

# PROPOSAL TO ASTM HDEOCP/PCEOCP

Prepared by:

ACC PAPTG

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# Proposal

- ACC PAPTG member companies have collected and analyzed candidate engine data to support the proposal to waive the engine tests listed below when qualifying an oil for a C category before the S category claim.
  - Ball Rust test
  - Sequence IVA
  - Sequence VG
  - Sequence VIII
  - Sequence IIIF piston deposits and wear—or use Sequence IIIFHD.
  - Gel Index

# Data to Support Proposal - 1

Data has been collected from four ACC companies on five CI-4 type technologies to support the proposal :

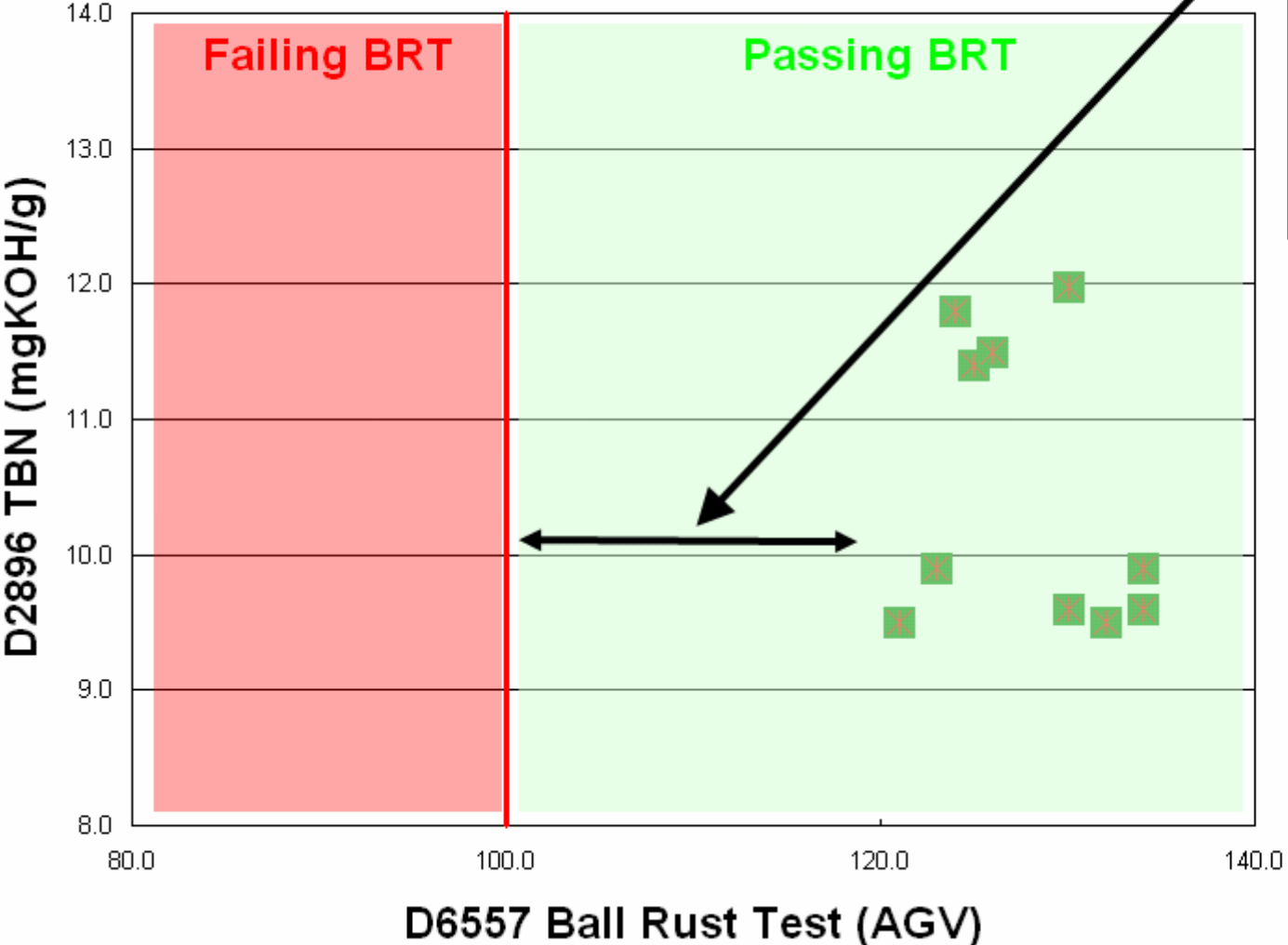
- BRT vs. TBN
  - Confirm that at HD TBN levels, BRT will always be passing
  
- Sequence IVA vs. RFWT and Sequence IVA vs. M11EGR
  - Confirm that passing RFWT and M11EGR wear parameters will always yield passing Sequence IVA
  
- M11EGR vs. VG Sludge and M11EGR vs. VG Varnish
  - Confirm that passing M11EGR sludge results in passing Sequence VG sludge and varnish
  
- Sequence VIII vs. Orbahn Shear; T10 Corrosion: HTCBT Corrosion
  - Confirm that KO shear pass will yield passing Sequence VIII shear and that HD lead corrosion measurements will yield passing Sequence VIII corrosion.

# Data to Support Proposal - 2

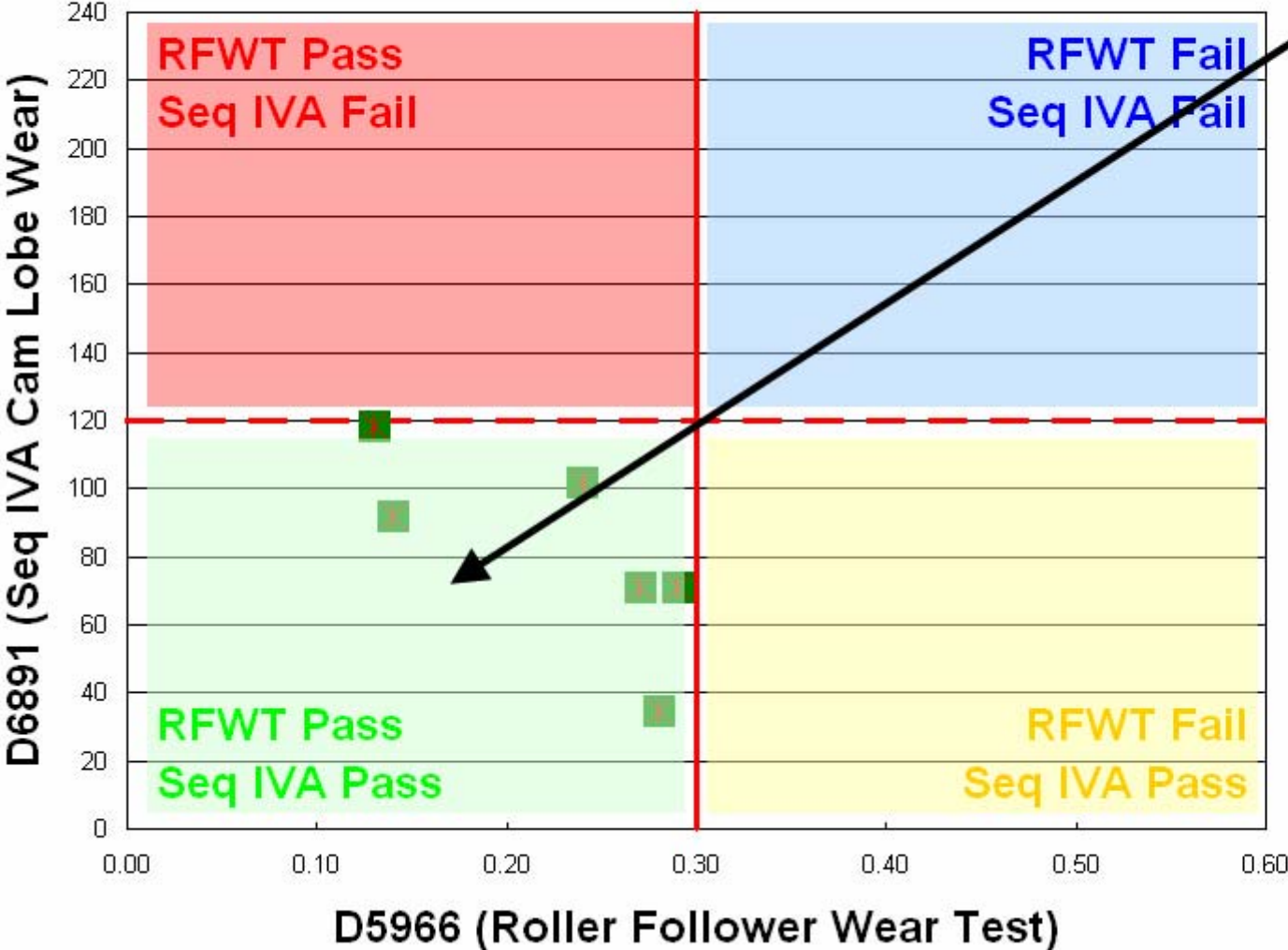
- Sequence IIF Piston Deposits vs. 1R Piston Deposits
  - Confirm that passing Cat 1R piston deposits will yield passing results in the Sequence IIF piston deposits
  
- Sequence IIF Cam & Lifter Wear vs. M11EGR Cross-Head Weight Loss
  - Confirm that passing M11EGR cross-head weight loss will yield passing results in the Sequence IIF cam and lifter wear
  
- Sequence IIF Cam & Lifter Wear vs. RFWT
  - Confirm that passing RFWT will yield passing results in the Sequence IIF cam & lifter wear
  
- Gelation Index vs. T10A and T11A
  - Passing used oil MRV in the T10A or T11A will result in passing Gelation Index

### Universal Oil Redundancy Data

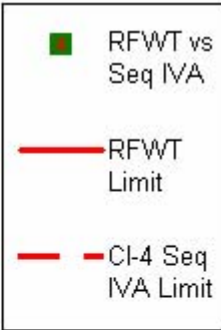
Universal Oils have sufficient Detergency to protect against corrosion with 20 units of AGV headroom over the D6557 test limit. This data set is based upon five technologies, from four companies in three viscosity grades and two base stock groups.



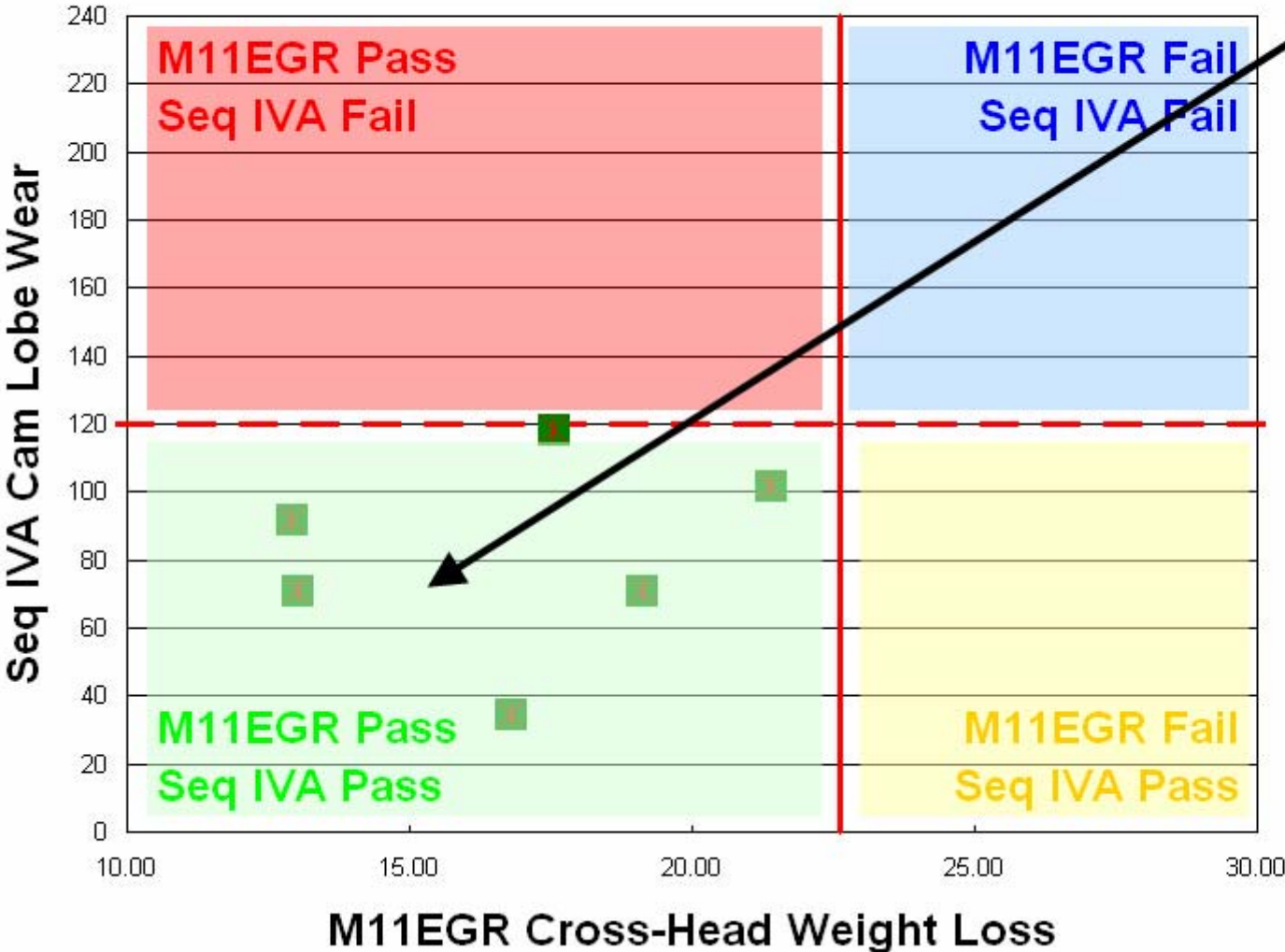
### Universal Oil Redundancy Data



Universal oils which pass the RFWT test also show the ability to control wear in the Sequence IVA cam lobe wear test. This data set is based upon five technologies from four companies in three viscosity grades and two base stock groups.



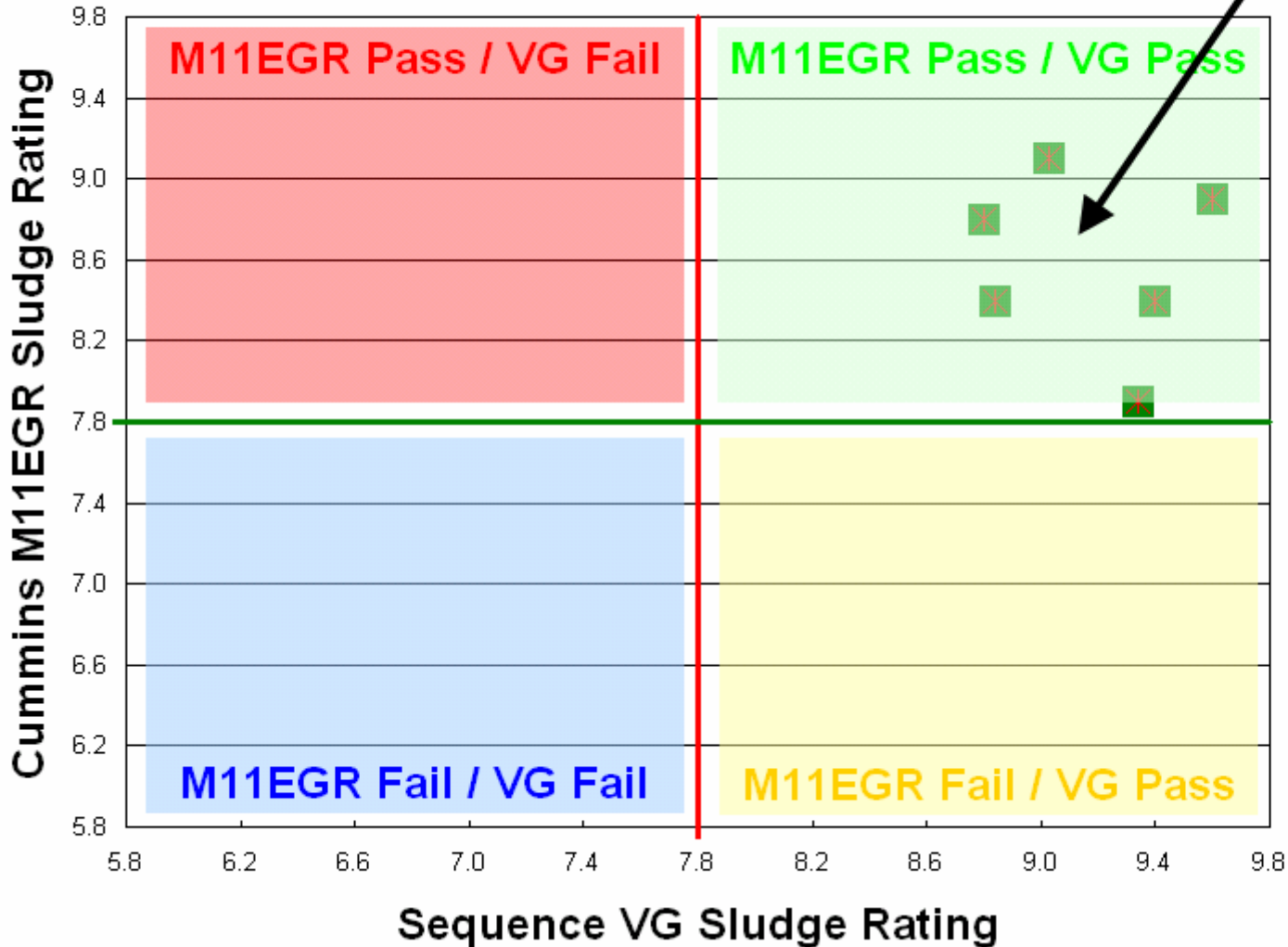
### Universal Oil Redundancy Data



Universal oils which pass the M11EGR Cross-Head Weight Loss test also show the ability to control wear in the Sequence IVA cam lobe wear test. This data set is based upon five technologies from four companies in three viscosity grades and two base stock groups.

- M11EGR vs Seq IVA
- M11EGR Limit
- - - CI-4 Seq IVA Limit

### Universal Oil Redundancy Data

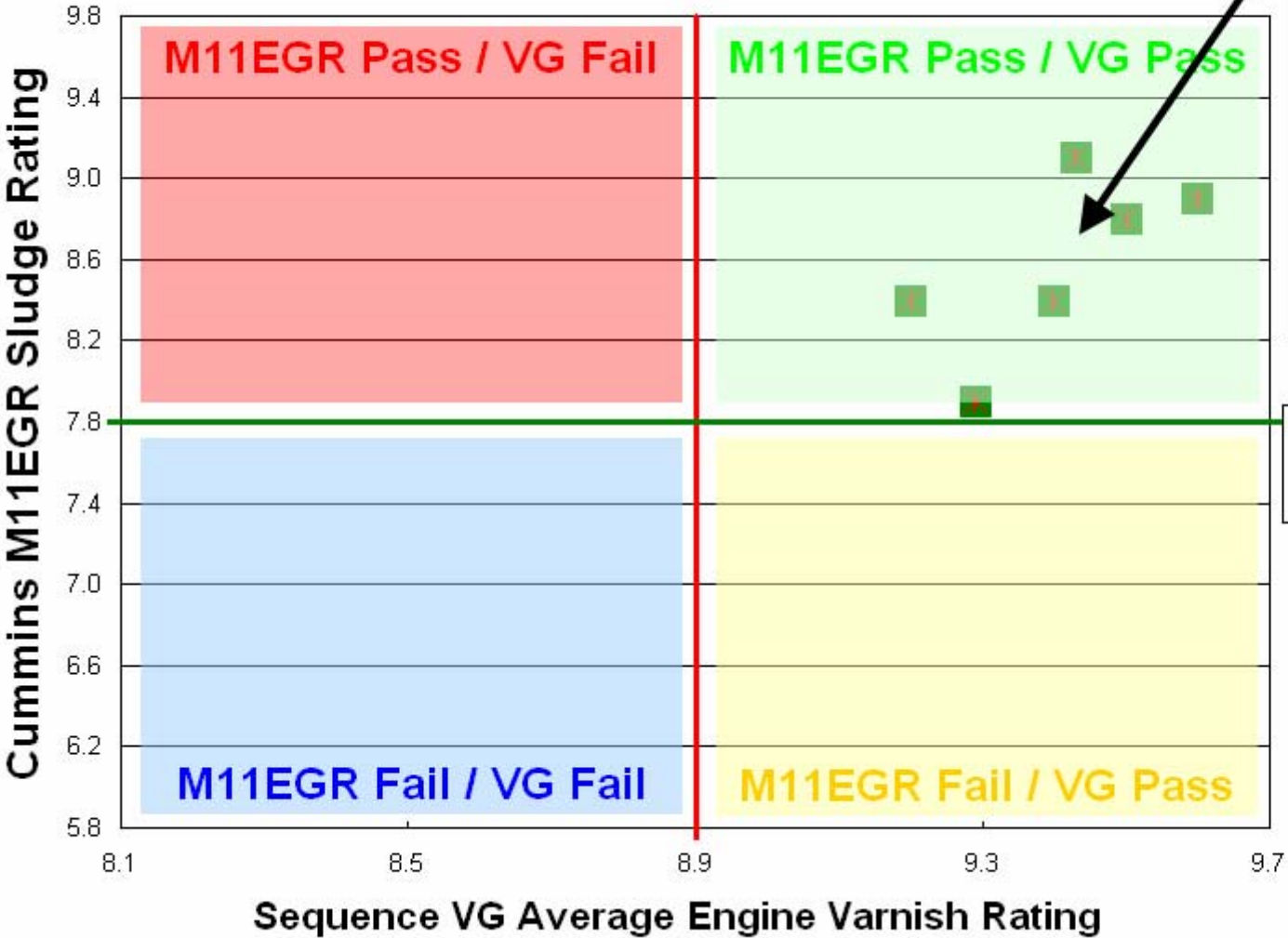


Universal Oils have plenty of dispersancy. Oils which have passed the M11EGR also pass the Sequence VG sludge test and typically by a comfortable margin. This data set is based upon five technologies, from four companies in three viscosity grades and two base stock groups.

- Sludge Comparison
- VG Sludge Limit
- M11EGR Sludge Limit



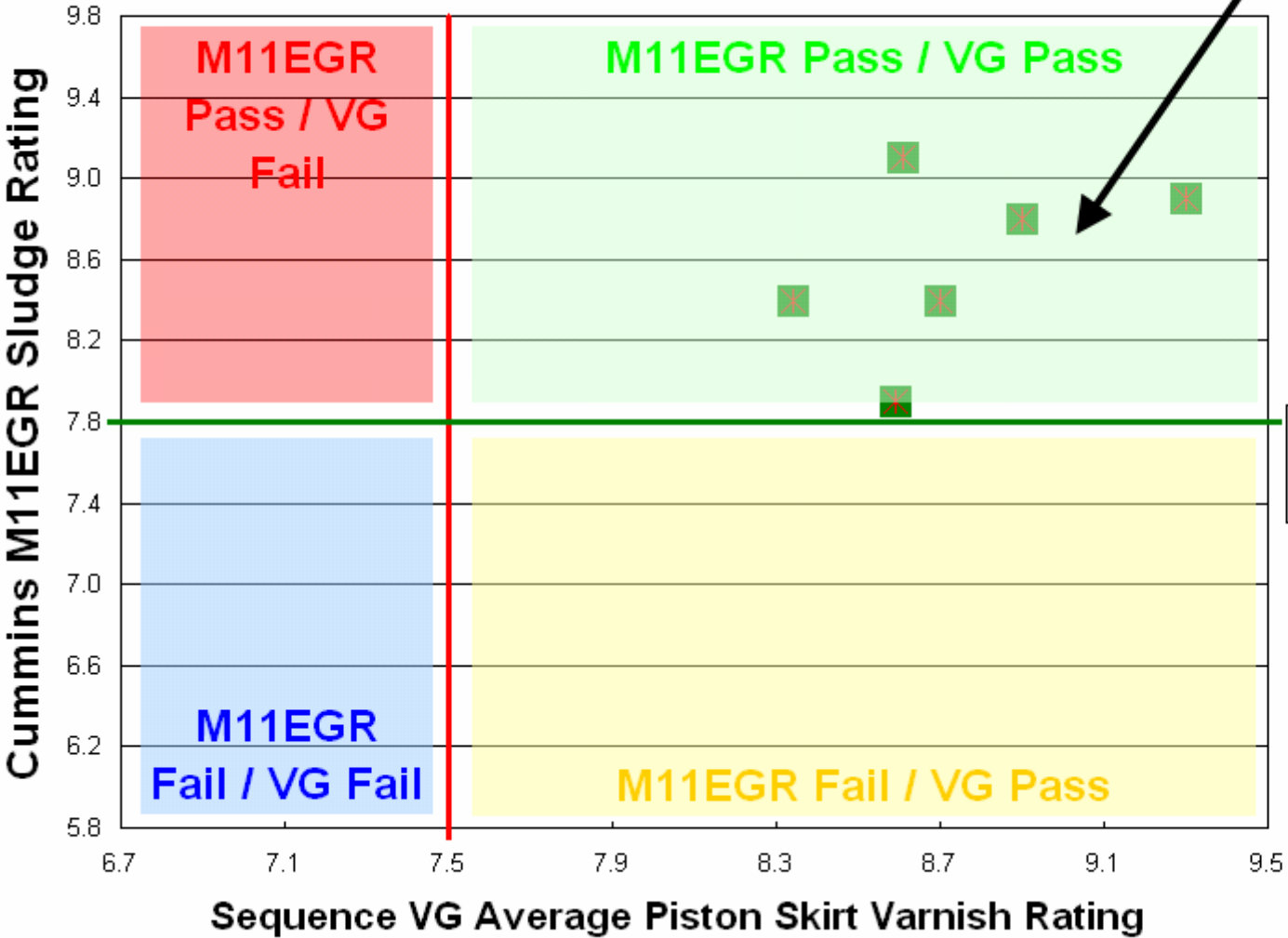
### Universal Oil Redundancy Data



Universal Oils have plenty of dispersancy. Oils which have passed the M11EGR also pass Average Engine Varnish in the Sequence VG and by a very comfortable margin. This data set is based upon five technologies, from four companies in three viscosity grades and two base stock groups.

- Cleanliness Comparison
- VG Varnish Limit
- M11EGR Sludge Limit

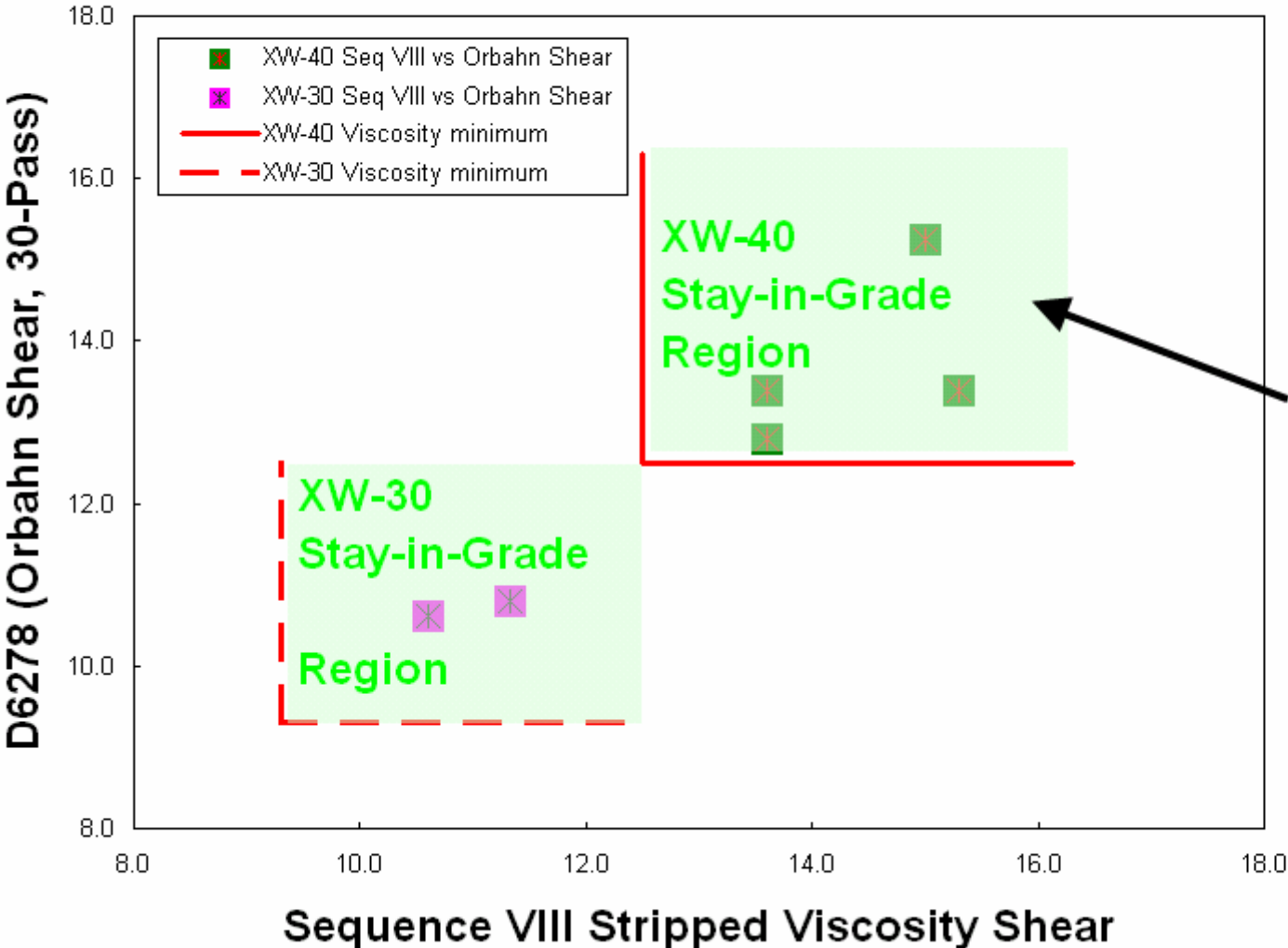
### Universal Oil Redundancy Data



Universal Oils have plenty of detergency. Oils which have passed the M11EGR also pass Average Piston Skirt Varnish in the Sequence VG and by a very comfortable margin. This data set is based upon five technologies, from four companies in three viscosity grades and two base stock groups.

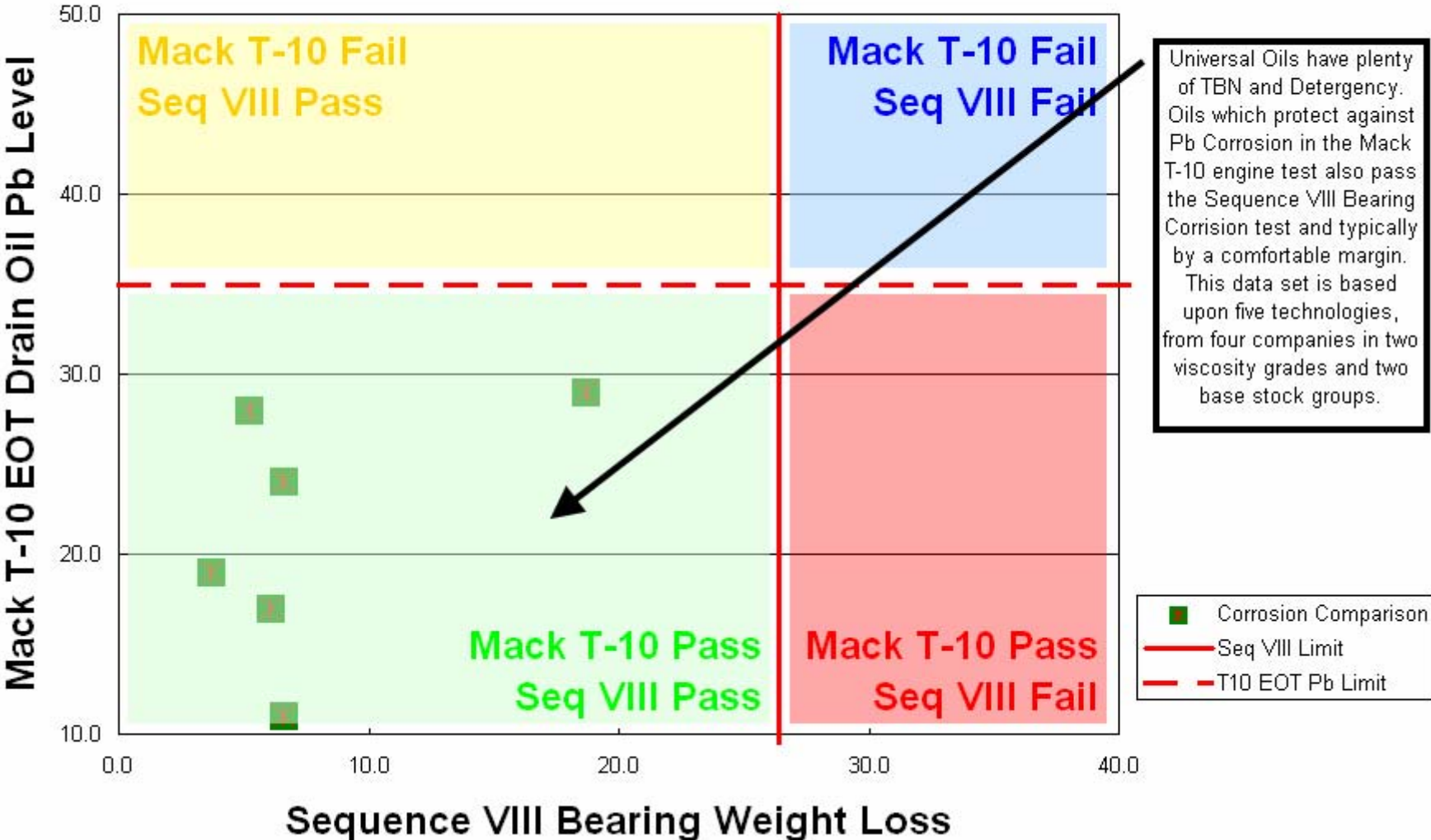
- Cleanliness Comparison
- VG APSV Limit
- M11EGR Sludge Limit

### Universal Oil Redundancy Data

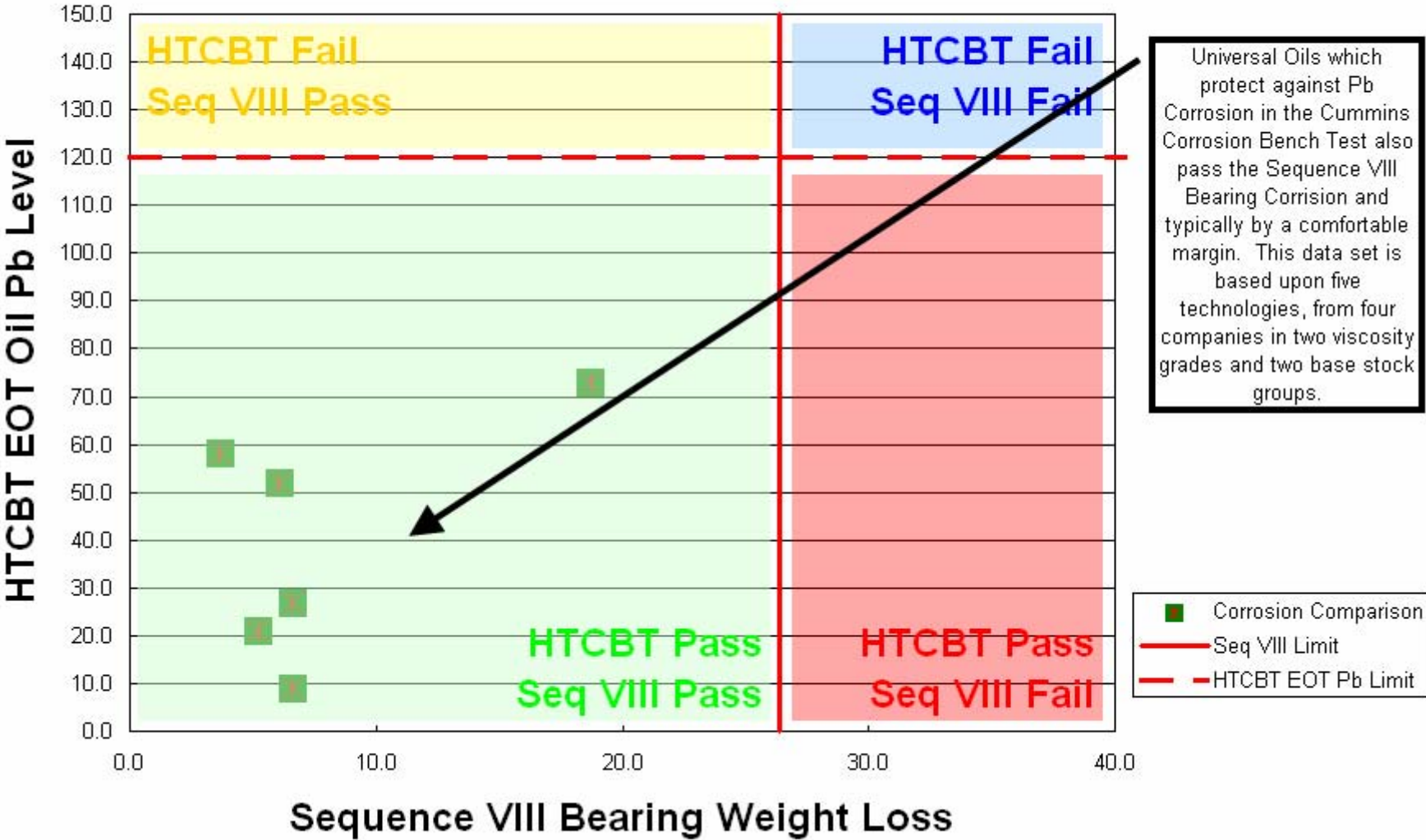


Universal oils are formulated with shear stable Viscosity Modifiers. Oils whose viscosity remains 'in-grade' after being Orbahn Sheared, also stay 'in-grade' after shearing in the Sequence VIII engine test. This data set is based upon five technologies, from four companies in two viscosity grades and two base stock groups.

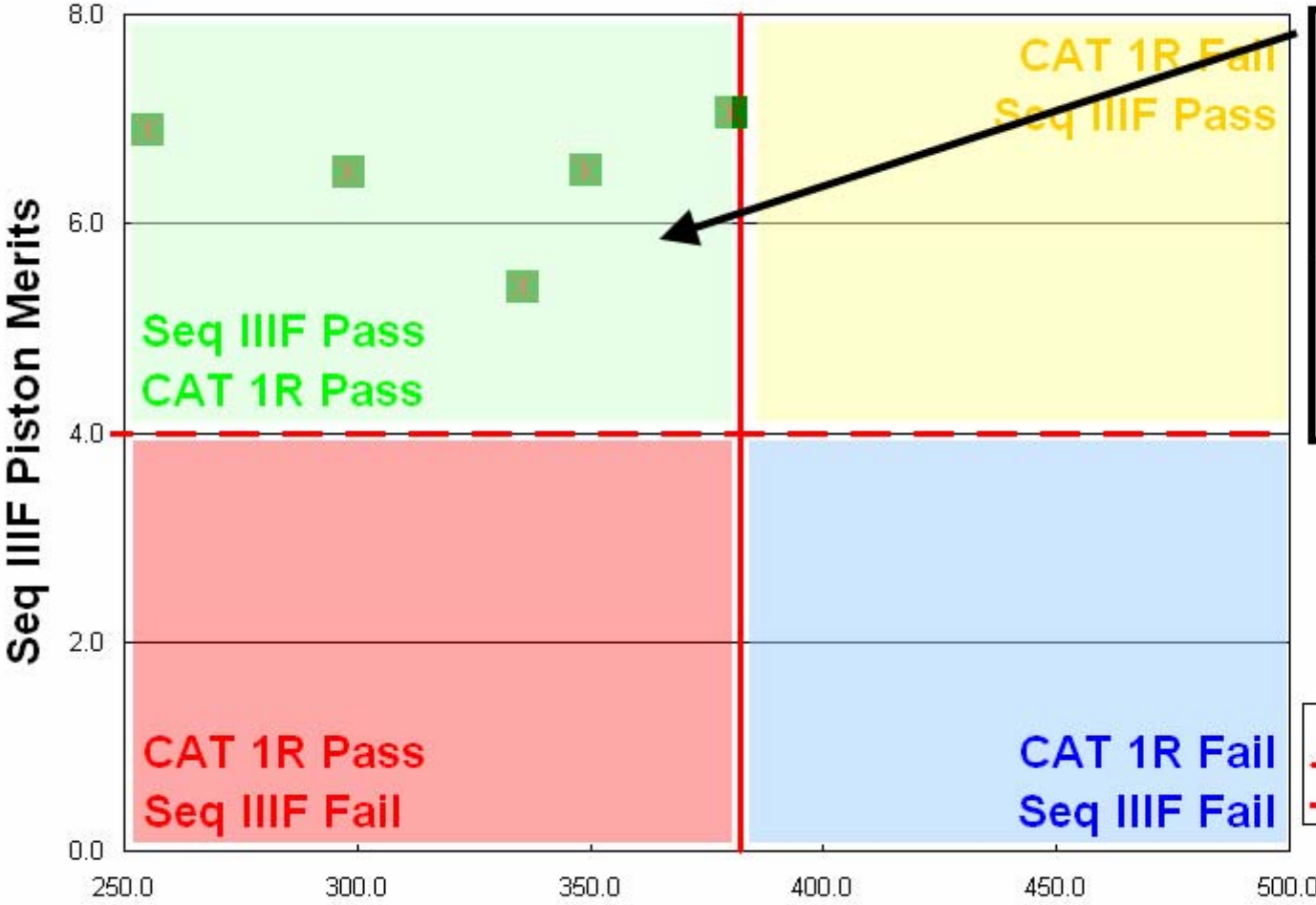
### Universal Oil Redundancy Data



### Universal Oil Redundancy Data



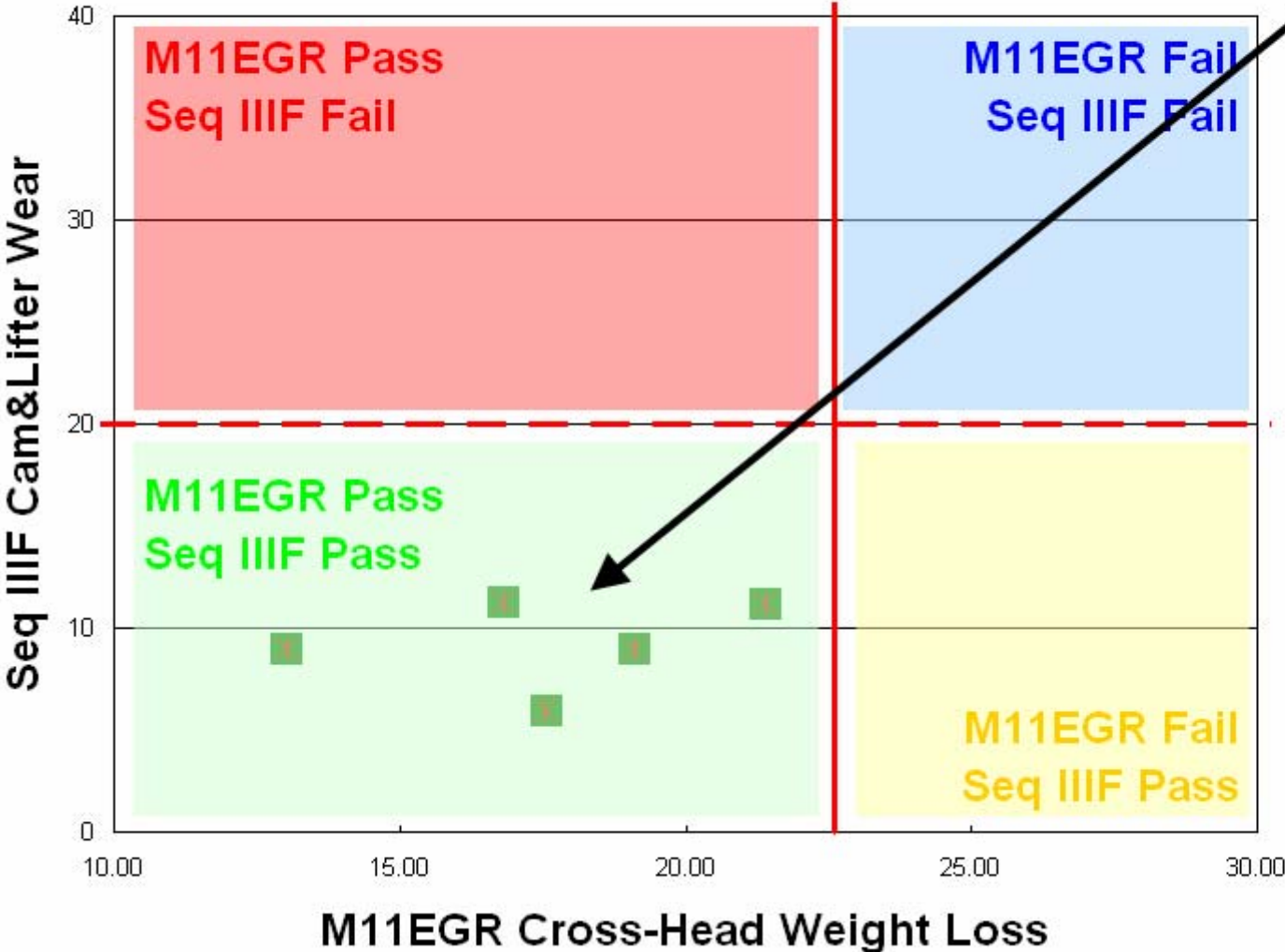
### Universal Oil Redundancy Data



Universal Oils are formulated with higher levels of detergents than PCMO's. Universal oils which can pass the CAT 1R Piston Deposits test can keep IIF pistons clean. This data set is based upon five technologies, from four companies in two viscosity grades and two base stock groups.

- Piston Cleanliness
- CAT 1R Max Demerits
- - - IIF Min Piston Merits

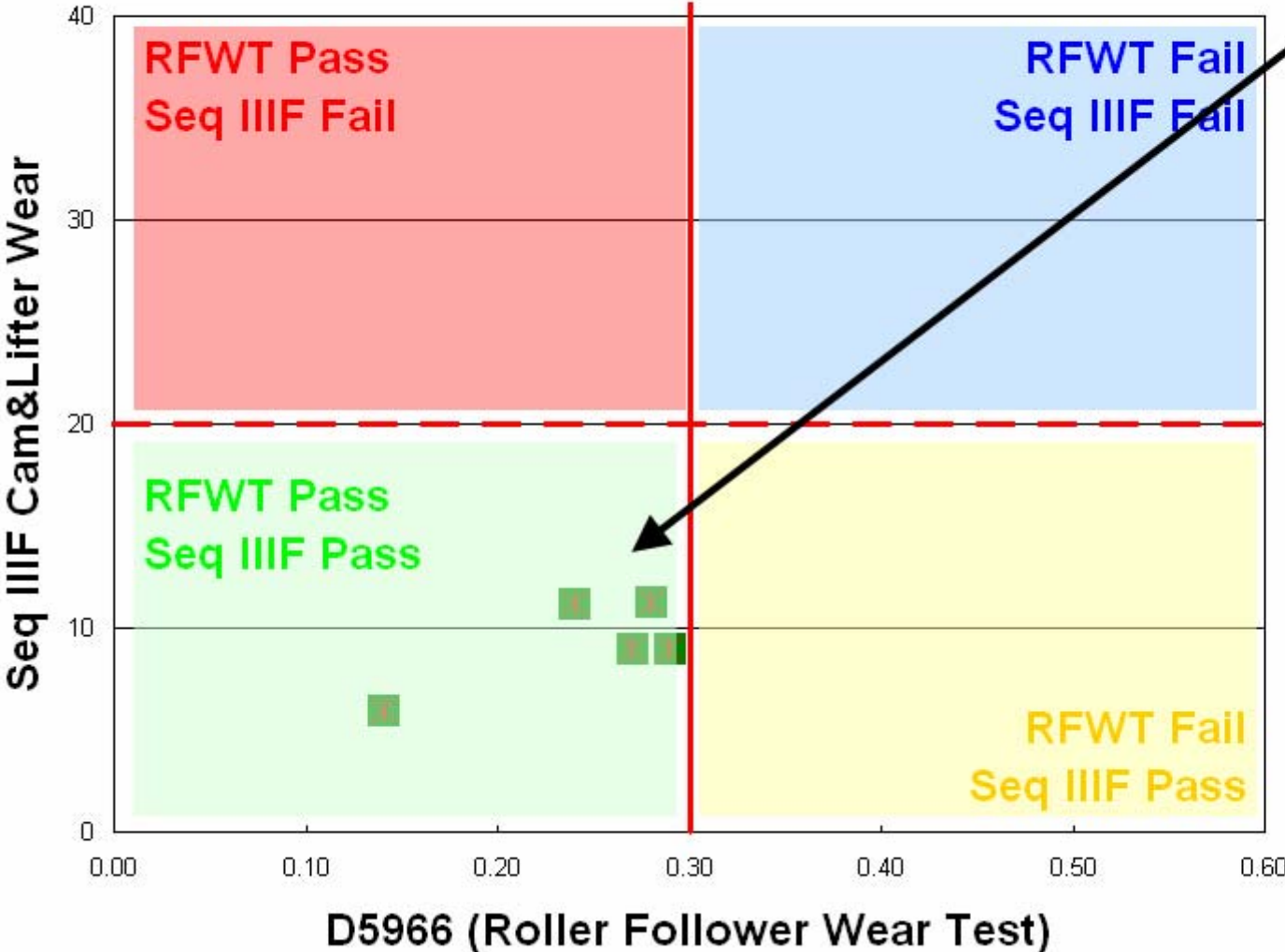
### Universal Oil Redundancy Data



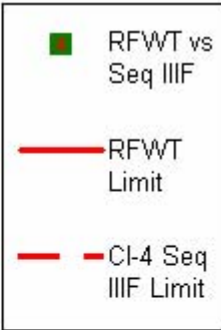
Universal oils which pass the M11EGR Cross-Head Weight Loss test also show the ability to control wear in the Sequence IIF test. This data set is based upon five technologies from four companies in two viscosity grades and two base stock groups.

- M11EGR vs Seq IIF
- M11EGR Limit
- - - CI-4 Seq IIF Limit

### Universal Oil Redundancy Data

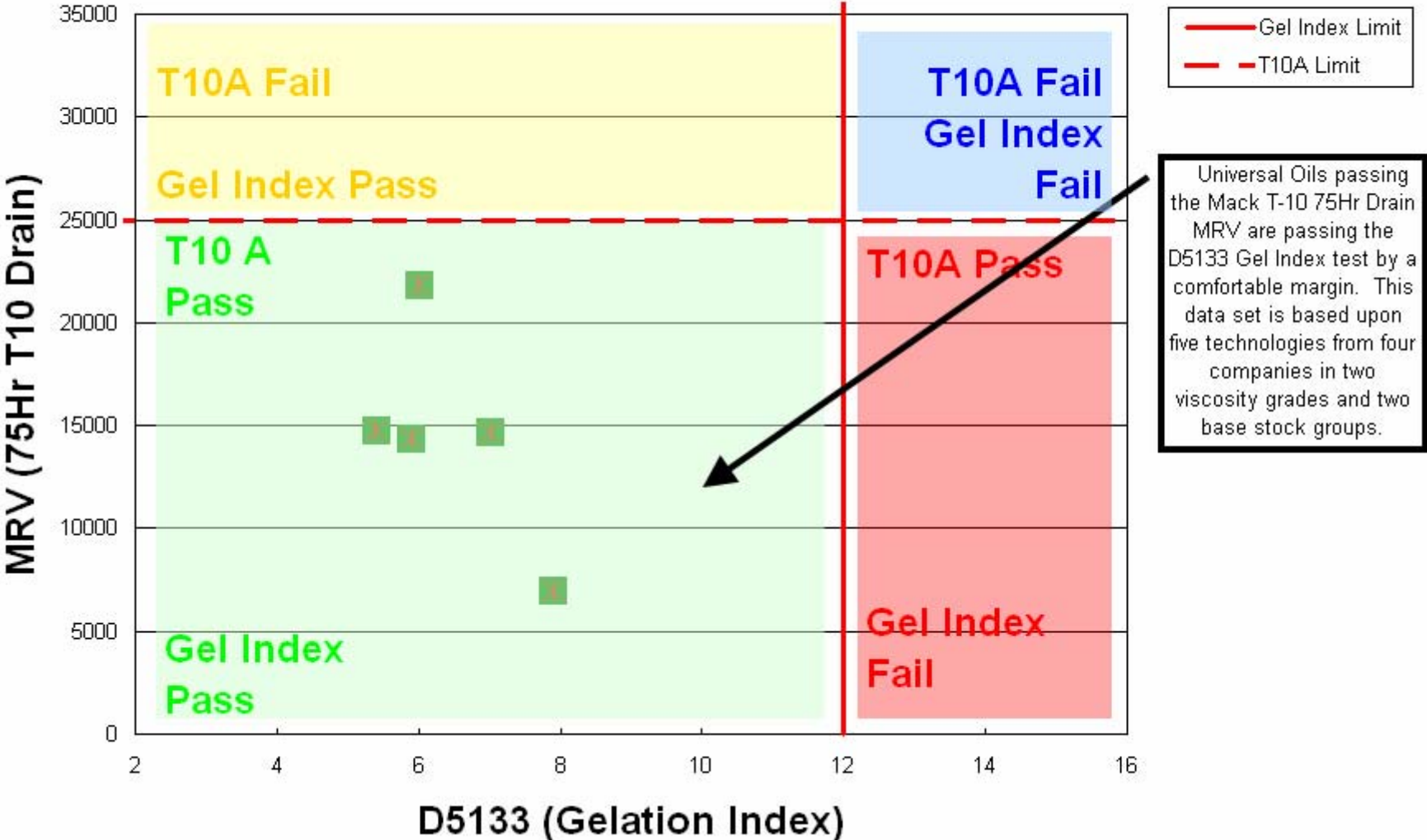


Universal oils which pass the RFWT test also show the ability to control wear in the Sequence IIIF test. This data set is based upon five technologies from four companies in two viscosity grades and two base stock groups.



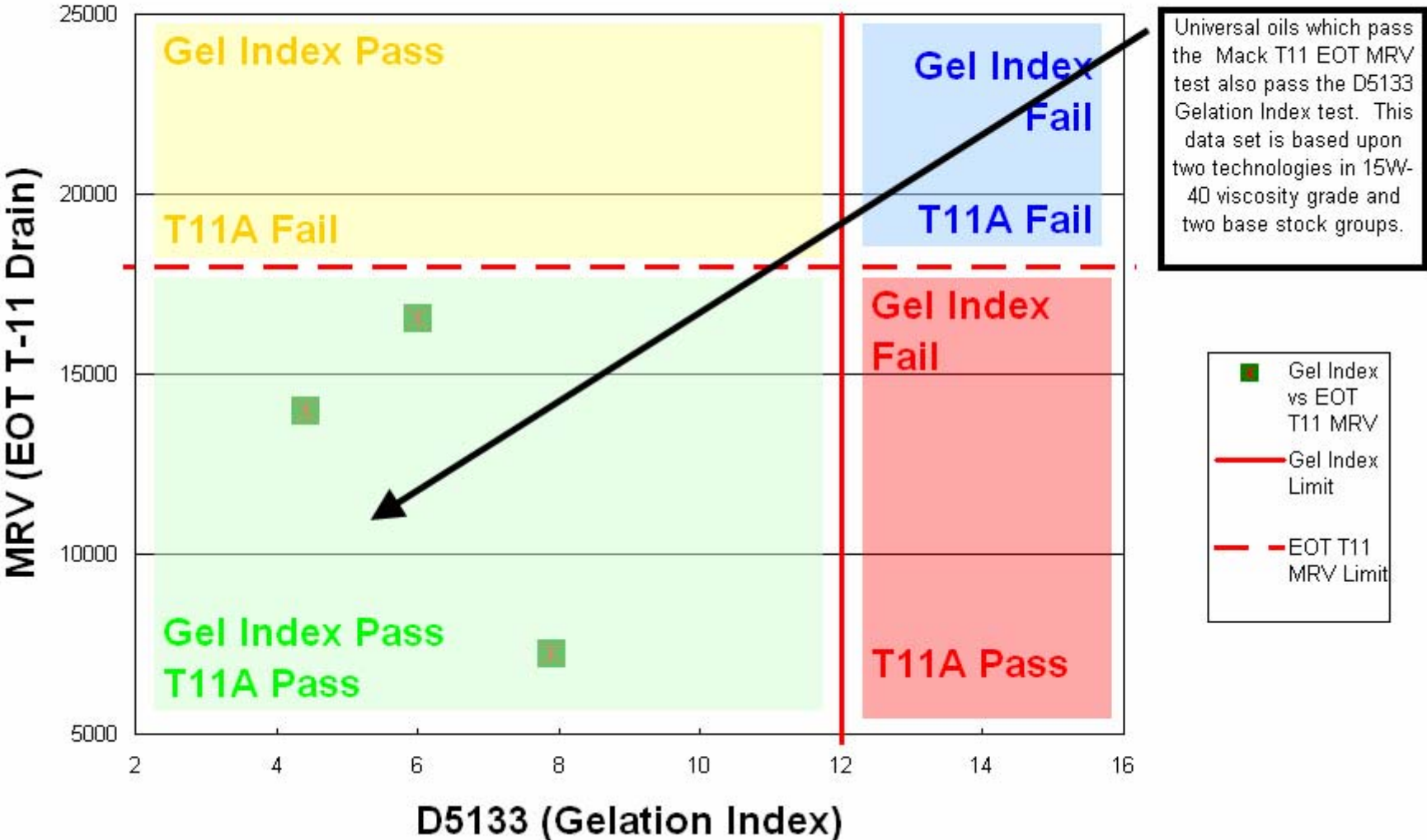


### Universal Oil Redundancy Data



Universal Oils passing the Mack T-10 75Hr Drain MRV are passing the D5133 Gel Index test by a comfortable margin. This data set is based upon five technologies from four companies in two viscosity grades and two base stock groups.

### Universal Oil Redundancy Data



# Summary of ACC Proposal on Universal Oils

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<b>Test/Parameter Eliminated</b>	<b>Performance Assured by Test/Parameter in API CI-4</b>
BRT	TBN
Sequence IVA	RFWT & M11EGR
Sequence VIII	KO Shear, T10 corrosion, HTCBT
Sequence VG	M11EGR
Seq IIF piston deposits	Cat 1R piston deposits
Seq IIF cam/lifter wear	RFWT & M11EGR XHDWL
Gelation Index	T10A/T11A used oil MRV

# Next Steps

- Following positive feedback from both ASTM HDEOCP and PCEOCP, ACC PAPTG will take this proposal to API LC.
  - For API CI-4/SX, API CI-4Plus/SX, and API CJ-4/SX (where x=J,L,M) the requirement to run and measure the Sequence IVA, Sequence VG, Sequence IIF piston deposits and wear, Sequence VIII, BRT, and Gelation Index is waived with passing API CI-4/CI-4 Plus/CJ-4 results.