FILE COPY

O T T A W A April 29th, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1209.

Examination of Small Pieces of Metallic Material found in Seized Jacobs Aircraft Engine.

(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 10th, 1942, Squadron Leader A. J. Smith, of the Department of National Defence (Air Services), Ottawa, Ontario, submitted several small pieces of metallic material found in Jacobs aircraft engines which were reported as seizing in service. It was requested that an examination of these small particles be made for identification in the hope that information secured would indicate the cause of the trouble.

This request was confirmed in a letter (File No.

(Origin of Problem, cont'd) -

935F-3-5(AMAE DAI)) dated April 23rd, 1942, from Group Captain A. L. Johnson, for Chief of the Air Staff, Department of National Defence (Air Services), Ottawa.

Spectrographic Analysis:

The spectrographic analysis (only qualitative) showed the following results:

	(a) Heavy Metal Particle:	(b) Light Metal Particle:
Major constituents	- Ag	- Al
Minor constituents	- -	- Mg, Cu
Important traces	- Pb, Mn	- Mn
Spectrographic traces:		
Strong	- Cu, Fe, In	- Si, Fe
Med.	- Mg, Si, Ni	- Sn
Faint	- Sn	- Pb, Ca
Nil	- Al, Ca	-

Microscopic Examination:

Metallographic examination confirmed the results of the spectrographic analysis.

Figure 1 shows the microstructure of the silver-bearing material and large particles of inclusions.

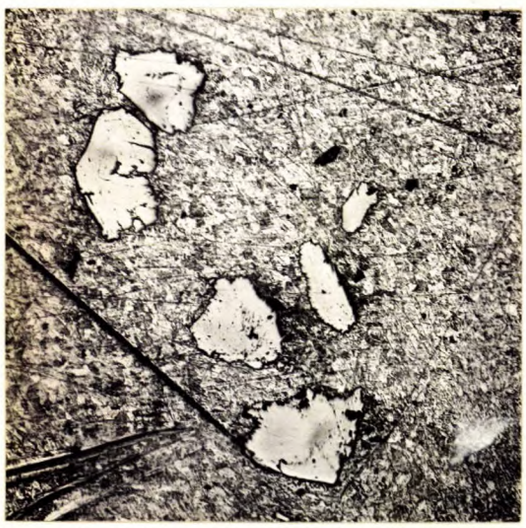
Figure 2 shows the microstructure of the aluminium alloy, characteristic for duralumin-type wrought alloys.

Figures 3 and 4 show the edge of this particle with pronounced corrosion products.

(Continued on next page)

(Microscopic Examination, cont'd) -

Figure 1.



X100, etched with diluted CrO_3.

INCLUSIONS IN SILVER-BEARING MATERIAL.

Figure 2.

X100, etched with Keller's reagent. *

ALUMINIUM ALLOY - INSIDE.

Figure 3.

X100, etched with Keller's reagent. *

ALUMINIUM ALLOY - EDGE.

Figure 4.

X500, etched with Keller's reagent. *

ALUMINIUM ALLOY - EDGE.

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* Keller's reagent: 1% HF, 1.5% HCl, 2.5% HNO_3, 95% H_2O.

(Microscopic Examination, cont'd) -

In an attempt to identify the inclusion shown in the silver-bearing material (Figure 1), the section was examined with an oil immersion objector using polarized light. This proved definitely that the inclusion is metallic. Further microchemical tests and spectrographic analysis suggested that iron and possibly magnesium are constituents, but the quantity of material available was too small for conclusive tests.

Conclusions:

The investigation shows that the submitted small pieces are:

(a) particles from silver-bearing material, and

(b) a particle from a wrought aluminium alloy.

No traces of any non-metallic particles were found.

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