Operation of the Analytical Services H.A. Laboratory and Dispensary

Peter J. Watson

Date: Wednesday, 28 October 2015
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 $\beta/\gamma$ 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
Remote Handling

- In cell operations in both facilities are carried out using Wälischmiller A202 Master Slave Manipulators (MSMs)
The ASL HA / MA Cells Facility

Constructed in 1989 the facility features:

- 2 Flasking Stations
- 2 Connected HA Cells
- 6 Connected MA Cells
- A Pneumatic Transfer System (PTS)
- An in cell ICP-OES instrument
- A supporting Fumehood area
- A MSM Workshop
- An Operator Area
The ASL HA / MA Cells Facility

Samples come to the ASL facility from across the Sellafield Site

- **HA Samples**
  - High Activity Evaporator Liquors
  - Dissolver Liquors from Magnox & THORP
  - Magnox High Activity Raffinate
  - Centrifuge cake (THORP)

- **MA Samples**
  - THORP Raffinate
    - *After dilution in THORP HA*
  - MSSS Silo Liquors
  - Legacy Pond Sludges
  - THORP Sump liquors
  - Lower activity Magnox liquors
The ASL HA / MA Cells Facility

- Depending on the source samples can be delivered to the ASL facility by:
  - Shielded 2 tonne Flask
  - various shielded Castles
  - or by PTS directly to the MA cells from THORP
ASL HA/MA Analytical Methods

• Quality Assured Analytical Methods (QAAMs) are used alongside a number of other supporting methods. These include:
  – Sample Preparation for Determination of U and Pu by TIMS
  – Determination of Total Solids remaining at 1000 °C
  – Determination of Acidity in Plant Solutions
  – Elemental Analysis by ICP-OES
  – Determination of Suspended Solids
  – pH of MA samples

• Samples are also dissolved and diluted for further downstream analysis in the ASL fumehood and instrument laboratories
• Additionally MA Cell 6 is used for occasional experimental work
The ASL MA Facility

- A large proportion of the work carried out in the MA Cells is to achieve dose reduction prior to downstream analysis.
- Prepared samples are removed from the MA cells manually.
- To allow this there is man access to the back of the MA cells controlled by interlocks and in cell gamma monitoring.
In Cell ICP-OES Instrument

- A new inductively coupled plasma, optical emission spectrometer is being installed in the MA Cell facility.
- In order to maintain containment the bulk of the instrument is outside the cell with an optical window into Torch box.
- There is manned access via glove ports for setting up and maintenance of the instrument.
- Excess sample material is removed via PTS prior to access in order to reduce dose uptake.
The THORP HA Cells Facility

- The THORP HA Cells provide a dedicated service to the Thermal Oxide Reprocessing Plant.
- The facility consists of 2 cells that receive samples directly from a number of autosampler systems.
THORP HA Analytical Methods

- As in the ASL facility, THORP HA operate a number of QAAMs and supporting methods including:
  - Determination of Free Acidity
  - Determination of Suspended Solids in THORP HA Liquors
  - Sample Preparation of Determination of Pu and U by TIMS
  - Determination of Specific Gravity by Weight

- Samples are also dissolved and transferred via PTS to the ASL MA facility for further processing and downstream analysis.
Thank you for your attention

• Any questions?