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O T T A W A May 7th, 1942.

R E P O R T

of the


ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1214.

Investigation of Tracer Tube Body (Tracer No. 12.).

(Copy No. 10.)

BUREAU OF MINES
DIVISION OF METALLIC MINERALS
—
ORE DRESSING AND
METALLURGICAL LABORATORIES


CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Origin of Problem:

On April 20th, 1942, the Inspection Board of the United Kingdom and Canada, 58 Lyon Street, Ottawa, Ontario, submitted for examination one tracer tube body, Tracer No. 12, cadmium plated. This tube showed a white deposit at the base of some of the exterior threads. In the accompanying Analysis Requisition No. O.T. 281, it was requested that the cause of the white deposit at the base of the threads be determined.

Spectrographic Analysis:

The spectrographic laboratory reported that the major metallic constituents of this white deposit were sodium and cadmium. There were strong indications that this deposit was a carbonate.

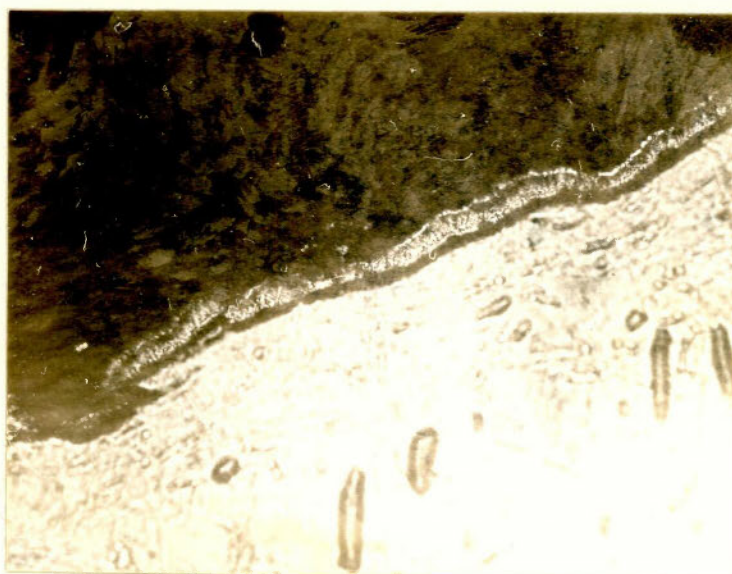
Microscopic Examination:

Figure 1 is a photomicrograph, at 500 diameters, of a section on the side of the thread showing the cadmium plate.

Figure 2 is a photomicrograph, at 500 diameters, of a section at the root of one of the threads, where the white deposit occurred. Note the absence of plate and also the presence of some of the white deposit.

It was noted that at the base of all of the threads the plate was either absent or discontinuous.

Figure 1.



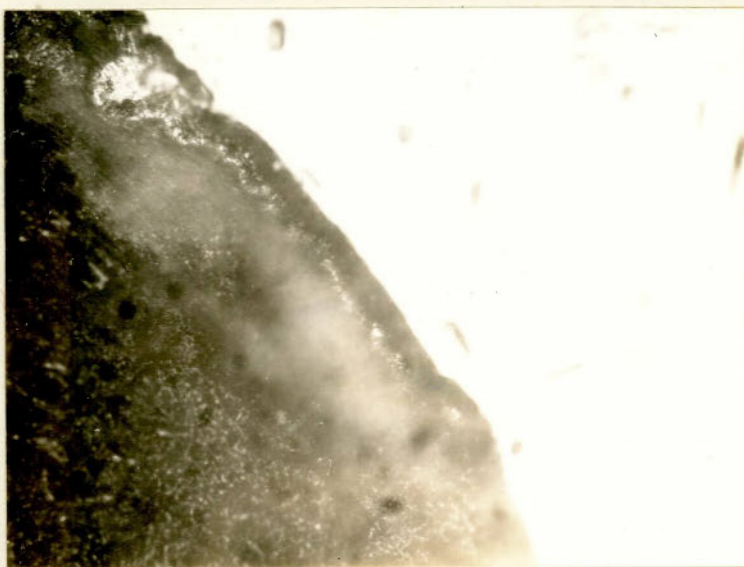
X500, nital etch.

Note presence of cadmium plate.

(Continued on next page)

(Microscopic Examination, cont'd) -

Figure 2.



X500, nital etch.

Note absence of cadmium plate and presence of corrosion product.

Discussion of Results:

Cadmium plating is done in a bath containing cadmium oxide, sodium cyanide, and sodium hydroxide.

Before plating, all scale and grease must be removed from the work. This could be a fairly difficult operation with work such as the threaded portion of the tracer tube bodies. It is quite conceivable that the base of these threads could retain traces of foreign material unless given special attention. This could account for the relatively poor plate on this part of the article. Even handling with greasy hands after cleaning could be a source of dirt. In the Electrochemical Society's Preprint No. 80, entitled "Cadmium Plating," by G. Soderberg and L.R. Westbrook, it is recommended that anodic

(Discussion of Results, cont'd) -

cleaning be employed to eliminate pitting.

If the bath is not kept cool there is a tendency to build up a sodium carbonate content through decomposition of the cyanide and absorption of carbon dioxide from the air. The presence of excess carbonates interferes with optimum operation of the bath.

Cadmium is electro-negative to iron. This means that cadmium will protect exposed areas of an iron surface by sacrificing itself. It could possibly be that, for the reasons given above, the plating at the root of the thread was either badly pitted or discontinuous. It could also be possible that after plating the pieces were not thoroughly washed or after washing got wetted again with a caustic solution. This could set up corrosion at the base of the thread where the plate is not continuous. In time this would result in the removal of all the plate in this zone without attacking the iron. By the reaction with carbon dioxide either a cyanide or caustic salt could decompose to a carbonate.

Conclusions:

1. There are indications that plating might be irregular or pitted in the threaded part of the tracer tube bodies.
2. Through some means, after plating some caustic solution might have got onto the tracer tube body and not have been completely removed, thereby providing conditions permitting corrosion to set in.

Recommendations:

1. The parts be thoroughly cleaned, preferably by means of anodic cleaning.
2. The plating bath should be kept cool and the carbonate content kept low.
3. The pieces should be thoroughly washed and dried after plating.

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