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O T T A W A August 29, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1926.

Corrosion Resistance of Metal Name Plates For Export Packing Cases.

(Copy No. 10.)

Bureau of Mines
Division of Metallic
Minerals

Physical Metallurgy
Research Laboratories

CANADA

DEPARTMENT
OF
MINES AND RESOURCES

Mines and Geology Branch

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Background:

A letter dated July 9, 1945, from Dr. A. H. Woodcock, Vice-Chairman, Canadian Packaging Committee, Department of Munitions and Supply, Ottawa, Ontario, requested that the corrosion resistance of metal name plates for export packing cases be investigated.

The letter stated, in part:

> "One of these plates will be placed on each export packing case and printed to denote that the goods inside are tropically packed and that the packing should not be removed until they are ready for use."

The plates were to be supplied by Dr. Woodcock.

INVESTIGATION:

The eleven plates submitted were treated as follows:

Two (2) were placed in the Salt Spray Cabinet in which 20 per cent salt (sodium chloride) solution and a temperature of about 95° F. were used.

Two (2) were placed in the Intermittent Immersion Corrosion Machine, the corroding liquid being 20 per cent salt (sodium chloride) solution and the temperature about 93° F.

Two (2) were completely immersed in 20 per cent salt (sodium chloride) solution, the temperature being about 93° F.

Two (2) were placed in the Weather-Ometer, where they were exposed continuously to light from an electric arc which resembles sunlight. A spray of ordinary tap water wet the plates for three minutes out of every twenty. The temperature was about 135° F.

One (1) was placed in the Humidity Cabinet at a temperature of about 120° F. and relative humidity of 95 to 100 per cent.

One (1) was scratched and the lower edge was cut off. It then was placed in the Intermittent Immersion Machine, the corroding liquid being 20 per cent salt solution.

One (1) was kept uncorroded for purposes of comparison.

Salt Spray Corrosion.

After 40 days the plates were removed from the Salt Spray Cabinet and one of them was photographed (see Figures 1 and 2). Considerable rusting had occurred around and near the edges, covering up some of the printing.

Note: It was found that the rust could be removed by swabbing the plate with dilute acid. This made the printing quite readable.

(Investigation, cont'd) -

Intermittent Immersion Corrosion.

After 40 days the plates were removed from the Intermittent Immersion Corrosion Machine and one of them was photographed (see Figures 3 and 4). The fronts of the plates were covered with a thin film of brown rust. The printing still could be read very easily. This film of rust could be removed by rubbing with a dry cloth.

Total Immersion Corrosion.

After 40 days the plates were removed from the salt solution and one of them was photographed (see Figures 5 and 6). Considerable rust was observed at the four holes on the front of each plate and near the edge on the back of each plate.

Weather-Ometer Corrosion.

After 40 days the plates were removed from the Weather-Ometer and one of them photographed (see Figure 7). The surface had become a duller, darker grey and printing had faded considerably. However, it still could be easily read.

Humidity Cabinet Corrosion.

After 40 days the plate was removed from the Humidity Cabinet and photographed (see Figure 8). The plate showed little or no deterioration.

Damaged Plate.

After 40 days in the Intermittent Immersion Corrosion Machine, the scratched and cut plate was removed and photographed (see Figures 9 and 10). Little or no increase in corrosion was noted at the scratches and at the cut edge.

CONCLUSIONS:

1. The most serious deterioration due to corrosion took place under salt water conditions, especially in the salt spray. Even in this case, the damage was not serious. The corrosion product was readily removed.

(Conclusions, cont'd) -

2. The printing faded considerably in the Weather-Ometer. This probably was due to the effect of the bright light.

3. Indoor storage conditions from which salt water spray was excluded would have little or no effect on the plates.

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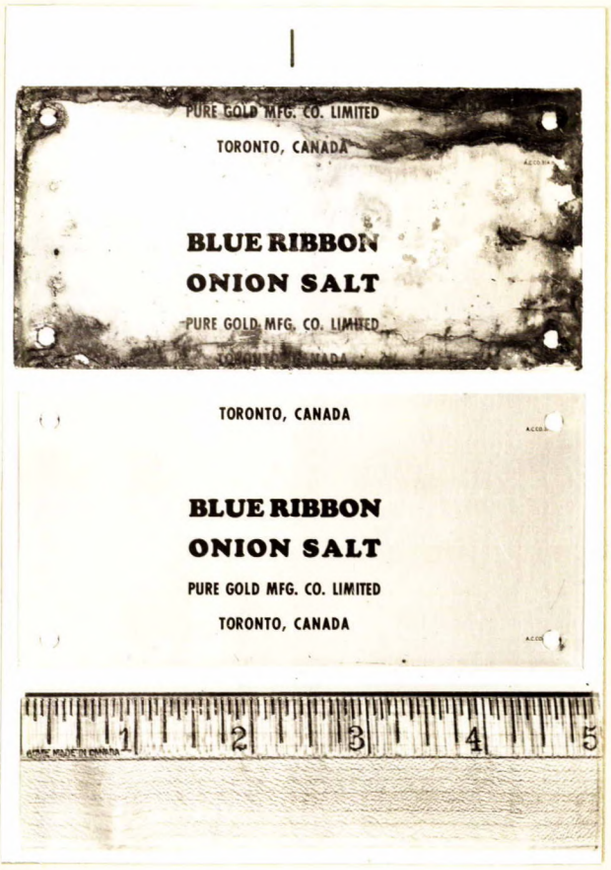
(Figures 1 to 10)
(follow, on Pages)
(5 to 9.)

Figure 1.



UPPER PLATE - AFTER 40 DAYS OF SALT SPRAY CORROSION.

LOWER PLATE - UNCORRODED.

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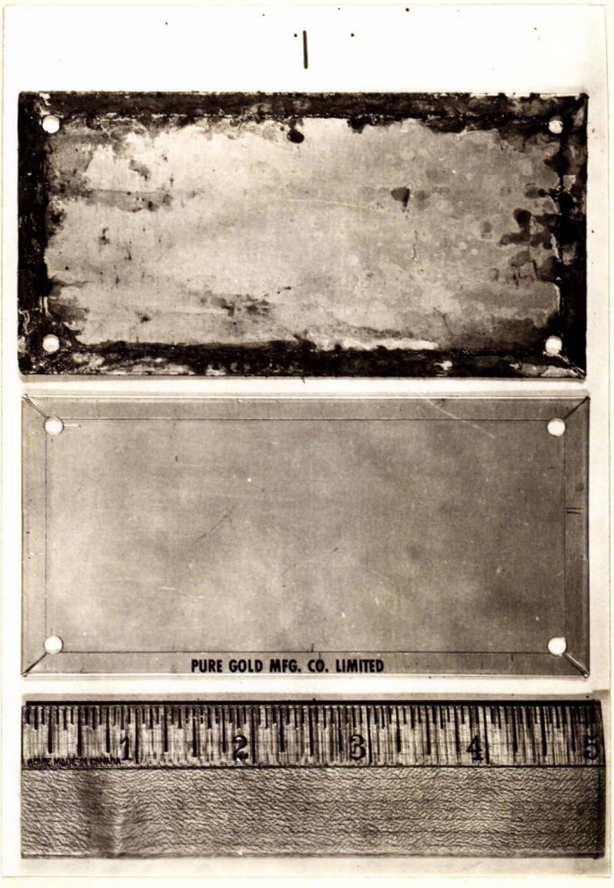
Figure 2.



REVERSE OF PLATES SHOWN IN FIGURE 1.

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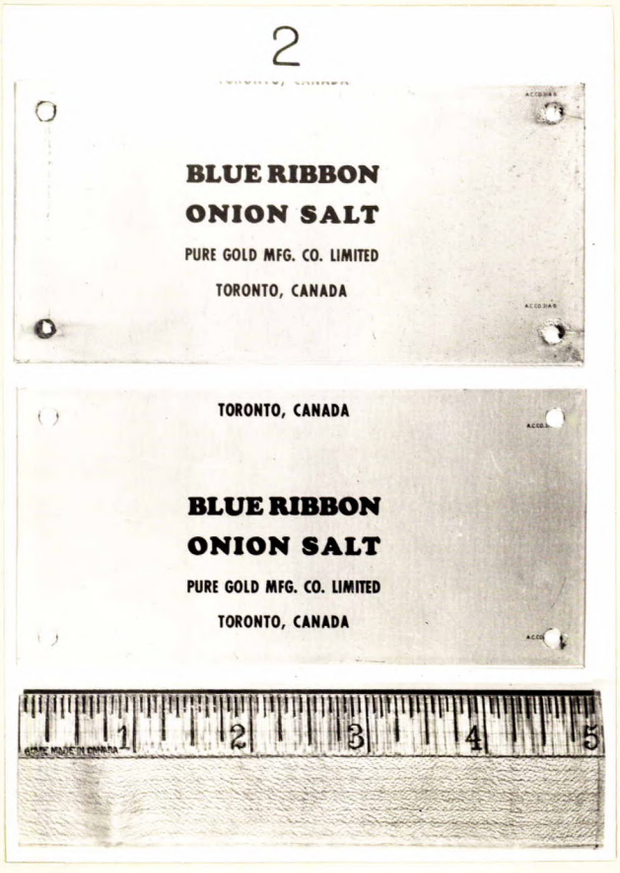
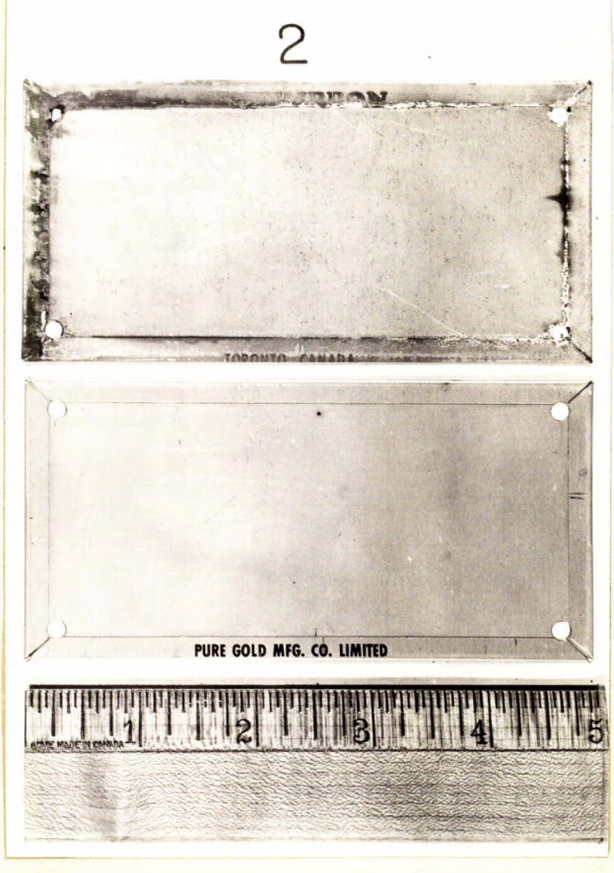
Figure 3.



UPPER PLATE - AFTER 40 DAYS OF INTER-
MITTENT IMMERSION CORROSION.

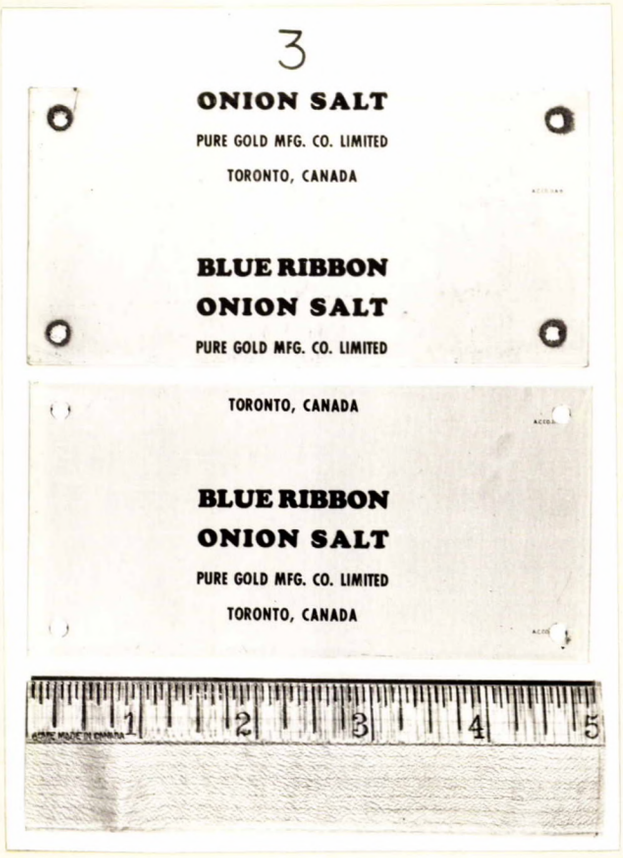
LOWER PLATE - UNCORRODED.

Figure 4.



REVERSE OF PLATES SHOWN IN FIGURE 3.

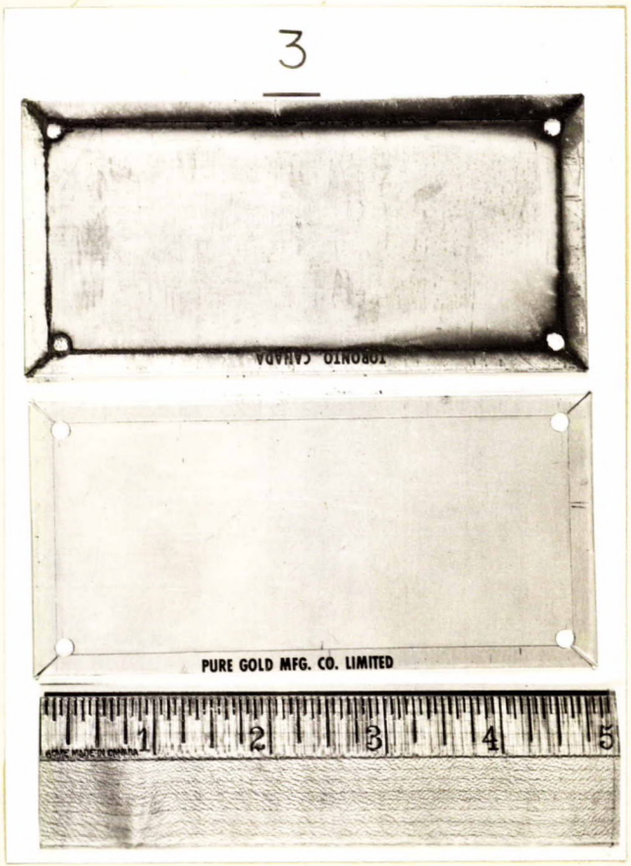
Figure 5.



UPPER PLATE - AFTER 40 DAYS OF TOTAL IMMERSION CORROSION.

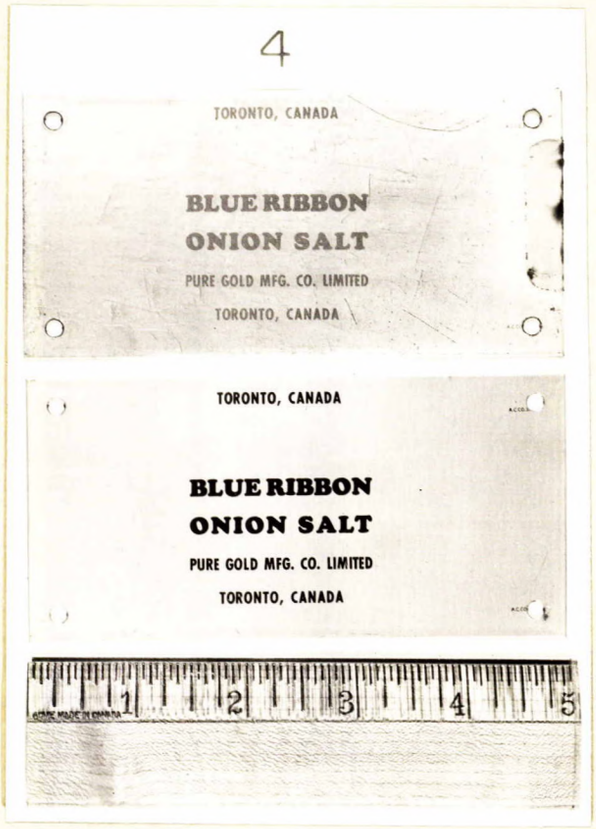
LOWER PLATE - UNCORRODED.

Figure 6.



REVERSE OF PLATES SHOWN IN FIGURE 5.

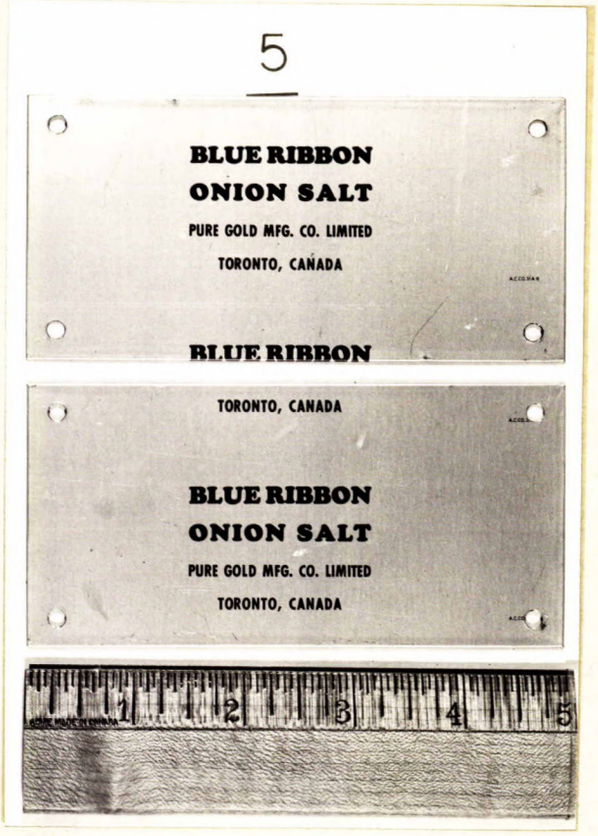
Figure 7.



UPPER PLATE - AFTER 40 DAYS IN THE WEATHER-OMETER.

LOWER PLATE - UNCORRODED.

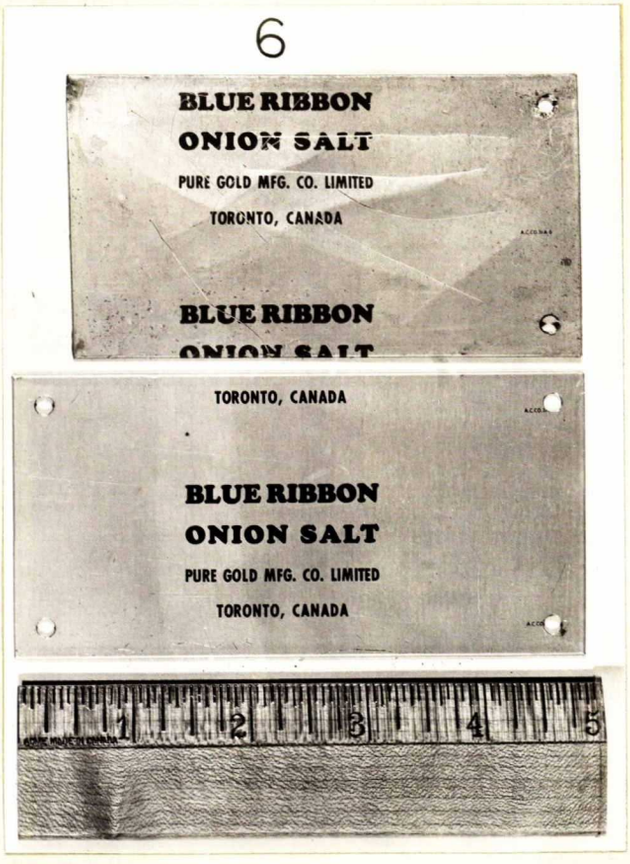
Figure 8.



UPPER PLATE - AFTER 40 DAYS IN THE HUMIDITY CABINET.

LOWER PLATE - UNCORRODED.

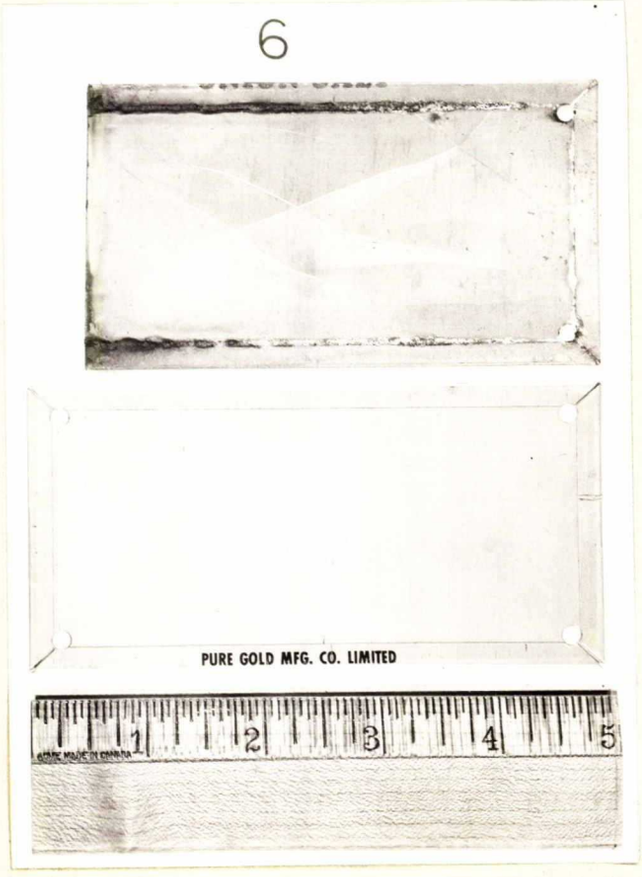
Figure 9.



UPPER PLATE (DAMAGED) - AFTER 40 DAYS IN THE INTERMITTENT IMMERSION CORROSION MACHINE.

LOWER PLATE - UNCORRODED.

Figure 10.



REVERSE OF PLATES SHOWN IN FIGURE 9.

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