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DEPARTMENT OF MINES AND RESOURCES

BUREAU OF MINES

CANADA

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Ottawa, January 31, 1947.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2172.

Corrosion Preventive Properties of Lubricating Oils to Specification 3-G.P.-356.

(Copy No. 6.)

CANADA

Bureau of Mines

Mineral Dressing and
Metallurgy Division

DEPARTMENT
OF
MINES AND RESOURCES

Physical Metallurgy
Research Laboratories

Mines and Geology Branch

O T T A W A January 31, 1947.

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Background:

A letter (N.S. 6550-355/8, Vol. I Equip.) dated December 3, 1946, was received from Mr. R. O. King, Director of Scientific Research and Development, Naval Service, Department of National Defence, Ottawa, Ontario, requesting that four samples of lubricating oil from H.M.C.S. "Haida" be tested for their corrosion preventive properties. The letter read, in part:

> "It is desired to ascertain, if possible, whether the lubricating oil could in any way be held responsible for the damage to the bearings.
>
> "It is noted that the oil samples contain a proportion of Admiralty Special Mineral Oil mixed with the original 3-G.P.-356. The approximate proportions are 1 part A.S.M.O. to 5-6 parts 3-G.P.-356. The 3-G.P.-356 is non-corrosive lubricating oil."

(Continued on next page)

(Background, cont'd) -

The samples of oil were labelled as follows:

1. H.M.C.S. "Haida"

   Sample of oil from sump of port main thrust block.

2. H.M.C.S. "Haida"

   Sample of oil from sump of starboard L.P. ford bearing.

3. H.M.C.S. "Haida"

   Sample of oil from sump of pinion bearing.

4. H.M.C.S. "Haida"

   Sample of oil from drain tanks.

NOTE: All samples were also labelled:

D.N.D.-356 (non-corrosive), new in system December 1944. Sample taken September 1946.
Total operating hours - 1,350 hrs. Total hours separator run - 663 hrs. 240 gals. Admiralty Spec. Min. Oil added April 1945.

EXPERIMENTAL:

The following tests were performed in the Physical Metallurgy Research Laboratories of the Bureau of Mines, at Ottawa:

Observations of Oil Samples Before Testing.

Sample 1. The sample separated into a layer of oil and a layer of grey emulsion-like material under it.

Sample 2. A few black particles were at the bottom of the sample.

Sample 3. The sample separated into three layers: (a) oil, (b) a half-inch of greyish

(Experimental, cont'd) -

emulsion-like material, and (c) three-quarters of an inch of water.

Sample 4. A very small amount of water and black particles was at the bottom of the sample.

Salt Water Corrosion Test.
Specification 3-G.P.-356 (Paragraph D-1a).

Note: This is the first time our laboratory has tested an oil to specification 3-G.P.-356 (para. D-1a). The equipment was specially constructed to perform these tests.

Results:

Sample 1. The steel sample had corroded about half an inch at the surface of the liquid (see Figure 1). Also, at one point on the edge where the oil first came in contact with the steel sample, a fibrous material had collected. When this material was removed a small, slightly corroded area remained (see Figure 1, in circled area).

Sample 2. The steel sample showed no evidence of corrosion.

Sample 3. The steel sample had corrosion about three-quarters of an inch at the surface of the liquid (see Figure 2).

Sample 4. The steel sample had some corrosion at the surface but considerably less than Samples 1 and 3. Corrosion also took place on the edge of the sample first to come in contact with the oil and across the sample almost to the opposite edge (see Figure 3). Part of this corrosion was formed under a

(Experimental, cont'd) -

fibrous material which was caught by the leading edge of the sample.

Conclusions:

On the basis of the above tests it is concluded that:

1. The sample of oil from the sump of the port main thrust block did not prevent corrosion.

2. The sample of oil from the sump of the starboard L.P. ford bearing passed the test.

3. The sample of oil from the sump of the pinion bearing did not prevent corrosion. It was worse than oil No. 1.

4. The sample of oil from the drain tanks allowed the steel sample to corrode. The full length of the steel sample was corroded, especially near the edge with which the oil first came in contact.

5. The corrosion probably is due to foreign material getting into the oil.

6. The original oil can not be held responsible for the damage to the bearings in view of the fact that one of the oil samples passed the test.

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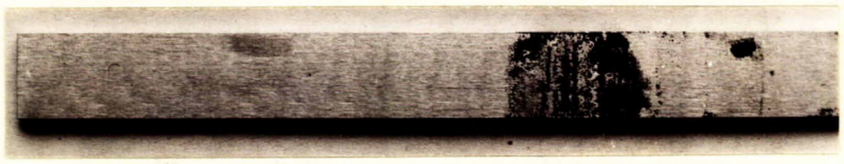
(Figures 1 to 3 follow, on Page 5.)

Figure 1.

STEEL SAMPLE AFTER SALT WATER CORROSION TEST USING OIL FROM THE SUMP OF THE PORT MAIN THRUST BLOCK.

Figure 2.



STEEL SAMPLE AFTER THE SALT WATER CORROSION TEST USING OIL FROM THE SUMP OF THE PINION BEARINGS.

Figure 3.

STEEL SAMPLE AFTER THE SALT WATER CORROSION TEST USING OIL FROM THE DRAIN TANKS.

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