O T T A W A May 1, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1856.

Corrosion Resistance of Painted and Electroplated Steel Nuts, Bolts and Washers.

(Copy No. 10.)

O T T A W A May 1, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1856.

Corrosion Resistance of Painted and Electroplated Steel Nuts, Bolts and Washers.

Background:

On April 18, 1945, a verbal request was received from Mr. H. G. Neale, of the Transport Controller's Office, 261 St. Sacrament St., Montreal, Quebec, to test a number of steel nuts, bolts and washers, some painted and some electroplated, for corrosion resistance under conditions of bright sunlight, high humidity, high temperature, heavy rainfall, and high salt content in the air.

TESTS PERFORMED:

1. The set of steel parts submitted by Mr. Neale was tested in the Salt Spray Cabinet, using the spray from a 20 per cent salt (sodium chloride) solution at a temperature of about 95° F.

2. The set of steel parts sent later (at Mr. Neale's request) from the Hamilton Bridge Co. Ltd., Hamilton, Ontario, was tested in the Weather-Ometer, using a temperature of 130° F. and a tapwater spray cycle of 3 minutes' spraying followed by a drying period of 17 minutes. An electric arc giving light similar to sunlight was going throughout the test.

Salt Spray Corrosion Test.

The painted samples were removed from the salt spray cabinet at the end of 40 hours. Without exception they were badly corroded, as shown in Figures 1a and 1b. General breakdown took place both on threaded and on flat surfaces.

The electroplated samples were removed from the salt spray cabinet at the end of 70 hours. The large washers shown in Figure 2a showed no evidence of iron rust. The two nuts shown in the same figure were almost completely covered with corrosion product from the coating metal (presumably zinc). There were a considerable number of small iron rust spots both on the threaded and on the flat surfaces. The bolts in Figure 2b had considerable coating corrosion product on their surface, and considerable iron rust was present in the encircled area.

Weather-Ometer Corrosion Test.

The coated steel samples, both painted and electroplated, were removed from the Weather-Ometer at the end of 70 hours. All of the painted samples showed considerable evidence of corrosion, as shown in Figures 3a and 3b. Breakdown

(Tests Performed, cont'd) -

took place both on threaded and on flat surfaces.

The electroplated washers showed small corrosion spots in the areas encircled in Figure 4a. The nuts (Figure 4a) showed no evidence of corrosion on the exterior surfaces but there was considerable corrosion on the threads. The bolts (Figure 4b) showed no signs of corrosion.

CONCLUSIONS:

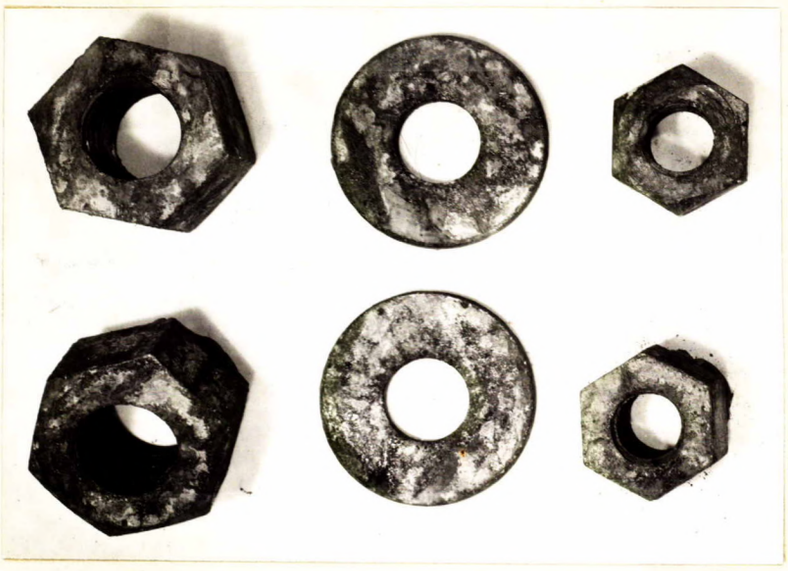
1. Coated steel parts similar to those submitted for test would not be useful for service under bright, humid, hot, rainy conditions, especially if there is a high concentration of salt in the atmosphere.

2. Of the samples submitted the electroplated ones withstood the corrosive conditions much better than the painted ones.

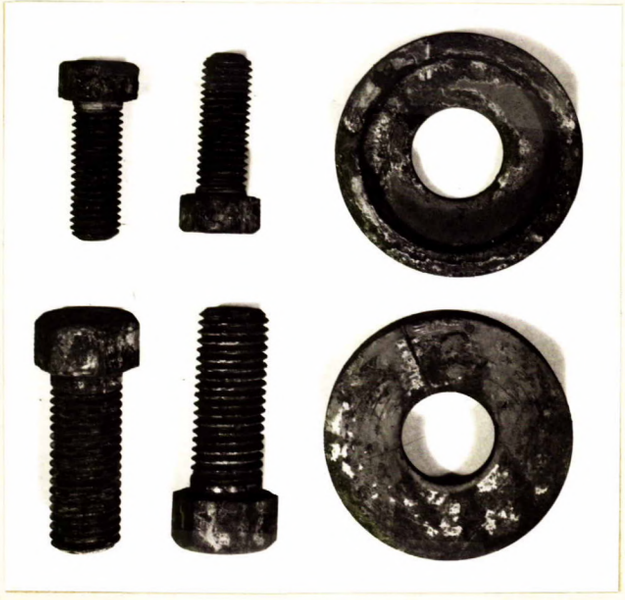
oooooooo
oooo
oo

RRR:CHB.

Figure 1.



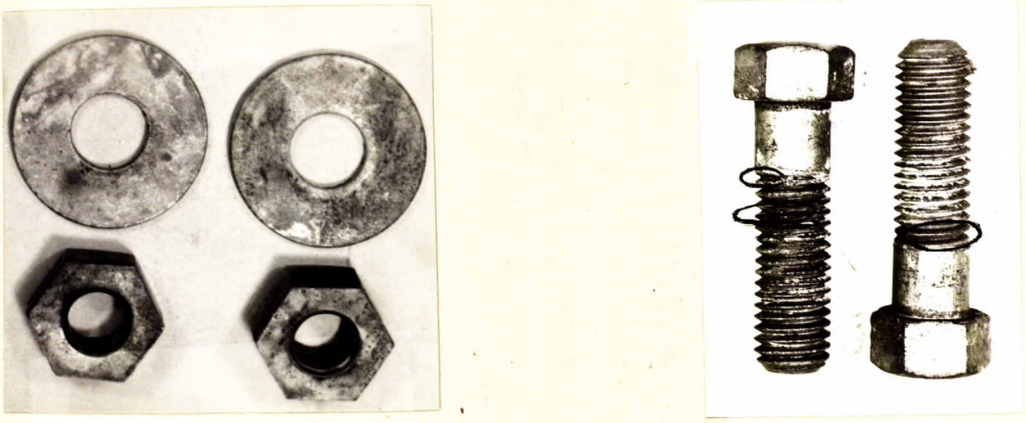
(a)



(b)

PAINTED STEEL SAMPLES AFTER 40 HOURS IN THE SALT SPRAY CORROSION CABINET.

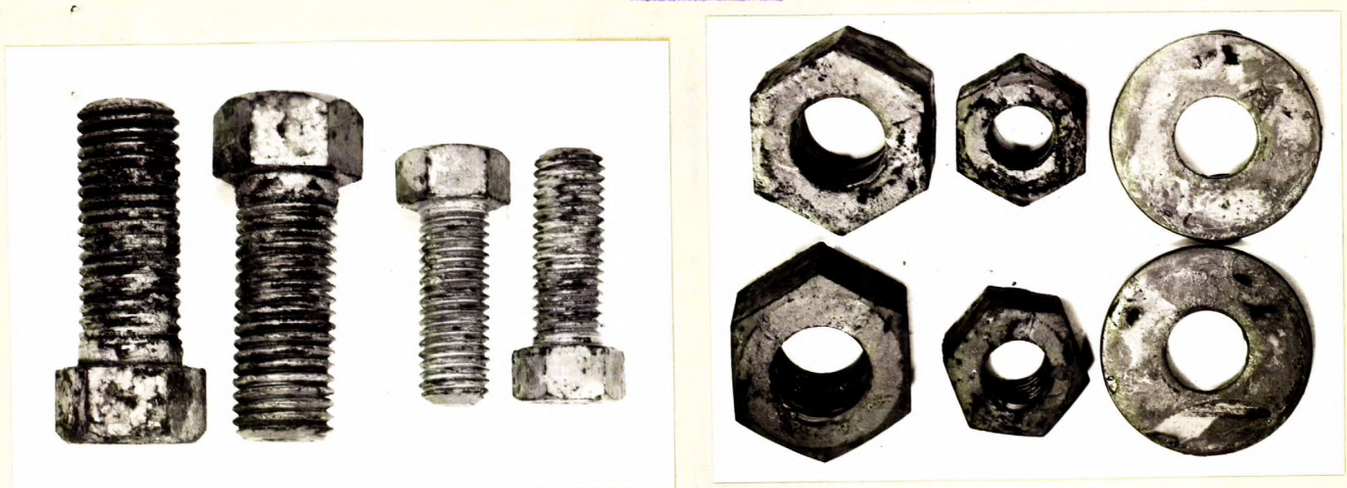
Figure 2.



(a) (b)

ELECTROPLATED STEEL SAMPLES AFTER 70 HOURS
IN THE SALT SPRAY CORROSION CABINET.

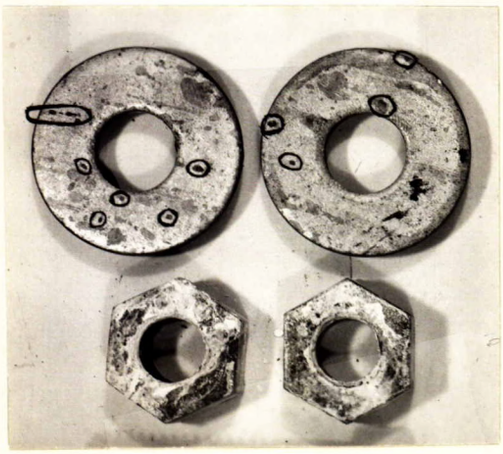
Figure 3.



(a) (b)

PAINTED STEEL SAMPLES AFTER 70 HOURS IN THE
WEATHER-OMETER CORROSION TEST.

Figure 4.



(a)

(b)

ELECTROPLATED STEEL SAMPLES AFTER 70 HOURS IN THE IN THE WEATHER-OMETER CORROSION TEST.

RRR:GHB.