Proposed Mack T10 Merit Rating System

presented to

Heavy Duty Engine Oil Classification Panel

ATTACHMENT 6, 1 OF 9

Participants
Subgroup of the Mack T10 Task Force

- Mack
- ExxonMobil
- Infineum
- Lubrizol
- Ethyl
- Oronite

ATTACHMENT 6, 2 OF 9

Merit Rating System Terms Applied to Each Criterion

- Anchors -- based on EMA one test limit
- Maximums -- limit of acceptable performance
- Minimums -- best achievable result
- Weights -- relative contribution to total merit

ATTACHMENT 6, 3 OF 9

Proposed Merit Rating System

- A result at or below the anchors for all five criteria would pass the test.

- If any of the five criteria results is above the maximum, the test fails.

- If results are below the maximums for all five criteria but one or more results is above the anchors, a mathematical system determines whether marginal numbers above the anchors are compensated by better than anchor results on other criteria.

ATTACHMENT 6, 4 OF 9

Parameters

Criterion	EOT Delta Pb	250-300 Hour Delta PB	Cylinder Liner Wear	Top Ring Weight Loss	Oil Consumption
Weight	225	225	250	150	150
Maximum	35	12	32.0	158	65.0
Anchor	30	10	30	140	57
Minimum	5	0	12	50	25

ATTACHMENT 6, 5 OF 9

Multiple Test Acceptance Procedure

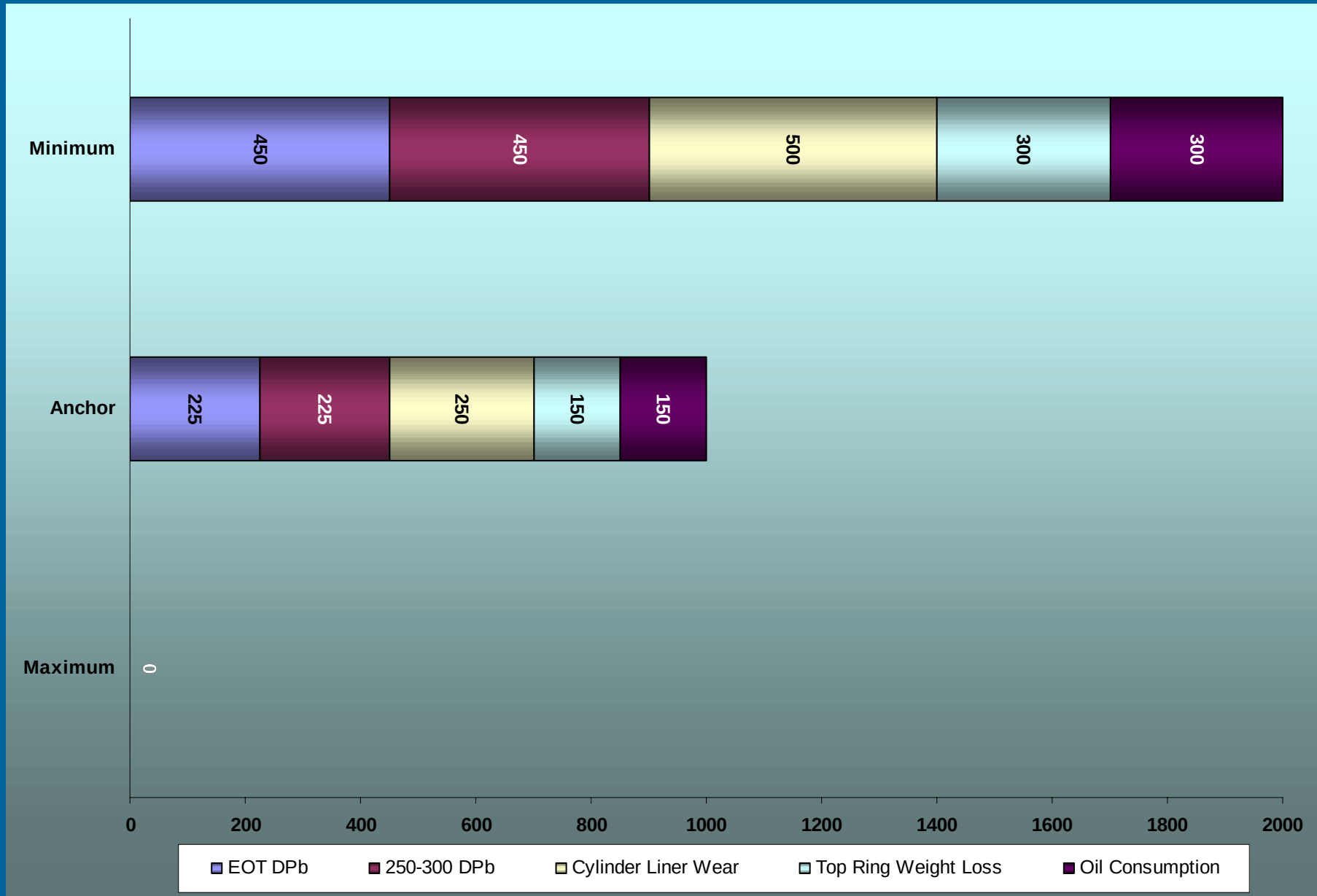
- Multiple test evaluation would consist of averaging the five individual criteria across multiple tests. The Mack T10 Merit Rating System would be applied to the averages for the criteria.

ATTACHMENT 6, 6 OF 9

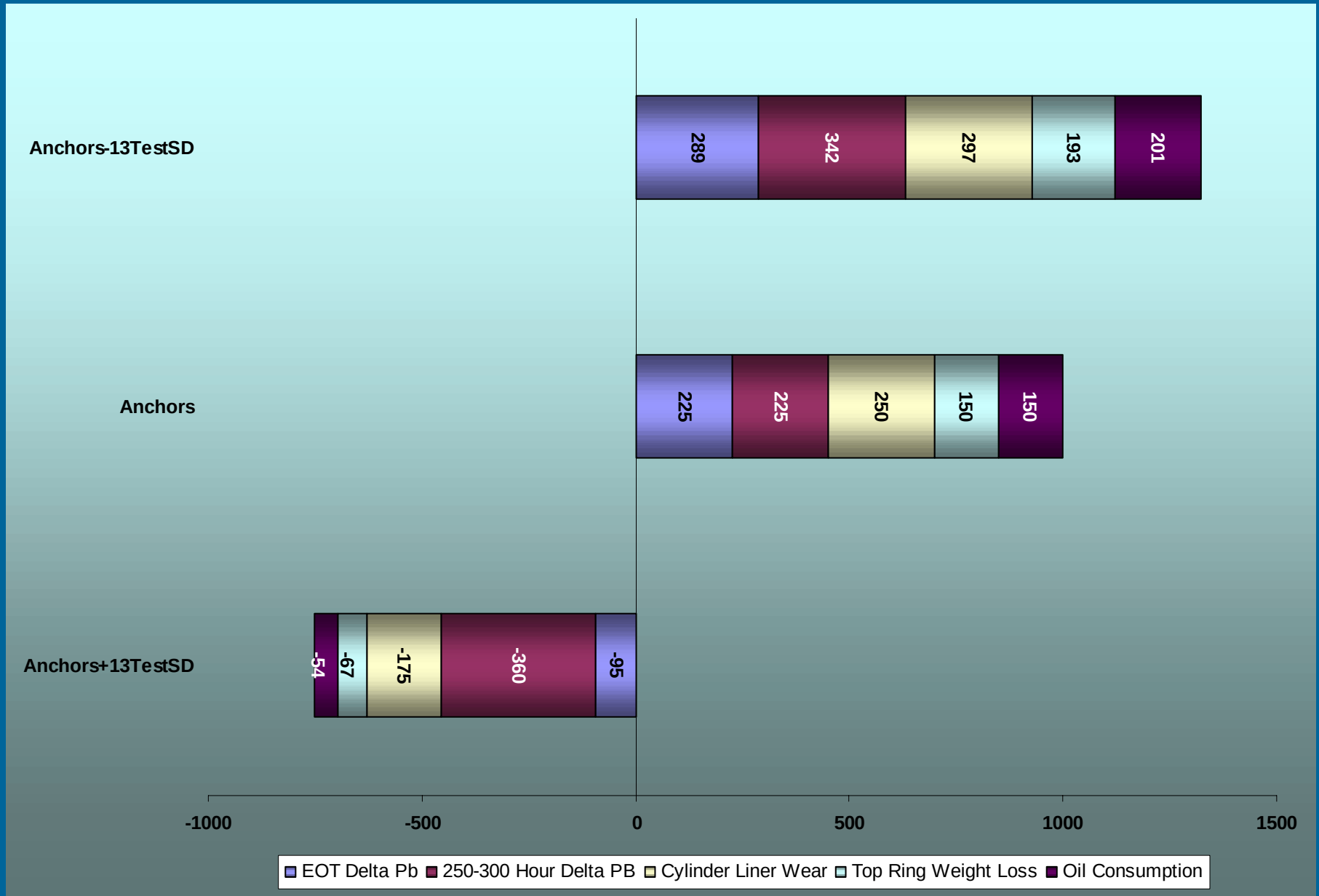
Examples Using Hypothetical Test Results

		EOT Delta Pb	250-300 Hour Delta PB	Cylinder Liner Wear	Top Ring Weight Loss	Oil Consumption	Calculated Merit	**Final Merit**
On the border		30	10	30.0	140	57.0	1000	**1000**
Borderline Failures		**31**	10	30.0	140	57.0	955	**955**
		30	**11**	30.0	140	57.0	888	**888**
		30	10	**31.0**	140	57.0	875	**875**
		30	10	30.0	**141**	57.0	992	**992**
		30	10	30.0	140	**57.1**	998	**998**
One parameter can make up for another		**31**	5	30.0	140	57.0	1068	**1068**
		30	**11**	20.0	140	57.0	1026	**1026**
		30	7	30.0	140	**60.0**	1011	**1011**
		30	10	20.0	**150**	57.0	1056	**1056**
		30	4	**31.0**	140	57.0	1010	**1010**
Over Maximum Failures		5	5	5.0	5	**80.0**	1306	**Fail**
		5	5	5.0	**200**	20.0	1238	**Fail**
		5	5	**35.0**	5	20.0	1013	**Fail**
		5	**15**	5.0	5	20.0	1213	**Fail**
		36	5	5.0	5	20.0	1393	**Fail**
Multiple Test Averaging	Failed First Test	25	10	**32.5**	140	57.0		**Fail**
	Second Test	25	10	28.0	140	57.0		
	Average -- Pass	25	10	30.3	140	57.0	1014	**1014**

ATTACHMENT 6, 7 OF 9



ATTACHMENT 6, 8 OF 9



ATTACHMENT 6, 9 OF 9