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NAVY DEPARTMENT

BUREAU OF ENGINEERING

Report on Cooperative Fuel Testing

Progress Report (c)

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 February 1934 to April 1934

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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-13 to A-18 inclusive.

METHOD OF TEST

5. The methods of tests used are given detail in the follpwing 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 precent 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					
		13	14	15	16	17	18
Gravity	40°F	1.0143	0.9988	0.9993	0.9839	0.9965	0.9945
	60°F	1.0070	0.9914	0.9923	0.9766	0.9895	0.9872
	80°F	0.9997	0.9840	0.9853	0.9693	0.9825	0.9799
	120°F	0.9851	0.9692	0.9713	0.9547	0.9685	0.9653
	160°F	0.9705	0.9543	0.9574	0.9400	0.9545	0.9507
	200°F	0.9559	0.9395	0.9434	0.9254	0.9405	0.9361
	240°F	0.9413	0.9246	0.9295	0.9107	0.9265	0.9215
Change in Gravity per °F		0.000365	0.000371	0.000349	0.000366	0.000350	0.000365
°API at 60°F		9.01	11.23	11.10	13.41	11.50	11.83
Viscosity	40°F						
	50°F		2105.SSF				
	60°F		954.SSF		1247.SSF		
	70°F					1630.SSF	
	77°F	1814.SSF	367.1SSF	1893.SSF	461.0SSF	1065.SSF	1307.SSF
	100°F	411.0SSF	123.3SSF	522.5SSF	140.7SSF	229.2SSF	372.9SSF
	122°F	151.9SSF	56.2SSF	233.0SSF	60.9SSF	86.5SSF	148.9SSF
					591.5SU		
	160°F	41.6SSF	22.0SSF	56.8SSF	22.7SSF	28.0SSF	45.6SSF
		394.7SSU	185.2SSU		195.4SSU	252.7SSU	437.7SSU
	200°F	148.0SSU	87.5SSU	23.8SSF	90.6SSU	108.9SSU	175.0SSU
				207.4SSU			
	240°F	77.6SSU	57.0SSU	102.8SSU	58.2SSU	64.5SSU	94.7SSU
Flash point PM closed cup °F		195	200	275	205	260	160
Flash point open cup °F		245	215	305	270	330	240
Fire Point °F		295	245	370	345	390	335
Pour point °F		40	20	30	25	60	25
Water by distillation %		.05	.075	Trace	0.1	0.05	0.1
Conradson Carbon Residue %		13.6	11.9	12.0	7.1	8.7	12.4
Sediment & water by centrifuge %							
Benzol solvent							
Before heating		0.6	0.4	0.2	0.4	0.5	0.8
After heating		0.5	0.4	0.2	0.4	0.4	1.2
Residue in % on extraction, benzol		0.162	0.135	0.022	0.070	0.074	0.168

		SAMPLE NUMBER					
		13	14	15	16	17	18
Residue in % on sintered glass filter	Solvent Hexane #4	11.8	10.5	10.8	4.5	4.8	9.5
	#3	10.7	0.6	0.2	0.8	3.2	6.8
	#2	0.6	-	-	-	0.4	0.4
Heated for 30 min. at 430°F	#4	14.1	11.9	11.5	5.2	5.6	9.8
Analysis of dry sample							
Carbon %		86.79	86.63	86.28	86.98	88.17	87.12
Hydrogen %		9.85	10.23	10.41	10.80	10.38	10.50
Sulfur %		1.39	1.37	2.56	0.53	0.77	1.95
Ash (after benzol extraction) %		0.037	0.026	none	0.016	0.013	0.008
Molecular weight f.p. naphtholene		346	321	415	355	374	410