

PROJECT ADMINISTRATION DATA SHEET

ORIGINAL  REVISION NO. \_\_\_\_\_

Project No. A-3176

DATE 3/31/82

Project Director: Dr. Thomas L. Starr

School/DCR EMSL

Sponsor: Standard Container Company

Order Agreement: P. O. No. 32446

Award Period: From 2/19/82 To Open (Performance) \_\_\_\_\_ (Reports)

Sponsor Amount: \$1,899 Contracted through:

Cost Sharing: \_\_\_\_\_ GTRI/~~EMSL~~

Title: Aging of Brake Fluid in Polyethylene Containers

**ADMINISTRATIVE DATA**

OCA Contact Linda H. Bowman x-4820

Sponsor Technical Contact:

Floyd Maynard  
Standard Container Company  
P. O. Box 336  
Homerville, GA 31634

2) Sponsor Admin/Contractual Matters:

Floyd Maynard  
Standard Container Company  
P. O. Box 336  
Homerville, GA 31634

Phone: (912) 487-5341

Phone: (912)487-5341

Defense Priority Rating: None

Security Classification: None

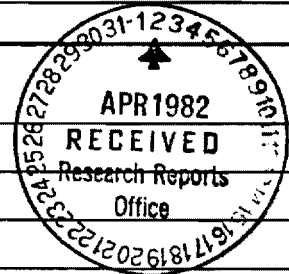
**RESTRICTIONS**

Are Attached N/A Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of \$500 or 125% of approved proposal budget category.

Equipment: Title vests with N/A

**COMMENTS:**



**COPIES TO:**

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ORM OCA 4-781

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Project File  
Other \_\_\_\_\_

SPONSORED PROJECT TERMINATION SHEET

2  
SR-321

Date 7/13/82

Project Title: Aging of Brake Fluid in Polyethylene Containers

Project No: A-3176

Project Director: Dr. Tom Starr

Sponsor: Standard Container Co.

Effective Termination Date: open

Clearance of Accounting Charges: \_\_\_\_\_

Grant/Contract Closeout Actions Remaining:

- Final Invoice and ~~Closing Documents~~
- Final Fiscal Report
- Final Report of Inventions
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other \_\_\_\_\_

Assigned to: EMSL (School/Laboratory)

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EES Public Relations (2)  
 Computer Input  
 Project File  
 Other \_\_\_\_\_

STABILITY OF BRAKE FLUID IN POLYETHYLENE BOTTLES

Testing performed by: Engineering Experiment Station, Georgia  
Institute of Technology, Atlanta, Georgia

For: Standard Container Company,  
Homerville, Georgia

Contract No: A-3176

Summary:

Samples of brake fluid in polyethylene and metal containers were aged at 80% relative humidity and temperature cycled between 77<sup>0</sup> and 120<sup>0</sup>F at 24 hour intervals. Testing after 14 and 30 days showed no difference in water content and only very slight difference in boiling point for samples in polyethylene as compared to samples in metal. Water content averaged 0.44% for all samples and did not change between the two sample times. Equilibrium boiling point at the end of the test varied from 239<sup>0</sup>F for the samples in metal to 235<sup>0</sup> and 236<sup>0</sup> for samples in polyethylene. The samples in metal showed no change over the test period while the samples in polyethylene showed a slight decrease from 14 to 30 days.

Samples:

Eighteen bottles containing brake fluid were delivered for testing: eight 12oz. metal, eight 12oz. red polyethylene (.05" wall thickness), and two 16oz. white polyethylene (.04" wall thickness). The containers were not opened prior to testing.

Procedure:

The bottles were individually labeled and placed in two sealed containers. Open beakers of saturated ammonium chloride were included to maintain the atmosphere inside the containers at 80% R.H. (ASTM E 104).

The two sealed containers were exchanged between the open laboratory and an oven on a daily basis (except for weekends) to achieve the desired temperature cycling. Actual temperatures varied from 76<sup>o</sup> to 80<sup>o</sup> ambient and from 118<sup>o</sup> to 122<sup>o</sup> in the oven during the test. Nine bottles were removed from the containers and analyzed after 14 days. The remainder were analyzed after 30 days.

Water in the fluid was determined by the Karl-Fischer method (ASTM D 1123). Equilibrium boiling point was determined under steady-state reflux conditions (ASTM D 1120). Details of the test procedures can be found in the cited ASTM procedures.

Results:

Analytical results are summarized in the table below. No significant change in water content was found. A slight decrease in boiling point is noted for samples stored in polyethylene.

The bottle material was confirmed to be polyethylene by infrared spectroscopy. The white bottle material also contained titanium dioxide pigment. Very limited measurement of wall thickness indicated some variation but, overall, was .05" for the red bottles and .04" for the white.

Some corrosion of the metal cans was noted after testing. This is most likely due to the periodic condensation experienced during the cool-down phase of each cycle. Slight seepage of fluid from a few of the plastic bottles was observed. The bottles appeared to gain weight slightly during the test, however, the magnitude of this change (generally less than 1 gram versus a total weight of 400-500g.) is close to expected weighing errors.

Table 1. Brake Fluid Analysis

<u>Bottle material</u>	<u>14 days</u>		<u>30 days</u>	
	<u>%H<sub>2</sub>O</u>	<u>B.P.</u>	<u>%H<sub>2</sub>O</u>	<u>B.P.</u>
metal	.42	239	.39	239
polyethylene (.05")	.47	239	.50	236
polyethylene (.04")	.46	236	.42	235
estimated error	<u>+ .05</u>	<u>+ 1</u>	<u>+ .05</u>	<u>+ 1</u>

Note: Values are averages of four samples, except for polyethylene (.04") which is a single determination. Error is estimated from variation among quadruplicate samples.

Thomas L. Starr  
Energy and Materials Sciences Laboratory  
April 12, 1982