OTTAWA March 11th, 1942.

# REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1175.

Examination of Steel Helmet, American Model U.S.M. I.

(Copy No. 13.)

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DEPARTMENT OF MINES AND RESOURCES MINES AND GEOLOGY BRANCH

METALLURGICAL LABORATORIES

BUREAU OF MINES

DIVISION OF METALLIC MINERALS

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## Origin of Request and Object of Investigation:

On March 3rd, 1942, under Analysis Requisition No. C.T. 142, a steel helmet, American Model U.S.M. I, was received from Mr. H. D. Quinlan of the Inspection Board of the United Kingdom and Canada, 479 Bank Street, Ottawa, Ontario. Chemical analysis, haraness tests, and microstructures were requested.

A photograph of this hat, 1/3 natural size, is shown in Figure 1.

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## Chemical Analysis:

The chemical analysis is given in Table I.

## Table I.

Ste	01	he	lme	to	
Amer	ic	an	mod	.01	TRACT

Desired

		12	er cent)		
Carbon	-	1.22		1.10	minimum
Manganese	-20	13.78	424	12.0	85
Silicon	-	0.36		webs that	
Phosphorus	-	0.050	-		
Sulphur	-	0.023	***	035 4/17	

### Physical Testing:

An average V.P.N. value of 486 was obtained, using a 10-kilogram load.

A magnetic deflection value of 1 inch was obtained using a very strong small magnet suspended by seven feet of cord.

## Microscopic Examination:

The microstructure of the metal is shown in Figure 2. Note the austenitic structure and also the presence of slip planes. This, of course, is to be expected.

#### Conclusions:

1. The chemical analysis is in agreement with good practice as indicated by previous investigations on this material.

2. The magnetic deflection value would indicate that the metal is in the desired condition. This is confirmed by the photomicrograph.

3. The Vickers hardness number would appear

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(Conclusions, cont'd) -

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to be higher than previously encountered. However, there are not enough data available to interpret this property in terms of ballistics.

HVK:PES.

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Figure 1.

PHOTOGRAPH OF HELMET.

Figure 2.

X100, etched in 1% picric, 5% HCl in alcohol.

PHOTOMICROGRAPH OF HELMET METAL.

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HVK:PES.

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