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O T T A W A      May 19, 1945.

R E P O R T  
of the  
ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1873.

Corrosion Prevention Value of Shell Ensis  
Fluid 211 (Specification DND 702 for  
Dewatering Corrosion Preventive Compounds).

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Background:

A letter (File No. 832-33C-11 (AMSO-DAI)) dated March 19, 1945, was received from Air Commodore A. L. Johnson, Director of Aeronautical Inspection, for the Chief of the Air Staff, Department of National Defence for Air, Ottawa, Ontario, requesting that a sample of Shell Ensis Fluid 211 be tested according to Specification DND 702. The sample of fluid was to be furnished by the R.C.A.F.

Tests Performed:

The following tests were performed by the Division of Fuels, Bureau of Mines:

| Test   | Specification | Shell Ensis Fluid 211       |
|--|---------------|-----------------------------|
| Flash Point, °F.<br>(Pensky-Martens closed)    | 100 (min.)    | 100                         |
| Pour Point, °F.                                | 45 (max.)     | Below -35                   |
| Cloud Point, °F.<br>(First sign of separation) | -             | +15                         |
| Abrasives<br>(Test method, Par. D-1b)          | Pass.         | Pass.                       |
| Stability<br>(Test method, Par. C-1a)          | Pass          | Does not pass. <sup>e</sup> |
| Sprayability<br>(Test method, Par. C-1e)       | Pass.         | Pass.                       |

The following tests were performed by the Physical Metallurgy Research Laboratories, Bureau of Mines:

| Test   | Specification | Shell Ensis Fluid 211   |
|--|---------------|---|
| Corrosion<br>(Test method, Par. D-1a)  | Negligible.   | Aluminium, Copper and mild steel were unaffected. Dark spots were produced on brass (see Figure 1). |
| Film Thickness, inches<br>(Test method, Par. D-1c)                               | 0.0003 (max.) | Pass.   |
| Volatility<br>(Test method, Par. C-1b)   | Pass.         | Pass.   |
| <u>Protection from Corrosion:</u>  |               |   |
| Water Displacement Test<br>(method simulates conditions outlined in Par. D-1f-3) | Pass.         | Pass.   |
| Protection at High Humidity<br>(Test method Par. D-1f-4)                         | Pass.         | Pass.   |
| Transparency<br>(Test method, Par. C-1d)   | Pass.         | Pass.   |
| Colour<br>(Test method, Par. C-1f)   | Pass.         | Pass.   |
| Toxicity<br>(Test method, Par. C-1g)   | Pass.         | Pass.   |
| Removability<br>(Test method, Par. C-1h)   | Pass.         | Pass.   |

<sup>e</sup> After standing overnight in a refrigerator at 16° F. a small amount of material settled out. The Ensis Fluid 211 had not regained its homogeneity after standing for three days at room temperature.

Conclusions:

1. The sample of Shell Ensis Fluid 211 which was tested fulfilled the specification requirements except as follows:

(a) Stability Test - The solid material which separated out at the low temperature and did not readily reenter the Fluid at room temperature might be inhibitor material which was added by the manufacturer to prevent the Fluid from corroding the metal during service. Accordingly, it is felt that this departure from the specifications should be given considerable weight.

(b) Corrosion Test - The dark spots produced on the brass by the Fluid were considerably more than the "extremely slight discolouration" allowed by the specifications.

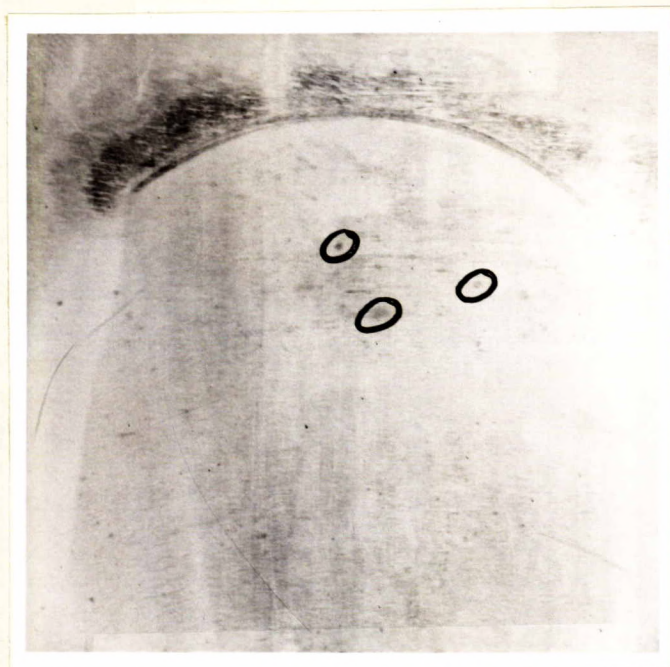
2. As far as could be determined with the equipment available, the Fluid passed the Water Displacement Test. Care was taken to make the important test conditions resemble those laid down in the specifications as nearly as possible.

In a letter dated April 21, 1945, to Dr. D. Wolochow, Secretary of the Canadian Government Purchasing Standards Committee, exact information regarding the dimensions of the Water Displacement Test tank and other specification requirements was requested. When this information has been received a tank will be constructed to specifications and the test will be carried out exactly as instructed.

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Figure 1.



PHOTOGRAPH OF BRASS PLATE AT END  
OF THE CORROSION TEST.

Note the dark spots such as the ones  
which have been encircled.

(Approximately to size).

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