

**1K/1N  
Final Report Cover**

**Method  
Version**

**Conducted For:**

	<b>V</b> = Valid
	<b>I</b> = Invalid
	<b>N</b> = Results Cannot Be Interpreted As Representative Of Oil Performance (Non-Reference) And Shall Not Be Used In Determining An Average Test Result Using Multiple Test Criteria.

<b>Test Number</b>	
Test Stand:	Engine Run #:
EOT Time:	EOT Date:
Oil Code <sup>A</sup> :	
Formulation/Stand Code:	
Alternate Codes:	

In my opinion this test \_\_\_\_\_ been conducted in a valid manner in accordance with the 1K/1N Test Procedure (Research Report RR:D02-1273/RR:D02-1321) and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

<sup>A</sup> CMIR or Non-Reference Oil Code

Submitted By: \_\_\_\_\_ Testing Laboratory

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Typed Name

\_\_\_\_\_  
Title

**1K/1N  
Form 1  
Test Report Summary**

Lab	EOT Date	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR			
Start Date	Total Test Length	TMC Oil Type	
Laboratory Internal Oil Code			

	Correction Effective Date	WDK/WDN	TGF %	TLHC%	Transformed TLHC%	BSOC g/KW-h	EOTOC g/kW-h
Unadjusted Lab Rating							
Industry Correction(If Any)							
Subtotal							
Lab Severity Adjustment(If Any) <sup>A</sup>							
Total							

	Effective Date	WDK/WDN	TGF %	TLHC %	Transformed TLHC%	BSOC g/KW-h	EOTOC g/kW-h
Test Target Mean <sup>B</sup>							
Test Target STD <sup>B</sup>							
<sup>A, C</sup>							

	Referee Lab	WDK/WDN	TGF %	
Referee Ratings				

	Top	Int. 1	Oil	Piston	Liner
Ring Loss Of Side Clearance(mm)					
Ring End Gap Increase (mm)					
Is The Ring Stuck?					
Scuffed Area %					
Average Wear Step (µm)					
% Bore Polish					

Notes: <sup>A</sup> Reference oil tests or as requested by test sponsor      <sup>C</sup> See Appendix X4  
<sup>B</sup> Non-reference oil tests only

**1K/1N  
Form 2  
Operational Summary**

Lab	EOT Date	End Time	Method		
Stand	Run Number				
Formulation/Stand Code					
Oilcode/CMIR					
<b>Operating Condition</b>		<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>	<b>Specification</b>
Engine Speed	r/min				2100 ± 10
Engine Power	kW				Report
Fuel Flow	g/min				185 ± 1
Humidity	g/kg				17.8 ± 1.7
<b>Temperature °C</b>					
Coolant Out	°C				93 ± 2.5
Coolant In	°C				Report
Coolant delta T	°C				5 ± 1.0
Oil To Bearing	°C				107 ± 2.5
Oil Cooler In	°C				Report
Inlet Air	°C				127 ± 2.5
Exhaust	°C				550 ± 30
Fuel @ Injector Housing	°C				57 + 3
<b>Pressures</b>					
Oil To Bearing	kPa				482 Max
Oil To Jet	kPa				360 ± 13
Inlet Air	kPa				240 ± 1
Exhaust (ABS)	kPa				216 ± 1
Fuel @ Filter HSG	kPa				210 ± 20
Crankcase Vacuum	kPa				0.7 ± 0.1
Coolant Jug Pressure	kPa				Report
<b>Flows</b>					
Blowby	L/min				Report
Coolant Flow	L/min				65 ± 2
Air/Fuel Ratio: 24 hr.			Air/Fuel Ratio: 252 hr.		
<b>Assembly Measurements And Parts Record</b>					
Piston/Head Clearance mm			Intake Valve Open °ATC		
		Fuel Timing °BTC			
	Part No. (1)	Serial No. (2)	Date Code	Inspection Code	
Liner			F	G	
Ring Set (1)				I	H
Piston			D	E	

D Number blow "E" located on top of piston

E Number on top of "E" located on top of piston

F Four alphanumeric characters (NNAN) on liner O.D.

G Four digit number on liner O.D.

(1) And (2) Number On Parts Box Yellow Label

**1K/1N**  
**Form 3**  
**Operational Summary - Offset And Deviation**

Lab	EOT Date	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Controlled Parameter	Allowable % Out	This Test % Out	Allowable % Off	This Test % Off
Speed	5		20	
Fuel Flow	10		25	
Humidity	10		25	
Coolant Flow	5		25	
<b>Temperatures</b>				
Coolant Out	5		20	
Oil To Bearing	5		20	
Intake Air	5		20	
Fuel At Injector Housing	5		20	
<b>Pressures</b>				
Oil Jet	5		25	
Intake Air	10		25	
Exhaust	10		25	
Fuel At Filter Housing	5		20	
Crankcase Vacuum	10		20	

**1K/1N  
Form 4  
Piston Rating Summary**

<b>Test</b>	Lab	EOT Date	END Time	Stand	Run No.	Method
Formulation/Stand Code					Oilcode	
Test Fuel	Fuel Batch	Date Rated		Rating Number	Rater	
<b>Last Stand Reference Information</b>	<b>Date Completed</b>		<b>Stand No.</b>	<b>Run No.</b>		<b>TMC Oil Code</b>
	<b>WDK/WDN</b>	<b>TGF</b>	<b>TLHC</b>	<b>Transformed TLHC</b>	<b>BSOC</b>	<b>EOTOC</b>
Last Ref. This Stand						
Industry Average						
Industry STD						

Total Piston Ratings Summary																					
	Dep. Factor	Grooves						Lands						Upper Skirt		Under Crown		Pin Bores			
		NO. 1		NO. 2		NO. 3		NO. 1		NO. 2		NO. 3		A,%	Dem.	A,%	Dem.	Front		Rear	
		A,%	Dem.	A,%	Dem.	A,%	Dem.	A,%	Dem.	A,%	Dem.	A,%	Dem.					A,%	Dem.	A,%	Dem.
<b>C A R B O N</b>																					
	HC-1.0																				
	MC-0.5																				
	LC-.25																				
	Total																				
<b>L A C Q U E R</b>	8 - 9																				
	7 - 7.9																				
	6 - 6.9																				
	5 - 5.9																				
	4 - 4.9																				
	3 - 3.9																				
	2 - 2.9																				
	1 - 1.9																				
	>0 - 0.9																				
	Clean		0		0		0		0		0		0		0		0		0		0
Total																					
Rating																					
Location Factor	1.5		1.5		25		1		1		25		50		20		0		0		
Weighted Rating																					
<b>TGF %</b>		<b>Intermediate Groove Fill %</b>				<b>WDK/WDN</b>				<b>Unweighted Deposit</b>				<b>T.L. Heavy Carbon %</b>				<b>T.L. Flaked Carbon %</b>			

**1K/1N**  
**Form 4A**  
**Piston Rating Worksheet**

Lab	EOT Date	END Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Refer to Appendix C for an example of Piston Rating Worksheet.

**1K/1N**  
**Form 5**  
**Supplemental Piston Deposits(Groove Sides And Rings)**

Lab		EOT Date				End Time				Method				
Stand:						Run Number								
Formulation/Stand Code														
Oilcode:														
Deposit Type			Carbon			Varnish								
			HC	MC	LC	8 - 9	7 - 7.9	6 - 6.9	5 - 5.9	4 - 4.9	3 - 3.9	2 - 2.9	1 - 1.9	>0 -
<b>Groove Top And Bottom</b>	1	T												
		B												
	2	T												
		B												
	3	T												
		B												
<b>Top Bottom And Back Of Rings</b>	1	T												
		B												
		BK												
	2	T												
		B												
		BK												
	3	T												
		B												
		BK												
Additional Deposit & Condition Ratings														
Piston Crown														
Rings														
Liner														

**1K/1N  
Form 5A  
Referee Rating**

<b>Test Identification</b>																							
Lab				EOT Date						End Time						Method							
Stand				Run No.																			
Formulation/Stand Code																							
Oilcode																							
<b>Referee Rating Information</b>																							
Company				Rating Number						Date Rated						Rater							
<b>Total Piston Ratings Summary</b>																							
	Dep.. Factor	<b>Grooves</b>						<b>Lands</b>						<b>Upper Skirt</b>		<b>Under Crown</b>		<b>Pin Bores</b>					
		No. 1		No. 2		No. 3		No. 1		No. 2		No. 3		A,%	Dem.	A,%	Dem.	Front		Rear			
		A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	Dem.	A,%	Dem.	A,%	Dem.					A,%	Dem.	A,%	Dem.	A,%	Dem.
C A R B O N	HC-1.0																						
	MC-0.5																						
	LC-.25																						
	Total																						
L A C Q U E R	8 - 9																						
	7 - 7.9																						
	6 - 6.9																						
	5 - 5.9																						
	4 - 4.9																						
	3 - 3.9																						
	2 - 2.9																						
	1 - 1.9																						
	>0 - 0.9																						
	Clean		0		0		0		0		0		0		0		0		0		0		
	Total																						
Rating																							
Location Factor		1.5		1.5		25		1		1		25		50		20		0		0			
Weighted Rating																							
<b>TGF %</b>				<b>Intermediate Groove Fill %</b>				<b>WDK/WDN</b>				<b>Unweighted Deposit</b>				<b>Test Lab TLHC%</b>				<b>Test Lab TLHC %</b>			





**1K/1N  
Form 7  
Unscheduled Downtime & Maintenance  
Maintenance Summary**

Lab	EOT Date	END Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Test Hours	Date	Downtime	Reasons
			Total Downtime (125 Hr. Max)

Other Comments	
Number of Comment Lines	

**1K/1N  
Form 7A  
Unscheduled Downtime & Maintenance Summary**

Lab	EOT Date	END Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Number of Downtime Occurrences			
Test Hours	Date	Downtime	Reasons
			Total Downtime (125 Hr. Max)

Other Comments	
Number of Comment Lines	



**1K/1N  
Form 8  
Ring Measurements**

Lab	EOT Date	END Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Ring Gaps (mm)	Top	Intermediate	Oil
<b>Specifications</b>	$0.724 \pm 0.076$ mm	$0.673 \pm 0.076$ mm	$0.572 \pm 0.190$ mm
Pre-Test			
Post-Test			
Increase			

Ring Side Clearance*	A	B	C	D	Avg.	Min.	Specification
<b>Top</b>	Pre-Test						0.193+0.032 mm
	Post-Test						
	LSC						
<b>Int..</b>	Pre-Test						0.090+0.020 mm
	Post-Test						
	LSC						
<b>Oil</b>	Pre-Test						0.073 +0.016 mm
	Post-Test						
	LSC						

**\*Notes:**

1. Write "Stuck" In Place Of Dimension When Applicable.
2. Write "<0.038 mm" For Clearance When Applicable.
3. Write ">" Before Calculated Decrease Or Average Decrease Values That Incorporate A "<0.038 mm" In Calculation.
- 4 LSC: Loss Of Side Clearance.
5. Min: Intermediate And Oil Ring Minimum Side Clearance Is Measured 360° Around Piston.

**1K/1N  
Form 9  
Liner Measurements**

Lab	EOT Date	END Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

<b>Liner Surface Finish (Micrometer)</b>			
Distance From Top	Transverse	Longitudinal	Average
130 mm			
50 mm			
25 mm			
		Total Average	

<b>% Liner Bore Polish - Grid (Add T/AT Values From Grid)</b>	
Thrust	
Anti-Thrust	
Total	

<b>Liner Bore Measurement (mm)</b>				
<b>Before Test – Diameter (Dial Bore Gage)</b>				
Bore Height	Longitudinal	Transverse		
230 mm				
130 mm				
50 mm				
25 mm				
15 mm				
<b>After Test - (Surface Profile)</b>				
	Longitudinal		Transverse	
	Front	Rear	T	AT
Wear Step @ 15mm				

**1K/1N**  
**Form 10**  
**Characteristics Of The Data Acquisition System**

Lab	EOT Date	END Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Parameter (1)	Sensing Device (2)	Calibration Frequency (3)	Record Device (4)	Observation Frequency (5)	Record Frequency (6)	Log Frequency (7)	System Response (8)
<b>Operation Conditions</b>							
Engine Speed (R\min)							
Engine Power (kW)							
Fuel Flow (g/min)							
Humidity (g/kg)							
Coolant Out							
Coolant In							
Oil To Bearing							
Oil Cooler In							
Inlet Air							
Exhaust							
Fuel							
<b>Pressures (kPa)</b>							
Oil To Bearing							
Oil To Jet							
Inlet Air							
Exhaust							
Fuel @ Filter HSG							
Crankcase VAC							
<b>Flows (L/min)</b>							
Blowby							
Coolant Flow							

**Legend:**

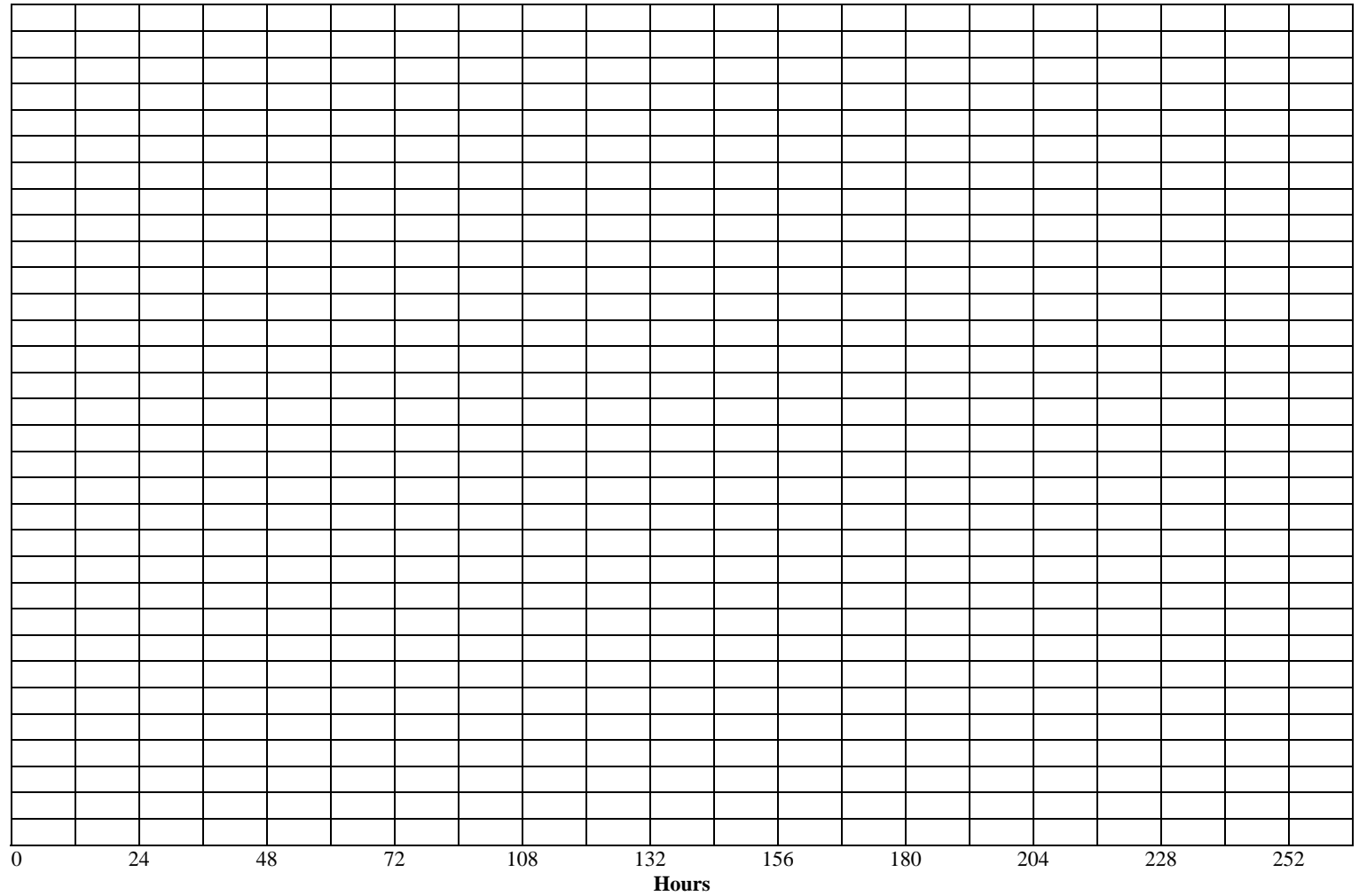
- (1) Operating Parameter
- (2) The Type Of Device Used To Measure Temperature, Pressure Or Flow
- (3) Frequency At Which The Measurement System Is Calibrated
- (4) The Type Of Device Where Data Is Recorded
  - LG - Hanglog Sheet
  - DL - Automatic Data Logger
  - C/M - Computer, Using Manual Data Entry
  - SC - Strip Chart Recorder
  - C/D - Computer, Using Direct I/O Entry

- (5) Data Area Observed But Only Recorded If Off Spec.
- (6) Data Are Recorded But Are Not Retained At EOT
- (7) Data Are Logged As Permanent Record, Note Specify If:
  - SS - Snapshot Taken At Specified Frequency
  - AG/X Average Of X Data Points At Specified Frequency
- (8) Time For The Output To Reach 63.2% Of Final Value For Step Change At Input

**1K/1N  
Form 11**

Lab	EOT Date	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Inlet Air	130
C	127
	124
Oil to Bearing	110
C	107
	104
Coolant In	91
C	88
	85
Coolant Out	96
C	93
	90
Exhaust	580
C	550
	520
Fuel Rate	186
g/min	185
	184
Engine Speed	2110
r/min	2100
	2090
Power	57
kW	52
	47

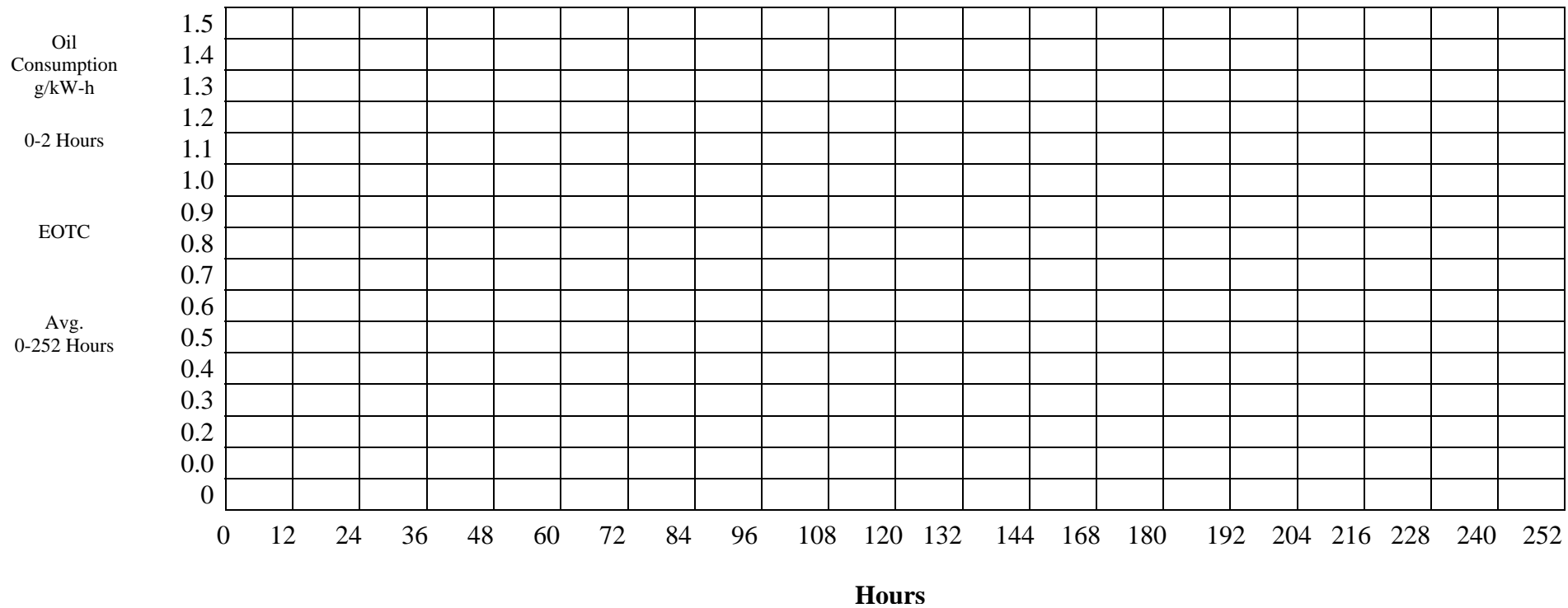






**1K/1N  
Form 13  
Oil Consumption Plot**

Lab	EOT Date:	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			



**1K/1N**  
**Form 14**  
**Piston, Ring And Liner Photographs**

Lab	EOT DATE:	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

Refer to Appendix C for example of Photo Layout.







**1K/1N**  
**Form 16**  
**TMC Control Chart Analysis**

Lab	EOT Date	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			

**1K/1N**  
**Form 17**  
**Fuel Batch Analysis**

Lab	EOT Date	End Time	Method
Stand	Run Number		
Formulation/Stand Code			
Oilcode/CMIR:			