRPAR154	PMFAR154	PCTAR154
PCLAR15	PCYAR155	PRPAR155	PMFAR155	PCTAR155
PCLAR15	PCYAR156	PRPAR156	PMFAR156	PCTAR156
PCLAR15	PCYAR157	PRPAR157	PMFAR157	PCTAR157
PCLAR15	PCYAR158	PRPAR158	PMFAR158	PCTAR158
PCLAR15	PCYAR159	PRPAR159	PMFAR159	PCTAR159
PCLAR16	PCYAR160	PRPAR160	PMFAR160	PCTAR160
PCLAR16	PCYAR161	PRPAR161	PMFAR161	PCTAR161
PCLAR16	PCYAR162	PRPAR162	PMFAR162	PCTAR162
PCLAR16	PCYAR163	PRPAR163	PMFAR163	PCTAR163
PCLAR16	PCYAR164	PRPAR164	PMFAR164	PCTAR164
PCLAR16	PCYAR165	PRPAR165	PMFAR165	PCTAR165
PCLAR16	PCYAR166	PRPAR166	PMFAR166	PCTAR166
PCLAR16	PCYAR167	PRPAR167	PMFAR167	PCTAR167
PCLAR16	PCYAR168	PRPAR168	PMFAR168	PCTAR168

Legend:

PP	**Peak Pressure Only**
MFB2	**Mass Fraction Burn @2% Only**
PP&MFB2	**Both Peak Pressure and Mass Fraction Burn @ 2%**

Sequence IX Aged Oil
Form 15
Summary of Pre-ignition Events, Iteration B

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLBR001	PCYBR001	PRPBR001	PMFBR001	PCTBR001
PCLBR002	PCYBR002	PRPBR002	PMFBR002	PCTBR002
PCLBR003	PCYBR003	PRPBR003	PMFBR003	PCTBR003
PCLBR004	PCYBR004	PRPBR004	PMFBR004	PCTBR004
PCLBR005	PCYBR005	PRPBR005	PMFBR005	PCTBR005
PCLBR006	PCYBR006	PRPBR006	PMFBR006	PCTBR006
PCLBR007	PCYBR007	PRPBR007	PMFBR007	PCTBR007
PCLBR008	PCYBR008	PRPBR008	PMFBR008	PCTBR008
PCLBR009	PCYBR009	PRPBR009	PMFBR009	PCTBR009
PCLBR010	PCYBR010	PRPBR010	PMFBR010	PCTBR010
PCLBR011	PCYBR011	PRPBR011	PMFBR011	PCTBR011
PCLBR012	PCYBR012	PRPBR012	PMFBR012	PCTBR012
PCLBR013	PCYBR013	PRPBR013	PMFBR013	PCTBR013
PCLBR014	PCYBR014	PRPBR014	PMFBR014	PCTBR014
PCLBR015	PCYBR015	PRPBR015	PMFBR015	PCTBR015
PCLBR016	PCYBR016	PRPBR016	PMFBR016	PCTBR016
PCLBR017	PCYBR017	PRPBR017	PMFBR017	PCTBR017
PCLBR018	PCYBR018	PRPBR018	PMFBR018	PCTBR018
PCLBR019	PCYBR019	PRPBR019	PMFBR019	PCTBR019
PCLBR020	PCYBR020	PRPBR020	PMFBR020	PCTBR020
PCLBR021	PCYBR021	PRPBR021	PMFBR021	PCTBR021
PCLBR022	PCYBR022	PRPBR022	PMFBR022	PCTBR022
PCLBR023	PCYBR023	PRPBR023	PMFBR023	PCTBR023
PCLBR024	PCYBR024	PRPBR024	PMFBR024	PCTBR024
PCLBR025	PCYBR025	PRPBR025	PMFBR025	PCTBR025
PCLBR026	PCYBR026	PRPBR026	PMFBR026	PCTBR026
PCLBR027	PCYBR027	PRPBR027	PMFBR027	PCTBR027
PCLBR028	PCYBR028	PRPBR028	PMFBR028	PCTBR028

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLBR029	PCYBR029	PRPBR029	PMFBR029	PCTBR029
PCLBR030	PCYBR030	PRPBR030	PMFBR030	PCTBR030
PCLBR031	PCYBR031	PRPBR031	PMFBR031	PCTBR031
PCLBR032	PCYBR032	PRPBR032	PMFBR032	PCTBR032
PCLBR033	PCYBR033	PRPBR033	PMFBR033	PCTBR033
PCLBR034	PCYBR034	PRPBR034	PMFBR034	PCTBR034
PCLBR035	PCYBR035	PRPBR035	PMFBR035	PCTBR035
PCLBR036	PCYBR036	PRPBR036	PMFBR036	PCTBR036
PCLBR037	PCYBR037	PRPBR037	PMFBR037	PCTBR037
PCLBR038	PCYBR038	PRPBR038	PMFBR038	PCTBR038
PCLBR039	PCYBR039	PRPBR039	PMFBR039	PCTBR039
PCLBR040	PCYBR040	PRPBR040	PMFBR040	PCTBR040
PCLBR041	PCYBR041	PRPBR041	PMFBR041	PCTBR041
PCLBR042	PCYBR042	PRPBR042	PMFBR042	PCTBR042
PCLBR043	PCYBR043	PRPBR043	PMFBR043	PCTBR043
PCLBR044	PCYBR044	PRPBR044	PMFBR044	PCTBR044
PCLBR045	PCYBR045	PRPBR045	PMFBR045	PCTBR045
PCLBR046	PCYBR046	PRPBR046	PMFBR046	PCTBR046
PCLBR047	PCYBR047	PRPBR047	PMFBR047	PCTBR047
PCLBR048	PCYBR048	PRPBR048	PMFBR048	PCTBR048
PCLBR049	PCYBR049	PRPBR049	PMFBR049	PCTBR049
PCLBR050	PCYBR050	PRPBR050	PMFBR050	PCTBR050
PCLBR051	PCYBR051	PRPBR051	PMFBR051	PCTBR051
PCLBR052	PCYBR052	PRPBR052	PMFBR052	PCTBR052
PCLBR053	PCYBR053	PRPBR053	PMFBR053	PCTBR053
PCLBR054	PCYBR054	PRPBR054	PMFBR054	PCTBR054
PCLBR055	PCYBR055	PRPBR055	PMFBR055	PCTBR055
PCLBR056	PCYBR056	PRPBR056	PMFBR056	PCTBR056

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn @2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn @ 2%**

Sequence IX Aged Oil
Form 15A
Summary of Pre-ignition Events, Iteration B

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLBR057	PCYBR057	PRPBR057	PMFBR057	PCTBR057
PCLBR058	PCYBR058	PRPBR058	PMFBR058	PCTBR058
PCLBR059	PCYBR059	PRPBR059	PMFBR059	PCTBR059
PCLBR060	PCYBR060	PRPBR060	PMFBR060	PCTBR060
PCLBR061	PCYBR061	PRPBR061	PMFBR061	PCTBR061
PCLBR062	PCYBR062	PRPBR062	PMFBR062	PCTBR062
PCLBR063	PCYBR063	PRPBR063	PMFBR063	PCTBR063
PCLBR064	PCYBR064	PRPBR064	PMFBR064	PCTBR064
PCLBR065	PCYBR065	PRPBR065	PMFBR065	PCTBR065
PCLBR066	PCYBR066	PRPBR066	PMFBR066	PCTBR066
PCLBR067	PCYBR067	PRPBR067	PMFBR067	PCTBR067
PCLBR068	PCYBR068	PRPBR068	PMFBR068	PCTBR068
PCLBR069	PCYBR069	PRPBR069	PMFBR069	PCTBR069
PCLBR070	PCYBR070	PRPBR070	PMFBR070	PCTBR070
PCLBR071	PCYBR071	PRPBR071	PMFBR071	PCTBR071
PCLBR072	PCYBR072	PRPBR072	PMFBR072	PCTBR072
PCLBR073	PCYBR073	PRPBR073	PMFBR073	PCTBR073
PCLBR074	PCYBR074	PRPBR074	PMFBR074	PCTBR074
PCLBR075	PCYBR075	PRPBR075	PMFBR075	PCTBR075
PCLBR076	PCYBR076	PRPBR076	PMFBR076	PCTBR076
PCLBR077	PCYBR077	PRPBR077	PMFBR077	PCTBR077
PCLBR078	PCYBR078	PRPBR078	PMFBR078	PCTBR078
PCLBR079	PCYBR079	PRPBR079	PMFBR079	PCTBR079
PCLBR080	PCYBR080	PRPBR080	PMFBR080	PCTBR080
PCLBR081	PCYBR081	PRPBR081	PMFBR081	PCTBR081
PCLBR082	PCYBR082	PRPBR082	PMFBR082	PCTBR082
PCLBR083	PCYBR083	PRPBR083	PMFBR083	PCTBR083
PCLBR084	PCYBR084	PRPBR084	PMFBR084	PCTBR084

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLBR085	PCYBR085	PRPBR085	PMFBR085	PCTBR085
PCLBR086	PCYBR086	PRPBR086	PMFBR086	PCTBR086
PCLBR087	PCYBR087	PRPBR087	PMFBR087	PCTBR087
PCLBR088	PCYBR088	PRPBR088	PMFBR088	PCTBR088
PCLBR089	PCYBR089	PRPBR089	PMFBR089	PCTBR089
PCLBR090	PCYBR090	PRPBR090	PMFBR090	PCTBR090
PCLBR091	PCYBR091	PRPBR091	PMFBR091	PCTBR091
PCLBR092	PCYBR092	PRPBR092	PMFBR092	PCTBR092
PCLBR093	PCYBR093	PRPBR093	PMFBR093	PCTBR093
PCLBR094	PCYBR094	PRPBR094	PMFBR094	PCTBR094
PCLBR095	PCYBR095	PRPBR095	PMFBR095	PCTBR095
PCLBR096	PCYBR096	PRPBR096	PMFBR096	PCTBR096
PCLBR097	PCYBR097	PRPBR097	PMFBR097	PCTBR097
PCLBR098	PCYBR098	PRPBR098	PMFBR098	PCTBR098
PCLBR099	PCYBR099	PRPBR099	PMFBR099	PCTBR099
PCLBR100	PCYBR100	PRPBR100	PMFBR100	PCTBR100
PCLBR101	PCYBR101	PRPBR101	PMFBR101	PCTBR101
PCLBR102	PCYBR102	PRPBR102	PMFBR102	PCTBR102
PCLBR103	PCYBR103	PRPBR103	PMFBR103	PCTBR103
PCLBR104	PCYBR104	PRPBR104	PMFBR104	PCTBR104
PCLBR105	PCYBR105	PRPBR105	PMFBR105	PCTBR105
PCLBR106	PCYBR106	PRPBR106	PMFBR106	PCTBR106
PCLBR107	PCYBR107	PRPBR107	PMFBR107	PCTBR107
PCLBR108	PCYBR108	PRPBR108	PMFBR108	PCTBR108
PCLBR109	PCYBR109	PRPBR109	PMFBR109	PCTBR109
PCLBR110	PCYBR110	PRPBR110	PMFBR110	PCTBR110
PCLBR111	PCYBR111	PRPBR111	PMFBR111	PCTBR111
PCLBR112	PCYBR112	PRPBR112	PMFBR112	PCTBR112

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn @2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn @ 2%**

Sequence IX Aged Oil
Form 15B
Summary of Pre-ignition Events, Iteration B

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLBR113	PCYBR113	PRPBR113	PMFBR113	PCTBR113
PCLBR114	PCYBR114	PRPBR114	PMFBR114	PCTBR114
PCLBR115	PCYBR115	PRPBR115	PMFBR115	PCTBR115
PCLBR116	PCYBR116	PRPBR116	PMFBR116	PCTBR116
PCLBR117	PCYBR117	PRPBR117	PMFBR117	PCTBR117
PCLBR118	PCYBR118	PRPBR118	PMFBR118	PCTBR118
PCLBR119	PCYBR119	PRPBR119	PMFBR119	PCTBR119
PCLBR120	PCYBR120	PRPBR120	PMFBR120	PCTBR120
PCLBR121	PCYBR121	PRPBR121	PMFBR121	PCTBR121
PCLBR122	PCYBR122	PRPBR122	PMFBR122	PCTBR122
PCLBR123	PCYBR123	PRPBR123	PMFBR123	PCTBR123
PCLBR124	PCYBR124	PRPBR124	PMFBR124	PCTBR124
PCLBR125	PCYBR125	PRPBR125	PMFBR125	PCTBR125
PCLBR126	PCYBR126	PRPBR126	PMFBR126	PCTBR126
PCLBR127	PCYBR127	PRPBR127	PMFBR127	PCTBR127
PCLBR128	PCYBR128	PRPBR128	PMFBR128	PCTBR128
PCLBR129	PCYBR129	PRPBR129	PMFBR129	PCTBR129
PCLBR130	PCYBR130	PRPBR130	PMFBR130	PCTBR130
PCLBR131	PCYBR131	PRPBR131	PMFBR131	PCTBR131
PCLBR132	PCYBR132	PRPBR132	PMFBR132	PCTBR132
PCLBR133	PCYBR133	PRPBR133	PMFBR133	PCTBR133
PCLBR134	PCYBR134	PRPBR134	PMFBR134	PCTBR134
PCLBR135	PCYBR135	PRPBR135	PMFBR135	PCTBR135
PCLBR136	PCYBR136	PRPBR136	PMFBR136	PCTBR136
PCLBR137	PCYBR137	PRPBR137	PMFBR137	PCTBR137
PCLBR138	PCYBR138	PRPBR138	PMFBR138	PCTBR138
PCLBR139	PCYBR139	PRPBR139	PMFBR139	PCTBR139
PCLBR140	PCYBR140	PRPBR140	PMFBR140	PCTBR140

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLBR141	PCYBR141	PRPBR141	PMFBR141	PCTBR141
PCLBR142	PCYBR142	PRPBR142	PMFBR142	PCTBR142
PCLBR143	PCYBR143	PRPBR143	PMFBR143	PCTBR143
PCLBR144	PCYBR144	PRPBR144	PMFBR144	PCTBR144
PCLBR145	PCYBR145	PRPBR145	PMFBR145	PCTBR145
PCLBR146	PCYBR146	PRPBR146	PMFBR146	PCTBR146
PCLBR147	PCYBR147	PRPBR147	PMFBR147	PCTBR147
PCLBR148	PCYBR148	PRPBR148	PMFBR148	PCTBR148
PCLBR149	PCYBR149	PRPBR149	PMFBR149	PCTBR149
PCLBR150	PCYBR150	PRPBR150	PMFBR150	PCTBR150
PCLBR151	PCYBR151	PRPBR151	PMFBR151	PCTBR151
PCLBR152	PCYBR152	PRPBR152	PMFBR152	PCTBR152
PCLBR153	PCYBR153	PRPBR153	PMFBR153	PCTBR153
PCLBR154	PCYBR154	PRPBR154	PMFBR154	PCTBR154
PCLBR155	PCYBR155	PRPBR155	PMFBR155	PCTBR155
PCLBR156	PCYBR156	PRPBR156	PMFBR156	PCTBR156
PCLBR157	PCYBR157	PRPBR157	PMFBR157	PCTBR157
PCLBR158	PCYBR158	PRPBR158	PMFBR158	PCTBR158
PCLBR159	PCYBR159	PRPBR159	PMFBR159	PCTBR159
PCLBR160	PCYBR160	PRPBR160	PMFBR160	PCTBR160
PCLBR161	PCYBR161	PRPBR161	PMFBR161	PCTBR161
PCLBR162	PCYBR162	PRPBR162	PMFBR162	PCTBR162
PCLBR163	PCYBR163	PRPBR163	PMFBR163	PCTBR163
PCLBR164	PCYBR164	PRPBR164	PMFBR164	PCTBR164
PCLBR165	PCYBR165	PRPBR165	PMFBR165	PCTBR165
PCLBR166	PCYBR166	PRPBR166	PMFBR166	PCTBR166
PCLBR167	PCYBR167	PRPBR167	PMFBR167	PCTBR167
PCLBR168	PCYBR168	PRPBR168	PMFBR168	PCTBR168

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn @2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn @ 2%**

Sequence IX Aged Oil
Form 16
Summary of Pre-ignition Events, Iteration C

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLCR001	PCYCR001	PRPCR001	PMFCR001	PCTCR001
PCLCR002	PCYCR002	PRPCR002	PMFCR002	PCTCR002
PCLCR003	PCYCR003	PRPCR003	PMFCR003	PCTCR003
PCLCR004	PCYCR004	PRPCR004	PMFCR004	PCTCR004
PCLCR005	PCYCR005	PRPCR005	PMFCR005	PCTCR005
PCLCR006	PCYCR006	PRPCR006	PMFCR006	PCTCR006
PCLCR007	PCYCR007	PRPCR007	PMFCR007	PCTCR007
PCLCR008	PCYCR008	PRPCR008	PMFCR008	PCTCR008
PCLCR009	PCYCR009	PRPCR009	PMFCR009	PCTCR009
PCLCR010	PCYCR010	PRPCR010	PMFCR010	PCTCR010
PCLCR011	PCYCR011	PRPCR011	PMFCR011	PCTCR011
PCLCR012	PCYCR012	PRPCR012	PMFCR012	PCTCR012
PCLCR013	PCYCR013	PRPCR013	PMFCR013	PCTCR013
PCLCR014	PCYCR014	PRPCR014	PMFCR014	PCTCR014
PCLCR015	PCYCR015	PRPCR015	PMFCR015	PCTCR015
PCLCR016	PCYCR016	PRPCR016	PMFCR016	PCTCR016
PCLCR017	PCYCR017	PRPCR017	PMFCR017	PCTCR017
PCLCR018	PCYCR018	PRPCR018	PMFCR018	PCTCR018
PCLCR019	PCYCR019	PRPCR019	PMFCR019	PCTCR019
PCLCR020	PCYCR020	PRPCR020	PMFCR020	PCTCR020
PCLCR021	PCYCR021	PRPCR021	PMFCR021	PCTCR021
PCLCR022	PCYCR022	PRPCR022	PMFCR022	PCTCR022
PCLCR023	PCYCR023	PRPCR023	PMFCR023	PCTCR023
PCLCR024	PCYCR024	PRPCR024	PMFCR024	PCTCR024
PCLCR025	PCYCR025	PRPCR025	PMFCR025	PCTCR025
PCLCR026	PCYCR026	PRPCR026	PMFCR026	PCTCR026
PCLCR027	PCYCR027	PRPCR027	PMFCR027	PCTCR027
PCLCR028	PCYCR028	PRPCR028	PMFCR028	PCTCR028

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLCR029	PCYCR029	PRPCR029	PMFCR029	PCTCR029
PCLCR030	PCYCR030	PRPCR030	PMFCR030	PCTCR030
PCLCR031	PCYCR031	PRPCR031	PMFCR031	PCTCR031
PCLCR032	PCYCR032	PRPCR032	PMFCR032	PCTCR032
PCLCR033	PCYCR033	PRPCR033	PMFCR033	PCTCR033
PCLCR034	PCYCR034	PRPCR034	PMFCR034	PCTCR034
PCLCR035	PCYCR035	PRPCR035	PMFCR035	PCTCR035
PCLCR036	PCYCR036	PRPCR036	PMFCR036	PCTCR036
PCLCR037	PCYCR037	PRPCR037	PMFCR037	PCTCR037
PCLCR038	PCYCR038	PRPCR038	PMFCR038	PCTCR038
PCLCR039	PCYCR039	PRPCR039	PMFCR039	PCTCR039
PCLCR040	PCYCR040	PRPCR040	PMFCR040	PCTCR040
PCLCR041	PCYCR041	PRPCR041	PMFCR041	PCTCR041
PCLCR042	PCYCR042	PRPCR042	PMFCR042	PCTCR042
PCLCR043	PCYCR043	PRPCR043	PMFCR043	PCTCR043
PCLCR044	PCYCR044	PRPCR044	PMFCR044	PCTCR044
PCLCR045	PCYCR045	PRPCR045	PMFCR045	PCTCR045
PCLCR046	PCYCR046	PRPCR046	PMFCR046	PCTCR046
PCLCR047	PCYCR047	PRPCR047	PMFCR047	PCTCR047
PCLCR048	PCYCR048	PRPCR048	PMFCR048	PCTCR048
PCLCR049	PCYCR049	PRPCR049	PMFCR049	PCTCR049
PCLCR050	PCYCR050	PRPCR050	PMFCR050	PCTCR050
PCLCR051	PCYCR051	PRPCR051	PMFCR051	PCTCR051
PCLCR052	PCYCR052	PRPCR052	PMFCR052	PCTCR052
PCLCR053	PCYCR053	PRPCR053	PMFCR053	PCTCR053
PCLCR054	PCYCR054	PRPCR054	PMFCR054	PCTCR054
PCLCR055	PCYCR055	PRPCR055	PMFCR055	PCTCR055
PCLCR056	PCYCR056	PRPCR056	PMFCR056	PCTCR056

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 16A
Summary of Pre-ignition Events, Iteration C

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLCR057	PCYCR057	PRPCR057	PMFCR057	PCTCR057
PCLCR058	PCYCR058	PRPCR058	PMFCR058	PCTCR058
PCLCR059	PCYCR059	PRPCR059	PMFCR059	PCTCR059
PCLCR060	PCYCR060	PRPCR060	PMFCR060	PCTCR060
PCLCR061	PCYCR061	PRPCR061	PMFCR061	PCTCR061
PCLCR062	PCYCR062	PRPCR062	PMFCR062	PCTCR062
PCLCR063	PCYCR063	PRPCR063	PMFCR063	PCTCR063
PCLCR064	PCYCR064	PRPCR064	PMFCR064	PCTCR064
PCLCR065	PCYCR065	PRPCR065	PMFCR065	PCTCR065
PCLCR066	PCYCR066	PRPCR066	PMFCR066	PCTCR066
PCLCR067	PCYCR067	PRPCR067	PMFCR067	PCTCR067
PCLCR068	PCYCR068	PRPCR068	PMFCR068	PCTCR068
PCLCR069	PCYCR069	PRPCR069	PMFCR069	PCTCR069
PCLCR070	PCYCR070	PRPCR070	PMFCR070	PCTCR070
PCLCR071	PCYCR071	PRPCR071	PMFCR071	PCTCR071
PCLCR072	PCYCR072	PRPCR072	PMFCR072	PCTCR072
PCLCR073	PCYCR073	PRPCR073	PMFCR073	PCTCR073
PCLCR074	PCYCR074	PRPCR074	PMFCR074	PCTCR074
PCLCR075	PCYCR075	PRPCR075	PMFCR075	PCTCR075
PCLCR076	PCYCR076	PRPCR076	PMFCR076	PCTCR076
PCLCR077	PCYCR077	PRPCR077	PMFCR077	PCTCR077
PCLCR078	PCYCR078	PRPCR078	PMFCR078	PCTCR078
PCLCR079	PCYCR079	PRPCR079	PMFCR079	PCTCR079
PCLCR080	PCYCR080	PRPCR080	PMFCR080	PCTCR080
PCLCR081	PCYCR081	PRPCR081	PMFCR081	PCTCR081
PCLCR082	PCYCR082	PRPCR082	PMFCR082	PCTCR082
PCLCR083	PCYCR083	PRPCR083	PMFCR083	PCTCR083
PCLCR084	PCYCR084	PRPCR084	PMFCR084	PCTCR084

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLCR085	PCYCR085	PRPCR085	PMFCR085	PCTCR085
PCLCR086	PCYCR086	PRPCR086	PMFCR086	PCTCR086
PCLCR087	PCYCR087	PRPCR087	PMFCR087	PCTCR087
PCLCR088	PCYCR088	PRPCR088	PMFCR088	PCTCR088
PCLCR089	PCYCR089	PRPCR089	PMFCR089	PCTCR089
PCLCR090	PCYCR090	PRPCR090	PMFCR090	PCTCR090
PCLCR091	PCYCR091	PRPCR091	PMFCR091	PCTCR091
PCLCR092	PCYCR092	PRPCR092	PMFCR092	PCTCR092
PCLCR093	PCYCR093	PRPCR093	PMFCR093	PCTCR093
PCLCR094	PCYCR094	PRPCR094	PMFCR094	PCTCR094
PCLCR095	PCYCR095	PRPCR095	PMFCR095	PCTCR095
PCLCR096	PCYCR096	PRPCR096	PMFCR096	PCTCR096
PCLCR097	PCYCR097	PRPCR097	PMFCR097	PCTCR097
PCLCR098	PCYCR098	PRPCR098	PMFCR098	PCTCR098
PCLCR099	PCYCR099	PRPCR099	PMFCR099	PCTCR099
PCLCR100	PCYCR100	PRPCR100	PMFCR100	PCTCR100
PCLCR101	PCYCR101	PRPCR101	PMFCR101	PCTCR101
PCLCR102	PCYCR102	PRPCR102	PMFCR102	PCTCR102
PCLCR103	PCYCR103	PRPCR103	PMFCR103	PCTCR103
PCLCR104	PCYCR104	PRPCR104	PMFCR104	PCTCR104
PCLCR105	PCYCR105	PRPCR105	PMFCR105	PCTCR105
PCLCR106	PCYCR106	PRPCR106	PMFCR106	PCTCR106
PCLCR107	PCYCR107	PRPCR107	PMFCR107	PCTCR107
PCLCR108	PCYCR108	PRPCR108	PMFCR108	PCTCR108
PCLCR109	PCYCR109	PRPCR109	PMFCR109	PCTCR109
PCLCR110	PCYCR110	PRPCR110	PMFCR110	PCTCR110
PCLCR111	PCYCR111	PRPCR111	PMFCR111	PCTCR111
PCLCR112	PCYCR112	PRPCR112	PMFCR112	PCTCR112

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 16B
Summary of Pre-ignition Events, Iteration C

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLCR11	PCYCR113	PRPCR113	PMFCR11	PCTCR113
PCLCR11	PCYCR114	PRPCR114	PMFCR11	PCTCR114
PCLCR11	PCYCR115	PRPCR115	PMFCR11	PCTCR115
PCLCR11	PCYCR116	PRPCR116	PMFCR11	PCTCR116
PCLCR11	PCYCR117	PRPCR117	PMFCR11	PCTCR117
PCLCR11	PCYCR118	PRPCR118	PMFCR11	PCTCR118
PCLCR11	PCYCR119	PRPCR119	PMFCR11	PCTCR119
PCLCR12	PCYCR120	PRPCR120	PMFCR12	PCTCR120
PCLCR12	PCYCR121	PRPCR121	PMFCR12	PCTCR121
PCLCR12	PCYCR122	PRPCR122	PMFCR12	PCTCR122
PCLCR12	PCYCR123	PRPCR123	PMFCR12	PCTCR123
PCLCR12	PCYCR124	PRPCR124	PMFCR12	PCTCR124
PCLCR12	PCYCR125	PRPCR125	PMFCR12	PCTCR125
PCLCR12	PCYCR126	PRPCR126	PMFCR12	PCTCR126
PCLCR12	PCYCR127	PRPCR127	PMFCR12	PCTCR127
PCLCR12	PCYCR128	PRPCR128	PMFCR12	PCTCR128
PCLCR12	PCYCR129	PRPCR129	PMFCR12	PCTCR129
PCLCR13	PCYCR130	PRPCR130	PMFCR13	PCTCR130
PCLCR13	PCYCR131	PRPCR131	PMFCR13	PCTCR131
PCLCR13	PCYCR132	PRPCR132	PMFCR13	PCTCR132
PCLCR13	PCYCR133	PRPCR133	PMFCR13	PCTCR133
PCLCR13	PCYCR134	PRPCR134	PMFCR13	PCTCR134
PCLCR13	PCYCR135	PRPCR135	PMFCR13	PCTCR135
PCLCR13	PCYCR136	PRPCR136	PMFCR13	PCTCR136
PCLCR13	PCYCR137	PRPCR137	PMFCR13	PCTCR137
PCLCR13	PCYCR138	PRPCR138	PMFCR13	PCTCR138
PCLCR13	PCYCR139	PRPCR139	PMFCR13	PCTCR139
PCLCR14	PCYCR140	PRPCR140	PMFCR14	PCTCR140

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLCR14	PCYCR141	PRPCR141	PMFCR141	PCTCR141
PCLCR14	PCYCR142	PRPCR142	PMFCR142	PCTCR142
PCLCR14	PCYCR143	PRPCR143	PMFCR143	PCTCR143
PCLCR14	PCYCR144	PRPCR144	PMFCR144	PCTCR144
PCLCR14	PCYCR145	PRPCR145	PMFCR145	PCTCR145
PCLCR14	PCYCR146	PRPCR146	PMFCR146	PCTCR146
PCLCR14	PCYCR147	PRPCR147	PMFCR147	PCTCR147
PCLCR14	PCYCR148	PRPCR148	PMFCR148	PCTCR148
PCLCR14	PCYCR149	PRPCR149	PMFCR149	PCTCR149
PCLCR15	PCYCR150	PRPCR150	PMFCR150	PCTCR150
PCLCR15	PCYCR151	PRPCR151	PMFCR151	PCTCR151
PCLCR15	PCYCR152	PRPCR152	PMFCR152	PCTCR152
PCLCR15	PCYCR153	PRPCR153	PMFCR153	PCTCR153
PCLCR15	PCYCR154	PRPCR154	PMFCR154	PCTCR154
PCLCR15	PCYCR155	PRPCR155	PMFCR155	PCTCR155
PCLCR15	PCYCR156	PRPCR156	PMFCR156	PCTCR156
PCLCR15	PCYCR157	PRPCR157	PMFCR157	PCTCR157
PCLCR15	PCYCR158	PRPCR158	PMFCR158	PCTCR158
PCLCR15	PCYCR159	PRPCR159	PMFCR159	PCTCR159
PCLCR16	PCYCR160	PRPCR160	PMFCR160	PCTCR160
PCLCR16	PCYCR161	PRPCR161	PMFCR161	PCTCR161
PCLCR16	PCYCR162	PRPCR162	PMFCR162	PCTCR162
PCLCR16	PCYCR163	PRPCR163	PMFCR163	PCTCR163
PCLCR16	PCYCR164	PRPCR164	PMFCR164	PCTCR164
PCLCR16	PCYCR165	PRPCR165	PMFCR165	PCTCR165
PCLCR16	PCYCR166	PRPCR166	PMFCR166	PCTCR166
PCLCR16	PCYCR167	PRPCR167	PMFCR167	PCTCR167
PCLCR16	PCYCR168	PRPCR168	PMFCR168	PCTCR168

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 17
Summary of Pre-ignition Events, Iteration D

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLDR00	PCYDR001	PRPDR001	PMFDR00	PCTDR001
PCLDR00	PCYDR002	PRPDR002	PMFDR00	PCTDR002
PCLDR00	PCYDR003	PRPDR003	PMFDR00	PCTDR003
PCLDR00	PCYDR004	PRPDR004	PMFDR00	PCTDR004
PCLDR00	PCYDR005	PRPDR005	PMFDR00	PCTDR005
PCLDR00	PCYDR006	PRPDR006	PMFDR00	PCTDR006
PCLDR00	PCYDR007	PRPDR007	PMFDR00	PCTDR007
PCLDR00	PCYDR008	PRPDR008	PMFDR00	PCTDR008
PCLDR00	PCYDR009	PRPDR009	PMFDR00	PCTDR009
PCLDR01	PCYDR010	PRPDR010	PMFDR01	PCTDR010
PCLDR01	PCYDR011	PRPDR011	PMFDR01	PCTDR011
PCLDR01	PCYDR012	PRPDR012	PMFDR01	PCTDR012
PCLDR01	PCYDR013	PRPDR013	PMFDR01	PCTDR013
PCLDR01	PCYDR014	PRPDR014	PMFDR01	PCTDR014
PCLDR01	PCYDR015	PRPDR015	PMFDR01	PCTDR015
PCLDR01	PCYDR016	PRPDR016	PMFDR01	PCTDR016
PCLDR01	PCYDR017	PRPDR017	PMFDR01	PCTDR017
PCLDR01	PCYDR018	PRPDR018	PMFDR01	PCTDR018
PCLDR01	PCYDR019	PRPDR019	PMFDR01	PCTDR019
PCLDR02	PCYDR020	PRPDR020	PMFDR02	PCTDR020
PCLDR02	PCYDR021	PRPDR021	PMFDR02	PCTDR021
PCLDR02	PCYDR022	PRPDR022	PMFDR02	PCTDR022
PCLDR02	PCYDR023	PRPDR023	PMFDR02	PCTDR023
PCLDR02	PCYDR024	PRPDR024	PMFDR02	PCTDR024
PCLDR02	PCYDR025	PRPDR025	PMFDR02	PCTDR025
PCLDR02	PCYDR026	PRPDR026	PMFDR02	PCTDR026
PCLDR02	PCYDR027	PRPDR027	PMFDR02	PCTDR027
PCLDR02	PCYDR028	PRPDR028	PMFDR02	PCTDR028

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLDR02	PCYDR029	PRPDR029	PMFDR029	PCTDR029
PCLDR03	PCYDR030	PRPDR030	PMFDR030	PCTDR030
PCLDR03	PCYDR031	PRPDR031	PMFDR031	PCTDR031
PCLDR03	PCYDR032	PRPDR032	PMFDR032	PCTDR032
PCLDR03	PCYDR033	PRPDR033	PMFDR033	PCTDR033
PCLDR03	PCYDR034	PRPDR034	PMFDR034	PCTDR034
PCLDR03	PCYDR035	PRPDR035	PMFDR035	PCTDR035
PCLDR03	PCYDR036	PRPDR036	PMFDR036	PCTDR036
PCLDR03	PCYDR037	PRPDR037	PMFDR037	PCTDR037
PCLDR03	PCYDR038	PRPDR038	PMFDR038	PCTDR038
PCLDR03	PCYDR039	PRPDR039	PMFDR039	PCTDR039
PCLDR04	PCYDR040	PRPDR040	PMFDR040	PCTDR040
PCLDR04	PCYDR041	PRPDR041	PMFDR041	PCTDR041
PCLDR04	PCYDR042	PRPDR042	PMFDR042	PCTDR042
PCLDR04	PCYDR043	PRPDR043	PMFDR043	PCTDR043
PCLDR04	PCYDR044	PRPDR044	PMFDR044	PCTDR044
PCLDR04	PCYDR045	PRPDR045	PMFDR045	PCTDR045
PCLDR04	PCYDR046	PRPDR046	PMFDR046	PCTDR046
PCLDR04	PCYDR047	PRPDR047	PMFDR047	PCTDR047
PCLDR04	PCYDR048	PRPDR048	PMFDR048	PCTDR048
PCLDR04	PCYDR049	PRPDR049	PMFDR049	PCTDR049
PCLDR05	PCYDR050	PRPDR050	PMFDR050	PCTDR050
PCLDR05	PCYDR051	PRPDR051	PMFDR051	PCTDR051
PCLDR05	PCYDR052	PRPDR052	PMFDR052	PCTDR052
PCLDR05	PCYDR053	PRPDR053	PMFDR053	PCTDR053
PCLDR05	PCYDR054	PRPDR054	PMFDR054	PCTDR054
PCLDR05	PCYDR055	PRPDR055	PMFDR055	PCTDR055
PCLDR05	PCYDR056	PRPDR056	PMFDR056	PCTDR056

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 17A
Summary of Pre-ignition Events, Iteration D

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLDR05	PCYDR057	PRPDR057	PMFDR05	PCTDR057
PCLDR05	PCYDR058	PRPDR058	PMFDR05	PCTDR058
PCLDR05	PCYDR059	PRPDR059	PMFDR05	PCTDR059
PCLDR06	PCYDR060	PRPDR06	PMFDR06	PCTDR060
PCLDR06	PCYDR061	PRPDR061	PMFDR06	PCTDR061
PCLDR06	PCYDR062	PRPDR062	PMFDR06	PCTDR062
PCLDR06	PCYDR063	PRPDR063	PMFDR06	PCTDR063
PCLDR06	PCYDR064	PRPDR064	PMFDR06	PCTDR064
PCLDR06	PCYDR065	PRPDR065	PMFDR06	PCTDR065
PCLDR06	PCYDR066	PRPDR066	PMFDR06	PCTDR066
PCLDR06	PCYDR067	PRPDR067	PMFDR06	PCTDR067
PCLDR06	PCYDR068	PRPDR068	PMFDR06	PCTDR068
PCLDR06	PCYDR069	PRPDR069	PMFDR06	PCTDR069
PCLDR07	PCYDR070	PRPDR07	PMFDR07	PCTDR070
PCLDR07	PCYDR071	PRPDR071	PMFDR07	PCTDR071
PCLDR07	PCYDR072	PRPDR072	PMFDR07	PCTDR072
PCLDR07	PCYDR073	PRPDR073	PMFDR07	PCTDR073
PCLDR07	PCYDR074	PRPDR074	PMFDR07	PCTDR074
PCLDR07	PCYDR075	PRPDR075	PMFDR07	PCTDR075
PCLDR07	PCYDR076	PRPDR076	PMFDR07	PCTDR076
PCLDR07	PCYDR077	PRPDR077	PMFDR07	PCTDR077
PCLDR07	PCYDR078	PRPDR078	PMFDR07	PCTDR078
PCLDR07	PCYDR079	PRPDR079	PMFDR07	PCTDR079
PCLDR08	PCYDR080	PRPDR08	PMFDR08	PCTDR080
PCLDR08	PCYDR081	PRPDR081	PMFDR08	PCTDR081
PCLDR08	PCYDR082	PRPDR082	PMFDR08	PCTDR082
PCLDR08	PCYDR083	PRPDR083	PMFDR08	PCTDR083
PCLDR08	PCYDR084	PRPDR084	PMFDR08	PCTDR084

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLDR08	PCYDR085	PRPDR085	PMFDR085	PCTDR085
PCLDR08	PCYDR086	PRPDR086	PMFDR086	PCTDR086
PCLDR08	PCYDR087	PRPDR087	PMFDR087	PCTDR087
PCLDR08	PCYDR088	PRPDR088	PMFDR088	PCTDR088
PCLDR08	PCYDR089	PRPDR089	PMFDR089	PCTDR089
PCLDR09	PCYDR090	PRPDR090	PMFDR090	PCTDR090
PCLDR09	PCYDR091	PRPDR091	PMFDR091	PCTDR091
PCLDR09	PCYDR092	PRPDR092	PMFDR092	PCTDR092
PCLDR09	PCYDR093	PRPDR093	PMFDR093	PCTDR093
PCLDR09	PCYDR094	PRPDR094	PMFDR094	PCTDR094
PCLDR09	PCYDR095	PRPDR095	PMFDR095	PCTDR095
PCLDR09	PCYDR096	PRPDR096	PMFDR096	PCTDR096
PCLDR09	PCYDR097	PRPDR097	PMFDR097	PCTDR097
PCLDR09	PCYDR098	PRPDR098	PMFDR098	PCTDR098
PCLDR09	PCYDR099	PRPDR099	PMFDR099	PCTDR099
PCLDR10	PCYDR100	PRPDR100	PMFDR100	PCTDR100
PCLDR10	PCYDR101	PRPDR101	PMFDR101	PCTDR101
PCLDR10	PCYDR102	PRPDR102	PMFDR102	PCTDR102
PCLDR10	PCYDR103	PRPDR103	PMFDR103	PCTDR103
PCLDR10	PCYDR104	PRPDR104	PMFDR104	PCTDR104
PCLDR10	PCYDR105	PRPDR105	PMFDR105	PCTDR105
PCLDR10	PCYDR106	PRPDR106	PMFDR106	PCTDR106
PCLDR10	PCYDR107	PRPDR107	PMFDR107	PCTDR107
PCLDR10	PCYDR108	PRPDR108	PMFDR108	PCTDR108
PCLDR10	PCYDR109	PRPDR109	PMFDR109	PCTDR109
PCLDR11	PCYDR110	PRPDR110	PMFDR110	PCTDR110
PCLDR11	PCYDR111	PRPDR111	PMFDR111	PCTDR111
PCLDR11	PCYDR112	PRPDR112	PMFDR112	PCTDR112

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 17B
Summary of Pre-ignition Events, Iteration D

Lab	LAB	Oil Code	OILCODEL
Stand	STANDL	Test No.	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLDR11	PCYDR113	PRPDR113	PMFDR11	PCTDR113
PCLDR11	PCYDR114	PRPDR114	PMFDR11	PCTDR114
PCLDR11	PCYDR115	PRPDR115	PMFDR11	PCTDR115
PCLDR11	PCYDR116	PRPDR116	PMFDR11	PCTDR116
PCLDR11	PCYDR117	PRPDR117	PMFDR11	PCTDR117
PCLDR11	PCYDR118	PRPDR118	PMFDR11	PCTDR118
PCLDR11	PCYDR119	PRPDR119	PMFDR11	PCTDR119
PCLDR12	PCYDR120	PRPDR120	PMFDR12	PCTDR120
PCLDR12	PCYDR121	PRPDR121	PMFDR12	PCTDR121
PCLDR12	PCYDR122	PRPDR122	PMFDR12	PCTDR122
PCLDR12	PCYDR123	PRPDR123	PMFDR12	PCTDR123
PCLDR12	PCYDR124	PRPDR124	PMFDR12	PCTDR124
PCLDR12	PCYDR125	PRPDR125	PMFDR12	PCTDR125
PCLDR12	PCYDR126	PRPDR126	PMFDR12	PCTDR126
PCLDR12	PCYDR127	PRPDR127	PMFDR12	PCTDR127
PCLDR12	PCYDR128	PRPDR128	PMFDR12	PCTDR128
PCLDR12	PCYDR129	PRPDR129	PMFDR12	PCTDR129
PCLDR13	PCYDR130	PRPDR130	PMFDR13	PCTDR130
PCLDR13	PCYDR131	PRPDR131	PMFDR13	PCTDR131
PCLDR13	PCYDR132	PRPDR132	PMFDR13	PCTDR132
PCLDR13	PCYDR133	PRPDR133	PMFDR13	PCTDR133
PCLDR13	PCYDR134	PRPDR134	PMFDR13	PCTDR134
PCLDR13	PCYDR135	PRPDR135	PMFDR13	PCTDR135
PCLDR13	PCYDR136	PRPDR136	PMFDR13	PCTDR136
PCLDR13	PCYDR137	PRPDR137	PMFDR13	PCTDR137
PCLDR13	PCYDR138	PRPDR138	PMFDR13	PCTDR138
PCLDR13	PCYDR139	PRPDR139	PMFDR13	PCTDR139
PCLDR14	PCYDR140	PRPDR140	PMFDR14	PCTDR140

Cylinder	Cycle	Peak Pressure	MFB2	Type
PCLDR14	PCYDR141	PRPDR141	PMFDR141	PCTDR141
PCLDR14	PCYDR142	PRPDR142	PMFDR142	PCTDR142
PCLDR14	PCYDR143	PRPDR143	PMFDR143	PCTDR143
PCLDR14	PCYDR144	PRPDR144	PMFDR144	PCTDR144
PCLDR14	PCYDR145	PRPDR145	PMFDR145	PCTDR145
PCLDR14	PCYDR146	PRPDR146	PMFDR146	PCTDR146
PCLDR14	PCYDR147	PRPDR147	PMFDR147	PCTDR147
PCLDR14	PCYDR148	PRPDR148	PMFDR148	PCTDR148
PCLDR14	PCYDR149	PRPDR149	PMFDR149	PCTDR149
PCLDR15	PCYDR150	PRPDR150	PMFDR150	PCTDR150
PCLDR15	PCYDR151	PRPDR151	PMFDR151	PCTDR151
PCLDR15	PCYDR152	PRPDR152	PMFDR152	PCTDR152
PCLDR15	PCYDR153	PRPDR153	PMFDR153	PCTDR153
PCLDR15	PCYDR154	PRPDR154	PMFDR154	PCTDR154
PCLDR15	PCYDR155	PRPDR155	PMFDR155	PCTDR155
PCLDR15	PCYDR156	PRPDR156	PMFDR156	PCTDR156
PCLDR15	PCYDR157	PRPDR157	PMFDR157	PCTDR157
PCLDR15	PCYDR158	PRPDR158	PMFDR158	PCTDR158
PCLDR15	PCYDR159	PRPDR159	PMFDR159	PCTDR159
PCLDR16	PCYDR160	PRPDR160	PMFDR160	PCTDR160
PCLDR16	PCYDR161	PRPDR161	PMFDR161	PCTDR161
PCLDR16	PCYDR162	PRPDR162	PMFDR162	PCTDR162
PCLDR16	PCYDR163	PRPDR163	PMFDR163	PCTDR163
PCLDR16	PCYDR164	PRPDR164	PMFDR164	PCTDR164
PCLDR16	PCYDR165	PRPDR165	PMFDR165	PCTDR165
PCLDR16	PCYDR166	PRPDR166	PMFDR166	PCTDR166
PCLDR16	PCYDR167	PRPDR167	PMFDR167	PCTDR167
PCLDR16	PCYDR168	PRPDR168	PMFDR168	PCTDR168

Legend:
PP **Peak Pressure Only**
MFB2 **Mass Fraction Burn 2% Only**
PP&MFB2 **Both Peak Pressure and Mass Fraction Burn 2%**

Sequence IX Aged Oil
Form 18
Hardware Information

Lab	LAB	Oil Code	OILCODE
Stand, Aging	STANDA	Test No. Aging	TESTNUM
Stand LSPI	STANDL	Test No. LSPI	TESTNUML
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Aging Hardware

Oil Weight at SOT (kg)	OILWSOT	Piston Batch	PISTBAT
Short Block ID	SBLOCKID	Engine Hours	ENGINEHR
Cylinder Head ID	CYLHDID	Cylinder Head Hours	HEADHRSA
Turbocharger ID	TCHARGID	Turbocharger Hours	TCHARGHR
PCM Calibration Identification	PCMID		

LSPI Hardware

Oil Weight at SOT (kg)	OILWSOTL	Piston Batch	PISTBATL
Short Block ID	SBLCKIDL	Engine Hours	ENGINEHL
Cylinder Head ID	CYLHDIDL	Cylinder Head Hours	HEADHRSL
Turbocharger ID	TCHARIDL	Turbocharger Hours	TCHARHRL
PCM Calibration Identification	PCMIDL		

Transducer Replacement History

Cylinder	Iteration							
	1	2	3	4	5	6	7	8
1	TDCRC1I1	TDCRC1I2	TDCRC1I3	TDCRC1I4	TDCRC1I5	TDCRC1I6	TDCRC1I7	TDCRC1I8
2	TDCRC2I1	TDCRC2I2	TDCRC2I3	TDCRC2I4	TDCRC2I5	TDCRC2I6	TDCRC2I7	TDCRC2I8
3	TDCRC3I1	TDCRC3I2	TDCRC3I3	TDCRC3I4	TDCRC3I5	TDCRC3I6	TDCRC3I7	TDCRC3I8
4	TDCRC4I1	TDCRC4I2	TDCRC4I3	TDCRC4I4	TDCRC4I5	TDCRC4I6	TDCRC4I7	TDCRC4I8

Sequence IX Aged Oil
Form 19
Chemical Analyses

Lab	LAB	Oil Code	OILCODE
Stand, Aging	STANDA	Test No. Aging	TESTNUM
Stand LSPI	STANDL	Test No. LSPI	TESTNUML
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Analytical Measurement	New Oil	Aged Oil	New LSPI	Iteration A	Iteration B	Iteration C	Iteration D
Aluminum (Al) by D5185	ALWMNEW	ALWMAGE	ALWMNEWL	ALWMITA	ALWMITB	ALWMITC	ALWMITD
Boron (B) by D5185	BWMNEW	BWMAGE	BWMNEWL	BWMITA	BWMITB	BWMITC	BWMITD
Calcium (Ca) by D5185	CAWMNEW	CAWMAGE	CAWMNEWL	CAWMITA	CAWMITB	CAWMITC	CAWMITD
Chromium (Cr) by D5185	CRWMNEW	CRWMAGE	CRWMNEWL	CRWMITA	CRWMITB	CRWMITC	CRWMITD
Copper (Cu) by D5185	CUWMNEW	CUWMAGE	CUWMNEWL	CUWMITA	CUWMITB	CUWMITC	CUWMITD
Iron (Fe) by D5185	FEWMNEW	FEWMAGE	FEWMNEWL	FEWMITA	FEWMITB	FEWMITC	FEWMITD
Lead (Pb) by D5185	PBWMNEW	PBWMAGE	PBWMNEWL	PBWMITA	PBWMITB	PBWMITC	PBWMITD
Magnesium (Mg) by D5185	MGWMNEW	MGWMAGE	MGWMNEWL	MGWMITA	MGWMITB	MGWMITC	MGWMITD
Manganese (Mn) by D5185	MNWMNEW	MNWMAGE	MNWMNEWL	MNWMITA	MNWMITB	MNWMITC	MNWMITD
Molybdenum (Mo) by D5185	MOWMNEW	MOWMAGE	MOWMNEWL	MOWMITA	MOWMITB	MOWMITC	MOWMITD
Potassium (K) by D5185	KWMNEW	KWMAGE	KWMNEWL	KWMITA	KWMITB	KWMITC	KWMITD
Phosphorus (P) by D5185	PWMNEW	PWMAGE	PWMNEWL	PWMITA	PWMITB	PWMITC	PWMITD
Silicone (Si) by D5185	SIWMNEW	SIWMAGE	SIWMNEWL	SIWMITA	SIWMITB	SIWMITC	SIWMITD
Sodium (Na) by D5185	NAWMNEW	NAWMAGE	NAWMNEWL	NAWMITA	NAWMITB	NAWMITC	NAWMITD
Tin (Sn) by D5185	SNWMNEW	SNWMAGE	SNWMNEWL	SNWMITA	SNWMITB	SNWMITC	SNWMITD
Titanium (Ti) by D5185	TIWMNEW	TIWMAGE	TIWMNEWL	TIWMITA	TIWMITB	TIWMITC	TIWMITD
Zinc (Zn) by D5185	ZNWMNEW	ZNWMAGE	ZNWMNEWL	ZNWMITA	ZNWMITB	ZNWMITC	ZNWMITD
Total Acid Number	TAN_NEW	TANEOT	TANNEWL				
Total Base Number	TBNNEW	TBNEOT	TBNNEWL				
Kinematic Viscosity @ 40 °C	V40NEW	V40EOT	V40NEWL	V40ITA	V40ITB	V40ITC	V40ITD
Kinematic Viscosity @ 100 °C	V100NEW	V100EOT	V100NEWL	V100ITA	V100ITB	V100ITC	V100ITD
Soot Concentration		EOTSOOT	NEWSOOTL				
Oxidation, FTIR by D7414		IROEOT	IRONEWL				
Nitration, FTIR by D7624		IRNEOT	IRNNEWL				
Fuel Dilution by GC D3525		FUELEOT	FUELDILN	FUELDILA	FUELDILB	FUELDILC	FUELDILD

Sequence IX Aged Oil
Form 20
Downtime Record, Aging

Lab	LAB	Oil Code	OILCODE
Stand, Aging	STANDA	Test No. Aging	TESTNUM
Stand LSPI	STANDL	Test No. LSPI	TESTNUML
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Number of Downtime Occurrences			DWNOCR	
Test Hours	**Date**	**Downtime**	**Reasons**	
DOWNR001	DDATR001	DTIMR001	DREAR001	
DOWNR002	DDATR002	DTIMR002	DREAR002	
DOWNR003	DDATR003	DTIMR003	DREAR003	
DOWNR004	DDATR004	DTIMR004	DREAR004	
DOWNR005	DDATR005	DTIMR005	DREAR005	
DOWNR006	DDATR006	DTIMR006	DREAR006	
DOWNR007	DDATR007	DTIMR007	DREAR007	
DOWNR008	DDATR008	DTIMR008	DREAR008	
DOWNR009	DDATR009	DTIMR009	DREAR009	
DOWNR010	DDATR010	DTIMR010	DREAR010	
DOWNR011	DDATR011	DTIMR011	DREAR011	
DOWNR012	DDATR012	DTIMR012	DREAR012	
DOWNR013	DDATR013	DTIMR013	DREAR013	
DOWNR014	DDATR014	DTIMR014	DREAR014	
DOWNR015	DDATR015	DTIMR015	DREAR015	
DOWNR016	DDATR016	DTIMR016	DREAR016	
DOWNR017	DDATR017	DTIMR017	DREAR017	
DOWNR018	DDATR018	DTIMR018	DREAR018	
DOWNR019	DDATR019	DTIMR019	DREAR019	
DOWNR020	DDATR020	DTIMR020	DREAR020	
		TOTLDOWN	**Total Downtime (hours)**	

Sequence IX Aged Oil
Form 20a
Downtime Record, LSPI

Lab	LAB	Oil Code	OILCODEL
Stand, Aging	STANDA	Test No. Aging	TESTNUM
Stand LSPI	STANDL	Test No. LSPI	TESTNUML
Laboratory Oil Code		LABOCODL	
Formulation Stand Code		FORM	

Number of Downtime Occurrences			DWNOCRL	
Test Hours	**Date**	**Downtime**	**Reasons**	
DOWLR001	DDTLR001	DTILR001	DRELR001	
DOWLR002	DDTLR002	DTILR002	DRELR002	
DOWLR003	DDTLR003	DTILR003	DRELR003	
DOWLR004	DDTLR004	DTILR004	DRELR004	
DOWLR005	DDTLR005	DTILR005	DRELR005	
DOWLR006	DDTLR006	DTILR006	DRELR006	
DOWLR007	DDTLR007	DTILR007	DRELR007	
DOWLR008	DDTLR008	DTILR008	DRELR008	
DOWLR009	DDTLR009	DTILR009	DRELR009	
DOWLR010	DDTLR010	DTILR010	DRELR010	
DOWLR011	DDTLR011	DTILR011	DRELR011	
DOWLR012	DDTLR012	DTILR012	DRELR012	
DOWLR013	DDTLR013	DTILR013	DRELR013	
DOWLR014	DDTLR014	DTILR014	DRELR014	
DOWLR015	DDTLR015	DTILR015	DRELR015	
DOWLR016	DDTLR016	DTILR016	DRELR016	
DOWLR017	DDTLR017	DTILR017	DRELR017	
DOWLR018	DDTLR018	DTILR018	DRELR018	
DOWLR019	DDTLR019	DTILR019	DRELR019	
DOWLR020	DDTLR020	DTILR020	DRELR020	
		TOTDOWNL	**Total Downtime (hours)**	

Sequence IX Aged Oil
Form 21
Comment Record

Lab	LAB	Oil Code	OILCODE
Stand, Aging	STANDA	Test No. Aging	TESTNUM
Stand LSPI	STANDL	Test No. LSPI	TESTNUML
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Number of Comment Lines	TOTCOM
OCOMR001	
OCOMR002	
OCOMR003	
OCOMR004	
OCOMR005	
OCOMR006	
OCOMR007	
OCOMR008	
OCOMR009	
OCOMR010	
OCOMR011	
OCOMR012	
OCOMR013	
OCOMR014	
OCOMR015	
OCOMR016	
OCOMR017	
OCOMR018	
OCOMR019	
OCOMR020	

Sequence IX Aged Oil
Form 22
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement

Test Laboratory	LAB				
Test Sponsor	TSTSPON1				
Formulation / Stand Code	FORM				
Test Number, Aging	TESTNUM				
Test Number, LSPI	TESTNUML				
Start Date	DTSTRT	Start Time	STRTTIME	Time Zone	TZONE

Declarations

No. 1 All requirements of the ACC Code of Practice for which the test laboratory is responsible were met in the conduct of this test. Yes YESRQMI No NORQMI*

No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other), including all updates issued by the organization responsible for the test, were met.
Yes YESFULL No NOFULL *

If the response to this Declaration is "No", does the test engineer consider the deviations from operational validity requirements that occurred to be beyond the control of the laboratory? Yes YESNODE* No NONODEC

No 3. A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes YESDEV* No NODEV (This currently applies only to specific deviations identified in the ASTM Information Letter System)

INCLUDE	Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations.
DONOTINC	*Operational review of this test indicates that the results should not be included in the Multiple Test Acceptance Criteria calculations.

Note: Supporting comments are required for all responses identified with an asterisk.

Comments
ACCCOMM1
ACCCOMM2
ACCCOMM3
ACCCOMM4

SUBSIGIM
Signature

SUBDATE
Date

SUBNAME
Typed Name

SUBTITLE