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GOVERNMENT LABORATORY

STATEMENT OF WITNESS

Laboratory Reference .....GPW 12835-12843, 13412-13416.....

Source Reference .....MAR RN 12000195.....

Statement of .....Dr. CHENG Yuk Ki (鄭郁棋).....

Age ..... Adult.....**Sex**.....Male .....**Telephone Number** .....2762 3739.....

Occupation: .....Forensic Scientist.....

Address: ..... Forensic Science Division, Government Laboratory, ...

..... 7/F, 88 Chung Hau St., Ho Man Tin, Kowloon, Hong Kong .....

This statement, consisting of five pages, in the English language and each signed by me, has been read over by me and is true to the best of my knowledge and belief. I have made it knowing that if I wilfully make a statement which I know to be false or do not believe to be true, I may be liable to be prosecuted for a criminal offence.

Dated the 30th day of January 2013

Signed:

I, Cheng Yuk-ki, state that I am a Bachelor of Science in Chemistry (B.Sc., Hons.) and a Doctor of Philosophy (Ph.D.) in the Faculty of Science, the University of Hong Kong. I have been employed as a chemist by the Forensic Science Division, Hong Kong Government Laboratory since September 1997. As part of my formal training, I have successfully completed The Road Traffic Accident Reconstruction Course jointly operated by the Hong Kong Police Force and the Government Laboratory (HK). Since then, I have examined and reported on numerous cases of vehicles or vehicle parts examination. I am actively involved in accident investigation, accident reconstruction and training of police officers in Hong Kong in those disciplines. I have handled several cases involving vessel accidents. I have received in-house training in Crime Scene Investigation, and I am currently responsible for attending scenes of crime. I have given evidence as an expert witness in courts of Hong Kong on numerous occasions and have been recognized as an expert witness.

Forensic Investigation Report

1. Introduction

1.1. On 25 January 2013, I was requested by the Chairman and Commissioners of Commission of Inquiry into the Collision of Vessels near Lamma Island on 1 October 2012 to further examine the glass bulbs (GPW 13412-13415) after I had testified in the Inquiry on the Statement of Witness prepared by me on 12 December 2012.

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2. Laboratory Examination

2.1. On 28 January 2013, DSPC 20778 again delivered the following light bulbs, which had previously been delivered on 19 October 2012, to this Laboratory:-

Laboratory Reference	Item
GPW 13412	One light bulb from the red light (port) of Lamma IV
GPW 13413	One light bulb from the green light (starboard) of Lamma IV
GPW 13414	One light bulb from the all-round navigation light of Lamma IV
GPW 13415	One light bulb from the masthead light of Lamma IV

2.2. I have examined the damaged glass bulbs in items GPW 13412, 13413, 13415. The purpose of my examination was to determine the chemical composition of the white and black powders recovered inside the damaged glass bulbs.

3. Results of examination

3.1. White powder attached to the long metal supports of the light bulbs in item GPW 13412, 13415 was found to be a mixture containing magnesium, sodium, chloride and oxygen (see Photograph 1 in Appendix). On the other hand, white powder attached to the filament coils of the same light bulbs was found to be a mixture containing magnesium, oxygen and tungsten.

3.2. Black (or dark purple) powder attached to the filament coils on the short metal supports of the light bulbs in items GPW 13412, 13413 was found to contain tungsten and oxygen.

3.3. White powder attached to the tail of the filament of the light bulb in item GPW 13413 was found to contain tungsten and oxygen.

4. In-house experiment

4.1. It is commonly known that electrolysis of seawater will cause deposition of magnesium hydroxide[1] on the cathode (the negative electrode). Therefore, the white powder attached to the long metal supports of the light bulbs in item GPW 13412, 13415 was likely to have originated from electrolysis of seawater as well as the precipitation of sodium chloride from seawater, resulting a mixture containing magnesium, sodium, chloride and oxygen.

[1] Hydroxide is a chemical compound containing oxygen and hydrogen. Elemental analysis of hydroxide was using scanning electron microscope could only reveal the presence of oxygen.

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4.2. To further confirm the aforementioned process, electrolysis of seawater using a broken light bulb with a direct current of 12 voltages flowing through it was conducted in the laboratory condition. Then, the broken light bulb was dried in an oven. Some white powder was found deposited on the support of the cathodeand the filament coil, but almost none on the anode (the positive electrode) (see Photographs 2 & 3). This white powder was found to be a mixture containing magnesium, sodium, chloride and oxygen, agreeing in chemical composition with those on the long metal supports of the light bulbs in item GPW 13412, 13415.

5. Conclusion

5.1. The black and/or white powders probably containing tungsten oxide were recovered from the filaments of the light bulbs in items GPW 13412, 13413, 13415.

5.2. A direct current was still flowing between the metal supports of the light bulbs in items GPW 13412, 13415, when the broken light bulbs were submerged in seawater.

5.3. The above findings provided further evidence to strengthen my conclusion that the sidelights and masthead light of Lamma IV were highly likely to have been lit before their housing was flooded and the glass bulbs were cracked by sea water.

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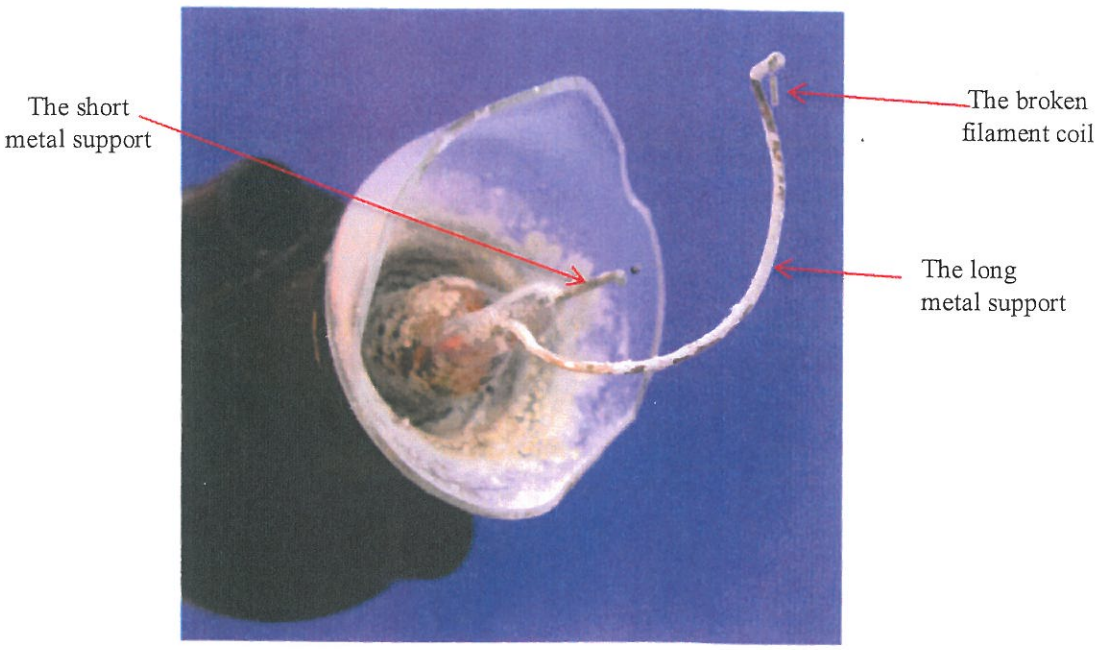
Appendix

Photograph 1 : The light bulb in item GPW 13412 depicts the long and short metal supports.



Photograph 2 : The damaged light bulb (control light bulb obtained in the laboratory) before the in-house experiment.

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Photograph 3 : White powder deposited on the metal support and the filament coil after electrolysis in seawater.

End of Statement

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