Roller Follower Wear Test

Report Packet Version No.
RFWT VERSION 19960828

Conducted For
TSTSPON1
TSTSPON2

LABVALID	**V = Valid**
	I = Invalid

Test Number			
Test Stand: STAND	**Stand Run Number:** RSTRUN STRUN	**Engine Number:** ENGINE	**Engine Run Number:** RENRUN ENRUN
Date Completed: RDTCOMP DTCOMP		**Time Completed:** REOTTIME EOTTIME	
Oil Code [A]: OILCODE CMIR			
Formulation/Stand Code: FORM			
Alternate Codes:	ALTCODE1	ALTCODE2	ALTCODE3

[A] CMIR or Non-Reference Oil Code

Submitted By:

SUBLAB
Testing Laboratory

SUBSIGIM
Signature

SUBNAME
Typed Name

SUBTITLE
Title

FIG. A5.1 Final Report Cover Sheet

Roller Follower Wear Test

Reference Oil Test					Non-Reference Oil Test				
Lab	**Stand**	**Stand Run No.**	**Engine**	**Engine Run No.**	**Lab**	**Stand**	**Stand Run No.**	**Engine**	**Engine Run No.**
LAB	STAND	RSTRUN	ENGINE	ENRUN	LAB	STAND	STRUN	ENGINE	RENRUN
Start Date	**Date Completed**	**End of Test Time**	**Test Length**		**Start Date**	**Date Completed**	**End of Test Time**	**Test Length**	
RDTSTRT	RDTCOMP	REOTTIME	RTESTLEN		DTSTRT	DTCOMP	EOTTIME	TESTLEN	
CMIR	**TMC Oil Code**	**Viscosity Grade**			**Oil Code**			**Viscosity Grade**	
CMIR	IND	RSAEVISC			OILCODE			SAEVISC	
Laboratory Oil Code			RLABOCOD		**Laboratory Oil Code**			LABOCODE	
Engine Displacement			ENDISPL		**Formulation Stand Code**				
					FORM				
Average Wear (mils)					**Average Wear (mils)**	**Severity Adjustment**	**Adjusted Average Wear**		
RWEAR					WEAR	WEARSA	AWEARFNL		

FIG. A5.2 Test Lab Affidavit

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE	CMIR	
Formulation/Stand Code:	FORM		

Lifter Part Number:
LIFTPN1

Profilometer Wear Measurements in Mils

Lifter Number	Wear (Mils)	Lifter Number	Wear (Mils)
1L	WEAR1L	**1R**	WEAR1R
2L	WEAR2L	**2R**	WEAR2R
3L	WEAR3L	**3R**	WEAR3R
4L	WEAR4L	**4R**	WEAR4R
5L	WEAR5L	**5R**	WEAR5R
6L	WEAR6L	**6R**	WEAR6R
7L	WEAR7L	**7R**	WEAR7R
8L	WEAR8L	**8R**	WEAR8R
Wear Statistics			
Minimum	**Maximum**	**Average**	**Std. Deviation**
IWEAR	XWEAR	RWEAR WEAR	SWEAR

Wear is measured at location shown by arrow

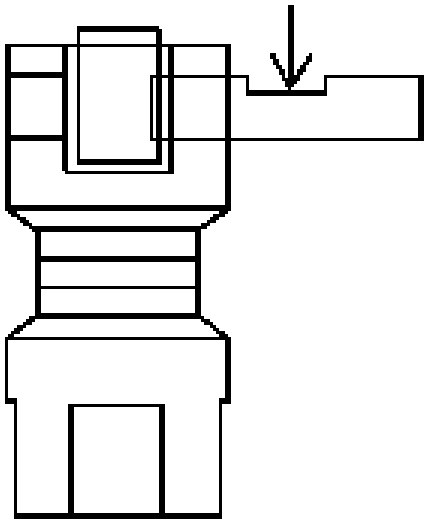


FIG. A5.3 Summary of Roller Follower Wear

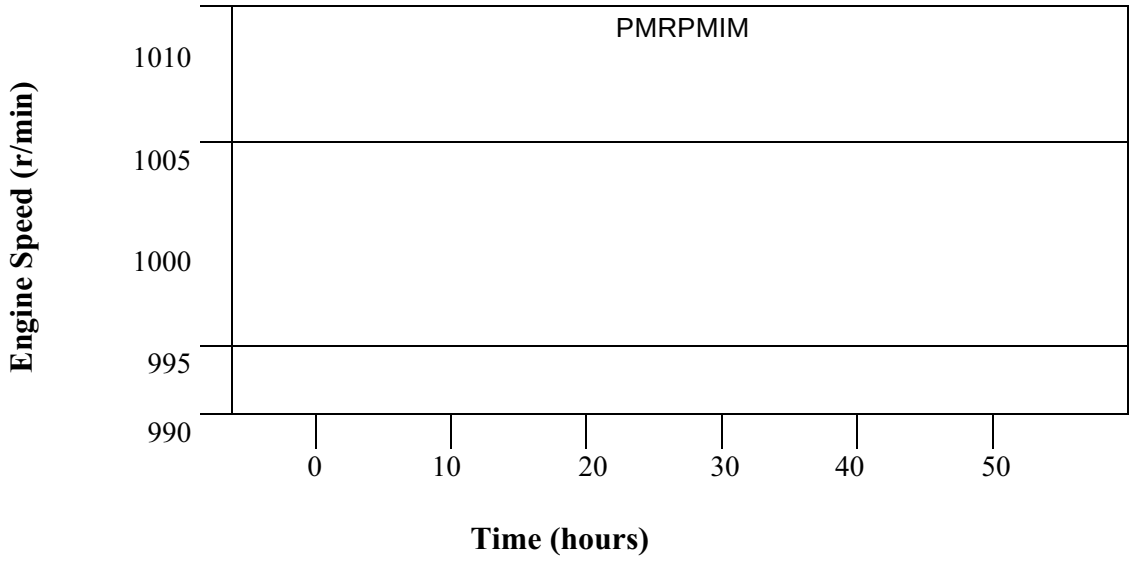
Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE							CMIR	
Formulation/Stand Code:	FORM								

Engine Speed (r/min)

Process Mean

Xav = PMRPM



Process Variability (s)

Sav = PVRPM

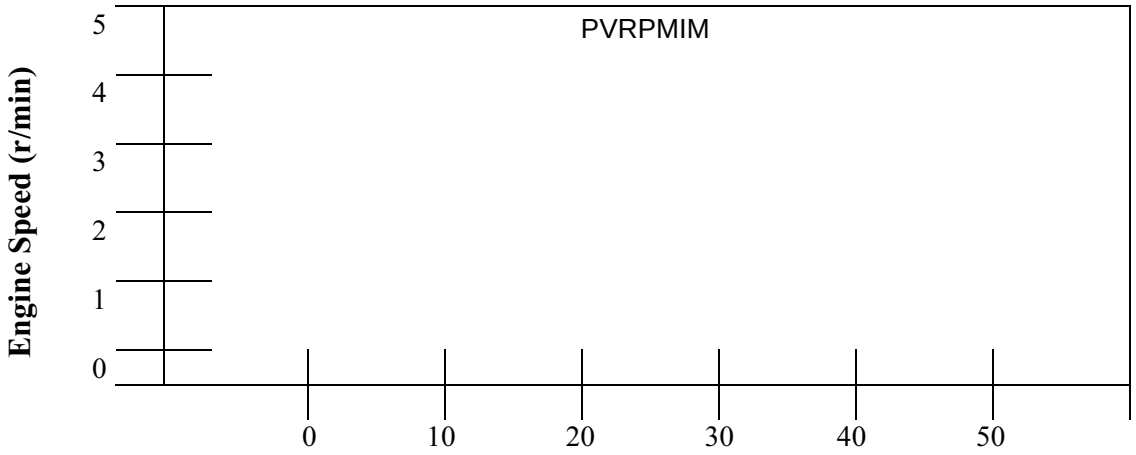


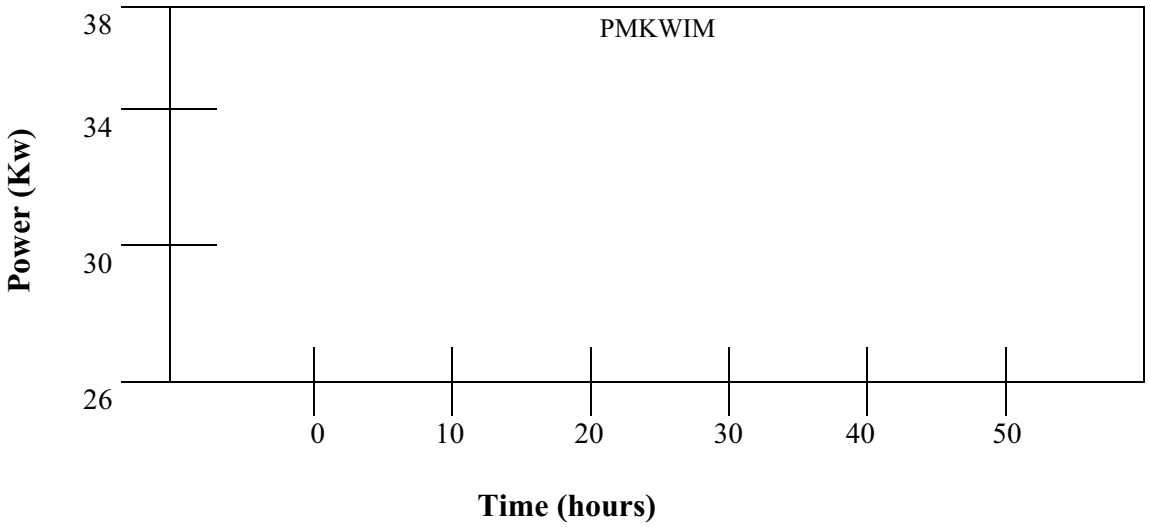
FIG. A5.4 Operational Data Summary - Engine Speed

Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE								CMIR
Formulation/Stand Code:	FORM								

Power (kW)

Process Mean
Xav = PMKW



Process Variability (s)
Sav = PVKW

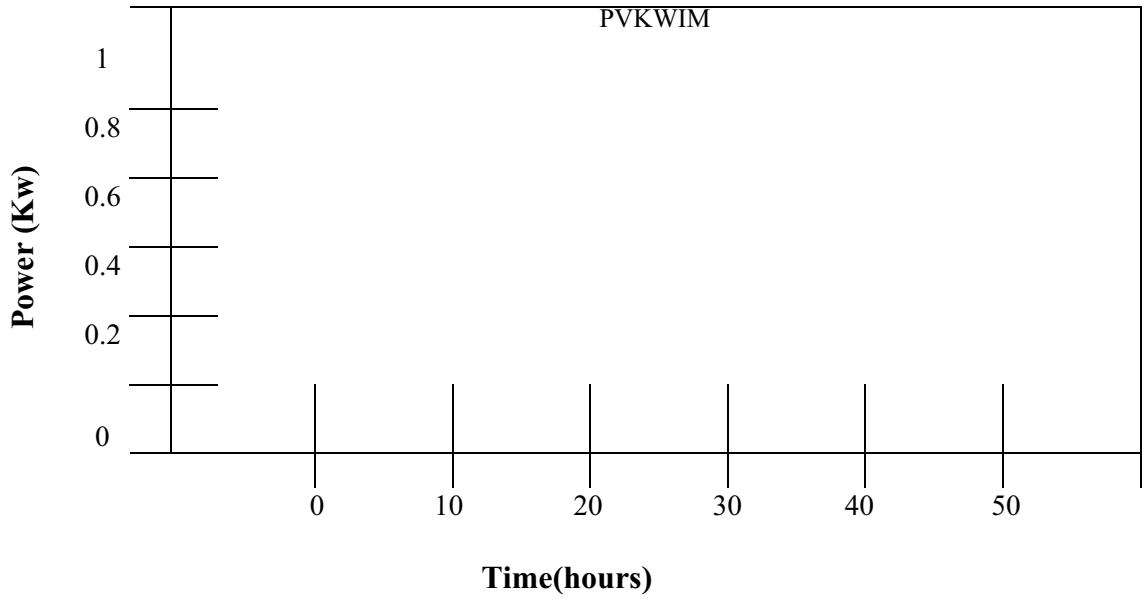


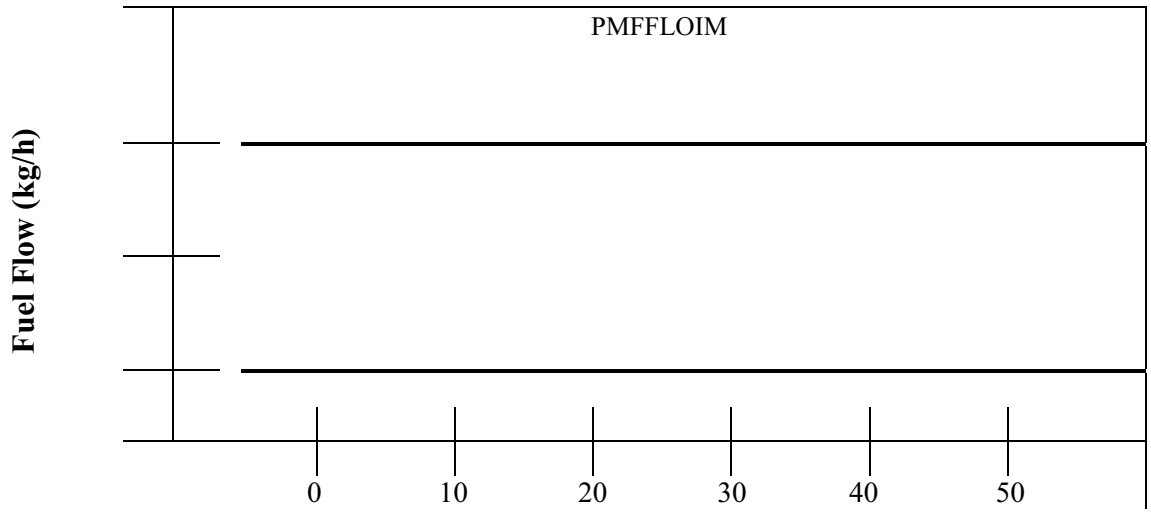
FIG. A5.5 Operational Data Summary – Power

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Fuel Flow (kg/h)

Process Mean
Xav = PMFFLO



Process Variability (s)
Sav = PVFFLO

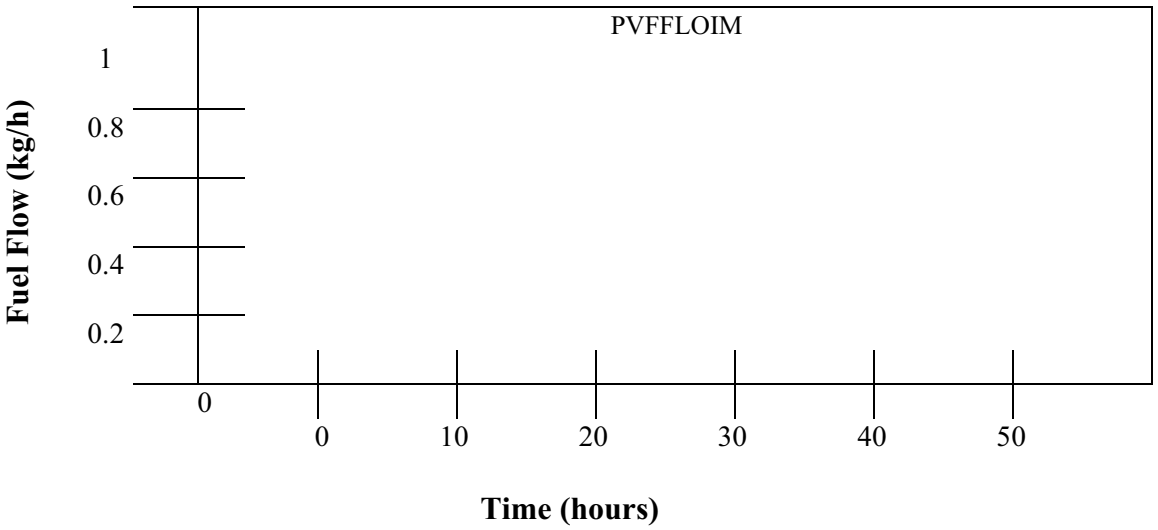


FIG. A5.6 Operational Data Summary – Fuel Flow

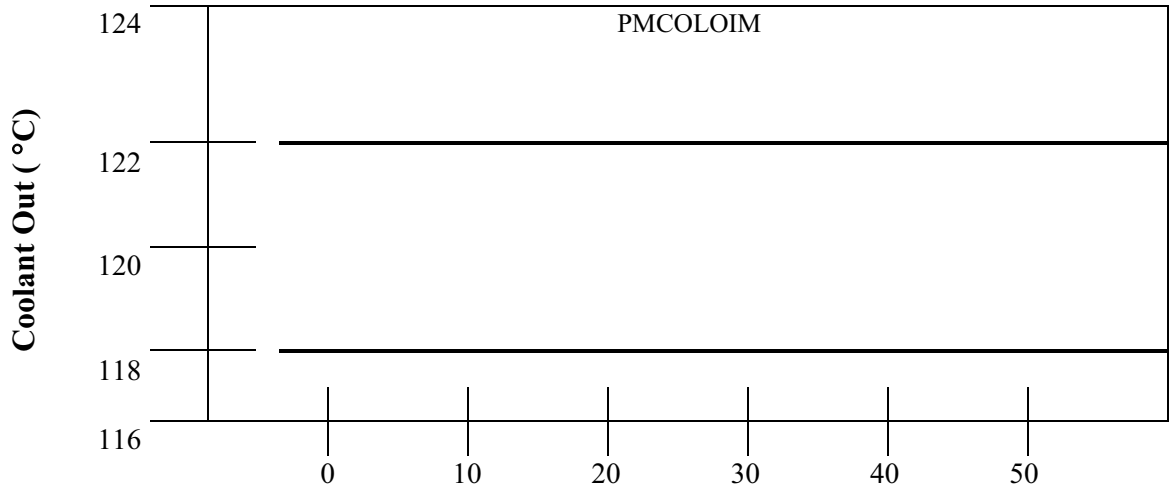
Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE								CMIR
Formulation/Stand Code:	FORM								

Coolant Out Temperature

Process Mean

Xav = PMCOLOUT



Process Variability (s)

Sav = PVCOLOUT

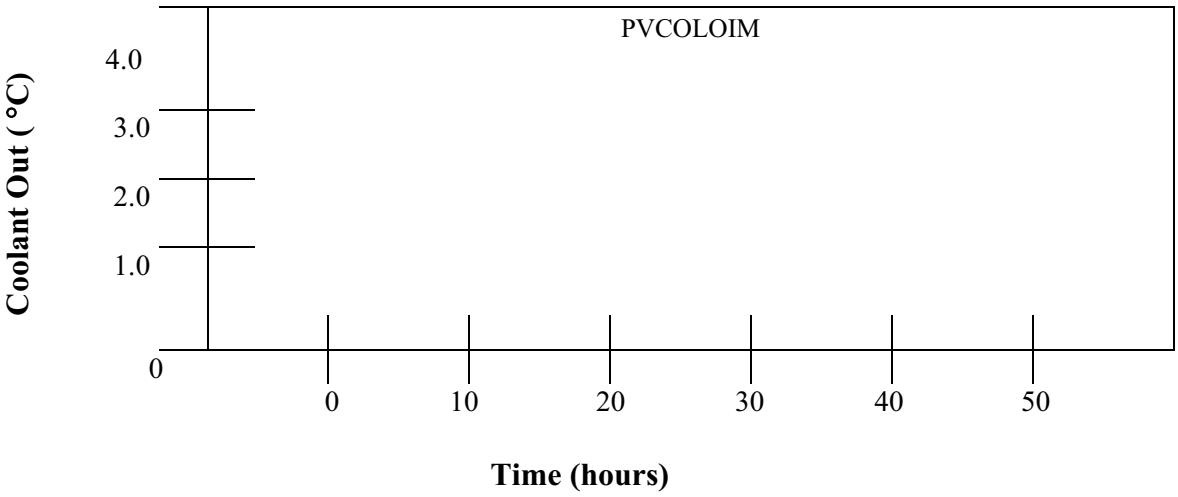


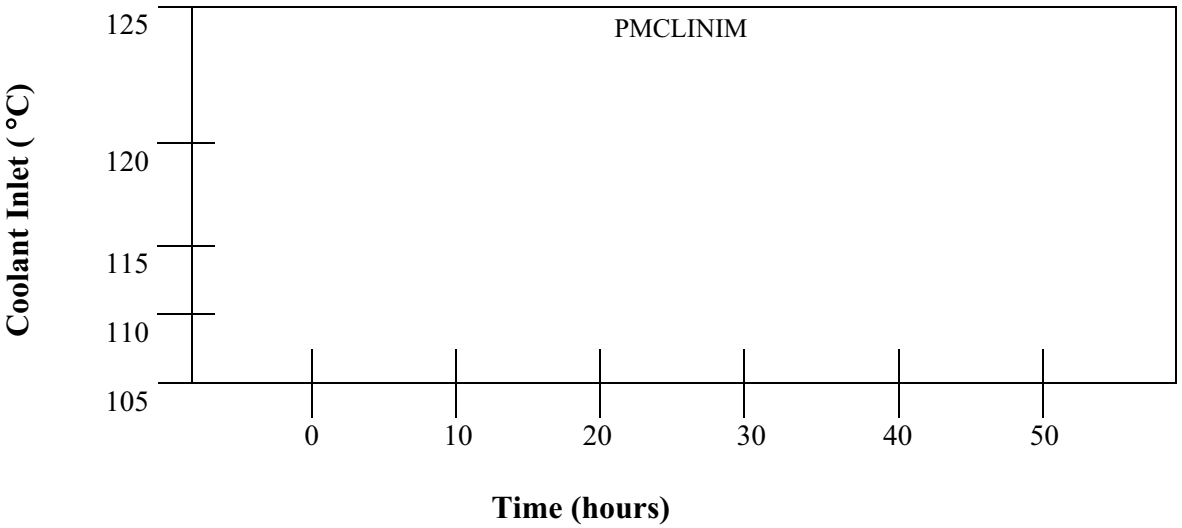
FIG. A5.7 Operational Data Summary – Coolant Output Temperature

Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number: STAND	RSTRUN	STRUN		ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE								CMIR
Formulation/Stand Code:	FORM								

Coolant Inlet Temperature

Process Mean
Xav = PMCOLIN



Process Variability (s)
Sav = PVCOLIN

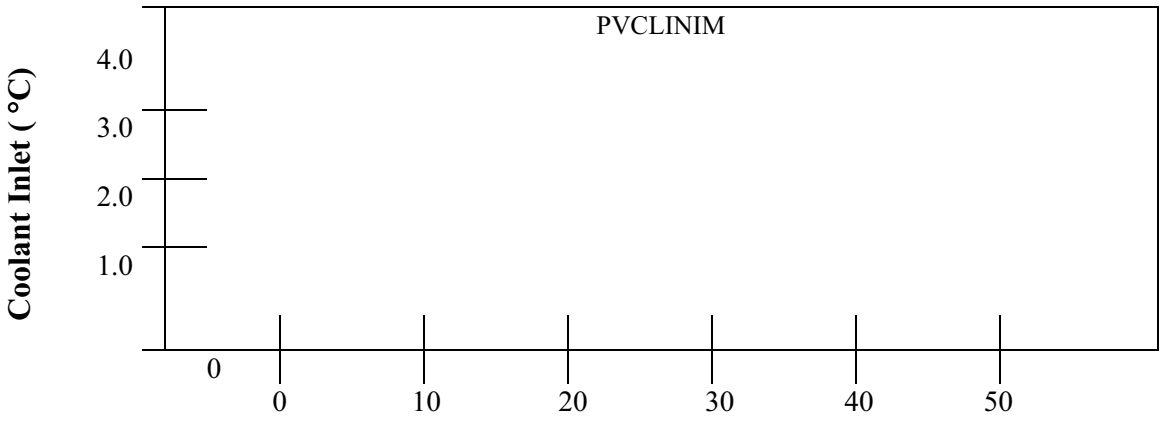


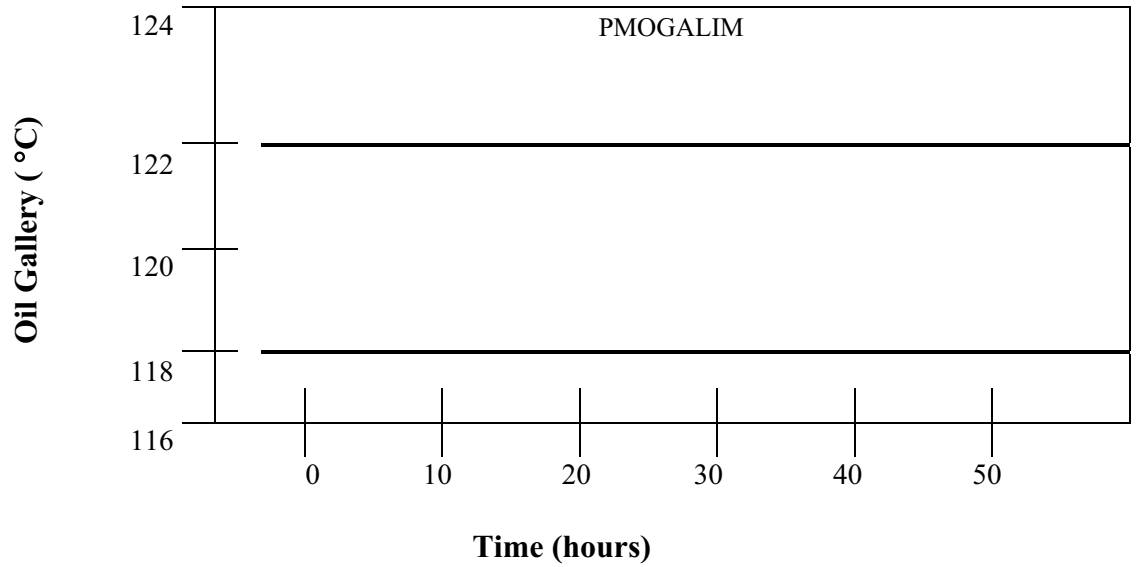
FIG. A5.8 Operational Data Summary – Coolant Inlet Temperature

Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE								CMIR
Formulation/Stand Code:	FORM								

Oil Gallery Temperature

Process Mean
Xav = PMOILGAL



Process Variability (s)
Sav = PVOILGAL

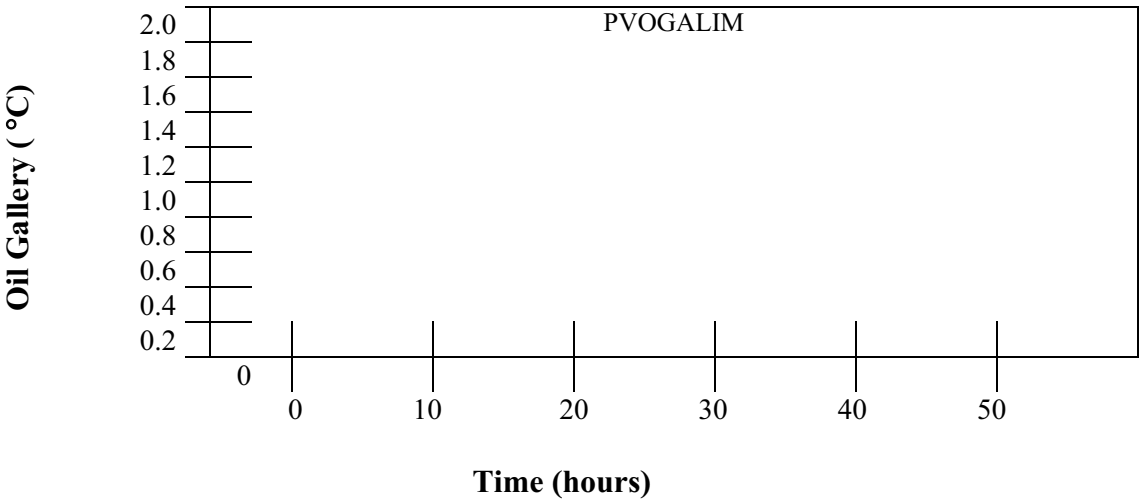


FIG. A5.9 Operational Data Summary – Oil Gallery Temperature

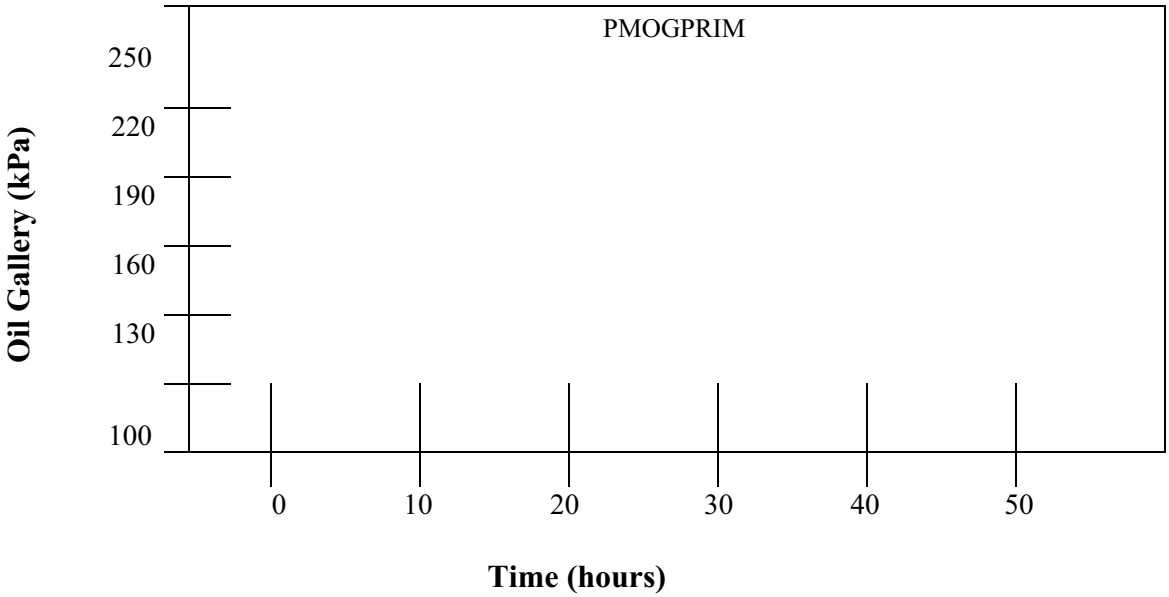
Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE								CMIR
Formulation/Stand Code:	FORM								

Oil Gallery Pressure

Process Mean

Xav = PMOILGPR



Process Variability (s)

Sav = PVOILGPR

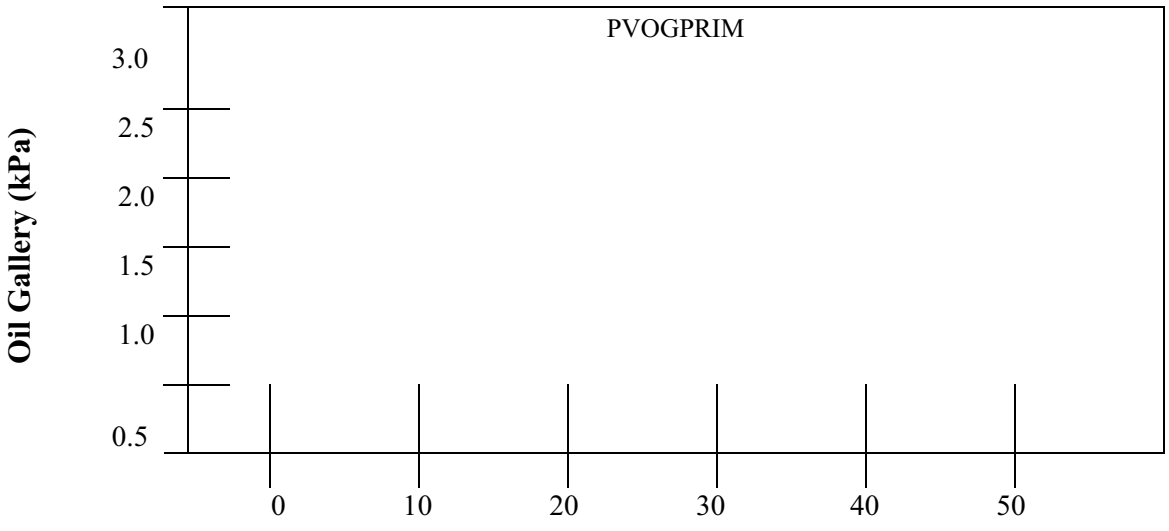


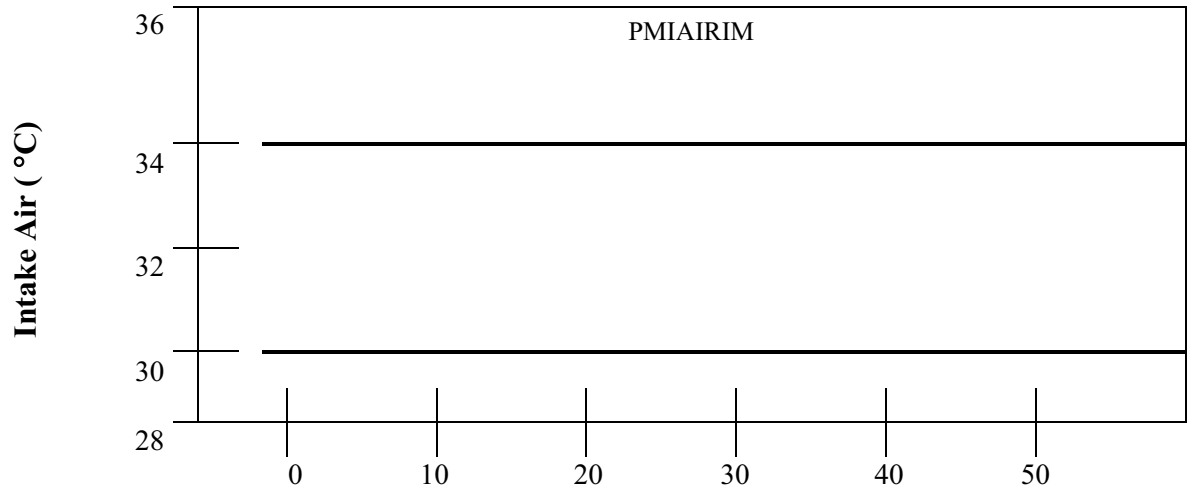
FIG. A5.10 Operational Data Summary – Oil Gallery Pressure

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Intake Air Temperature

Process Mean
Xav = PMINAIR



Process Variability (s)
Sav = PVINAIR

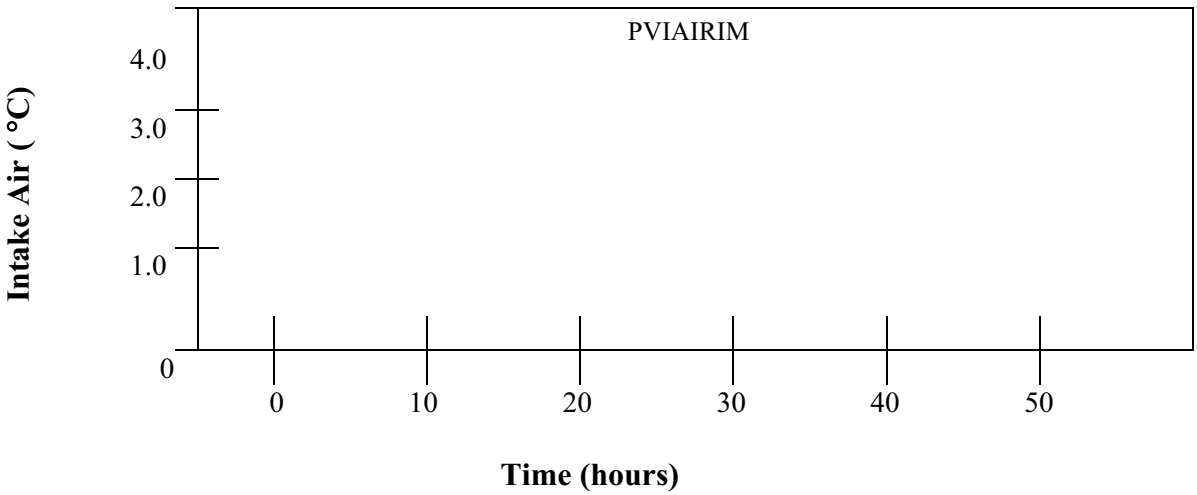


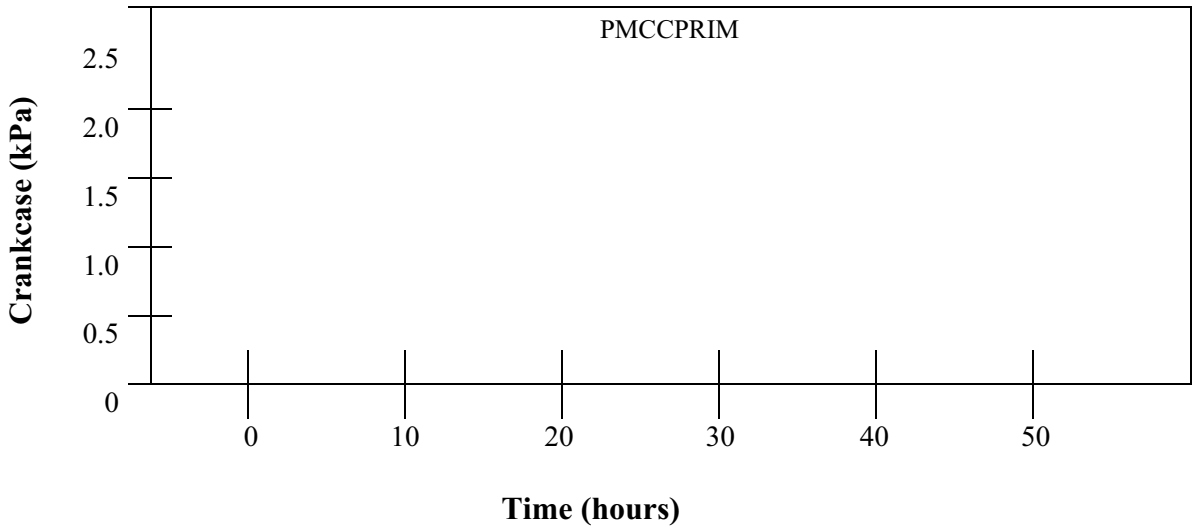
FIG. A5.11 Operational Data Summary – Intake Air Temperature

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE	CMIR	
Formulation/Stand Code:	FORM		

Crankcase Pressure

Process Mean
Xav = PMCCPR



Process Variability (s)
Sav = PVCCPR

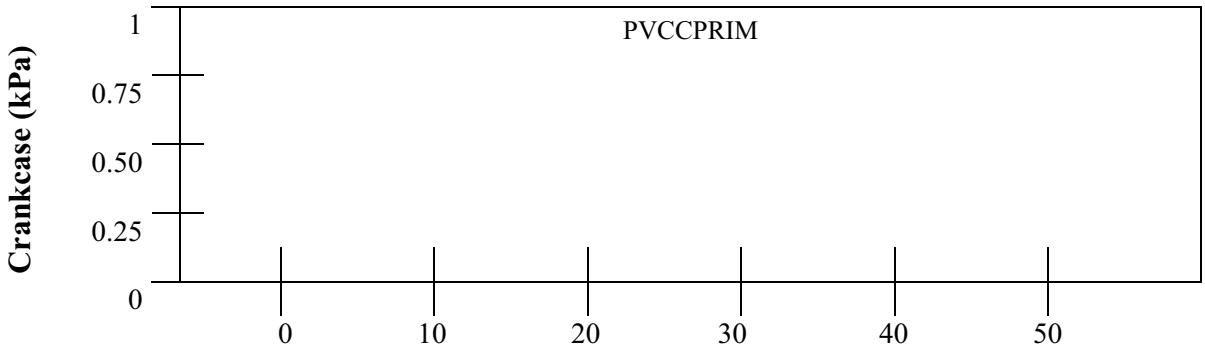


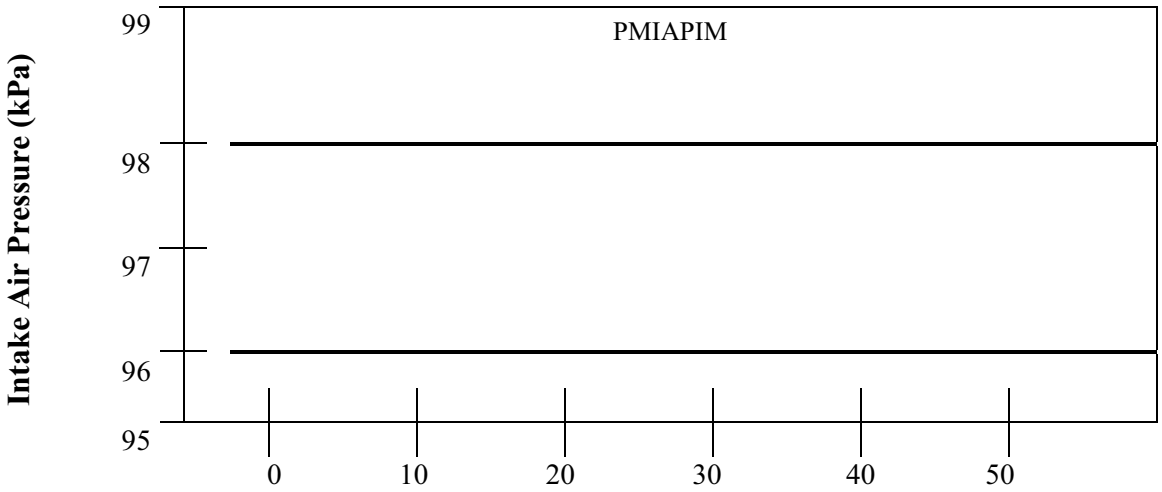
FIG. A5.12 Operational Data Summary – Crankcase Pressure

Roller Follower Wear Test

Laboratory:	LAB							RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN			
Oil Code:	OILCODE								CMIR
Formulation/Stand Code:	FORM								

Intake Air Pressure

Process Mean
Xav = PMINAIRP



Process Variability (s)
Sav = PVINAIRP

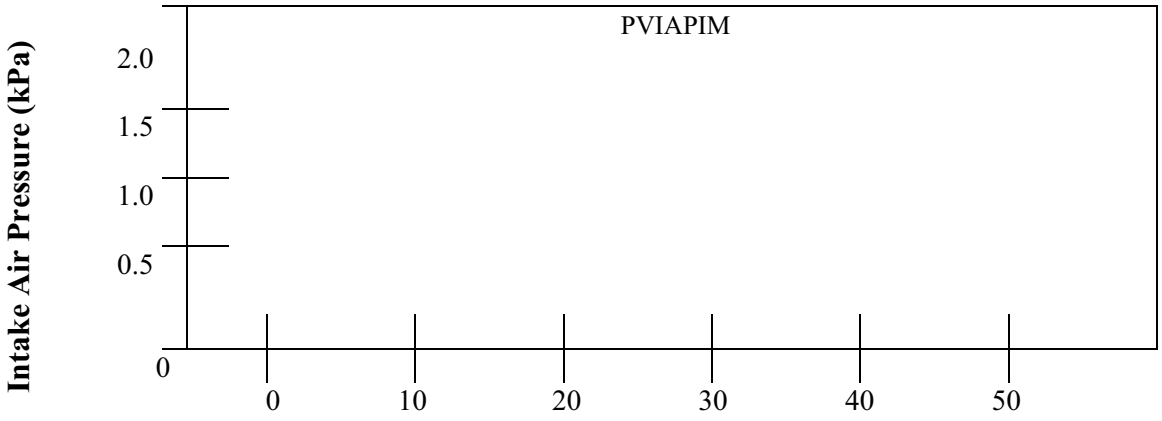


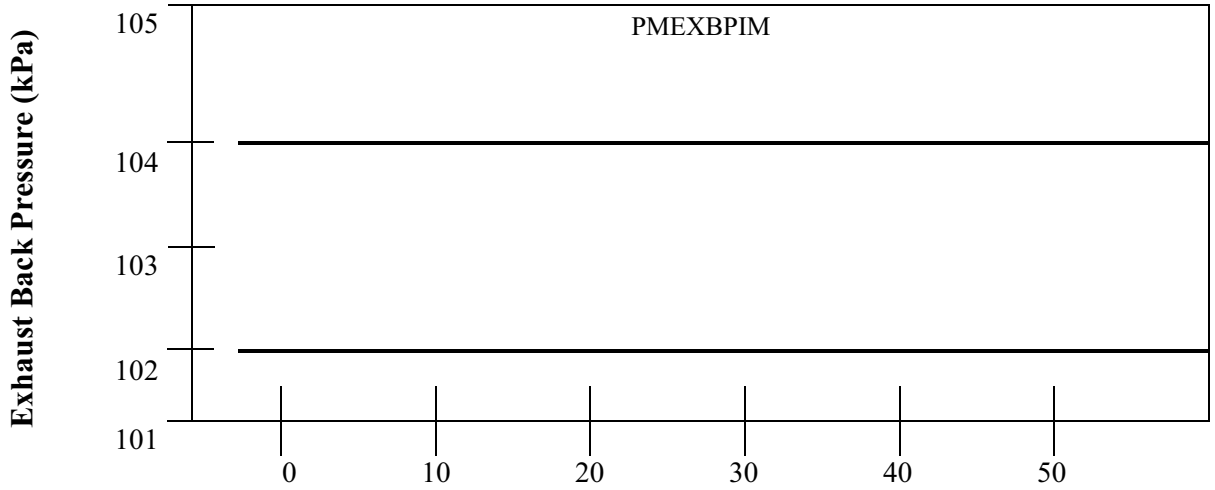
FIG. A5.13 Operational Data Summary – Intake Air Pressure

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND	RSTRUN STRUN	ENGINE RENRUN ENRUN	
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Exhaust Back Pressure

Process Mean
Xav = PMEXHBP



Process Variability (s)
Sav = PVEXHBP

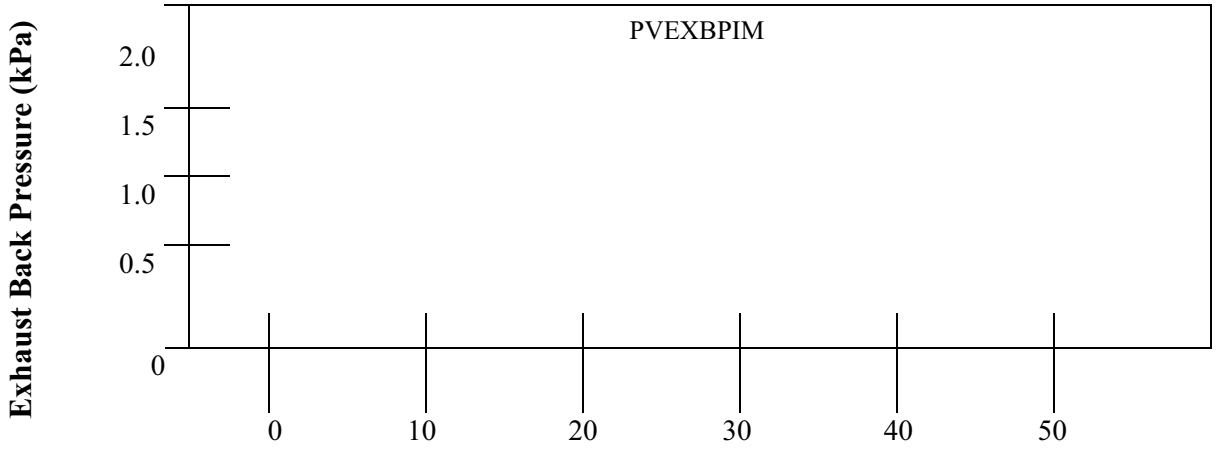


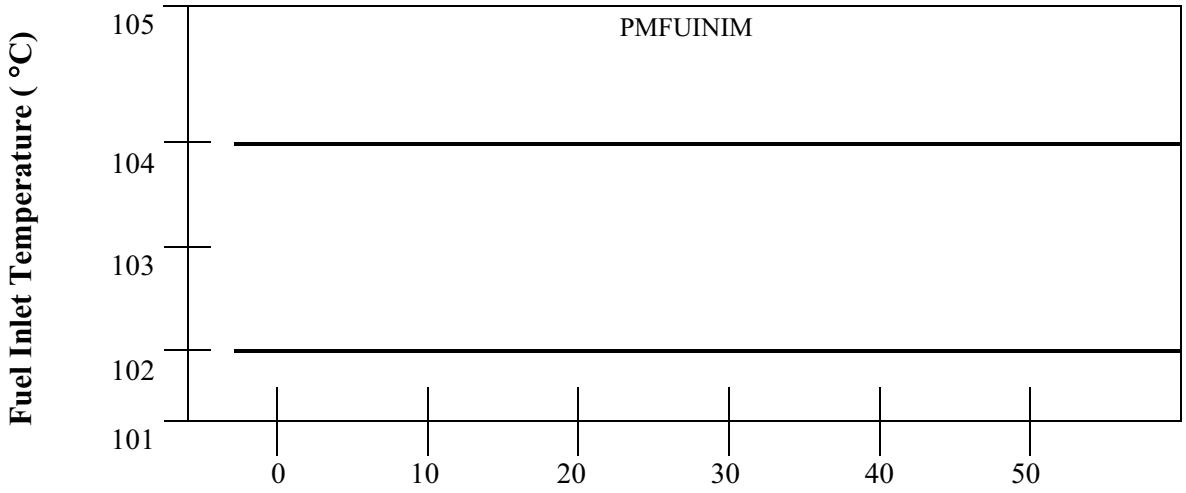
FIG. A5.14 Operational Data Summary – Exhaust Back Pressure

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Fuel Inlet Temperature

Process Mean
Xav = PMFUELIN



Process Variability (s)
Sav = PVFUELIN

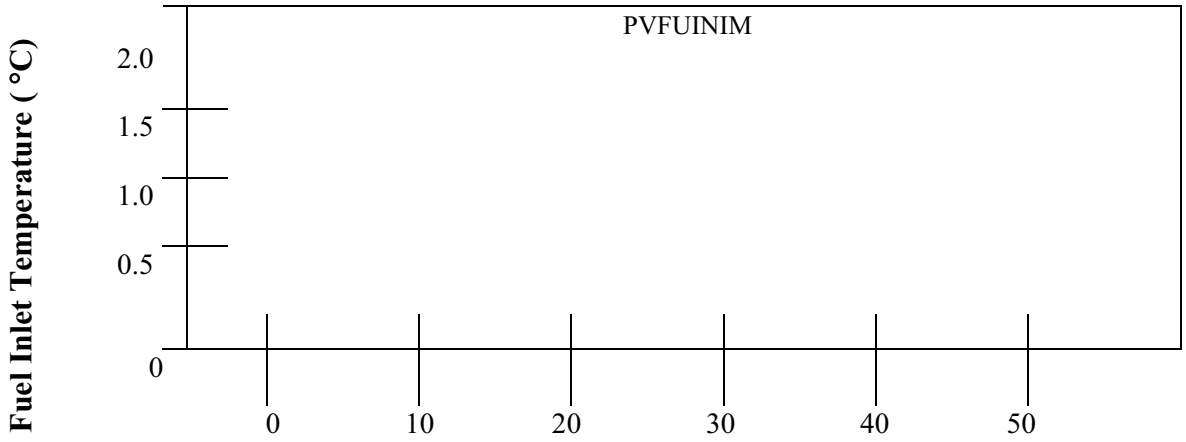


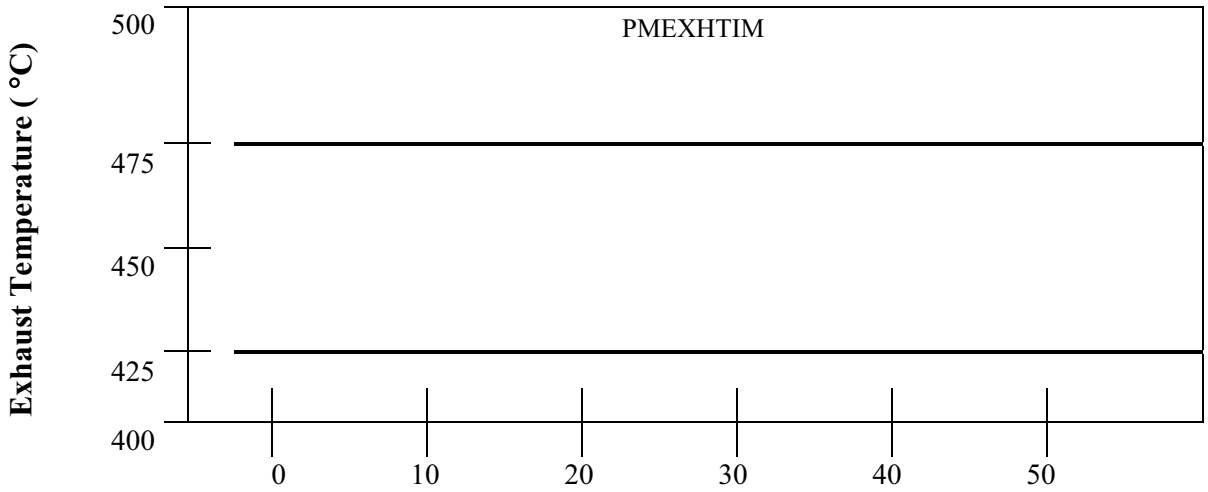
FIG. A5.15 Operational Data Summary – Fuel Inlet Temperature

Roller Follower Wear Test

Laboratory:	LAB						RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN		
Oil Code:	OILCODE							CMIR
Formulation/Stand Code:	FORM							

Exhaust Temperature

Process Mean
Xav = PMEXHT



Process Variability (s)
Sav = PVEXHT

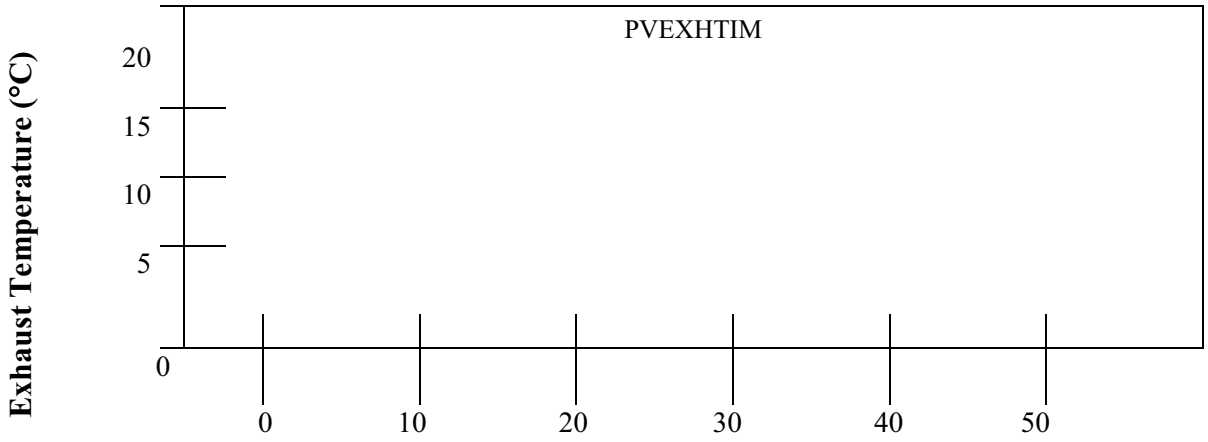


FIG. A5.16 Operational Data Summary – Exhaust Temperature

Roller Follower Wear Test

Laboratory:	LAB						RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN		
Oil Code:	OILCODE							CMIR
Formulation/Stand Code:	FORM							

*** Test Number is: STAND – STAND RUN NO. – ENGINE NO. – ENGINE RUN NUMBER**

Specification						
Test Parameter	**6.2L Engine**	**6.5L Engine**	**Average**	**Std. Dev.**	**Minimum**	**Maximum**
Engine Speed r/min	**1000 ± 5**	**1000 ± 5**	ARPM	SRPM	IRPM	XRPM
Torque N-m	**Record**	**Record**	ALOAD	SLOAD	ILOAD	XLOAD
Fuel Flow kg/h	**9.0 ± 0.1**	**9.4 ± 0.1**	AFFLO	SFFLO	IFFLO	XFFLO
Total Oil Consumption kg	**Record**	**Record**	TOTOCON			

Temperatures	**Specification**	**Average**	**Std. Dev.**	**Minimum**	**Maximum**
Coolant Out °C	**120 ± 2**	ACOLOUT	SCOLOUT	ICOLOUT	XCOLOUT
Coolant In °C	**Report Only**	ACOLIN	SCOLIN	ICOLIN	XCOLIN
Main Oil Gallery °C	**120 ± 2**	AOILTEM	SOILTEM	IOILTEM	XOILTEM
Fuel In °C	**35 ± 2**	AFUELIN	SFUELIN	IFUELIN	XFUELIN
Intake Air °C	**32 ± 2**	AINAIRT	SINAIRT	IINAIRT	XINAIRT
Oil Sump °C	**Report**	ASUMPT	SSUMPT	ISUMPT	XSUMPT
Exhaust °C	**Report**	AEXHT	SEXHT	IEXHT	XEXHT

Pressures	**Specification**	**Average**	**Std. Dev.**	**Minimum**	**Maximum**
Crankcase kPa	**Report**	ACCASEP	SCCASEP	ICCASEP	XCCASEP
Back Pressure kPa	**103 ± 1**	AEXP	SEXP	IEXP	XEXP
Intake Air kPa	**97 ± 1**	AINPRES	SINPRES	IINPRES	XINPRES

FIG. A5.17 Operational Summary

Roller Follower Wear Test

Laboratory:	LAB						RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN		
Oil Code:	OILCODE							CMIR
Formulation/Stand Code:	FORM							

Hours	Viscosity, cSt @ 100°C	% Soot
TST_HNEW	VIS1HNEW	TGA_HNEW
TST_H025	VIS1H025	TGA_H025
TST_H050	VIS1H050	TGA_H050

Hours	Elements						
	Al	Cr	Cu	Fe	Pb	Si	Sn
TST_HNEW	AL__HNEW	CR__HNEW	CU__HNEW	FE__HNEW	PB__HNEW	SI__HNEW	SN__HNEW
TST_H050	AL__H050	CR__H050	CU__H050	FE__H050	PB__H050	SI__H050	SN__H050

FIG. A5.18 Oil Analysis

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Number of Downtime Occurrences		DWNOCR	
Test Hours	**Date**	**Downtime**	**Reasons**
DOWNH001	DDATH001	DTIMH001	DREAH001
DOWNH002	DDATH002	DTIMH002	DREAH002
DOWNH003	DDATH003	DTIMH003	DREAH003
DOWNH004	DDATH004	DTIMH004	DREAH004
DOWNH005	DDATH005	DTIMH005	DREAH005
DOWNH006	DDATH006	DTIMH006	DREAH006
DOWNH007	DDATH007	DTIMH007	DREAH007
DOWNH008	DDATH008	DTIMH008	DREAH008
DOWNH009	DDATH009	DTIMH009	DREAH009
DOWNH010	DDATH010	DTIMH010	DREAH010
DOWNH011	DDATH011	DTIMH011	DREAH011
DOWNH012	DDATH012	DTIMH012	DREAH012
DOWNH013	DDATH013	DTIMH013	DREAH013
DOWNH014	DDATH014	DTIMH014	DREAH014
DOWNH015	DDATH015	DTIMH015	DREAH015
		TOTLDOWN	**Total Downtime**

Other Comments	
Number of Comment Lines	TOTCOM
OCOMH001	
OCOMH002	
OCOMH003	
OCOMH004	
OCOMH005	
OCOMH006	
OCOMH007	
OCOMH008	
OCOMH009	
OCOMH010	
OCOMH011	
OCOMH012	
OCOMH013	
OCOMH014	
OCOMH015	

FIG A5.19 Unscheduled Downtime & Maintenance Summary

Roller Follower Wear Test

Laboratory:	LAB						RDTCOMP	DTCOMP
Test Number:	STAND	RSTRUN	STRUN	ENGINE	RENRUN	ENRUN		
Oil Code:	OILCODE							CMIR
Formulation/Stand Code:	FORM							

Number of Downtime Occurrences		DWNOCR	
Test Hours	**Date**	**Downtime**	**Reasons**
DOWNH016	DDATH016	DTIMH016	DREAH016
DOWNH017	DDATH017	DTIMH017	DREAH017
DOWNH018	DDATH018	DTIMH018	DREAH018
DOWNH019	DDATH019	DTIMH019	DREAH019
DOWNH020	DDATH020	DTIMH020	DREAH020
DOWNH021	DDATH021	DTIMH021	DREAH021
DOWNH022	DDATH022	DTIMH022	DREAH022
DOWNH023	DDATH023	DTIMH023	DREAH023
DOWNH024	DDATH024	DTIMH024	DREAH024
DOWNH025	DDATH025	DTIMH025	DREAH025
DOWNH026	DDATH026	DTIMH026	DREAH026
DOWNH027	DDATH027	DTIMH027	DREAH027
DOWNH028	DDATH028	DTIMH028	DREAH028
DOWNH029	DDATH029	DTIMH029	DREAH029
DOWNH030	DDATH030	DTIMH030	DREAH030
		TOTLDOWN	**Total Downtime**

Other Comments	
Number of Comment Lines	TOTCOM
OCOMH016	
OCOMH017	
OCOMH018	
OCOMH019	
OCOMH020	
OCOMH021	
OCOMH022	
OCOMH023	
OCOMH024	
OCOMH025	
OCOMH026	
OCOMH027	
OCOMH028	
OCOMH029	
OCOMH030	

FIG A5.19A Unscheduled Downtime & Maintenance Summary

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Number of Downtime Occurrences		DWNOCR	
Test Hours	**Date**	**Downtime**	**Reasons**
DOWNH031	DDATH031	DTIMH031	DREAH031
DOWNH032	DDATH032	DTIMH032	DREAH032
DOWNH033	DDATH033	DTIMH033	DREAH033
DOWNH034	DDATH034	DTIMH034	DREAH034
DOWNH035	DDATH035	DTIMH035	DREAH035
DOWNH036	DDATH036	DTIMH036	DREAH036
DOWNH037	DDATH037	DTIMH037	DREAH037
DOWNH038	DDATH038	DTIMH038	DREAH038
DOWNH039	DDATH039	DTIMH039	DREAH039
DOWNH040	DDATH040	DTIMH040	DREAH040
DOWNH041	DDATH041	DTIMH041	DREAH041
DOWNH042	DDATH042	DTIMH042	DREAH042
DOWNH043	DDATH043	DTIMH043	DREAH043
DOWNH044	DDATH044	DTIMH044	DREAH044
DOWNH045	DDATH045	DTIMH045	DREAH045
		TOTLDOWN	**Total Downtime**

Other Comments	
Number of Comment Lines	TOTCOM
OCOMH031	
OCOMH032	
OCOMH033	
OCOMH034	
OCOMH035	
OCOMH036	
OCOMH037	
OCOMH038	
OCOMH039	
OCOMH040	
OCOMH041	
OCOMH042	
OCOMH043	
OCOMH044	
OCOMH045	

FIG A5.19B Unscheduled Downtime & Maintenance Summary

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Supplier:	FUELSUP	**Batch Identifiers:**	FUELBTID

Measurement	Specs.	Analysis	Test Method
Total Sulfur, % Weight	**0.03 - 0.05**	FUELSULF	**D 2622**
Gravity, °API	**32 – 36**	APIGRAV	**D 287 or D 4052**
Hydrocarbon Composition			
Aromatics % Vol.	**28 – 35**	FUELAROM	**D 1319**
Olefin	**Report**	FUELOLEF	**D 1319**
Saturates	**Report**	FUELSATU	**D 1319**
Cetane Index	**Report**	CETANEIN	**D 4737**
Cetane No.	**42 - 48**	CETANENO	**D 613**
Copper Strip Corrosion	**3 Maximum**	FUELCU	**D 130**
Flash Point, °C	**54 Minimum**	FLASHPT	**D 93**
Cloud Point, °C	**-12 Maximum**	FUELCLOU	**D 2500**
Pour Point, °C	**-18 Maximum**	FUELPOUR	**D 97**
Carbon Residue on 10% Residium, %	**0.35 Maximum**	FUELCRES	**D 524 (10 % Bottoms)**
Water & Sediment, % Vol	**0.05 Maximum**	FUELH2O	**D 2709**
Ash, % Wgt.	**0.01 Maximum**	FUELASH	**D 482**
Viscosity, cSt @ 40°C	**2.0 - 3.2**	KINVIS	**D 445**
Distillation, °C			
IBP	**177 - 199**	FUELIBP	**D 86**
10%	**210 - 232**	FUEL10	**D 86**
50%	**249 - 277**	FUEL50	**D 86**
90%	**299 - 327**	FUEL90	**D 86**
EP	**327 - 360**	FUELEP	**D 86**

FIG. A5.20 Test Fuel Analysis (Last batch)

Roller Follower Wear Test

Laboratory:	LAB	RDTCOMP	DTCOMP
Test Number: STAND RSTRUN STRUN	ENGINE RENRUN ENRUN		
Oil Code:	OILCODE		CMIR
Formulation/Stand Code:	FORM		

Parameter (1)	Sensing Device (2)	Calibration Frequency (3)	Record Device (4)	Observation Frequency (5)	Record Frequency (6)	Log Frequency (7)	System Response (8)
Temperatures							
Main Oil G.	OGTSENS	OGTCALF	OGTRECD	OGTOBSF	OGTRECF	OGTLOGF	
Fuel In.	FTEMSENS	FTEMCALF	FTEMRECD	FTEMOBSF	FTEMRECF	FTEMLOGF	
Intake Air	AITSENS	AITCALF	AITRECD	AITOBSF	AITRECF	AITLOGF	
Oil Sump	OSTSENS	OSTCALF	OSTRECD	OSTOBSF	OSTRECF	OSTLOGF	
Exhaust	EXMWSENS	EXMWCALF	EXMWRECD	EXMWOBSF	EXMWRECF	EXMWLOGF	
Cool. Out	COTSENS	COTCALF	COTRECD	COTOBSF	COTRECF	COTLOGF	
Other							
Fuel Flow	FFLOSENS	FFLOCALF	FFLORECD	FFLOOBSF	FFLORECF	FFLOLOGF	FFLOSYSR
Engine Rpm	RPMSENS	RPMCALF	RPMRECD	RPMOBSF	RPMRECF	RPMLOGF	RPMSYSR
Load	LOADSENS	LOADCALF	LOADRECD	LOADOBSF	LOADRECF	LOADLOGF	LOADSYSR
Intake Pres.	INTVSENS	INTVCALF	INTVRECD	INTVOBSF	INTVRECF	INTVLOGF	INTVSYSR
Exh. Press.	EXPRSENS	EXPRCALF	EXPRRECD	EXPROBSF	EXPRRECF	EXPRLOGF	EXPRSYSR
Oil Gal Pres	OILGSENS	OILGCALF	OILGRECD	OILGOBSF	OILGRECF	OILGLOGF	OILGSYSR

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 – Handlog sheet
DL – Automatic data logger
SC – Strip chart recorder
C/M – Computer, using manual data entry
C/D – Computer, using direct I/O entry
(5) Data are 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

FIG. A5.21 Characteristics of the Data Acquisition System