



**METRO NORTH
ORAL HEARING**

Assessment of Magnetic Field Strengths at St. James
and Comparison with Rotunda
March 2009

Metro North

**MEASUREMENT OF MAGNETIC FIELD STRENGTHS FROM LUAS AT ST
JAMES'S HOSPITAL AND COMPARISON WITH ROTUNDA DATA**

DOCUMENT HISTORY LOG

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1.0 MEASUREMENT OF MAGNETIC FIELD STRENGTHS FROM LUAS AT ST JAMES'S HOSPITAL AND COMPARISON WITH ROTUNDA DATA

1.1 Introduction

At the request of the Railway Procurement Agency CEI has carried out an assessment of the potential for electromagnetic interference with the operation of a scanning electron microscope (SEM) at the Rotunda Hospital.

1.2 Background

During a review of the installed equipment at Rotunda Hospital it was discovered that an electron microscope had a manufacturer's stated magnetic field susceptibility of 1 μ T (microTesla). The electron microscope was located at 40m laterally and 18m above the closest rail of the proposed Metro North system.

1.3 Electron Microscope

The Rotunda Hospital used a Jeol JEM-100CXII electron microscope which had the following data supplied.

"In order to maintain the guaranteed resolution and performance of the microscope, the stray magnetic field should not exceed 3 milligauss for AC and 10 milligauss for DC."

10 milligauss is 1 μ T

At the distance from the tunnel the projected DC magnetic fields is 1.6 μ T. As such, the projected field was greater than the manufacturer's stated specification.

John McAuley visited the Rotunda site on Thursday 26th February 2009. The system was viewed and discussions were held with staff operating the electron microscope. The electron microscope was used to observe samples and to take photographs using a special built in camera.

1.4 Measurements at St James's Hospital

A similar electron microscope has been in use at the St James's Hospital laboratory for several years. Whilst the electron microscope was from a different manufacturer the unit was similar in terms of age and technology. This electron microscope was located 35m linear distance from the Luas Red line. As such, this provided a suitable reference site to determine if interference would be expected.

The system at the Rotunda hospital was a Transmission Electron Microscope type Jeol JEM-100CXII 125 kV, magnification 500X to 300,000X.

The system at St James's Hospital was a Transmission Electron Microscope type Hitachi H-7100 100 CXII 100 kV, magnification 1000X - 300,000X.

Magnetic field measurements were taken at the site using an Applied Physics APS536 fluxgate magnetometer. Data from the magnetometer was recorded using a National Instruments 6015 data acquisition system and Labview 8.20 sound and vibration analysis software.

Figure 1 shows the results taken over a 40 minute period. During the measurement period eight trains passed. The survey was conducted on March 13th 2009.

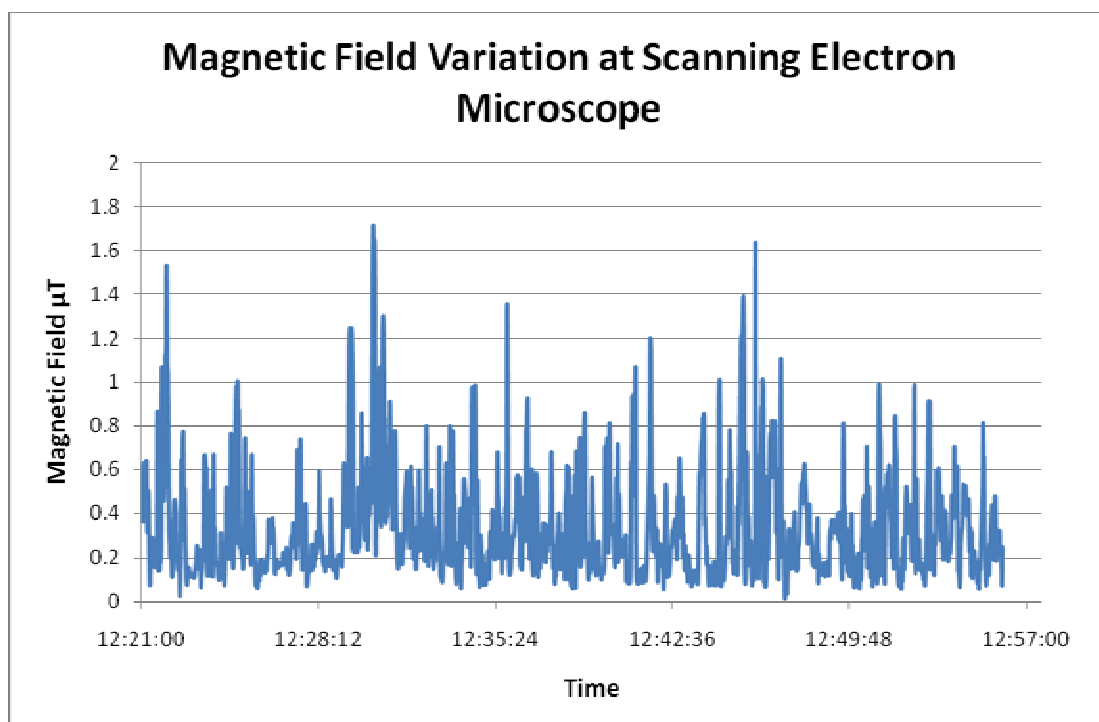


Figure 1: Magnetic Field Measurements

It was found that the magnetic field attained levels up to 1.7 μ T.

As such, it can be seen that the electron microscope was not experiencing interference from magnetic field levels equal to and greater than those predicted at the Rotunda Hospital.

The responsible manager at St James's Hospital, Mr Ronan Ward, was contacted and from his discussions with the operational staff it was determined that there was no evidence that the electron microscope was affected by passing vehicles on the Luas Red line.

1.4 Conclusions

The Scanning Electron Microscope at the Rotunda Hospital had a stated magnetic field environmental level of 1 μT DC. The predicted levels at the electron microscope location were 1.6 μT on a worst case basis at the distance of 40m laterally and 18m vertically.

Measurements at a similar electron microscope located at St James's Hospital laboratory beside the Luas Red line showed that magnetic fields attained levels of up to 1.7 μT .

The operational staff at St James's Hospital have indicated that no interference has been noticed.

As such, it is evident that there will not be interference issues with the electron microscope at the Rotunda Hospital because of magnetic field emissions from the proposed Metro North project.



Photograph 1: Outside electron microscope Room



Photograph 2: Relationship between Luas and Electron Microscope Room

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