

Status of the Sequence IIIF Test

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Chairman, Sequence IID/IIIE Surveillance Panel

Presentation to HDEOCP

9/20/2000

Overview

- Background
- Improvements
- Discrimination Matrix Results
 - Viscosity
- Review of Current Status

Background

- Concerns expressed at the 3/9/2000 PCEOCP Meeting
 - Insufficient oxidation discrimination
 - Imprecise Cam and Lifter Wear

GPS Task Force

(General Motors, PerkinElmer, Southwest Research)

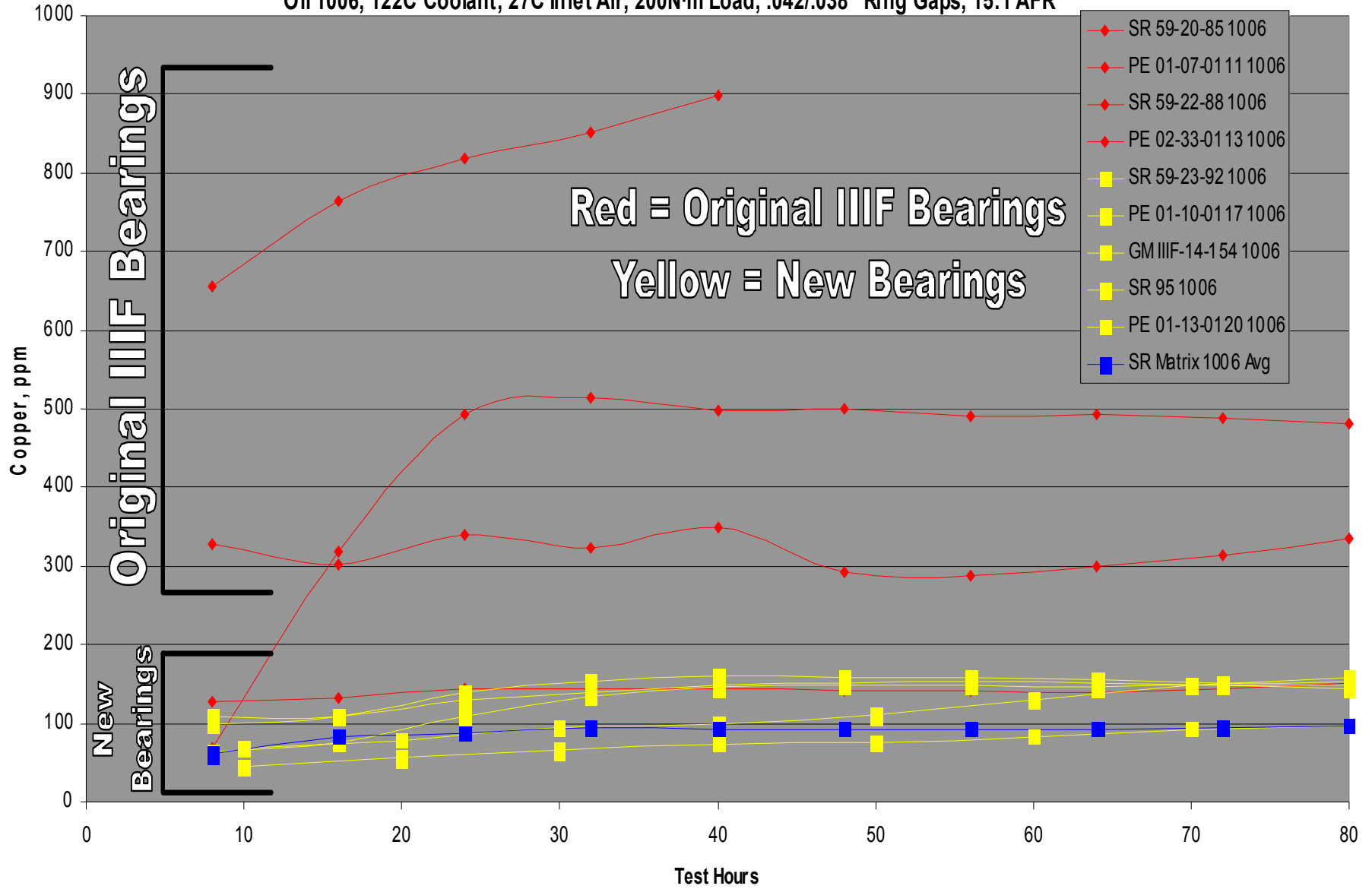
- The primary goal - More oxidation severity
- Secondary - Improve cam and lifter wear precision
- Third - Acceptable deposit discrimination

Improvements for Precision

- Balanced injector flow
- Camshaft front thrust plate with more clearance
- Standard part washing procedures
- Babbit material camshaft bearings
 - Copper and lead concentration in the used oil
 - decreased
 - much less variation

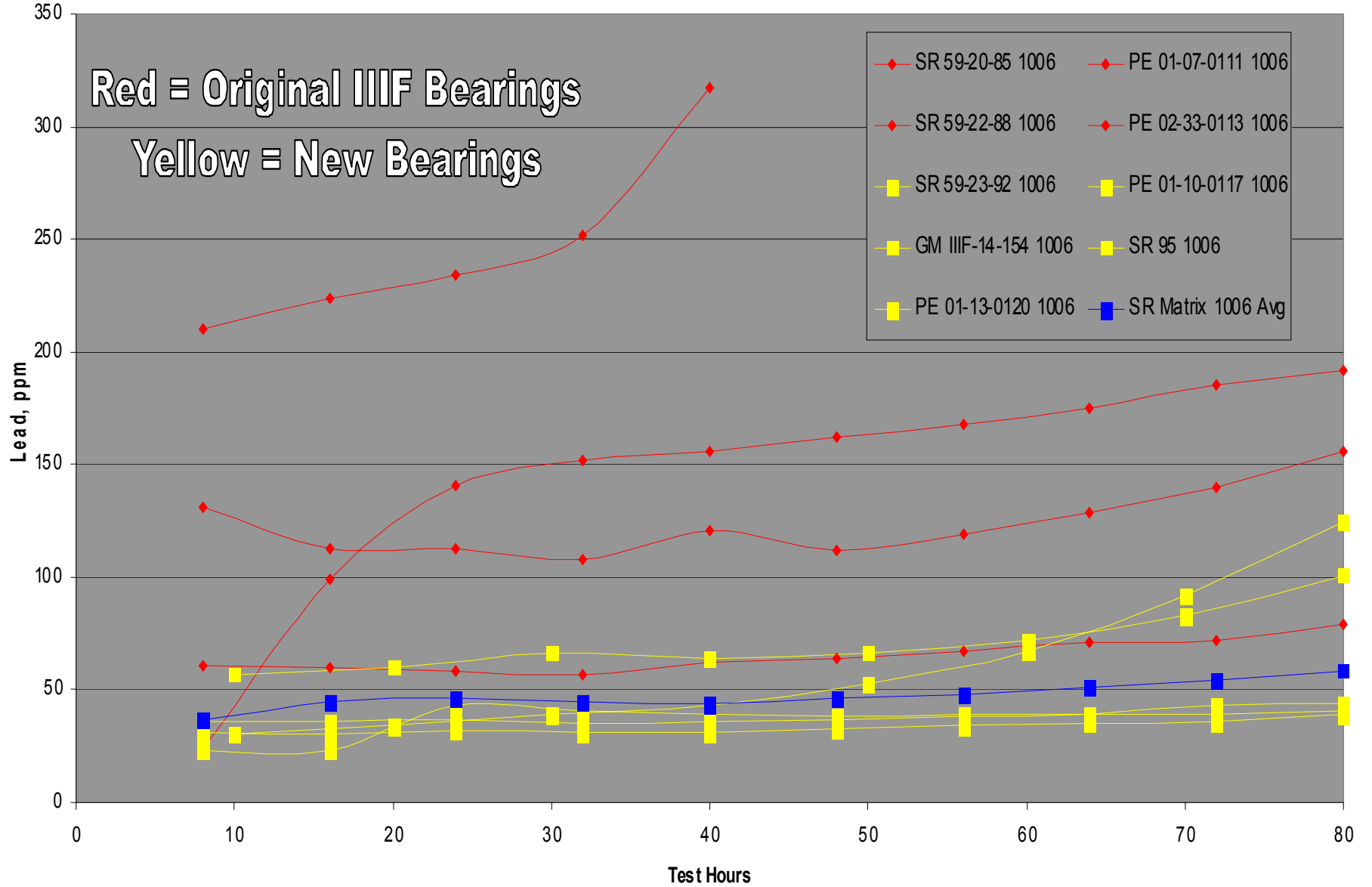
GPS IIF Copper Levels

Oil 1006, 122C Coolant, 27C Inlet Air, 200N·m Load, .042/.038" Ring Gaps, 15:1 AFR








GPS IIF Lead Levels

Oil 1006, 122C Coolant, 27C Inlet Air, 200N-m Load, .042/.038" Ring Gaps, 15:1 AFR



Increased Oxidation Severity

- Coolant Out Temperature - 115C  122C
- Air to Fuel Ratio - 16 to 1  15 to 1
- Increase in blowby
 - Typical initial blowby
 - Approximately 23 L/minute  29 L/minute
- Oil Check / Oil Level
 - Oil check interval - 8 hours  10 hours
 - Initial oil charge - 4320 ml  5500 ml

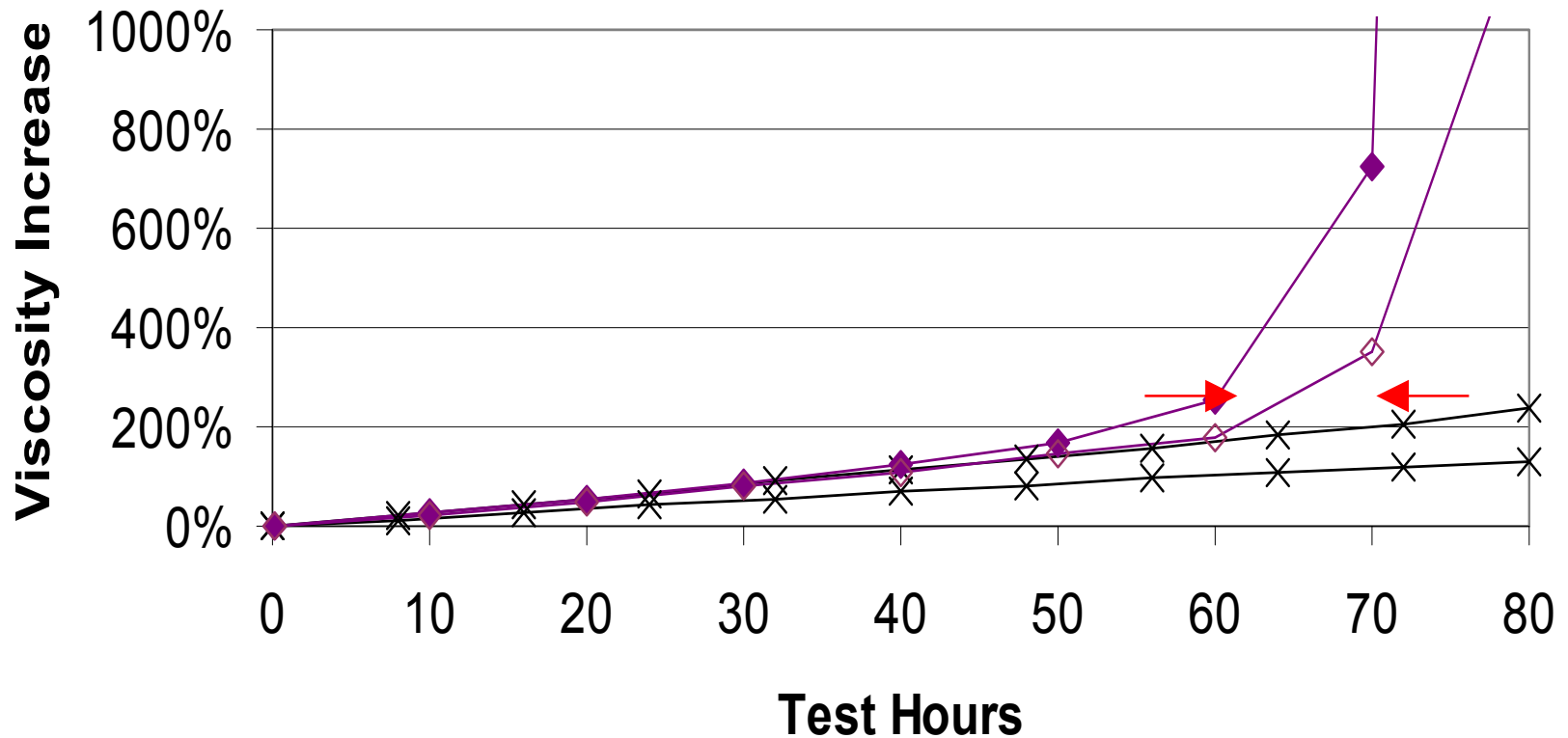
The following Action Item was recorded at
the Sequence III Surveillance Panel on
May 25, 2000

- *The goal for RO 1006 (GF-2
Category Oil) viscosity
performance in the IIIF was:*
 - *Viscosity break at 60-70 hours*

IIF Tests - Oil 1006

42/38 Ring Gap, 122C Coolant Out, 15 to 1 AFR

ACI Lifters, 5500 ml Initial Charge / 10 Hour Oil Checks



—x— 1006 Range (std test - no mod.) —◆— PerkinElmer —◇— SwRI

Discrimination Matrix Oils

- Reference oils 1006 and 1008
- 12 Oils (GPS-1 through 12)
 - SL prototype formulations included
 - Viscosity grades - 5W-30, 10W-30, & 15W-40
 - Base Stocks - Group I and II/II+
 - Varying expectations for oxidation

Discrimination Matrix

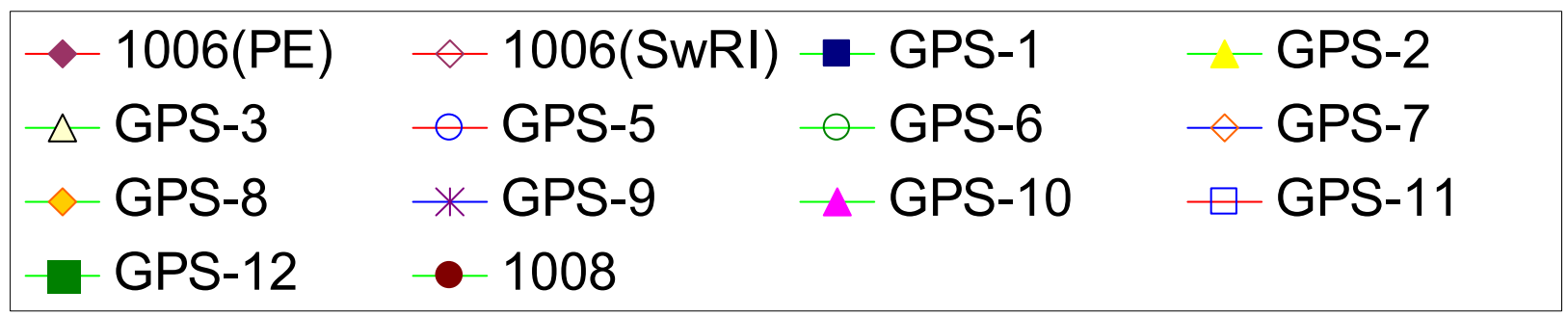
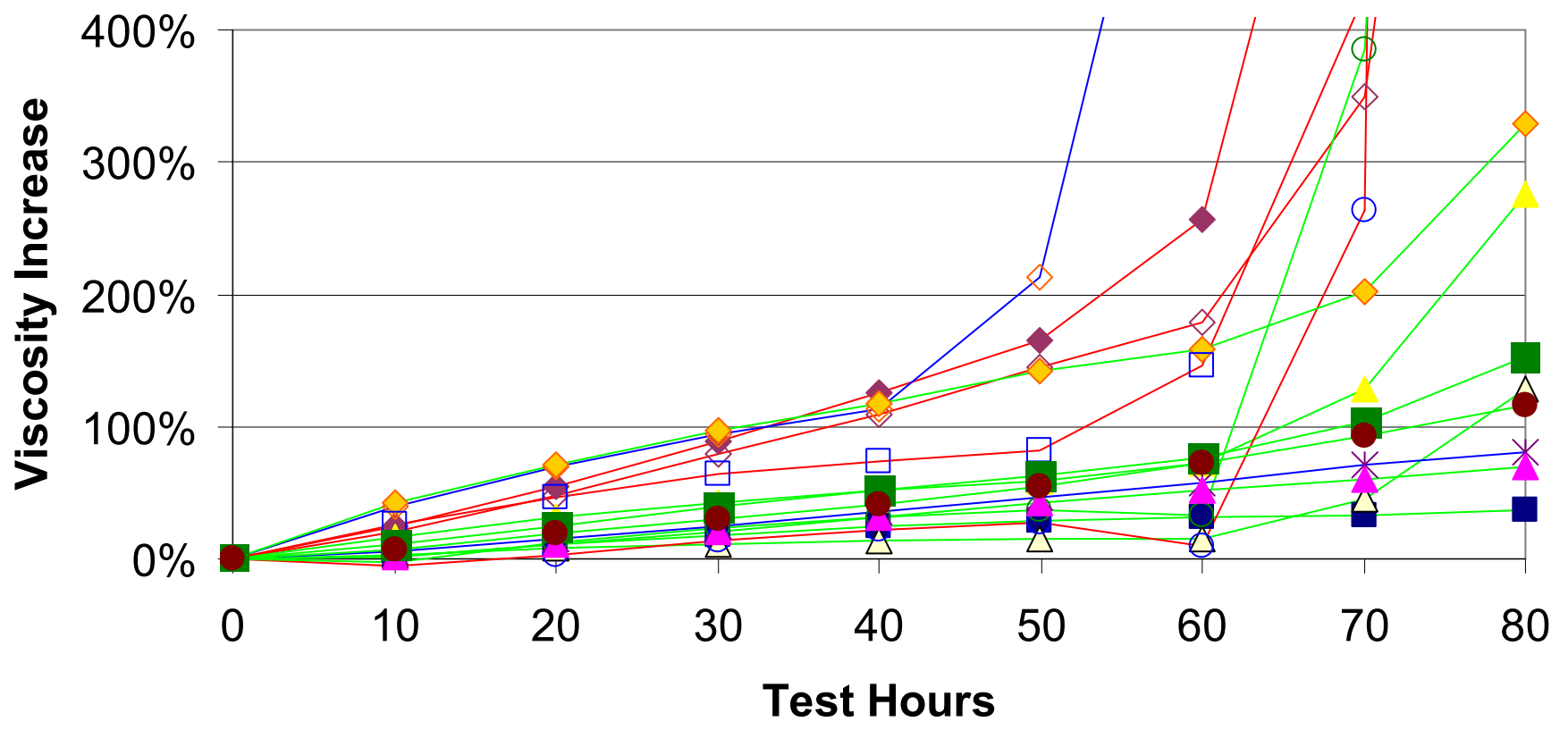
- Labs
 - GM
 - Lubrizol
 - PerkinElmer
 - SwRI
- Viscosity Increase Result Code - Pre-matrix expectation

Pass

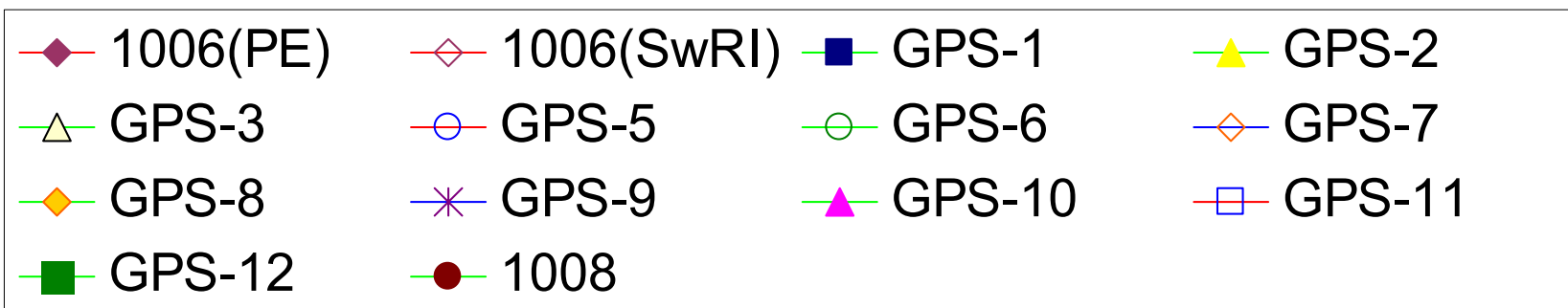
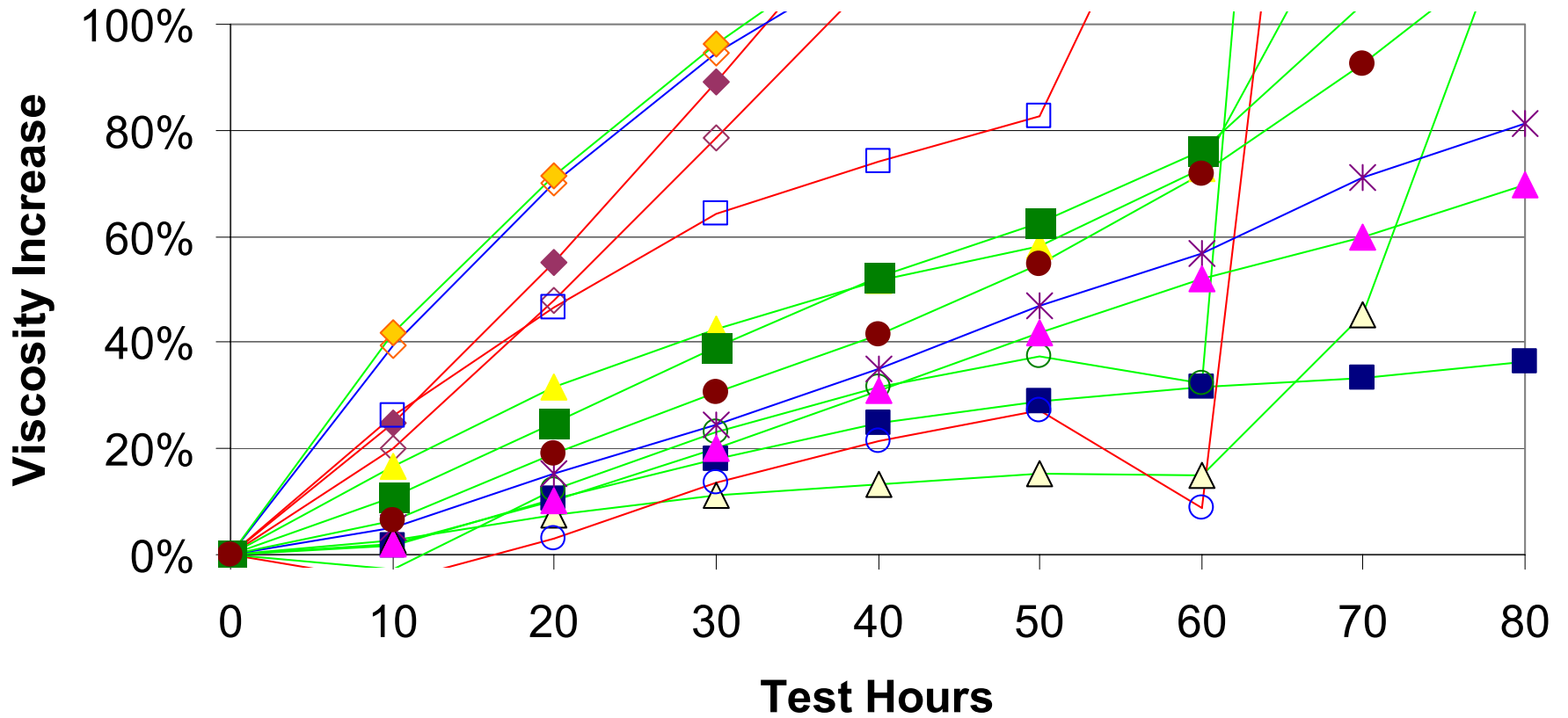
Borderline Fail

Fail

IIF Discrimination Matrix



IIF Discrimination Matrix



Current Status

- Acceptable piston deposit discrimination
- Cam and Lifter Wear strategy developed
- Revised procedure available
- new LTMS oils identified - 1006, 1008, 433
(formerly GPS-1)

- LTMS Matrix has been completed.
- On Tuesday, July 25, the Sequence III Surveillance Panel recommended approval of the IIF test for inclusion in GF-3.
- On Wednesday, July 26, the PCEOCP approved the IIF test for inclusion into GF-3 and initiated the D4485 ballot.

