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# R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1762.

## Investigation of a Particle of Metal Removed from a Soldier's Coveralls.

(Copy No. 6.)

Bureau of Mines
Division of Metallic
Minerals

Physical Metallurgy
Research Laboratories

CANADA

DEPARTMENT
OF
MINES AND RESOURCES

Mines and Geology Branch

O T T A W A December 18th, 1944.

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## Investigation of a Particle of Metal Removed from a Soldier's Coveralls.

### Origin of Request and Object of Investigation:

On December 13th, 1944, a small particle of metal removed from the coveralls of F 37498, Pte. Austin, J. W. A., was received from Major F. R. Milne of the Department of National Defence (Army), Ottawa, Ontario, with the verbal request that as much information as possible be obtained regarding its composition. It was felt that such information might give an important clue as to its source.

Procedure:

1. The particle of metal was mounted, polished, etched, and examined under the microscope.

2. The particle was analysed spectrographically. No quantitative analysis was possible, due to its small size.

3. Information was obtained regarding the analysis and structure of the lead alloy used in bullet cores and this was compared with the results of the microscopic examination and spectrographic analysis performed in the unknown sample.

Microscopic Examination:

Figure 1 shows the appearance of the unknown metal sample after polishing and etching. Small particles of a second phase are scattered through the matrix.

Spectrographic Analysis:

The major constituent of the metal was found to be lead. A certain amount of antimony also was present. Minute traces of silicon, vanadium, titanium, iron, aluminium, silver, and possibly calcium, were detected. These traces probably were present as impurities in the original lead and antimony used in making the lead-antimony alloy. No tin was present.

Characteristics of the Lead Alloy Used in Bullet Cores:

In an ordinary chemical analysis of seven lead-alloy bullet cores made recently for the Inspection Board of United kingdom and Canada, the antimony content varied between 1.39 and 1.86 per cent. No other important constituents were found to be present in addition to the lead. Minute traces of metals such as those mentioned in the previous paragraph cannot be detected by this type of analysis.

A typical bullet core was examined under the microscope. The structure is shown in Figure 2. Here again there are small particles of a second phase scattered through the matrix.

Conclusion:

The above evidence would indicate that the particle of metal which was submitted for investigation was similar to the metal used in bullet cores. It is true that the photomicrographs show a greater number of second-phase particles per unit area in the case of the unknown sample than in the case of the bullet core. However, this may be due to a somewhat different antimony content or to a different previous history.

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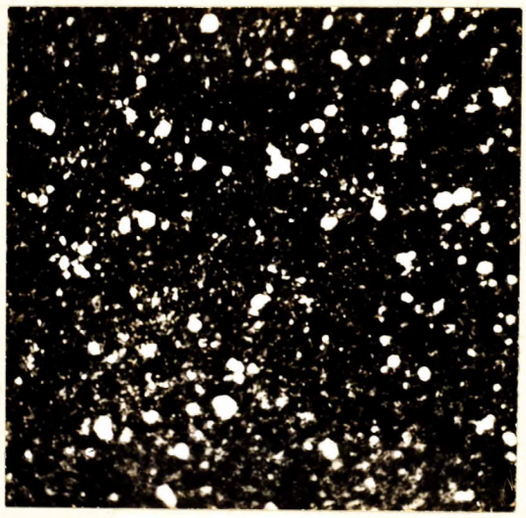
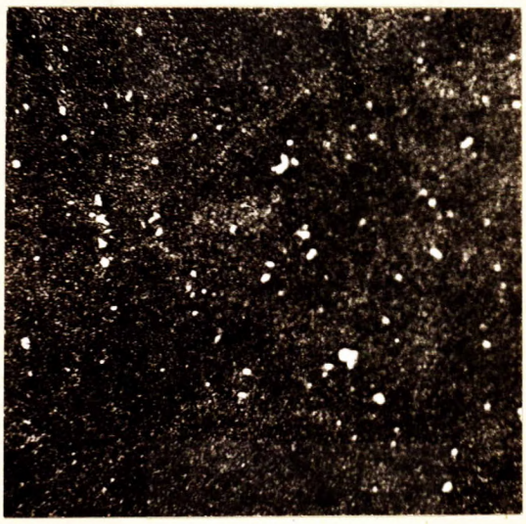
Figure 1.



X500.

UNKNOWN METAL SAMPLE AFTER POLISHING AND ETCHING.

Figure 2.



X500.

TYPICAL BULLET CORE AFTER POLISHING AND ETCHING.

Both samples were etched with a reagent consisting of 8 c.c. concentrated nitric acid, 8 c.c. glacial acetic acid, and 88 c.c. of glycerine.

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