
NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



February 11, 2011

MATERIALS LABORATORY FACTUAL REPORT

Report No. 11-003

A. ACCIDENT

Place : Grey Summit, Missouri
Date : August 5, 2010
Vehicle : 2001 and 2003 Bluebird school buses
NTSB No. : DCA10MH018
Investigator : Jennifer Morrison
OHS-20

B. COMPONENTS EXAMINED

Two brake fluid samples from the 2003 school bus and one brake fluid sample from the 2001 school bus

C. DETAILS OF THE EXAMINATION

Three samples of brake fluid were submitted to the Materials Laboratory for contaminant testing. Two samples came from the 2003 bus, which was found to have leaks in the brake lines. The first sample was taken from a hole in the the brake lines and the other sample was from the master cylinder. One sample came from the 2001 bus which was found to have an intact brake system.

The samples were sent to an independent, third-party laboratory for analysis. The samples were tested for oil contamination using a method that had been developed internally by the third party laboratory. The method is attached at the end of this report. The sample from the brake lines was found to have 2% oil contamination present. The master cylinder sample was found to have 1% oil contamination present. The third party laboratory stated that "possible oil contamination" was present. The sample take from the 2001 bus was found to have less than 2.5% contamination. The laboratory stated that this result was "acceptable." Certificates of analysis for all three samples are attached to end of this report.

Nancy B. McAtee
Chemist

CONTAMINATION OF BRAKE FLUID WITH OIL BY SEPARATION
FOR
HERGUTH LABORATORIES, INC.

HERGUTH LABORATORIES PROCEDURE HL-0015

Revision 1.1

Effective Date: _____

Approved: _____ Date: _____
Quality Assurance Manager

Approved: _____ Date: _____
General Manager

Approved: _____ Date: _____
Laboratory Manager

CONTAMINATION OF BRAKE FLUID WITH OIL BY SEPARATION

1.0 SCOPE AND APPLICATION:

This procedure measures the amount of water insoluble contamination of brake fluid. While water and oil are not miscible with each other, water and brake fluids are miscible. The water used in the test mixes with the brake fluid and any oil or solid contamination will separate out and can thereby be measured.

3.0 TEST METHOD SUMMARY:

A known amount of brake fluid sample is mixed with a sufficient amount of DI water to obtain 100 mLs and shaken for 1 minute. The mixed sample is allowed to separate for at least 8 hours (overnight). The amount of contamination is measured and quantified.

4.0 MATERIAL CONTROL PARTS LISTING:

<u>Description</u>	<u>HL Part #</u>
100 ml Stoppered Graduated Cylinder	62-004
DI Water	41-079

5.0 CLIENT MODIFICATIONS AUTHORIZATION:

No modification shall be permitted unless specifically requested by the client and/or documented below.

6.0 SAFETY PRECAUTIONS:

WARNING: All chemicals are to be considered hazardous. Refer to the applicable MSDS regarding proper handling and safety equipment. Also refer to the Herguth Health and Safety Manual for additional safety precautions and general laboratory safety practices.

7.0 REPORTING LIMITS:

The reporting limit for this test is 1.0%.

8.0 SAMPLE ANALYSIS:

- 8.1 Shake the sample lightly to disperse any solid particulate matter but not add an enormous amount of entrained air to the sample.
- 8.2 Pour up to 50 mLs of sample into a 100 ml graduated cylinder with a stopper. The amount of sample will vary depending on the amount sent by the client. Record the amount used.
- 8.3 Add DI water to bring the total volume to 100 mLs in the cylinder.
- 8.4 Place the stopper on the cylinder and shake well for 1 minute.
- 8.5 Vent the sample and replace the cap.
- 8.6 Set the cylinder aside and let stand undisturbed for at least 8 hours (overnight). This will give any contaminants plenty of time to separate from the water/brake fluid mixture.
- 8.7 Record the mLs of contamination found to the nearest 0.5 ml reading. Typically oil contamination will be floating on the water/brake fluid mixture.

9.0 RESULTS REPORTING:

Report the % Contamination found by using the following formula:

$$\% \text{ Contamination} = (C/S) * 100$$

where:

C = Contamination found in Section 8.7 (mLs)

S = Volume of sample used in Section 8.2 (mLs)

10.0 WORKSHEET:

The worksheet for this procedure can be found in:
H\COMMON\PROCS\FORMS\HL0015.XLS.

Certificate of Analysis
Lab Number V7003248

Nancy McAtee
 National Transportation Safety Board
 490 L'Enfant Plaza, SW
 Washington DC 20594

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Client Code : NATINM Sample Date : 10/26/10 P.O. Number : HWY10MH018
 Herguth ID : LABV7003248

Description : #1, Brake Fluid from Accident Bus, 2003 Blue Bird Bus
 Bag States: From hole in line - leak/drip
 Unit Type : Brake Fluid (GN_BF001)

Test Performed	Proc-Rev	Result
Brake Fluid Contamination with Oil HL-0015	0015-1.1	2 %

Possible oil contamination present.

Respectfully Submitted,
 Herguth Laboratories, Inc.



Bobby R Licu, Senior Evaluator

cc: Nancy McAtee

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Nancy McAtee
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 490 L'Enfant Plaza, SW
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Client Code : NATINM Sample Date : 10/26/10 P.O. Number : HWY10MH018
 Herguth ID : LABV7003249

Description : #2, Brake Fluid from Accident Bus, 2003 Blue Bird Bus

Bag States: from master cylinder

Unit Type : Brake Fluid (GN_BF001)

Test Performed	Proc-Rev	Result
Brake Fluid Contamination with Oil HL-0015	0015-1.1	1 %

Possible oil contamination present.

Respectfully Submitted,
 Herguth Laboratories, Inc.



Bobby R Licu, Senior Evaluator

cc: Nancy McAtee

Certificate of Analysis
Lab Number V7003250

Nancy McAtee
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 490 L'Enfant Plaza, SW
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Client Code : NATINM Sample Date : 10/26/10 P.O. Number : HWY10MH018
 Herguth ID : LABV7003250
 Description : #3, Brake Fluid from Exemplar Bus, 2003 Blue Bird Bus
 Bag States: from reservoir of second bus
 Unit Type : Brake Fluid (GN_BF001)

Test Performed	Proc-Rev	Result
Brake Fluid Contamination with Oil HL-0015	0015-1.1	<2.5 %

Result appears acceptable.

Respectfully Submitted,
 Herguth Laboratories, Inc.



Bobby R Licu, Senior Evaluator

cc: Nancy McAtee