



Evaluation of Storage Effects on Commercial, Biodegradable, Synthetic or Biosourced Hydraulic Fluid



SUPERIOR TECHNOLOGY

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April 21, 2006



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Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE 21 APR 2006		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Evaluation of Storage Effects on Commerical, Biodegradable, Synthetic or Biosourced Hydraulic Fluid				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Brosnan, Bridget				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USA TACOM 6501 E 11 MILE ROAD WARREN, MI 48397-5000				8. PERFORMING ORGANIZATION REPORT NUMBER 15742 RC	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S) TACOM TARDEC	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) 15742	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 10	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Project Overview



- In 2001-2002, testing was performed to determine if commercially available, biodegradable, bio-based hydraulic fluid could meet or exceed the performance requirements in military combat/tactical hydraulic fluid specifications:

- MIL-PRF 46170
- MIL-PRF 6083





MIL-PRF-46170

- Synthetic Hydrocarbon-based fluid (PAO)
- Rust Inhibited
- Fire resistant
- High flash point
- Class II biodegradable
- Poor low temperature properties



Project Overview

- In 2005, FLTT evaluated the same bio-based, biodegradable hydraulic fluid to determine the effects of long-term storage
 - 23 samples
 - 3 years in storage



Tests Conducted



- Flash Point ASTM D 92
- Fire Point ASTM D 92
- Galvanic Corrosion ASTM D 6547
- Kinematic Viscosity ASTM D 445
- Low Temperature Stability FTM 3458.1
- Lubricity (4-Ball) ASTM D 4172
- Pour Point ASTM D 97
- Total Acid Number ASTM D 664
- Water Content ASTM D 6304



General Findings

No Significant Property Changes

- Fire Point
- Galvanic Corrosion
- Kinematic Viscosity
- Low Temperature Stability
- Lubricity (4-Ball)

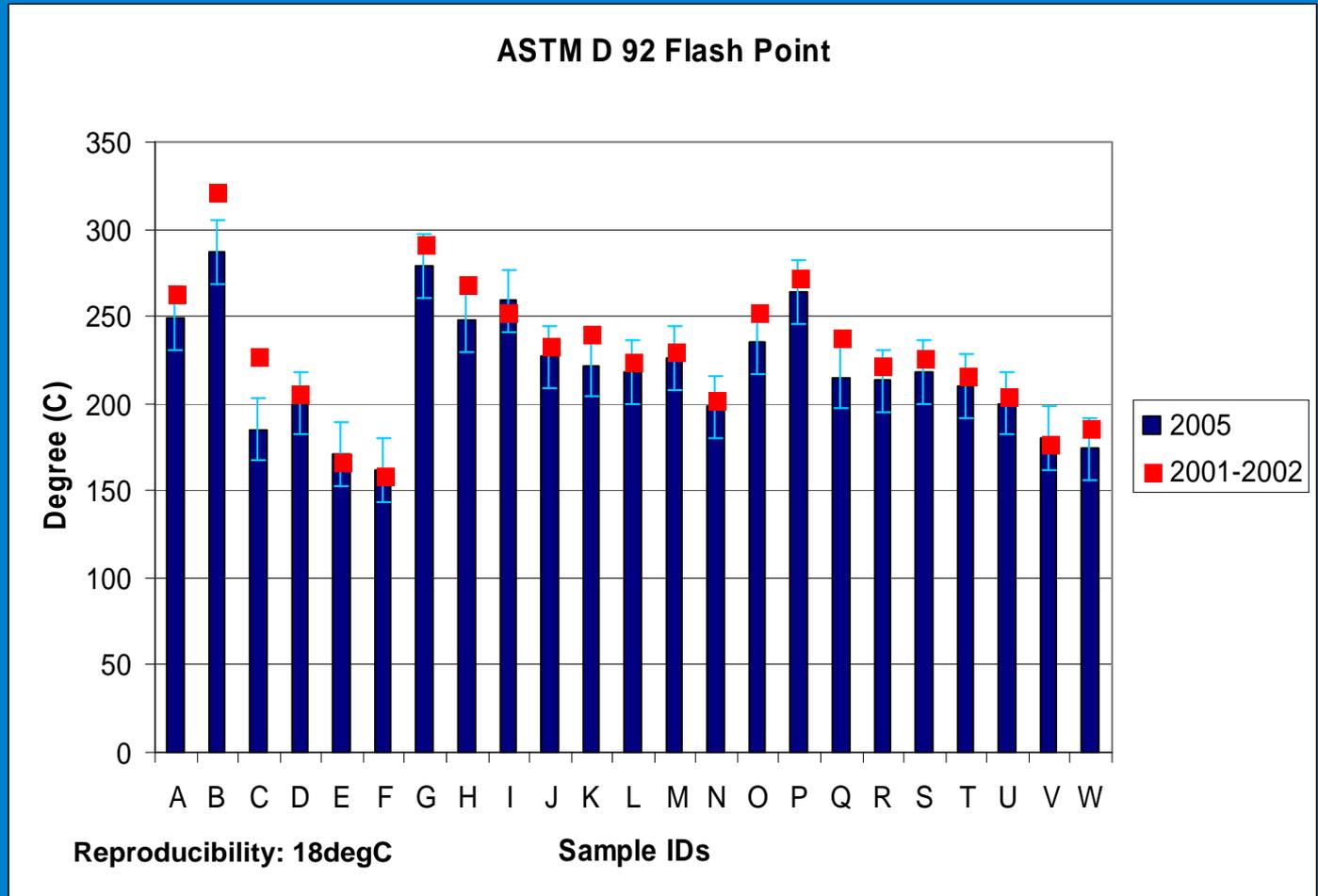
Observed Property Changes

- Flash Point
- TAN
- Water Content



ASTM D 92 Flash Point

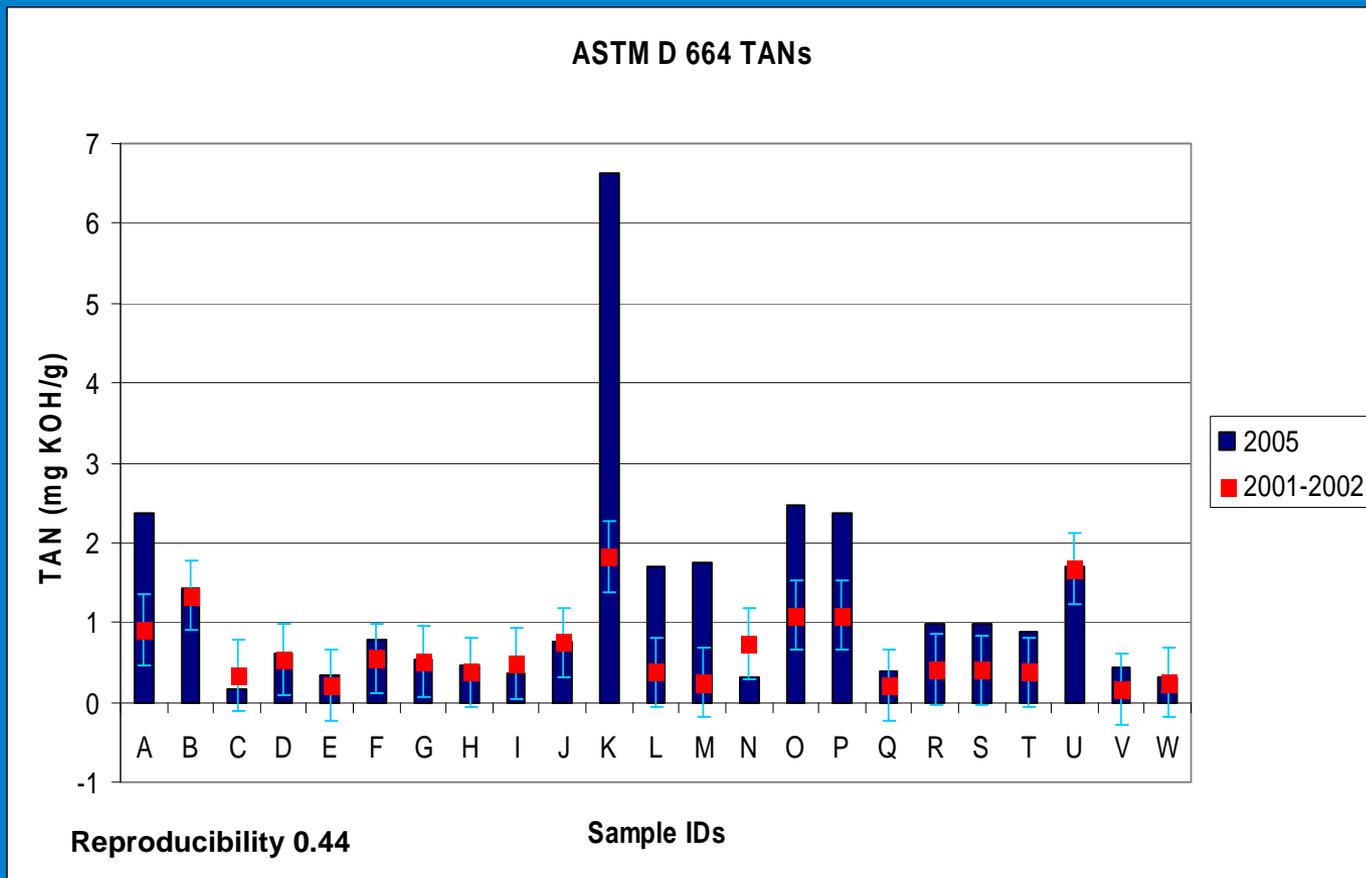
4%-6% overall decrease in flash points



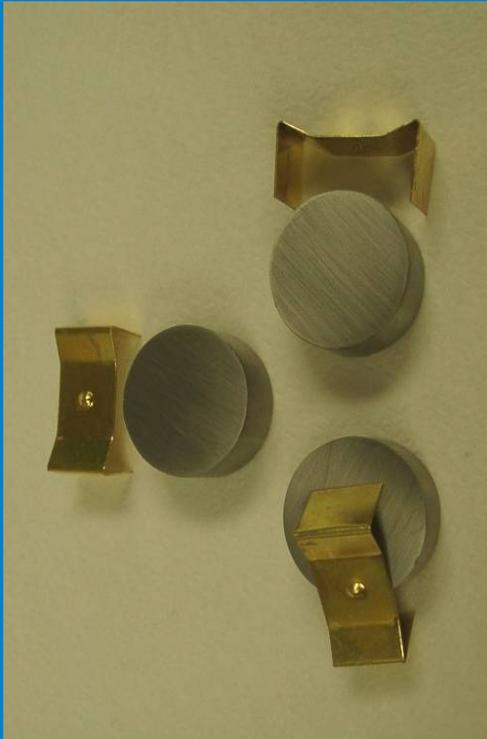


ASTM D 664 Total Acid Number (TAN)

39%-40%
increase
in TAN

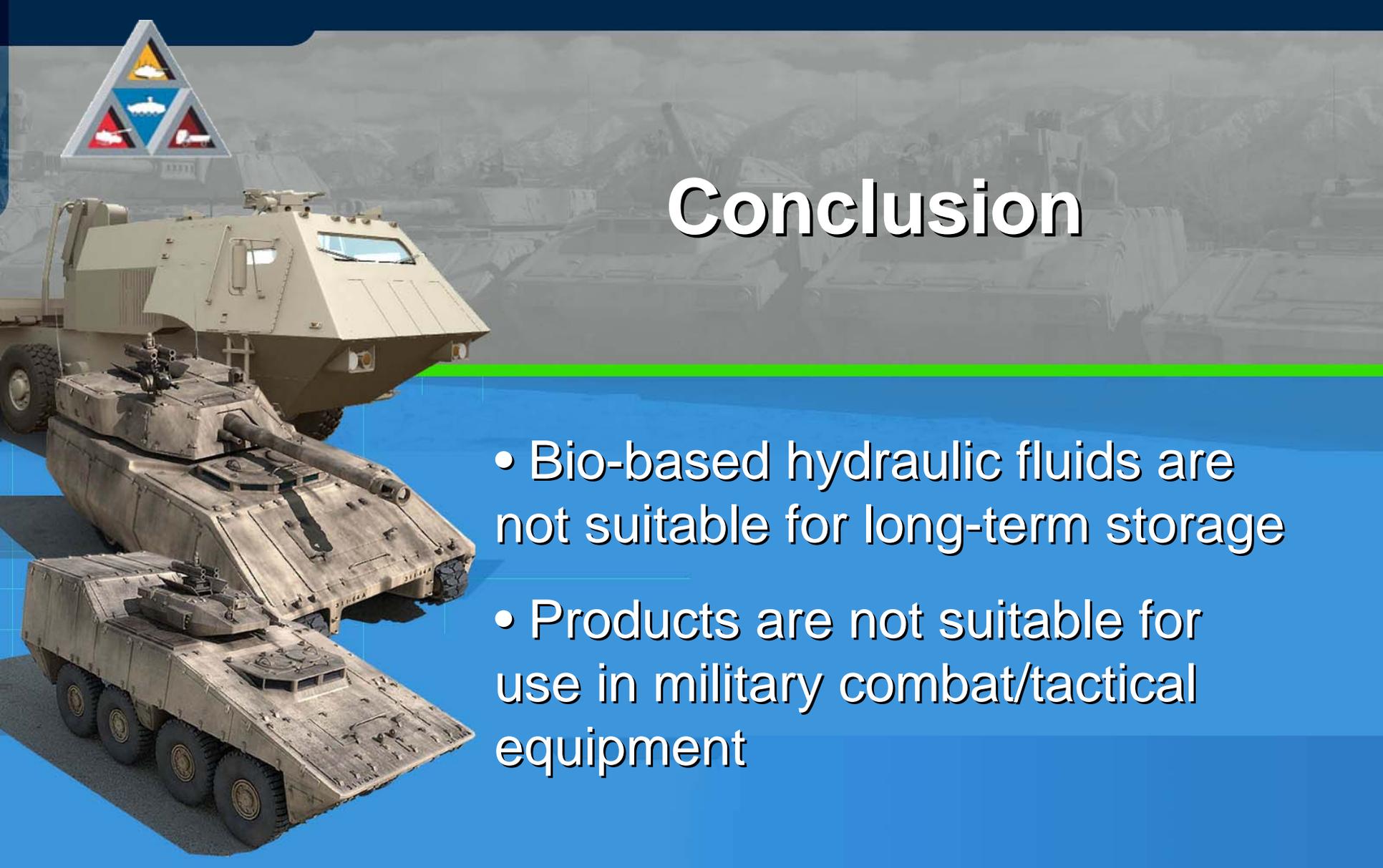


ASTM D 6547 Galvanic Corrosion



- Two dissimilar metals
 - Alloy Steel Disks
 - Brass Clips
- Electrolyte
 - Bio-based Hydraulic Fluid

Hydraulic Fluid Handbook, Totten, Ch. 12-Failure Analysis



Conclusion

- Bio-based hydraulic fluids are not suitable for long-term storage
- Products are not suitable for use in military combat/tactical equipment