

PROGRESS TOWARDS THE FIRST EXPERIMENT IN NNL CENTRAL LABORATORY HOT CELL FACILITY

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ABSTRACT

NNL's hot cell facility in Central Laboratory (Sellafield, UK) was designed and constructed during the late 1990's / early 2000's. It consists of a flask import / export bay, a cell preparation area, five experimental cells each equipped with two MSM arms and service connections and a cell decontamination area. Due to the restructuring of BNFL the facility was not commissioned immediately following construction. Customers for part of the facility have now been identified.

This presentation describes preparations for the first experiments in the hot-cell facility, during October 2017. Irradiated fuel samples will be prepared in the NNL Windscale Laboratory (Sellafield, UK) and flasks into the Central Laboratory. Dissolution and isotopic spiking experiments will take place in cell before transferring liquors into other parts of the facility for radiochemistry and analysis. The total programme will run over several years and will require full commissioning of much of the facility.

1. Items presented in poster

1.1 Overview / history

NNL Central Laboratory consists of four distinct areas; a non-active area with office space, workshops and chemical laboratories, a set of low inventory active laboratories with fumehoods and gloveboxes, a medium inventory (high alpha) glovebox facility and a hot cell facility for high gamma dose work.

A phased commissioning process has been followed over a number of years. The non-active area was formally opened in 2003, the low inventory laboratories in 2006 and the medium inventory laboratories are currently undergoing final commissioning. Customers and a business case have now been secured for the final phase, i.e. the hot cell facility. The first experiment will involve dissolution and analysis of used reactor fuel.

This poster describes the hot cell facility, commissioning activities in preparation for the first experiment and indicates the wide variety of work to be performed in-cell.

1.2 Through the Facility

The Central Laboratory hot cell facility is made up of a dedicated flask handling cell, five discrete modular hot cells, a commissioning area and a decommissioning cell.

The commissioning area is designed to prepare an experimental setup in a non-active environment.

The flask handling cell has the capability to receive flasks before transferring material on to the required hot cell.

The modular cells each have two Carrs VNE80 manipulators and have a bank of remote connections which allow experimental equipment to be connected to an external remote control. Each cell has a fully filtered air supply and extract to ensure there is no cross contamination between cells.

The decontamination cell will have the experimental cells directly connected to the back of it to allow transfer of contaminated waste out of the cell through remote handling. The waste can then be decontaminated to a lower classification of waste or flasks out as ILW. The

empty module is then taken for final decontamination, carried out by operators, to ensure the cell is fully clean and ready for a new experiment.

1.3 Unique Aspects of the Facility

The hot cell facility has been designed with experimental research and development in mind. It features a modular design, specifically created to allow experimental setup and non-active testing before use, followed by segregated decontamination once an experimental campaign is complete.

With 5 discrete cells available this provides the facility with an excellent level of flexibility when it comes to managing work and providing a capability to our customers.

This approach also provides an extremely clean environment to start new work packages, minimising the risk of contamination from previous experiments, which is a long standing problem of other hot cell facilities.

1.4 Commissioning Activities

Commissioning activities will be supported by a range of different teams and disciplines, in order to ensure that the facility is fit for purpose when commissioning is complete. These activities will include non-active testing followed by trace active testing before the first experiment commences.

1.5 First Experiment

The first experiment taking place within the Central Laboratory hot cell facility will include complex wet chemistry operations such as fuel dissolutions, spiking and dilutions. There will also be a range of downstream activities performed after export from the hot-cell, which will utilise many of the capabilities of NNL Central Laboratory, such as high precision mass spectrometry by MC-ICP-MS.

1.6 Figures

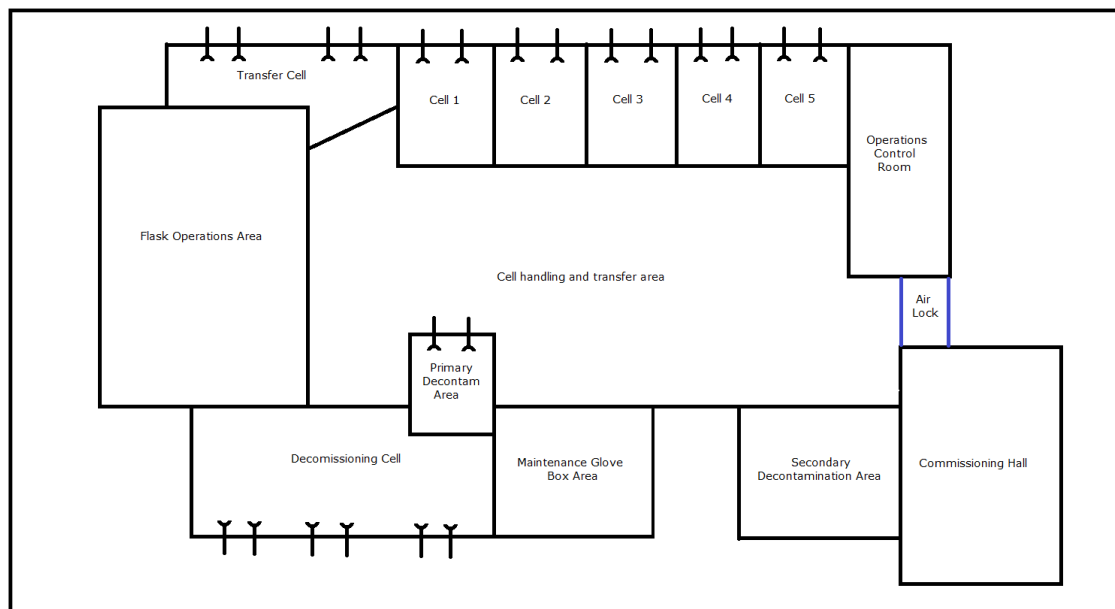


Fig 1. Schematic of layout of NNL Central Laboratory hot cell facility

1.7 Photographs



Photographs included in poster: Clockwise from top left, (1) Outside Central Laboratory, (2) Inside cell handling and transfer area, (3) Typical cell face, (4) Experimental cell withdrawn from cell face, (5) Experimental cell in transit, (6) MSMs mounted on cell window mock-up for practice/training purposes, (7) Flask operations area.