

PC-9 Matrix Design Task Force

Caterpillar 1R Test Matrix Proposal

**Presented to
ASTM D02.B.02
Heavy Duty Engine Oil Classification Panel
San Diego, CA
June 19, 2001**

Caterpillar 1R Matrix Testing

- **Caterpillar 1Q**

- ... Matrix Terminated at HDEOCP Meeting May 25, 2001

- **Caterpillar 1R**

- ... Will Replace 1Q

- ... Pre-1Q Tests completed on Oil PC-9M Indicate Possibility of Success for the 1R as a 1Q Replacement

- ... API BOI/VGRA Working Group has been asked to approve use of 1P BOI Guidelines for the 1R

- ... PC-9 MDTF Proposes a Formulations Matrix and 1R Test Plan (for Precision only If the 1P BOI Guidelines are acceptable for the 1R)

Caterpillar 1R Matrix Testing

Stand/Lab Test Capacity For PC-9 (1-R) Matrix Project

Calibration Requirements For Each Lab:

All Matrix Stands:

First Stand (In a Lab) = 3 Tests

Additional Stands (In a Lab) = 2 Tests

1R Matrix Stands = 2 Tests/Stand For the Caterpillar 1R Matrix

Note: Labs and Stands not in the 1Q/1R Matrix Project will revert to the original requirements above

	M-11/EGR	1R	T-10
Maximum Number of Stands	6	9	7
Number of Labs Participating	4	5	5

Caterpillar 1R Matrix Testing

PC-9 Test:	M11/EGR		1R		T-10		Total Cost	
	# Tests	\$	# Tests	\$	# Tests	\$	# Tests	\$
Number of Tests:	26	2.210	18	1.080	28	1.820	72	5.110
Project Cost (Funding Group)	10	0.850	9	0.540	9	0.585	28	1.975
			Test Prices Used		M-11/EGR	\$85,000		
			For Matrix Project		1R	\$60,000		
			Cost Estimates		T-10	\$65,000		

Caterpillar 1R Matrix Testing

Code	Technology	Base Oil	Featured Oil for the Test Listed
PC-9A	X	1	T-10
PC-9D	Y	1	---
PC-9E	Y	2	M11/EGR
PC-9P	Y	4	---
PC-9M	W	4	1R

Caterpillar 1R Matrix Testing

PC-9 Matrix Test Plan

Caterpillar 1R (Preferred)

Lab 1			Lab 2	Lab 3			Lab 4	Lab 5
Stand 1	Stand 2	Stand 8	Stand 3	Stand 4	Stand 5	Stand 9	Stand 6	Stand 7
PC-9A	PC-9M	PC-9A	PC-9M	PC-9A	PC-9M	PC-9A	PC-9M	PC-9A
PC-9M	PC-9A	PC-9M	PC-9A	PC-9M	PC-9A	PC-9M	PC-9A	PC-9M

Caterpillar 1R Matrix Testing

PC-9 Matrix Test Plan								
Caterpillar 1R (Alternate)								
Lab 1			Lab 2	Lab 3			Lab 4	Lab 5
Stand 1	Stand 2	Stand 8	Stand 3	Stand 4	Stand 5	Stand 9	Stand 6	Stand 7
PC-9A	PC-9M	PC-9A	PC-9M	PC-9A	PC-9M	PC-9A	PC-9M	PC-9A
PC-9M	Oil #3	PC-9M	PC-9A	PC-9M	Oil #3	PC-9M	PC-9A	PC-9M
Oil #3 = PC-9D or PC-9P								

Caterpillar 1R Matrix Testing

•Caterpillar 1R Proposal Summary

... Five Labs / Nine Stands / Eighteen Tests

... Pre-1Q Tests completed on Oil PC-9M Indicate Possibility of Success for the 1R

... API BOI/VGRA Working Group has been asked to approve use of 1P BOI Guidelines for the 1R

... PC-9 MDTF Proposal for Formulations to be used and Testing Plan for Precision Only have been accepted (Contingent upon 1P BOI Guidelines being acceptable for 1R)

... All Five Participating Labs have 1R tests Running

Caterpillar 1R Matrix Testing

- **PC-9 MDTF Primary Recommendation**
 - Five Labs – Nine Test Stands – 18 Tests (Two Tests/Stand)
 - Nine Tests/Oil PC-9A and Nine Test/Oil PC-9M
 - Each Stand will run Oils PC-9A and PC-9M
 - Propose Runs to be Alternated between PC-9A and PC-9M across the Nine Stands as shown on Page 7 the Preferred 1R Testing Plan
 - Test Run Sequence to be determined by the PC-9 Matrix Manager (John Zalar)

Caterpillar 1R Matrix Testing

• PC-9 MDTF Alternate Proposal

(This Proposal Is Offered in Response to an EMA Request)

- Five Labs – Nine Test Stands – 18 Tests (Two Tests/Stand)
- Nine Tests/PC-9M; Seven Tests/PC-9A; and Two Tests PC-9D
- Each Stand will see PC-9A or PC-9M (7 of 9 stands see both)
- Oil PC-9D to be run as the Second Test in One of the Two Original 1Q Stands at each Independent Lab as a Substitute for Oil PC-9A in that Stand *(This requirement is to allow for calibration of all Nine tests stands at the conclusion of the 1R Matrix Testing)*