Changing workload for Highly Active Analysis

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Introduction

• Sellafield Analytical Services currently carries out 300,000 determinations per year on 100,000 samples;
  – Current work is scheduled, regular, consistent and mainly known matrix
  – Customer expectation is well established, understood and met
  – 10% of overall workload is specific to SNM analysis
  – 18% of overall workload is “non-routine”
• High β/γ activity samples accounted for an average of 200 samples per week over the 2014/15 period.
• Currently operating two higher activity facilities
  – A suite of HA & MA cells in the main Analytical Services Laboratories
  – A dedicated HA cell facility within the THORP reprocessing plant
  – At present the cells are used for dose reduction as opposed to analysis
Analytical Services - New Challenges

Reprocessing & Effluents
- Known / defined matrices
- Known activities
- Well-defined “fingerprints”
- Small samples
- Usually < 5 analyses per sample
- Current AS methods are tailor made

Is the plant working as it should?

POCO & Decommissioning
- Unknown / unusual matrices
- Variable activities
- Little previous data
- Large samples
- Sometimes > 50 analyses per sample
- Current AS methods are sometimes unsuitable

What is this stuff?

A Nuclear Management Partners company operated under contract to the NDA
Analytical Services - New Challenges

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Sellafield Ltd
Analytical Services - New Challenges

- Each sample was subject to over 50 different determinations.
Change in Facility

- The current AS facility is approaching 70 years old and is in terminal decline.
- Over the next 10 years operations will be progressively transferred to a new facility.
- This will feature a new HA cells facility and supporting MA module.
Change in Philosophy

- At present the AS HA cells are primarily used for dose reduction by sub-sampling and dilution of samples.
- The plan going forward is for more analysis to be carried out in cell as outlined in the analytical hierarchy.
- Investing in the development of non-destructive technologies, including:
  - Gamma Spectroscopy
  - LASER Induced Breakdown Spectroscopy
  - Raman Spectroscopy
New Facility – Equipment Philosophy

• In the new facility equipment will be installed in one of two ways;
  – Complex / expensive items will be modified such that only the portions in contact with samples will be inside the cell.
  – Simpler / cheaper items will be installed wholly in cell and treated as disposable.
New Facility – Proposed Equipment

• Cell 1 – Instrumentation / Analysis Cell
  – Non-destructive Analysis Workstation
    • LIBS system
    • Raman spectrometer
    • Gamma (γ) Spectrometer
    • Hybrid K-Edge system
    • X-Ray Fluorescence system
    • Neutron (η) coincidence counting
New Facility – Proposed Equipment

- Cell 2 – Sample Preparation Cell
  - Analytical grade balance
  - Laser sampling apparatus
  - Sample dissolution apparatus
  - Centrifuge
  - Ultrasonic bath
  - Digital Optical Microscope
  - Radiation Monitoring equipment
New Facility – Proposed Equipment

• Cell 3 – Experimental Cell
  – Inert atmosphere capsule
  – This cell will be equipped as required on a project by project basis
New Facility – Proposed Equipment

• MA Cell Module
  – Proposed equipment includes;
    • Elemental analysis – ICP-OES or ICP-MS
      – including laser ablation sampling system for solids
    • Scanning Electron Microscope
    • Gamma Spectrometry
    • Particle size analyser
    • Ion chromatography systems
New Facility - Challenges

• The new facility is required to support High Hazard reduction activities from 2019 onwards.
• The current proposal is for a shared facility which will require integration of programmes.
• The HA cells are already constructed and partially commissioned but will require adaptation for AS purposes.
• Suitable waste routes need developing and putting in place.
Thank you for your attention

• Any questions?