

P-1031

REPORT NO. P-1031

DATE 28 February, 1934

SUBJECT

Cooperative Fuel Testing
Progress Report (b)



BY

NAVAL RESEARCH LABORATORY
BELLEVUE, D. C.

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P-25-11(b)

NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report
on
Cooperative Fuel Testing
Progress Report (b)

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

Number of Pages: 3

Authorization: Bu.Eng. Project Order 86/31

Date of Test: Data collected from December 1933 to February 1934.

Reported by:

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Approved by:

H.R.Greenlee, Capt., USN, Director.

Distribution: BuEng (25)
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AUTHORIZATION

1. This problem was authorized by the Bureau of Engineering Project Order 86/31.

PROBLEM

2. To study the characteristics of the fuel oils used in the cooperative test with the Naval Boiler Laboratory and Engineering Experiment Station.

DISCUSSION

3. This is a progress report and no discussion or conclusions will be made until the final report is written.

MATERIALS

4. The fuels studied in this test are samples A-7 to A-12 inclusive.

METHOD OF TEST

5. The methods of tests used are given detail in the following references:

Gravity: Determined with Westphal Balance - detailed report will be filed.

Viscosity: See ASTM D-88-30.

Flash point PM closed cup see ASTM D-93-22
" " open cup see ASTM D-92-24

Fire point: See ASTM D-92-24

Water by distillation: See ASTM D-95-30

Carbon Residue: Conradson See Report P-25-6

Sediment and water in percent by centrifuge See ASTM D-96-30
For "after heating" samples were heated at 430°F
for 30 minutes.

Residue by benzol extraction: Federal Specifications Method 300.2
B.Mines Tech.Paper 323B.

Residue in percent: sintered glass filter. See Report P-25-4.

Analysis: C and H See Report P-25-12
S N See Report P-25-3

Molecular Weight: See Report P-25-7

Pour Points: See ASTM D-97-30

SAMPLE NUMBER

	7	8	9	10	11	12
Gravity 40°F	0.9968	0.9715	1.0160	0.9940	0.9718	1.0299
60°F	0.9895	0.9643	1.0087	0.9867	0.9646	1.0225
80°F	0.9822	0.9571	1.0014	0.9794	0.9574	1.0151
120°F	0.9677	0.9426	0.9869	0.9649	0.9431	1.0004
160°F	0.9532	0.9282	0.9723	0.9503	0.9287	0.9857
200°F	0.9387	0.9138	0.9577	0.9357	0.9143	0.9710
240°F	0.9242	0.8993	0.9432	0.9212	0.9000	0.9563
Change in Gravity per °F	0.000363	0.000361	0.000364	0.000364	0.000359	0.000368
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API at 60°F	11.50	15.25	8.77	11.89	15.20	6.90
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Viscosity						
40°F						
50°F			1105F		1062F	
60°F			589.2F	1138F	400.1F	2234F
70°F						
77°F		1765.1F	228.0F	368.1F	156.7F	666.7F
80°F	320 F					
100°F	119F	374.3F	79.9F	106.5F	53.0F	189.0F
122°F	52.7F	141.4F	37.7F	48.7F	28.2F	77.2F
				469.5U	257.2U	
160°F	21.5F	42.8F	17.4F			25.8F
	182.7U		131.1U	168.6U	108.8U	231.2U
200°F	87.9U	20.4F	68.1U	83.6U	63.8U	98.7U
		169.0U				
240°F	57.7U	90.0U	48.1U	55.9U	48.3U	60.2U
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Flash point PM closed °F	205	230	205	160	195	Foamed
Flash point open cup °F	265	275	265	230	235	Foamed
Fire point °F	325	385	305	290	280	280
Pour point °F	20	40	0	35	50	20
Water by distil- lation %	0.1	0.15	0.1	0.2	0.1	0.9
Conradson Carbon Residue %	11.0	9.4	9.3	10.5	8.4	13.3
Sediment & water in % by centrifuge						
Benzol before heating	2.8	0.9	0.8	0.8	0.7	1.6
" after "	1.4	0.6	0.5	0.7	0.5	0.8
Residue in % on extraction, benzol	0.38	0.11	0.23	0.09	0.09	0.22

		SAMPLE NUMBER					
		7	8	9	10	11	12
Residue in % on sintered glass filter	Solvent						
	Hexane #4	7.2	6.4	6.2	6.8	6.0	9.6
	#3	7.1	0.1	0.8	0.6	0.8	6.6
	#2	1.8	-	-	0.3	-	2.8
	#1	-	-	-	-	-	0.7
Heated for 30 min. at 430°F	#4	7.9	6.4	6.7	6.8	5.9	9.8
	#3	7.3	0.1	0.8	0.6	0.6	8.8

Analysis of dry sample							
Carbon %	87.36	86.83	89.18	87.46	87.57	89.28	
Hydrogen %	10.21	11.08	9.67	10.18	10.85	9.40	
Sulfur %	1.86	1.35	0.33	1.61	1.31	0.81	
Ash (after benzol extraction) %	0.03	0.03	Tr	0.02	0.02	0.01	
Molecular weight f.p. naphtholene	341	443	297	334	332	306	