

O T T A W A October 2nd, 1941.

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

Investigation No. 1104.

Examination of Surface Defects
on Brass Primer Bodies.

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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 September 19th, 1941, per Analysis Requisition No. J.M.G.1112, Mr. H. H. Scotland, Inspector of Materials, Inspection Board of the United Kingdom and Canada, 58 Lyon Street, Ottawa, Ontario, submitted for examination twenty (20) brass primer bodies which showed small surface defects on the interior walls of the cap recess. The opinion given in Mr. Scotland's request letter was that these marks are extrusion cores.

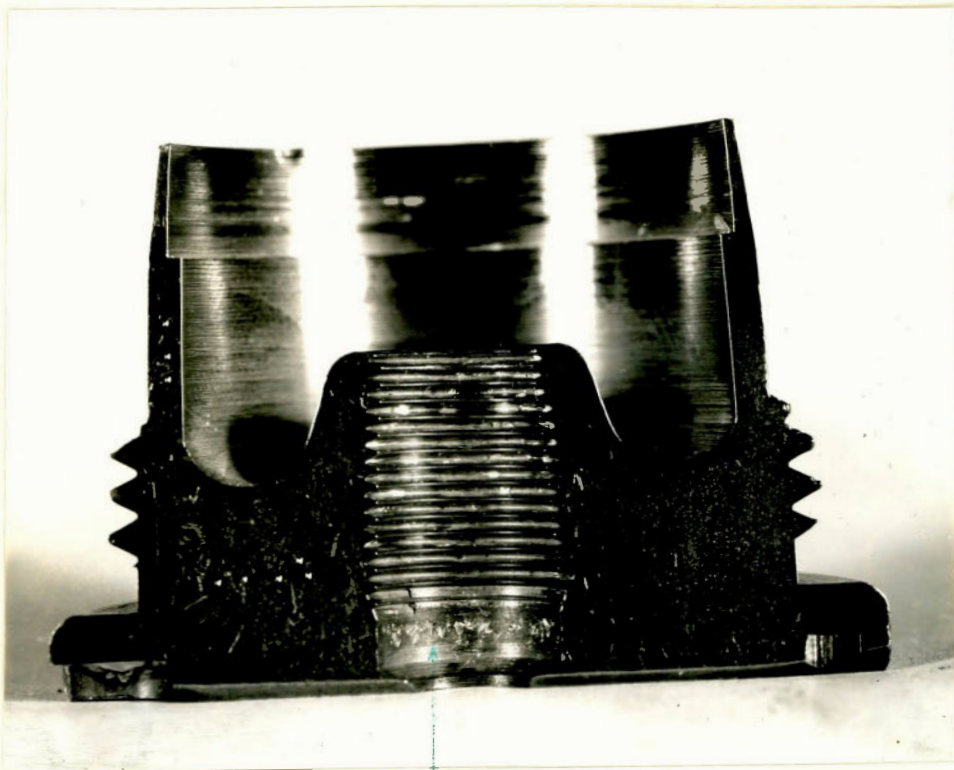
Description of Parts Received:

The primer bodies were machined from extruded brass rods.

For the examination, three of the twenty samples received were used. These three show the most marked defects and are designated Nos. 1, 2, and 3.

Figure 1 shows the section of Primer Body No. 2 with the surface defects as marked. All of the other primer bodies received show the same defects at the same place.

Figure 1.



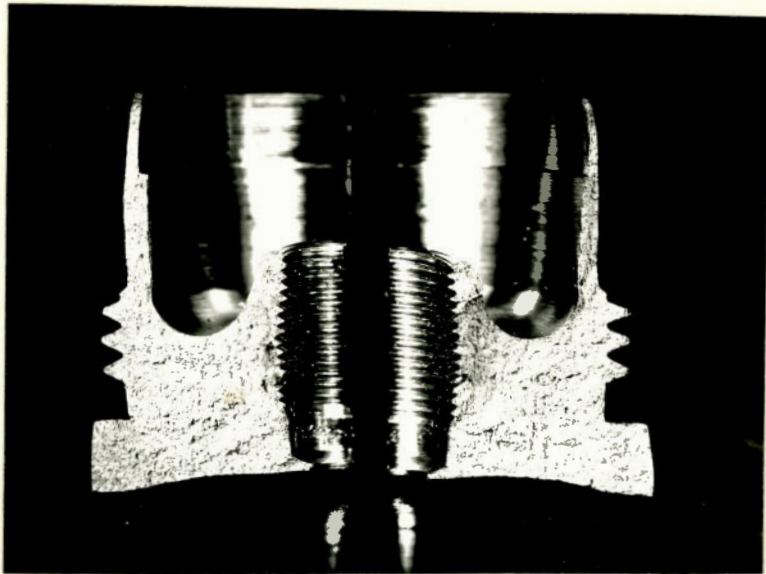
SECTION OF PRIMER BODY
NO. 2, showing the
surface defects.

Approximately X3 magnification.

Fracture Test:

Figure 2 shows the fractured surface of
Primer Body No. 1.

Figure 2.



Fractured surface of
Primer Body No. 1.

Approximately X2 magnification.

The fracture shows no inclusions or other
defects in the brass rod used for manufacturing the primer
bodies.

Hardness Tests:

<u>Location</u>	<u>Vickers Hardness Number</u>
0.010 inch from defective surface	- 155
0.015 " " " "	- 130
0.025 " " " "	- 96
0.040 " " " "	- 96

The higher hardness in the vicinity of the
defective area shows that the metal surface was severely
cold deformed.

Chemical Analysis:

The lot number and date stamped on the bottom of the primer bodies (No. 1, II BB/C, 6/41) were identical with those marked on a lot which, in Investigation No. 1070, August 21st, 1941, analysed as follows:

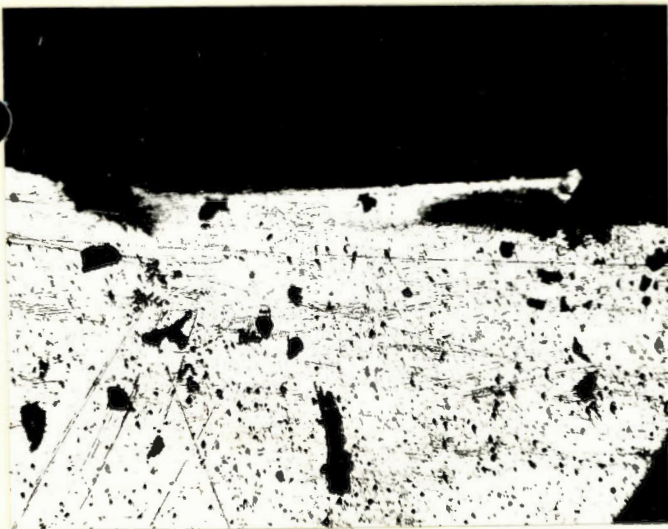
		<u>Per cent</u>
Copper	-	57.63
Zinc	-	39.49
Lead	-	2.61
Iron	-	0.15

This chemical composition compares closely with that specified in British Standard Specification No. 249.

Microstructure:

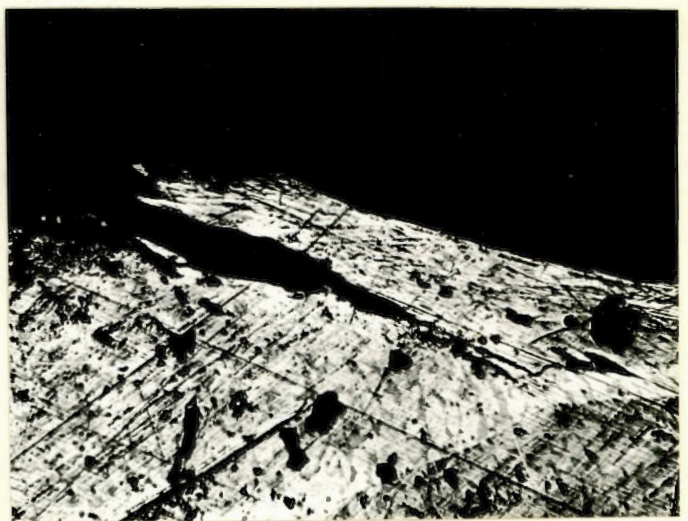
Figures 3 to 7 show the microstructure of the defective material.

Figure 3.



X100, unetched.
TRANSVERSE SECTION,
PRIMER BODY NO. 3.

Figure 4.

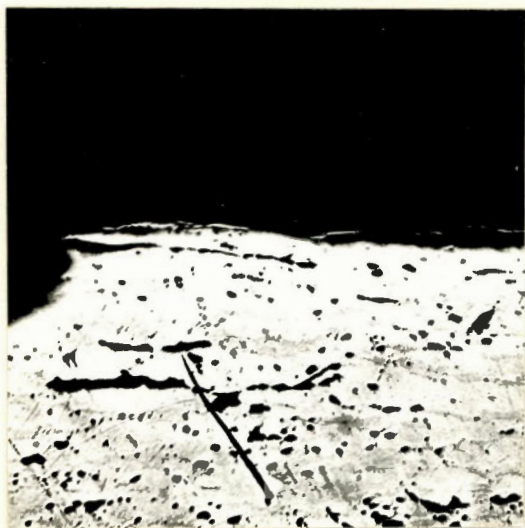


X250, unetched.
TRANSVERSE SECTION,
PRIMER BODY NO. 3.

(Continued on next page)

(Microstructure, cont'd) -

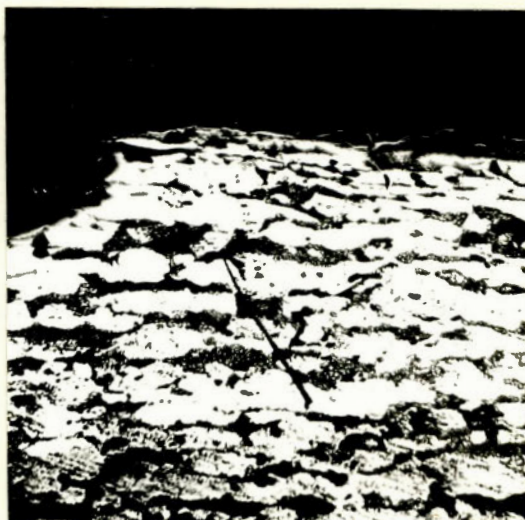
Figure 5.



X250, unetched.

LONGITUDINAL SECTION,
PRIMER BODY NO. 1.

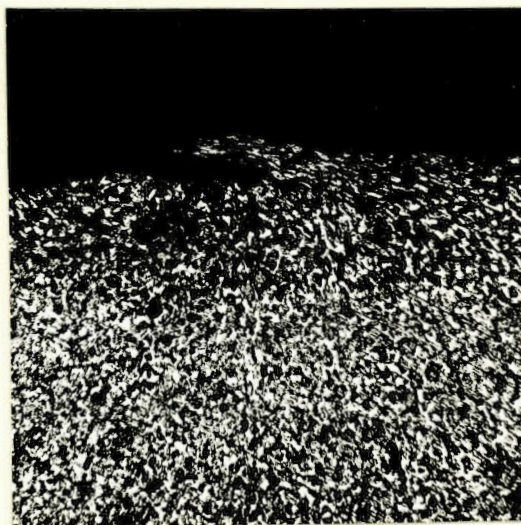
Figure 6.



X200, etched.[⊕]

LONGITUDINAL SECTION,
PRIMER BODY NO. 1.

Figure 7.



X100, etched.[⊕]

TRANSVERSE SECTION,
PRIMER BODY NO. 3.

[⊕] Etched with 10 per cent aqueous solution of copper ammonium chloride plus ammonium hydroxide to neutrality.

(Microstructure, cont'd) -

The micro-examination shows that the structure is typical of alpha + beta brass, with a fairly fine grain size. Some inclusions which might be connected with the extrusion have been observed (see Figures 3, 4, and 5). Their presence, however, does not seem to be in any way related to the surface defects shown in Figure 1.

Conclusions:

Since the metal has a normal microstructure and is relatively free from foreign inclusions, it would seem that the surface defects had little connection with metal structure. It is significant, however, that the only surface defect occurs at the same spot in every primer body. Micro-examination and hardness tests reveal that the metal has been "scuffed" or dragged, probably by the cutting tool. This might have resulted when the tool became dull or when the tool angles were not properly designed. Application of cutting lubricant or of changes in speeds and feeds might eliminate this defect.

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