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O T T A W A

March 29, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1825.

Corrosion Products in Pattern 0921 Compasses.

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(Copy No. 10.)

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Origin of Material and Object of Investigation:

A letter (File No. 33-4-2-1) dated January 31, 1945, was received from Commander F.G.S. Peile, R.N., of the British Admiralty Technical Mission, Ottawa, Ontario, requesting that the nature of material (probably corrosion products) found in two Pattern 0921 Compasses, Serial Nos. 643 and 762, be investigated. The two compasses were submitted with the letter, which read in part:

"Compass No. 643. This compass was manufactured about a year ago and a reddish-coloured deposit has appeared on the black paint within the bowl."

"Compass No. 762. This compass was manufactured about four months ago and a white deposit has appeared on the baffle glass. A previous examination disclosed that a similar discolouration was caused by a lead compound, probably lead oxychloride."

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Tests Performed:

Compass No. 643.

1. A small amount of the reddish-coloured deposit was scraped off and analysed spectrographically.

Results:

Copper - most prominent constituent.

Iron)
Silicon) ^{yes} present. Probably in
Tin) considerably smaller
Zinc) quantities.

2. As some of the black paint undoubtedly was mixed in with the sample of reddish material which was analysed, a sample of the paint without any reddish material was analysed spectrographically.

Results:

No copper.

Tin)
Titanium) - most prominent constituents. ✓

Iron)
Silicon) - present. Probably in consider-
Zinc) ably smaller quantities.

3. The alcohol from the compass was evaporated to dryness and the residue analysed spectrographically.

Results:

Cobalt)
Nickel) - most prominent constituents.

Silver)
Tin)
Copper)
Silicon)
Lead)
Iron) - less prominent constituents.
Zinc)
Cadmium)
Manganese)
Magnesium)
Calcium)
Boron)

(Tests Performed, cont'd) -

Compass No. 762.

1. As much as possible of the white deposit was removed and analysed spectrographically.

Results:

Lead }
Iron } - present in approximately
Silicon } equal quantities.
Copper - little, if any.

2. The alcohol from the compass was evaporated to dryness and the residue analysed spectrographically.

Results:

Silver)
Tin) - most prominent constituents.
Copper)

Silicon)
Lead)
Iron)
Zinc)
Cadmium) - less prominent constituents.
Manganese)
Magnesium)
Calcium)
Boron)
Titanium)

It should be noted that spectrographic analysis was used instead of ordinary chemical analysis because the quantity of materials available was extremely small.

Conclusions:

1. It is difficult to obtain conclusive evidence from these results.
2. There is an indication that the reddish deposit in Compass No. 643 is copper or a copper compound.
3. The white deposit in Compass No. 762 contained lead, but iron and silicon were also present in approximately the same amounts.

Suggestions:

1. Corrosion inside these compasses might be reduced, or prevented entirely, by

(a) using purer alcohol,

(b) using a corrosion inhibitor in the present type of alcohol, or

(c) using some other material instead of alcohol.

2. The Ontario Hughes-Owens Co. Ltd., of Ottawa, claims to have solved the corrosion problem in compasses, at least partially. A conference with this firm might bring to light useful information.

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