



Emulsion Issue Update

Heavy-Duty Engine Oil Classification Panel

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Anaheim, California

Hind Abi-Akar
Caterpillar Inc.

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Field Test – Purpose



- Evaluate “pass oil” emulsion performance in real-life application
- Evaluate impact of water separation from the emulsion on the engine oil
- Evaluate the “pass Oil” engine oil characteristics and performance

“Pass Oil”: passing reference oil for the O-WEST bench test

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Field Test - Setup



- 4 On-Highway trucks:
 - Two trucks were run with API CJ-4 engine oil
 - Two trucks were run with O-WEST “Pass” oil

- Photo-documentation of parts before and after the test

- Oil samples were sent to Caterpillar every 100hrs for analysis

- Engine oil was changed between 15,000–25,000 miles

- Test was run from April–June, 2009

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API CJ-4 Test Truck



Unit A192 – API CJ-4 Oil



Pre-Test

Pre-test photos showed significant emulsion formation
- Emulsion found on valve cover

Unit A192 – API CJ-4 Oil



Post-Test (19,006 miles)

Post-test photos showed emulsion still present
- Emulsion remaining on valve cover

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"Pass" Oil Test Truck



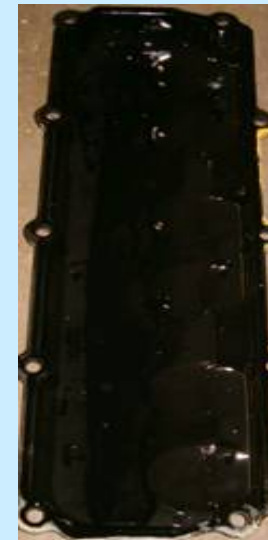
Unit A169 – API CJ-4 Oil



Pre-Test

Pre-test photos showed significant emulsion formation
- Emulsion found on valve cover

Unit A169 – O-WEST "Pass" Oil



Post-Test (17,414 miles)

Post-test photos showed no emulsion present
- No emulsion found on valve cover

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Second engine running "Pass" oil grounded for test period

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Results



Unit	Oil Type	Water
A169	"Pass" Oil	0.17%
A192	API CJ-4	0.13%
A179	API CJ-4	0.11%

- No additional “water build-up” in the sump was seen with the use of “Pass” engine oil
- No impact on other oil parameters: viscosity, TBN, oxidation, wear metals, etc

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Results



- Improvement was demonstrated in one engine that used a “Pass” oil – limited results

- An additional test site is being identified to generate more data
 - Actively searching for site with appropriate number of trucks/machines
 - Ambient temperature is becoming conducive to generate emulsion giving more opportunities for testing

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Moving Forward



- Focus is on setting an emulsion stability criteria
 - Continue oil testing on Cat O–WEST bench
 - Repeatability, reproducibility work
 - Make test bench available at 3rd party lab
 - Developing the O–WEST into an ASTM Test

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