In-situ analysis of heat exchanger materials at Calder Hall Magnox power station, Sellafield, UK (1996)

Overview of application

A FO-LIBS instrument was used to analyse the mild steel plates which form part of the lower section of the heat exchangers at the Calder Hall power station. Semi-quantitative measurements of the aluminium concentration of the steel plates were carried out. Although this type of measurement could normally be achieved using portable X-Ray Fluorescence (XRF) instruments, the background gamma radiation levels were such that an XRF instrument was not able to function correctly. The all-optical analysis process of LIBS, however, is unaffected by gamma radiation.

Calder Hall Magnox nuclear power station, Sellafield, UK

Location:	Calder Hall Magnox Power Station, Sellafield, Cumbria, United Kingdom
Inspection task:	Elemental characterisation of steam generator mild steel outer vessel, in particular the aluminium content
Environment:	External to building outside of radiation controlled area
Location of material:	Lower section of one steam generator, located outside of the building and accessed via an open stairway
Access:	Fibre-optic LIBS probe of length 30 m with laser / spectrometer located in a van parked below and adjacent to the steam generator.

FO-LIBS instrument design

This FO-LIBS instrument was of the compact, single-fibre design described elsewhere on the APL website. The instrument had an umbilical of length 30 metres. During a typical measurement the hand-held probe was placed in contact with the steel plate as illustrated below.

Applied Photonics Limited Unit 8 Carleton Business Park, Skipton, North Yorkshire BD23 2DE United Kingdom
Telephone: +44 (0)1756 708900 **Email:** mail@appliedphotonics.co.uk **Website:** www.appliedphotonics.co.uk

Deployment of the FO-LIBS instrument at Calder Hall nuclear power station

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Applied Photonics Limited Unit 8 Carleton Business Park, Skipton, North Yorkshire BD23 2DE United Kingdom
Telephone: +44 (0)1756 708900 **Email:** mail@appliedphotonics.co.uk **Website:** www.appliedphotonics.co.uk