

Caterpillar ECF-2 Program

- Test Criteria
- Test Matrix
- Results
- Way forward



Caterpillar ECF-2 Test Criteria

500 hour – Steady State Test Cycle

Test Pass/Fail Criteria:

1. No Loss of Oil Consumption Control (<50%)
2. No stuck rings/Loss of ring side clearance
3. No Liner Scuffing or Bore Polish
4. No Loss of Blowby Control
5. Measured Piston Deposits
6. EOT Oil Quality to be monitored



Caterpillar ECF-2 Test Matrix

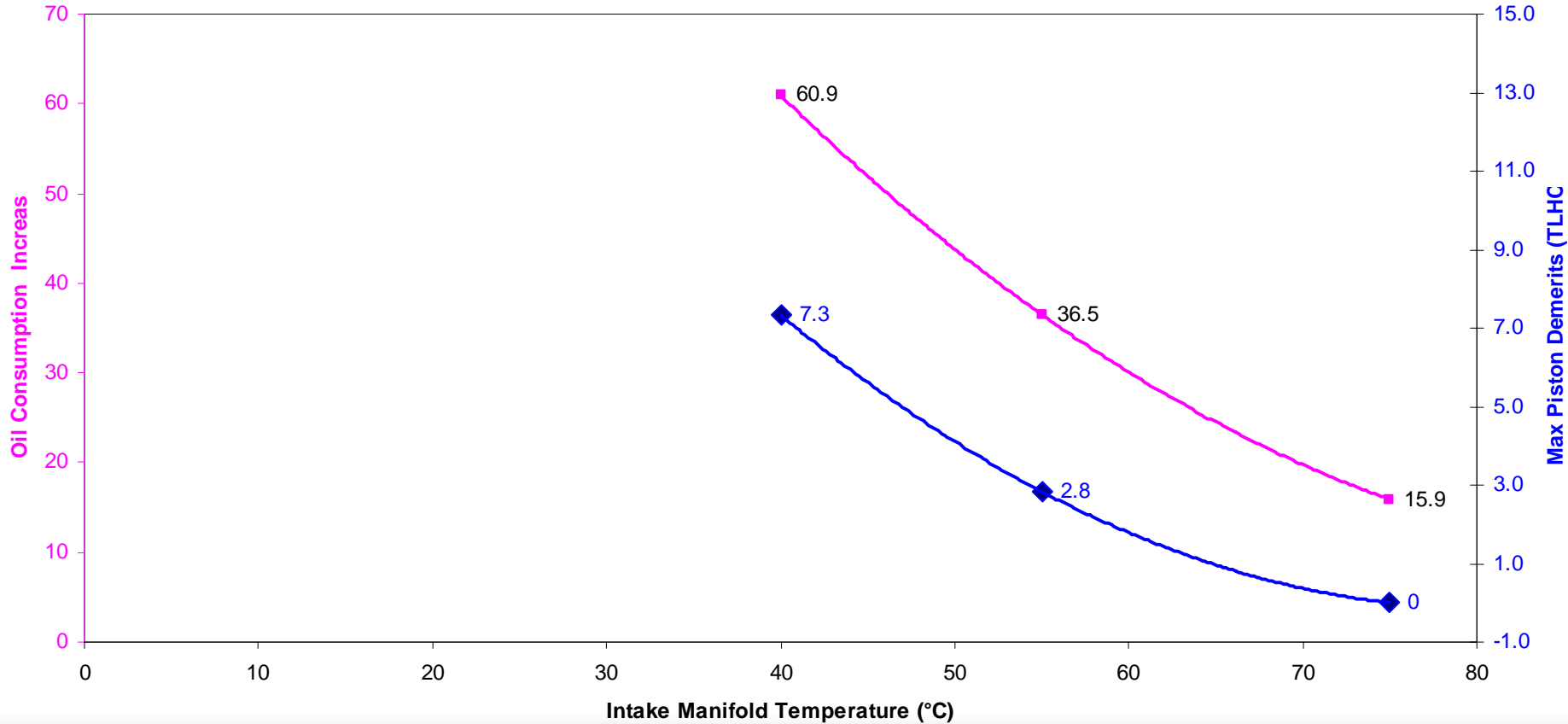
Test Conditions	IMP	IMT	Coolant	Oil	Fuel Rate
	kPa	°C	°C	°C	g/min
High	310	75	108	115	1260
Intermediate	290	55	98	107	1260
Low	280	40	88	100	1200



Caterpillar ECF-2 Test Results Summary

C13 Max TLHC

Temperature Effects on Deposits



Caterpillar ECF-2 Test Results

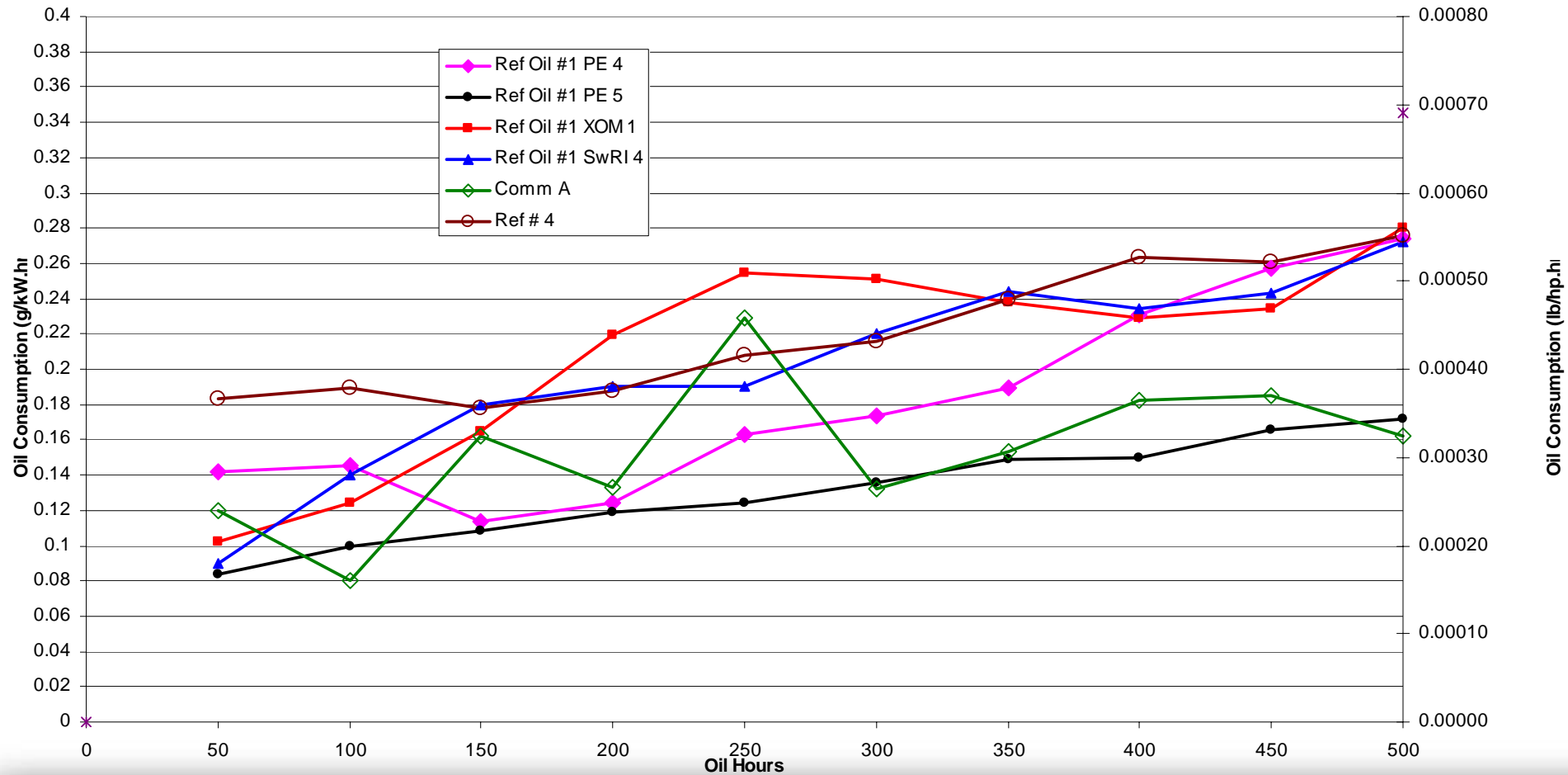
	#	Ref 1	Ref X
Intermediate Temps	1	36% Inc OC, Stuck Ring	41 % Inc OC, Sluggish Rings (Ref # 0)
Hot Temps	2	16 % Inc OC, Rings Free	49% Inc OC, Rings Free (Ref #2)
Low Temps	3	105 % Inc OC, Stuck Rings*	31% Inc OC, Stuck Rings* (Ref #2)
	4	62 % Inc OC, Stuck Ring	43% Inc OC, Rings Free Comm A – 1.5 Ash
	5	61 % Inc OC, Stuck Ring	46% Inc OC, Rings Free Ref # 4 – 1.0 Ash
	6	78 % Inc OC, Rings Free	

- Test started at hot temp for first 100-150 hrs, then switched to Low Temp
- Test 6 was a new engine on a new oil batch run at new test stand



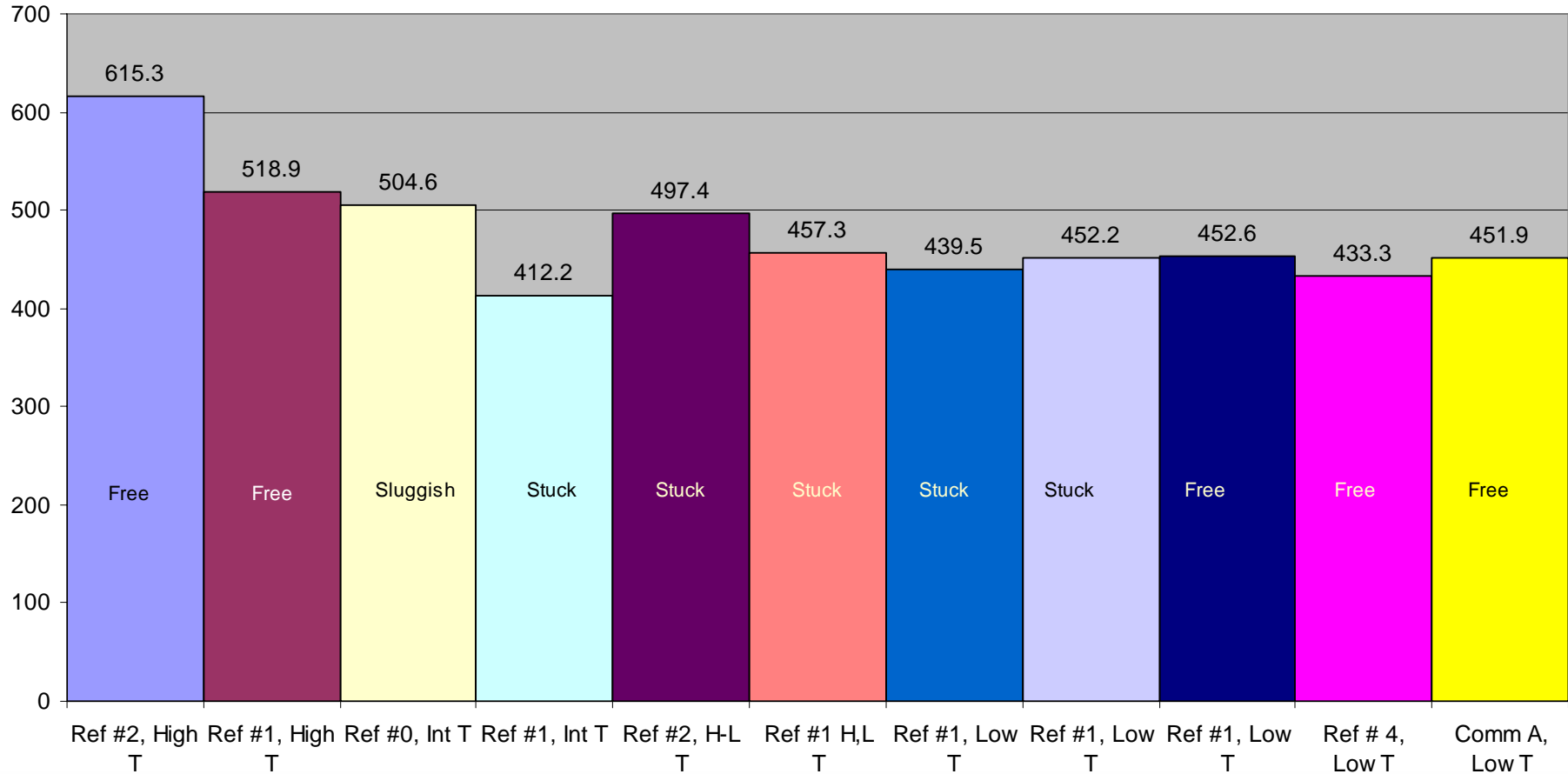
Caterpillar ECF-2 Test Results Summary

Caterpillar C13 Oil Consumption



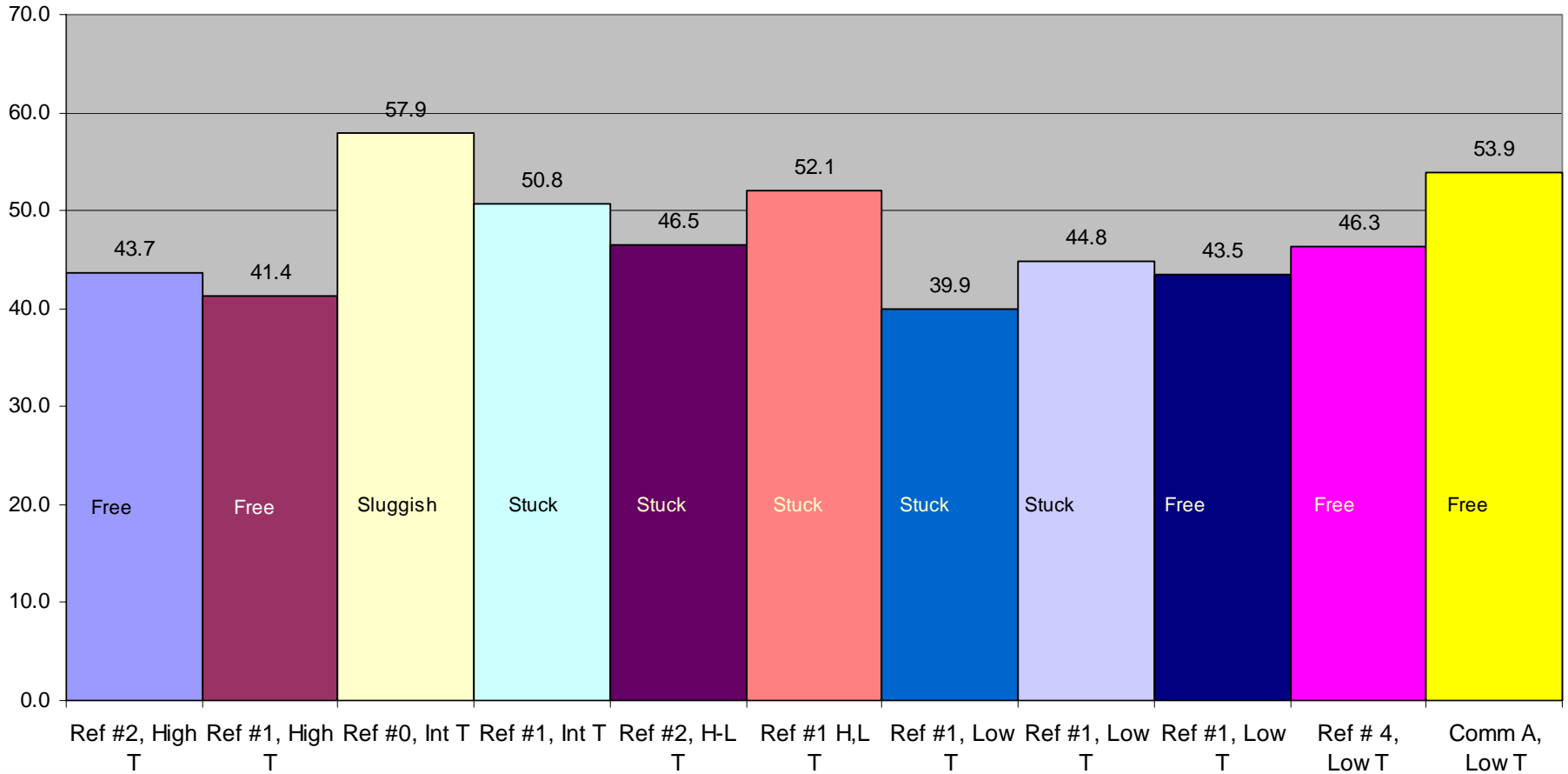
Caterpillar ECF-2 Test Results Summary

Dep WDP



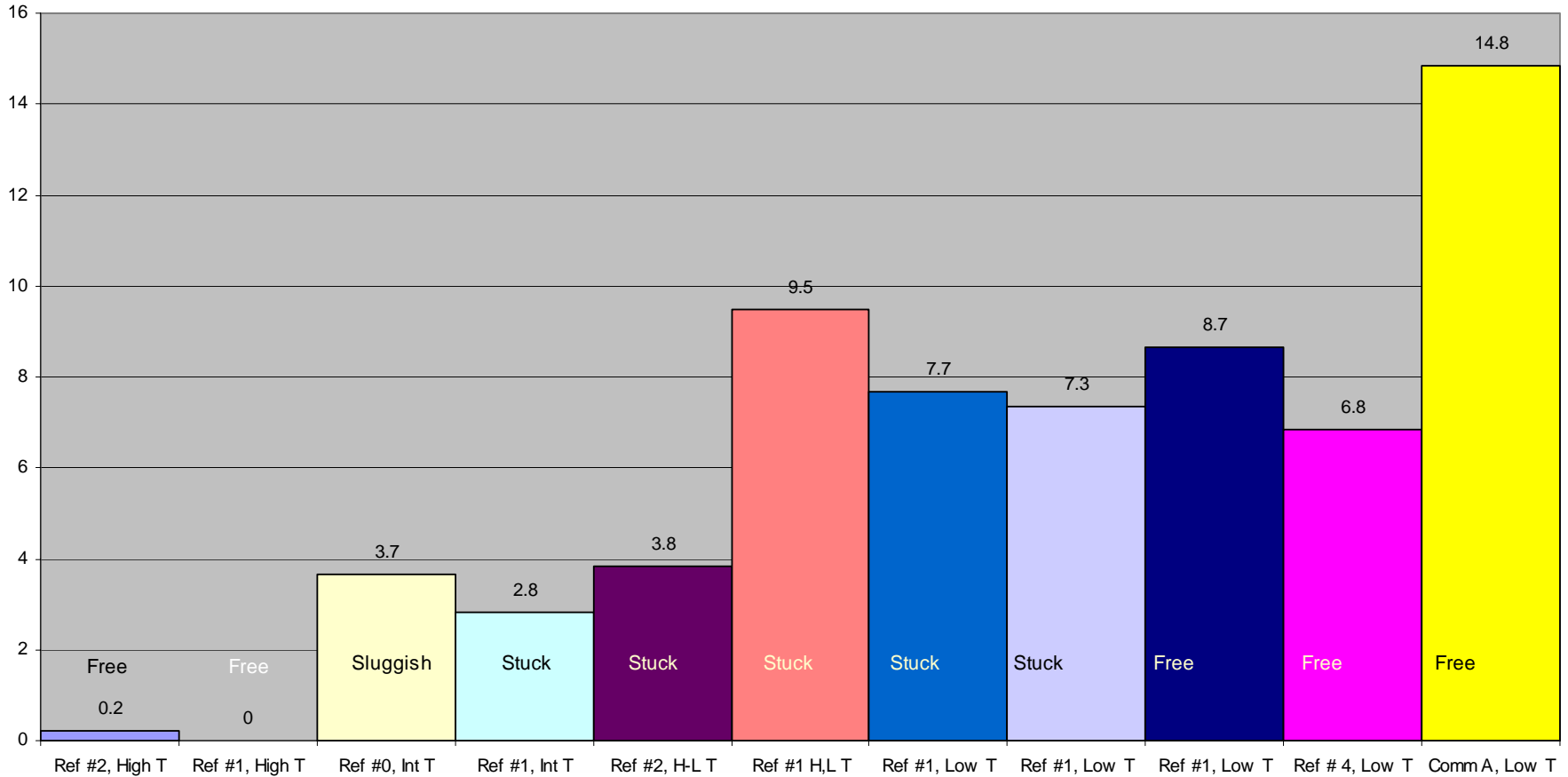
Caterpillar ECF-2 Test Results Summary

TGC



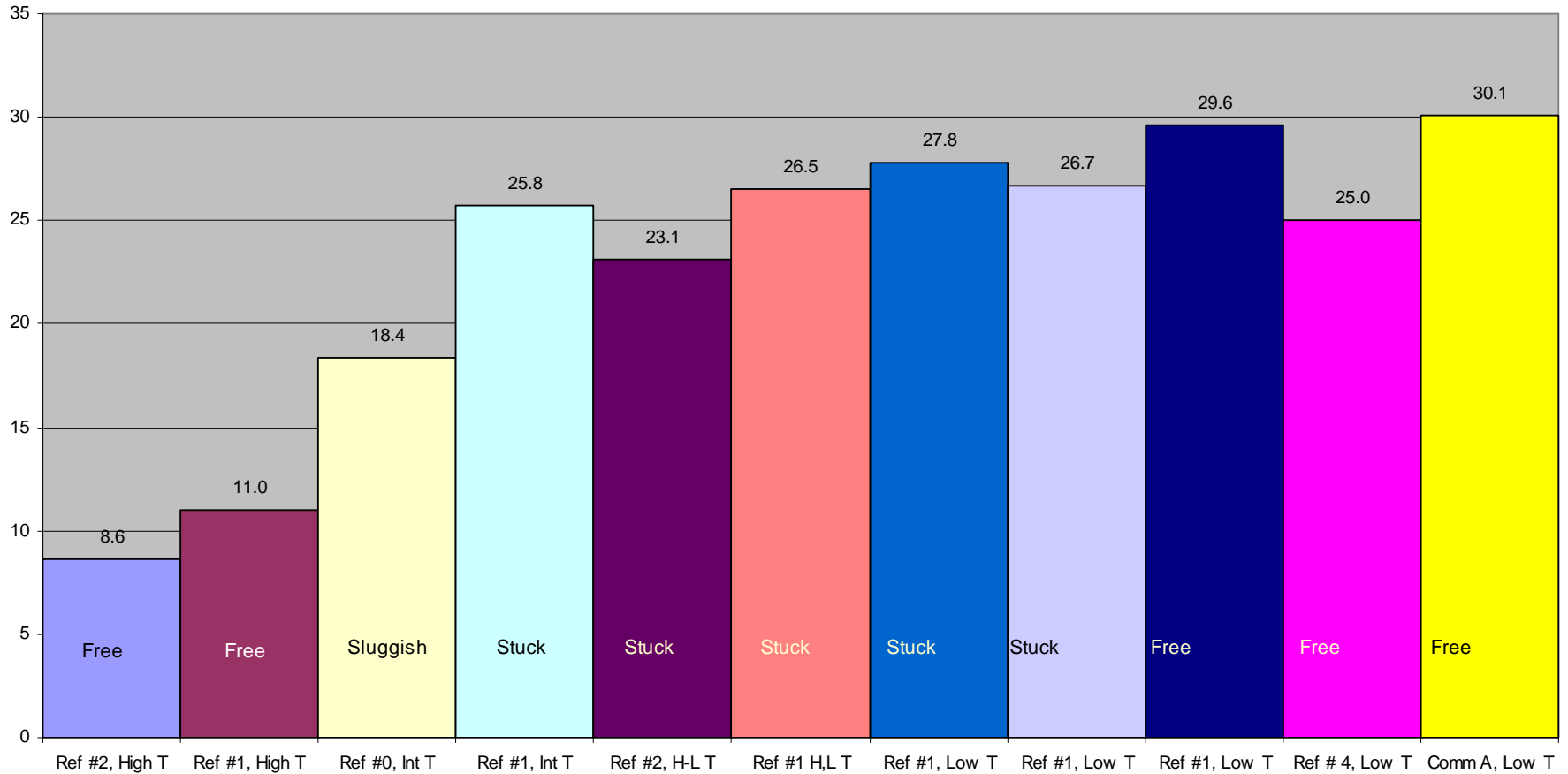
Caterpillar ECF-2 Test Results Summary

TLHC



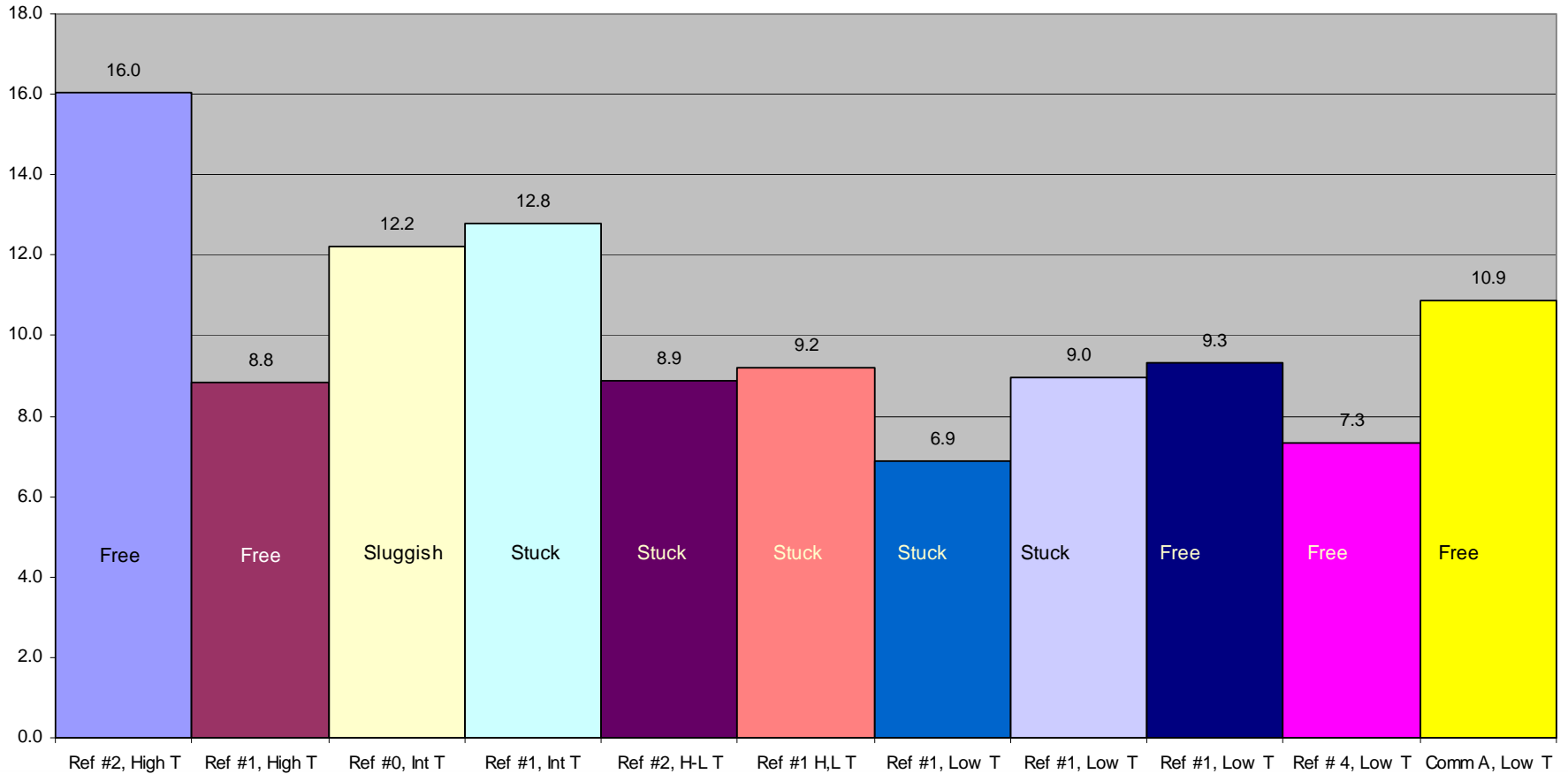
Caterpillar ECF-2 Test Results Summary

TLC



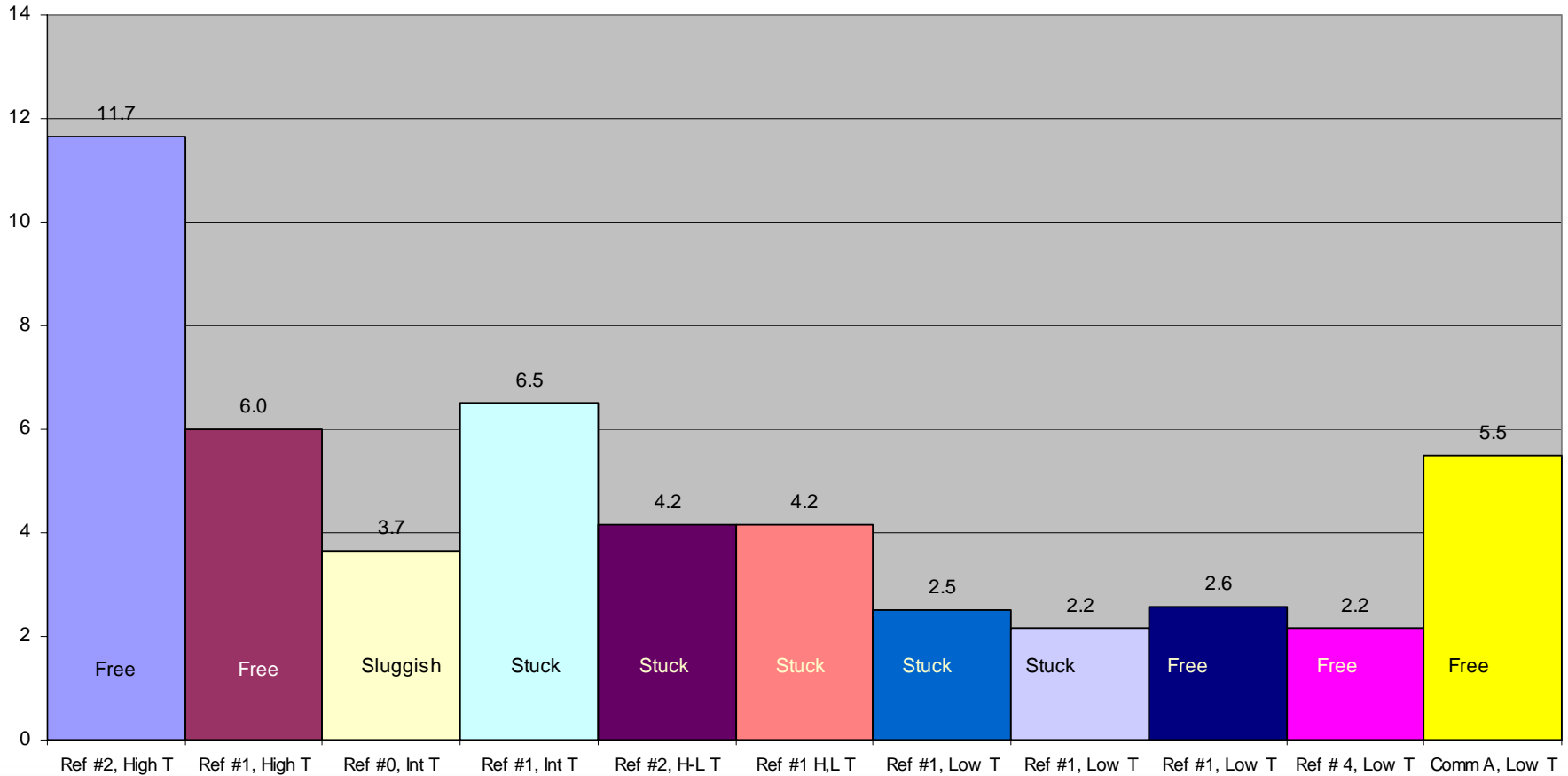
Caterpillar ECF-2 Test Results Summary

2GC



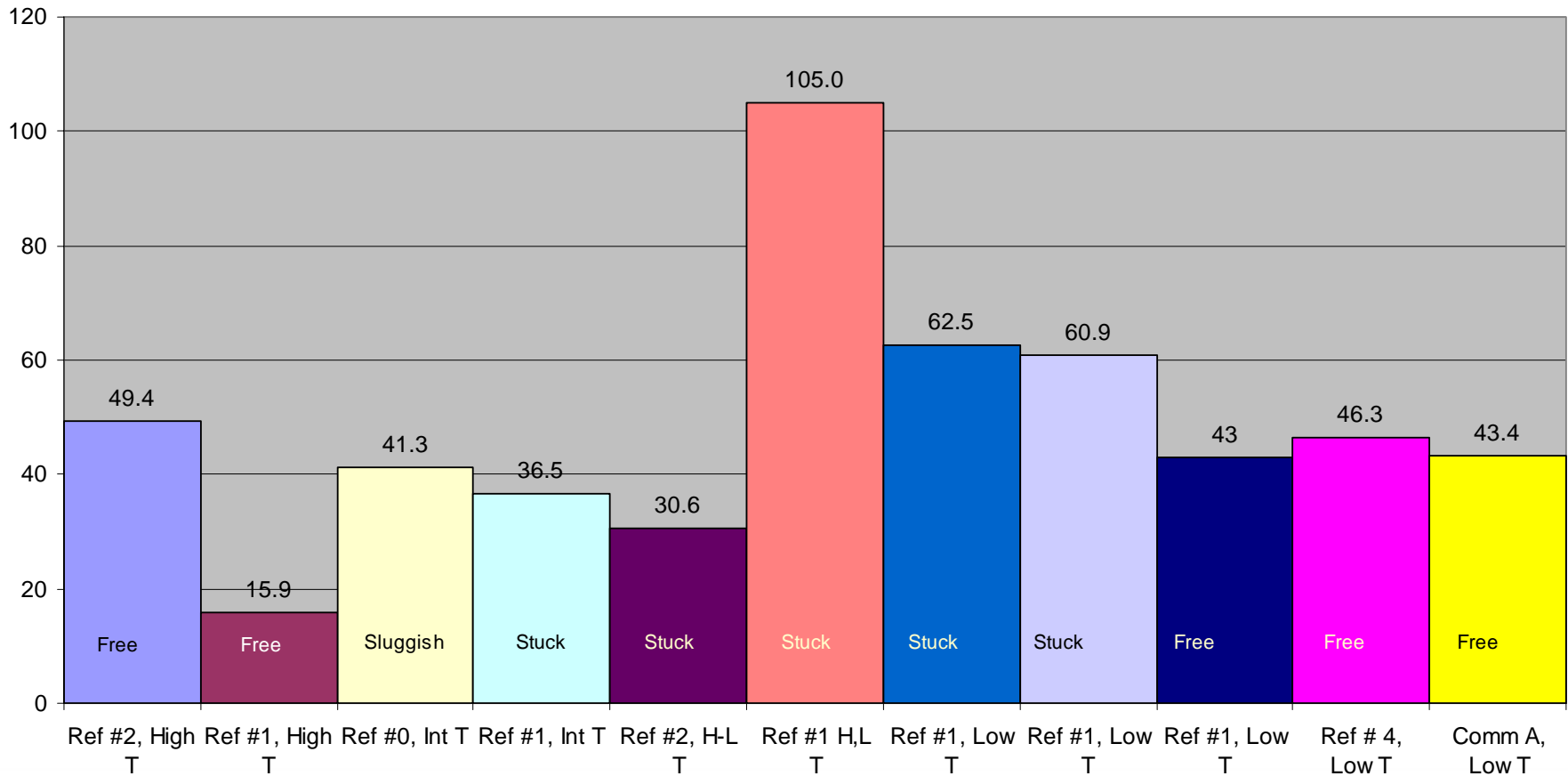
Caterpillar ECF-2 Test Results Summary

2GF



Caterpillar ECF-2 Test Results Summary

% Oil Cons Inc



Caterpillar ECF-2 Test Summary

1. Oil Consumption Control –variable
2. Discrimination - No Parameter distinctive
3. No Correlation – Oil consumption with deposits
– Oil consumption with 2nd ring stick
4. Propose Continue C13 test for PC-10
4. No Passing oil found – Ref # 4 best candidate
5. Failing Ref #1 oil is marginal



Caterpillar ECF-2 Test For 2007

Time to explore other deposit effects

- CCV
- ULSDF
- Aftertreatment
- Engine Durability of low Ash oils

