



**HM NUCLEAR INSTALLATIONS INSPECTORATE  
SELLAFIELD, CALDER HALL AND WINDSCALE  
WEST CUMBRIA SITES STAKEHOLDER GROUP**

**QUARTERLY REPORT FOR 1 APRIL 2009 – 30 JUNE 2009**

**FOREWORD**

This report is issued as part of the Health and Safety Executive's commitment to make information about inspection and regulatory activities relating to the above sites available to the public. It is for distribution to members of the West Cumbria Sites Stakeholder Group (WCSSG) and covers activities associated with the regulation of safety at Sellafield, Calder Hall and Windscale.

These reports are distributed quarterly and will be available on the Internet. Site Inspectors of HM Nuclear Installations Inspectorate (NII) attend WCSSG meetings and will be happy to respond to any questions raised there. Any other person wishing to inquire about matters covered by this report should contact HSE, Nuclear Safety Directorate Information Centre on 0151 951 4103.

This report will be put onto the HSE Website at <http://www.hse.gov/nsd/nsdhome.htm> under "Local Liaison Committee Reports"

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The format and contents of this report for the WCSSG is dictated by the range and scope of plants on the licensed sites reported therein and is structured along the following lines:

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## **1 INTRODUCTION**

### **1.1 Changes to HSE's Nuclear Directorate**

As reported previously, the Government has put forward proposals to change the status of HSE's Nuclear Directorate (ND) to that of a Statutory Corporation under the auspices of the HSE. This is intended to enable ND, as the independent nuclear regulator of safety and security, to better meet the challenges of a changing nuclear industry over the coming years. The changes are to provide the nuclear regulator with greater flexibility and increase the accountability, transparency and openness of nuclear regulation. The Government are proposing that the statutory changes needed to bring this about will be made by a Legislative Reform Order (LRO).

This builds on the outcome of the Government initiated review of the UK's nuclear regulatory regime, led by Dr Tim Stone. The Summary Recommendations and the Government's response (<http://www.hse.gov.uk/nuclear/stonereview.htm>) were published at the end of January 2009.

A public consultation, run by DWP and DECC, on the LRO was launched on June 30th for a 12 week period, which gives the opportunity for stakeholders to comment on the proposals. ([http://decc.gov.uk/en/content/cms/consultations/hse\\_restruct/hse\\_restruct.aspx](http://decc.gov.uk/en/content/cms/consultations/hse_restruct/hse_restruct.aspx))

These new arrangements will not change the substance or standards of regulation or compromise the independence of the nuclear regulatory body, and will not affect the decisions it takes or the international obligations the Government requires it to meet.

Subject to the outcome of the consultation and Parliamentary approval, and if the Parliamentary timetable permits, the aim is to bring the new body into being during 2010.

An internal change programme is currently operating within ND to ensure that the ND is ready to operate as a statutory corporation from spring 2010. This programme does not in anyway compromise the current regulatory activities of ND.

### **1.2 Number of Site Visits by Inspectors**

NII Inspectors made a total of 80 visits to the Sellafield, Calder Hall and Windscale sites during the quarter. This involved a total of 298 days on site (see Table 1 for details). The more significant issues identified during these inspections are summarised below.

## **2 SELLAFIELD LTD**

### **2.1 GENERAL MATTERS**

#### **2.1.1 PAIS Recommendations and Change Programme**

We have continued to monitor the activities of the Partner Assess Innovate and Sustain (PAIS) teams, which consisted of Sellafield staff and members of the consortium companies of NMPL. The work of the PAIS teams concluded at the end of

March 2009 and a copy of their final report was received by NII in April 2009.

We have engaged with the Sellafield Executive as it has considered the recommendations in the PAIS report and sought to plan and prioritise how they should implement the PAIS team findings. An Integrated Change Programme (ICP) is being developed, which will be the means for coordinating the various changes that will result from the PAIS work. The ICP and supporting project plans are still in preparation and we expect this work to conclude towards the end of July 2009.

The developed ICP will be considered during the next quarter and will help us to target our effort in this area to ensure that nuclear safety is given appropriate consideration.

### **2.1.2 Lifetime Plan**

Sellafield has produced 10 Safety, Security and Environmental Impact (SSEI) assessment reports, plus an overarching summary document. They record the potential effects of project deferrals at high hazard facilities between the plans made in 2007 (LTP07) and the revised 2009 plan (LTP09). The findings of these reviews, together with consideration of deliverability based on historic performance, will inform the build of the new contractual LTP10 for the site. The reports have not fully justified deferrals, but contribute to the prioritisation process. We are currently assessing the SSEI reports.

The Government has asked us and the EA to work with the Nuclear Decommissioning Authority, Sellafield Ltd and senior officials from relevant Government departments to focus on the key strategic and operational issues around the high hazard facilities. Although our assessment of the SSEI reports is not yet complete, we have informed the Government's Sellafield Remediation Forum that key risk reduction retrievals enabling projects should not be delayed. Sellafield Ltd has identified age-related, cliff edge effects for the certain facilities. Therefore, the licensee is giving priority to projects that are essential to reduce the risk of structural failures and other age related faults that could give rise to loss of containment.

NII is maintaining oversight of the development of the LTP10 build and assurance process to provide advice and ensure that safety is not compromised.

### **2.1.3 Sellafield Level 1 Emergency Exercise 'Jay'**

Level 1 Emergency Exercise 'Jay' was carried out on the 12<sup>th</sup> May 2009 to demonstrate the Sellafield Limited (SL) response under the Emergency Plan to an incident within Thorp. A number of NII inspectors observed the exercise from a variety of locations on the day. Although it was considered that the licensee implemented its arrangements in response to the exercise scenario, the inspectors were disappointed with the performance observed. A re-demonstration was not requested by NII as it was recognised that a number of site emergency exercises were already scheduled over the next 6-months, combined with the fact that the licensee fully recognised the areas of poor performance. NII indicated that a marked improvement would be required for the next observed exercise in November.

The main issues arising from the exercise related to:

- Evidence of poor command and control at each of the various control centres

- on the site
- The lack of challenge presented by the scenario
- The protracted period associated with recovering the casualty
- Evacuation of employees – route taken

NII has asked the licensee to undertake a fundamental review of its performance at each of the control centres and develop an improvement plan to deliver sustained improvement. Areas that it should consider include selection of individuals that fulfil key roles, improved exercise regimes, challenge presented by exercise scenarios and embedding of learning. An improvement plan is being produced and we will keep the Site Stakeholder Group informed accordingly.

#### **2.1.4 Joint team NII/EA Aqueous Waste Inspection of Sellafield site**

During the latter part of June NII joined with EA and 2 members of the Radiation Protection Institute of Ireland in an inspection of aqueous wastes across the Sellafield site, which focused on compliance with discharge authorisations and items associated with the integrated waste strategy.

RPII was very pleased to be involved in the audit and complimented the seamless joint working of the team. A number of messages were conveyed to the Sellafield Executive as a result of the inspection:

- No non-compliances were identified
- Management on site had some significant good practice, including improved knowledge of waste behaviour
- Well managed waste requires fit for purpose waste storage, and a storage strategy of 'can it fit here' must not be adopted.
- Good integrated waste management has to include reliable delivery and must consider alternative solutions - not putting all your eggs in one basket

A full report of the inspection will be available in September.

#### **2.1.5 NII Coordinated Inspection Topics**

During the year, NII will be undertaking a series of coordinated inspection activities at Sellafield that will focus on particular topics during each quarter. They are as follows:

- April to June – Training (LC10) and DAP's and SQEP's (LC12)
- July to September – Operating Rules (LC23)
- October to December – Emergency Arrangements (LC11)
- January to March – Examination, Inspection, Maintenance and Testing(LC 28)

The outcome of the inspections on Training and Control & Supervision are still being assimilated and the results and final conclusions will be provided to the Site Stakeholder Group in NII's next report.

#### **2.1.6 Sellafield Integrated Waste Strategy**

This has been submitted to NII, our assessment has yet to be completed, but a brief review has indicated it contains little by way of target setting or strategic approach to

improvements.

### **2.1.7 Management of Contractors**

Along with Sellafield Ltd, and Stobbarts, NII has undertaken a series of presentations to contractor organisations that work on the licensed sites to highlight important learning points from recent incidents that have involved contractors. Some of the key messages included:

- Contractors should not use Sellafield Ltd's management systems as a substitute for their own.
- Site Licence Conditions apply to all employees on site and contractor organisations have a legal duty to ensure that they and their employees comply with the requirements of all the Licence Conditions.
- Contractors should challenge the licensee if they are uncomfortable with any aspect of safety advice/instruction provided by Sellafield Ltd.
- A cultural change is required within contractor organisations to ensure that challenge is offered where there is concern or uncertainty.
- Organisations should ensure they have individuals trained to undertake investigations when events occur, reliance should not be placed on Sellafield Ltd's process.

### **2.1.8 Disciplined Operations Manual**

Following NII's intervention, Sellafield Ltd has undertaken a benchmarking exercise against international standards in all aspects of Conduct of Operations. This has culminated in the licensee producing an early draft Disciplined Operations Manual, which we hope will set a world class definitive standard for nuclear operations on the site. We will continue to work with Sellafield Ltd in this area, as we see it as a fundamental building block in establishing consistent good nuclear safety performance across the site.

NII has previously commented on the new governance structure involving the Heads of Manufacturing and we consider they have a key role in the implementation process for this manual. We will be looking to confirm the effectiveness of this over the coming months. Although the manual covers operational standards, NII anticipates that its implementation will drive up standards in many other areas.

## **2.2 INCIDENTS**

### **2.2.1 WVP Line 3 Shield Door Event**

NII has previously advised about the fault that occurred on the Waste Vitrification Plant (WVP) Line 3 shield door interlock system in September 2009, where inadvertent uncontrolled movement of two shielded trap doors and other hydraulically-driven components occurred. Nobody was injured or received any radiation dose.

During the quarter NII has been worked with Sellafield Ltd on the return to service of Line 3 and this matter is explored elsewhere in this report under WVP Operations. Our investigation into the event is still ongoing and although we have not yet reached any final conclusions, our initial thoughts are that Sellafield Ltd's investigation of the 2008 Line 3 event was thorough and well presented, but it appears the licensee did not fully

address the findings of its investigation into the related Line 1 shield door event, which occurred in 1998, with respect to respect the safety case for Line 3 shield doors.

NII will report the conclusions of its investigation to the WCSSG in due course.

### **2.2.2 First Generation Magnox Storage Pond**

We have previously advised the Stakeholder Group regarding the Improvement Notice NII served on Sellafield Ltd earlier this year following the incident in the First Generation Magnox Storage Pond, which involved the uncontrolled movement of the skip handler in November 2008. We have now confirmed that Sellafield Ltd has complied with the requirements of the Improvement Notice, in that it has made sufficient improvements to its assessment of the risks to health and safety associated with the skip handler, and closure of the Improvement Notice was occurred on the 30 June 2009.

NII is currently working towards issuing a Licence Instrument to allow Sellafield Ltd to proceed with skip handler gantry rail refurbishment in the First Generation Magnox Storage Pond. This is important enabling work to support the return to service of the skip handler. An operational skip handler is required to support the retrieval of pond inventory.

### **2.2.3 THORP Flask Incident – April 2008**

HSE's conclusions as a result of its investigation into this incident are still to be finalised. It is anticipated that they will be available in the latter part of 2009.

### **2.2.4 HALES Disruption of Cooling Water Supply 1 April 2009**

NII has previously advised of the event that resulted in the temporary disruption of cooling water supply to HALES, when a valve was opened inadvertently causing cooling water to be transferred to a delay tank via an underground pipeline instead of the components within HALES. The event also led to a quantity of cooling water (inactive) being discharged to ground because of a rupture in the underground pipeline.

During the quarter NII started a formal investigation to understand the immediate and underlying causes. NII has not yet concluded its investigations and we will convey the outcome to the WCSSG on completion. However, NII is able to confirm the following interim findings:

- The valve in question was one of a number that had been isolated to enable HALES' engineers to carry out maintenance work.
- The immediate cause of the event was that the person tasked with removing the isolations and reconfiguring the plant opened the valve because the position to which the valve should have been returned had not been communicated to him effectively.
- Sellafield Ltd's response to the event was good, and cooling water was restored well within the time limits stated in the safety case.
- The rupture to the underground pipeline was caused by the drilling of a borehole in March 2009. This matter is the subject of a separate NII investigation the

outcome of which will be also reported to the WCSSG.

NII expressed concern to Sellafield Ltd that the event appeared to share elements that are common to a number of other recent HLWP events raising questions as to whether routine operations were being effectively controlled in HLWPs. NII has scheduled a meeting with Sellafield Ltd to discuss its concerns and the outcome of this meeting will be covered in the next report to the WCSSG.

### **2.2.5 Thorp Breaches of Operating Instructions**

During the quarter, the licensee reported that 3 breaches of operating instructions had taken place within the Thorp facility. Operating instructions form one of the lines of defence for nuclear safety and compliance with these documents is important. NII discussed this issue with the licensee who is currently investigating the events. The results of this investigation are to be reported to NII during the next quarter.

### **2.2.6 Magnox - Contaminated Water Leak from Condensate Pipe**

This event was highlighted in our previous report and a joint investigation will be carried out by NII and EA in the coming months.

### **2.2.7 PF&S Loss of Power due to Water Leak**

During the reporting period, automatic fire alarms were activated in the PF&S Stores when water leaked from an emergency shower onto electrical distribution boards below. Certain electricity supplies were lost and the affected building was evacuated. Two electrical distribution boards were affected, with one badly damaged. Temporary electrical supplies were installed and most of the affected systems were restored later that day pending permanent repairs. Nuclear safety was not compromised, there was no release or spread of radioactive material and no-one was injured.

Sellafield Ltd prepared a recovery plan of several weeks duration and measures have been put in place to ensure that water ingress into the switch room can no longer occur; it has removed the redundant emergency shower, and confirmed that there are no other similar installations above switch rooms.

## **2.3 MAGNOX REPROCESSING OPERATIONS**

### **2.3.1 General**

Decanning and reprocessing of Magnox fuel did not take place for much of the quarter. This was to avoid exceeding the airborne discharge limit for the radioactive substance Antimony-125, as authorised by the Environment Agency. The discharge of this substance is undertaken on a routine basis and is of negligible safety significance. The licensee's monitoring arrangements indicated the potential for breaching the authorisation limit and it took positive action to prevent this whilst consulting with the regulator.

### **2.3.2 PF&S Conduct of Operations Intervention**

This intervention aims to implement strategic improvements to a number of areas of the Conduct of Operations in PF&S. The current level of performance will be

determined through targeted inspection by HSE and self audit by Sellafield Ltd for the purpose of establishing a benchmark against the current IAEA Safety Standard. The key areas to be addressed are:

- Management and organisation of plant operations
- Shift complement and functions
- Shift routines and operating practices
- Control of equipment and plant status
- Operations Equipment and Operator Aids
- Work control and authorisation

Several teams including PF&S managers, representatives from all of the shift teams, and Sellafield Ltd Site Inspectors have carried out a programme of inspections to identify gaps between current operations and best practice. A gap analysis was carried on the inspection findings, the largest gaps were identified, and the analysis results were presented to NII. Sellafield Ltd has undertaken to produce a detailed improvement plan based on the gap analysis for PF&S Conduct of Operations by the autumn. NII has indicated to Sellafield Ltd that the early development of appropriate Process Safety Indicators is essential for monitoring the progress of the PF&S Conduct of Operations intervention. NII intends to carry out its own baseline inspection on the Control of Equipment and Plant Status against the IAEA guidance on Conduct of Operations during August.

## **2.4 THORP OPERATIONS**

### **2.4.1 THORP OU Activities**

#### Shearing Operations

Fuel shearing continued during the period, with about 117 tonnes of fuel sheared. Sellafield Ltd aimed at reaching the 300 tonnes limit contained in the Licence Instrument associated with evaporator C by the end of July 09. Thorp will then be in outage for several months to allow the inspection of evaporator C on high level waste plant.

#### MASFE

At the time of this report, the licensee is still working towards routine operation of this plant.

### **2.4.2 Multi-Element Bottle (MEB) Export**

Sellafield Ltd continued to remove empty Multi Element Bottles (MEBs) from the receipt and storage ponds. During the quarter, a further 16 MEBs were exported to the MEB interim store, in line with the target. Some useful data was collected on the more active MEBs, which will allow Sellafield Ltd to further inform the safe operating envelope of the plant. The licensee expressed its intention to apply for Consent to move the plant into routine operation later in the year.

### **2.4.3 General THORP Matters**

In this reporting period, routine inspections mainly covered associated maintenance,

asset care, chloride ingress in receipt and storage ponds, ponds integrity, training and control & supervision.

#### Maintenance/Asset Care

NII carried out the first in a series of inspections planned to evaluate whether Sellafield Ltd's maintenance and asset care effort is effectively supporting the life extension of the plants proposed in the enabling plan. This inspection covered Thorp receipt and storage which could be used in the future as long term storage for fuel.

#### Pond Operations

A joint inspection was carried out with EA to check the work undertaken by Sellafield Ltd to identify sources of chloride ingress into the receipt and storage ponds. An increased chloride concentration in the pond water can give rise to fuel corrosion and hence affect fuel integrity. Sellafield Ltd has undertaken a detailed review of the potential sources of chloride and the 2 sources deemed the more credible have been eliminated.

The increased leakage rates from the receipt and storage ponds, reported during the last quarter, were confirmed to be due to the drop in pond water temperature caused by increased pond purge rates. These increased rates had been temporally introduced to reduce pond water chloride levels.

#### LTPR Slippage

Sellafield Ltd reported that it couldn't deliver the First Generation Oxide Fuel Storage Pond long term periodic review (LTPR) on schedule due to a lack of technical resource. NII expressed its concern regarding this new slippage in delivering LTPR. This matter will be progressed with Sellafield Ltd at the periodic LTPR meetings.

#### Training and Control & Supervision

This is the first quarterly coordinated inspection topic and as indicated earlier, the assimilated finds of this inspection accounting for all areas inspected across site will be provided in our next report.

NII reviewed the progress made by the licensee in clearing the actions raised during NII's inspections. These actions and the associated completion dates are agreed with Sellafield Ltd's management at the end of each inspection and a large proportion of actions were confirmed as overdue. A letter has been sent to Sellafield Ltd asking for measures to be taken to improve the situation.

#### **2.4.4 Oxide Operating Strategy Regulatory Forum (OOSRF)**

During the quarter, the 6th OOSRF was held. Useful information was exchanged and important issues discussed. Both NDA and Sellafield Ltd agreed that the development of an oxide fuel strategy is difficult and complicated. Its direction is dependent on evaporative capacity, which is uncertain. NDA has initiated a study of credible options for spent AGR fuel management to underpin strategy development. NII has been discussing with Sellafield Ltd how it will show that it is implementing NDA's strategy. Overall, NII was satisfied that there have been improvements to the way the Oxide Fuel Strategy is being managed, developed and decisions made.

#### **2.5 HIGH ACTIVE LIQUOR WASTE PLANTS**

## 2.5.1 Highly Active Liquor Evaporative Capacity

### Existing HA Evaporative Capacity: Evaporators A, B and C

Three evaporators within HALES (referred to as Evaporators A, B and C) are used to evaporate High Active (HA) raffinate produced during reprocessing and to process effluent from WVP. Once concentrated through evaporation, the raffinate is called Highly Active Liquor (HAL). HAL is stored in the HALES facility prior to feeding to WVP for vitrification, which immobilises the waste for long term storage and eventual disposal. The status of the evaporators early in 2009 was:

- **Evaporator A:** is shut down but available for use on HALES/WVP effluents and Magnox raffinates at low throughput rates since the only heating surface available is the base jacket.
- **Evaporator B:** has continued to process Magnox raffinates since mid January 2009 after being permissioned for use on HALES/WVP effluents and Magnox raffinates. During May, processing was interrupted following concern that one of the two remaining operational coils had developed a leak and was allowing the ingress of active liquor into the cooling water. After a thorough investigation, it was conclusively confirmed that no leak existed and processing recommenced.
- **Evaporator C:** has operated successfully on its permissioned oxide duty.

### New HA Evaporative Capacity: Evaporator D

NII is continuing to assess the pre-construction safety case for Evaporator D main build which was received in December 2008. NII permissioned the commencement of construction of the structural foundation in May and construction started shortly afterwards. The Evaporator D project has informed NII that it intends to make a modification to the design of Evaporator D to enhance its solids-handling capability for post-operational clean out. The documentation to support this change is expected within the next few months.

## 2.5.2 HAL Stocks

A NII Specification has been in place since 2001 to limit the amount of Highly Active Liquor (HAL) that can be stored at any time and to promote HAL stocks reduction. A revised Specification (No 679), replacing Specification 343, was issued on 29<sup>th</sup> October 2007 to lock-in the gains arising from the unplanned THORP shutdown following the Feed Clarification Cell event of 2004-5, which is available on HSE's HAL Storage web page (<http://www.hse.gov.uk/nuclear/halstorage.htm>).

Our latest (2008) biennial NII review of HAL stocks has now concluded. In this review NII considered, among other things, whether the long-term steady state (post 2015) limits used in the Specification are set too tightly to allow HALES to operate efficiently. The review concluded that some loosening of this aspect of the Specification is necessary in order to maximise the rate at which HAL can be vitrified. However, the extent of this loosening depends on further technical analysis now being undertaken by Sellafield Ltd.

The review also considered, in the light of Sellafield Ltd's operational experience

working with the revised Specification, whether the forms of limit used therein can be improved upon in the interests of safety. Specifically, the review looked at adopting limits based on the mass of uranium in the unprocessed fuel from which the HAL was derived (as per the Oxide limit in Specification 679) rather than limiting the volume of HAL. Changing the Specification in this manner will facilitate the Post Operations Clean Out (POCO) of redundant Highly Active Storage Tanks (HASTs) since the wash-out liquors necessary for tank clean-out (predominantly water and acid), which currently make a significant contribution to the volume of HAL, pose a relatively minor hazard. Early progress with POCO will also allow blending of the wash-out liquors with HAL, which should minimise the ultimate volume of vitrified waste. NII's review concluded that changing the Specification to use uranium masses does have safety advantages and so is to be pursued. A summary of our 2008 biennial review will have been included as Addendum 1 to this report and will also be available on HSE's HAL Storage web page in due course.

Discussions have been initiated with Sellafield Ltd in regard to the timing of any change to Specification 679. It is expected that a single change to the Specification, encompassing both a change in the form of limit applied and looser long-term steady state limits, will be applied before April 2010. The timing of this change is however uncertain as it depends on the outcome of further supporting technical analysis currently being undertaken by Sellafield Ltd.

Sellafield Ltd continues to provide NII with monthly reports summarising the quantities of HAL contained in the HASTs. These figures, supported by our inspection activities, are used by NII to confirm that Sellafield Ltd is complying with the HAL Stocks Specification.

### **2.5.3 Highly Active Storage Tanks (HAST)**

Sellafield Ltd's strategy for the future safe storage of HAL includes providing replacement HASTs as a contingency against further cooling component failures and as a means of increasing the rate at which HAL can be vitrified. NII is supportive of Sellafield Ltd's revised strategy and the work now being undertaken to review the design options for new replacement HASTs.

### **2.5.4 HLWP Alarm Management inspection, April 2009**

NII has previously reported to the WCSSG the progress of improvements to the management of alarms within HALES. In April 2009 NII undertook an inspection of alarm management in HALES and also in WVP. We concluded that HALES appears to have established a focussed and well supported "Alarm Review Group" that is delivering against a well defined improvements plan. We welcome the apparent success of improvements in the HAL buffer storage tank facility and look forward to seeing the learning from these improvements applied to the rest of HLWP. However NII expressed concern as to the adequacy of alarm management in WVP: based on our inspection, WVP does not fully comply with Sellafield Site Procedures for Alarm Management and falls short of the documented good practice. NII is now pursuing this matter with Sellafield Ltd.

### **2.5.5 Waste Vitrification Plant Operations**

Both Lines 1 and 2 operated successfully through most of the quarter. At the end of June Line 1 entered a planned outage: it is due to return to HAL feed at the end of August 2009.

Reliable operation of the vitrification lines is an essential component of the drive to reduce HAL stocks, and NII continues to engage Sellafield Ltd on issues associated with plant reliability. Sellafield Ltd is investing in improvements to the throughput and reliability of the vitrification process via its links with COGEMA: the recent success of Lines 1 and 2 underlines the importance of this work.

Line 3 remained shut down to undertake outage work and because of the shield door event in September 2008 which is referred to elsewhere in this report. Discussions continued on the return to service of Line 3. NII recognises that a fully engineered safety case cannot be achieved quickly and that an extended delay to the restart of HAL feed could be detrimental to the timely reduction of HAL stocks. Therefore NII considered an application by Sellafield to enter a time-limited period of interim operations supported by enhanced administrative controls. In June NII carried out an inspection of Line 3 to determine its readiness to return to service. At the end of the quarter NII issued a formal agreement to Line 3 interim operations.

#### **2.5.6 Residue Export Facility (REF)**

Active commissioning of REF and the export of the first containers off site is being progressed through three permissioning phases. Phase 1 has been successfully completed and in December NII issued a Licence Instrument to permission the commencement of Phase 2 active commissioning. This will demonstrate the effectiveness of the equipment, shielding and the arrangements associated with the retrieval, inspection and testing of active product containers followed by their loading and sealing into export flasks. The third and final stage of commissioning will involve commissioning the transport facilities on and off the Sellafield site, the finalisation of national and international agreements, processes and protocols associated with the movement of active material and ultimately the movement of the first filled product flask overseas. It is likely that NII will receive a request for a Licence Instrument to permission Phase 3 during autumn 2009.

The issues associated with commissioning the gamma monitors and the flask hoist, identified in the previous quarterly report, continue to be addressed but have yet to be resolved satisfactorily.

### **2.6 MOX OPERATIONS**

#### **2.6.1 Sellafield MOX Plant (SMP)**

NII is currently progressing a number of submissions from the licensee covering plant modification proposals that will facilitate the manufacture of the current MOX fuel campaign.

### **2.7 WASTE TREATMENT & DECOMMISSIONING**

There is nothing to report during this period.

## **2.8 LEGACY PONDS & SILOS (LP&S)**

In our last quarterly report we stated that we had written to Sellafield Ltd regarding project delays in LP&S and the potential non-compliance with parts of the Intermediate Level Waste (ILW) Specifications and we indicated that we were expecting a full written response by the end of May 2009. Sellafield Ltd supplied a substantial response and we are now considering this to inform our regulatory way forward. Our overriding objective remains unchanged in that we wish to ensure the earliest practicable safe reduction of risk from the high hazard legacy plants at Sellafield.

Separate discussions have been held regarding the Specification part relating to the Pile Fuel Storage Pond which comes into effect on 1 August 2009 and which will not be met by Sellafield Ltd. Compliance with the Specification has to be judged against Sellafield Ltd doing all that is reasonable practicable to meet the requirement by the due date. This is particularly appropriate given the nature of the challenge and the inherent uncertainties associated with remediating a legacy facility such as the Pile Fuel Storage Pond. We have requested Sellafield Ltd to provide additional information on reasonable practicability and a response is expected before the end of August. The way forward will be decided following our consideration of this additional information.

## **2.9 INFRASTRUCTURE – PLANT SERVICES & SITE SERVICES**

### **2.9.1 General**

Organisational changes within the Infrastructure Directorate have now been implemented, which will provide clarity in roles and responsibilities. NII continues to be engaged in discussions associated with further changes that are being progressed within the new Operating Units within the Directorate. We have also sought to discuss organisational/operational changes associated with the National Nuclear Laboratory (NNL) operations at NNL Central Laboratory on the Sellafield Site and the Active Handling Facility on the Windscale Site. An area of focus has been the proposals to facilitate “third party” access to the facilities within the Central Laboratory.

### **2.9.2 Analytical Services**

NII has been focusing on the further implementation of the Continued Operations Safety Report (COSR) for the facility and the various modification proposals associated with the future storage and processing of plutonium liquor analysis bottles within the facility. We will provide an update in our next report.

### **2.9.3 Facilities Services**

We have continued to oversee the various initiatives to improve the supply of clothing at the various change rooms across the site along with ensuring satisfactory progress is being achieved with the various projects to improve the changing room facilities across the site.

### **2.9.4 Utilities**

A number of exchanges have been held with the licensee on issues associated with the maintenance of the steam supply systems across the site. Sellafield Ltd has agreed to provide NII with details of the forward work programmes to address the

identified issues in a timely fashion.

## **2.10 EFFLUENT & ENCAPSULATION**

### **2.10.1 Floc Storage Tanks**

Sellafield Ltd commenced re-suspension and transfer of the floc from the second floc tank during the quarter. In preparation for re-suspension and transfer of the contents of a second tank, NII gave permission for the use of radioactive liquor already held in another tank to dilute the floc, as part of the preparation for re-suspension. This ensured the consumption of clean water was minimised, thus reducing waste volumes, thereby reducing demands on effluent treatment, encapsulation and waste storage and ultimate disposal facilities. NII carried out 2 readiness inspections before the start of floc re-suspension, which included training, the appointment of DAPs and SQEPs and emergency arrangements. No issues were identified that would have prevented re-suspension going ahead.

About 500m<sup>3</sup> of radioactive liquor was added to the second tank and the re-suspension process started without incident. Despite pump operation and leakage problems, which were overcome by the operations and engineering teams, the majority of the liquor in the second tank was transferred to the buffer tank. Re-suspension and transfer has been completed, which means that a major part of the radioactive inventory from this facility has either been recovered and transferred to an appropriate storage tank of known integrity, or treated and encapsulated in concrete within ILW stainless steel drums.

## **3 CALDER HALL**

### **3.1 General**

Nothing to report for this quarter.

## **4 SELLAFIELD LTD WINDSCALE**

### **4.1 General**

Discussions continue with Sellafield Ltd (Windscale) on the work programmes for the further integration of the Windscale site into the main Sellafield Site.

We have continued to pursue our concerns with the licensee on the implementation of the site LC36 (Control of Organisational Change) arrangements, particularly in relation to the management of the Management of Change Assessment (MOCA) processes and the management of the Windscale Site Baseline documents. Sellafield Ltd Windscale is currently embarking on various initiatives to address the concerns and we will continue to monitor Sellafield Ltd's progress in this area.

NII has also continued to check on the progress made by Sellafield Ltd Windscale on the eight main work programmes within the Windscale 2009/10 Safety Improvement Programme. One of the work programmes is related to various initiatives to improve maintenance processes on the site and NII will monitor closely the various work-streams aimed at improving/rationalising the current maintenance arrangements.

## **4.2 Piles Decommissioning Projects**

Progress on the decommissioning project work across the Windscale Site eg Piles 1 & 2, WAGR etc continues to be discussed with Sellafield Ltd Windscale in various meetings and visits throughout the report period. The NII Site Inspector has indicated that NII continues to seek that Sellafield Ltd Windscale continues with the forward decommissioning programmes without the introduction of further significant periods of care and maintenance.

## **4.4 Active Handling Facility – Inadvertent Export of Cave 5 Cans**

During the period a number Unusual Occurrence Reports (UNORs) relating to the Active Handling Facility operations were reviewed with Sellafield Ltd Windscale. One significant UNOR related to two cans that were identified as being “missing/mislaid” during a stock-take in Cave 5. Subsequently, one of the cans was found to have been inadvertently exported to the Multi Beta Gamma Waste Storage Facility on the main Sellafield Site. NII informed Sellafield Ltd Windscale of NII’s disappointment with the loss of control/management of material movement that had occurred, particularly as the event had occurred during a recent period of operations when enhanced procedures for the control of operations were supposed to be in place. NII is content that Sellafield Ltd Windscale undertook appropriate action following the event. NII has been involved in discussions relating to the Sellafield Ltd Windscale proposals for introducing revised procedures for the control and movement of radioactive material and the programme of work to make specific improvements within particular caves. NII will continue to engage with Sellafield Ltd Windscale as the operations within the caves are progressively restarted.

We continue to engage with Sellafield Ltd on the extensive programme of equipment improvement projects within the Active Handling Facility. Progress is being made in many of the Integrated Safety Improvement Programme (ISIP) projects although some of the project work has encountered some delays/difficulties.

## HM NUCLEAR INSTALLATIONS INSPECTORATE

**TABLE 1**

**QUARTERLY RETURNS FOR SELLAFIELD, CALDER HALL AND WINDSCALE**

**DURING THE QUARTER**

**1 APRIL 2009 – 30 JUNE 2009**

	Sellafield Ltd – Sellafield (including Calder Hall)	Sellafield Ltd – Windscale
<b>Number Of Visits</b>	73	7
<b>Inspection Days On Site</b>	283	15
<b>Incidents in the quarter likely to be published in HSE’s quarterly “Statement of Nuclear Incidents at Nuclear Installations”</b>	0	0
<b>Consents, Approvals, Specifications</b>	0	0
<b>Enforcement Actions <sup>1</sup></b>	0	0
<b>Licence Instruments</b>	7	0

<sup>1</sup> Enforcement action may be a Direction issued by HSE under the nuclear site licence, an Improvement Notice, or a Prohibition Notice, or the laying of information in pursuit of a prosecution.

**TABLE 2****CONSENTS, APPROVALS, SPECIFICATIONS AND ENFORCEMENT ACTIONS  
ISSUED DURING THE QUARTER****1 APRIL 2009 to 30 JUNE 2009**

<b>Date</b>	<b>Type</b>	<b>Ref. No.</b>	<b>Description</b>
<b>Sellafield Ltd - Sellafield (and Calder Works) – Nuclear Site Licence no. 31G</b>			
None			
<b>Sellafield Ltd – Windscale – Nuclear Site Licence no. 83</b>			
None			

**TABLE 3****AGREEMENTS & ACKNOWLEDGEMENTS ISSUED DURING THE QUARTER****1 APRIL 2009 TO 30 JUNE 2009**

<b>Date</b>	<b>Ref. No.</b>	<b>Description</b>
<b>Sellafield Ltd – Sellafield (and Calder Works) – Nuclear Site Licence no. 31 G</b>		
17/04/2009	737	Agreement to Category B PMP No. SMP/Area 500/0219 Revision 2 entitled: Implementation of Operational Safety Memo CULT B572/OSM/12942 - Identification of Alternative Safety Measures to Enable Magazine Handling Operations to recommence for the Current PWR Fuel Campaign (PMP 2)
11/05/2009	738	Agreement to Commence Construction of the Raft for B215 Evaporator D
20/05/2009	739	Acknowledgement - Alternative Safety Measures to Enable Fuel Assembly Manufacture to Recommence within the PWR Build Cavern for the Current PWR Fuel Campaign (PMP 3)
30/06/2009	740	Agreement to Proceed to the Implementation of Interim Operations Safety Case for WVP Line 3 Shield Doors
04/06/2009	741	Acknowledgement - Resumption of Fuel Handling Operations in SMP Fuel Assembly Store Area - PMP 4
23/06/2009	742	Acknowledgement of safety documentation for commissioning, including repackaging, export and transfer of Pu residues from B277 to PF&S store, B209 and notice of intention to examine under arrangements made under condition 22(1)
23/06/2009	743	Acknowledgment of the Pile Fuel Storage Pond Local Sludge Treatment Plant Storage Facility Pre-commencement Safety Report and Notice of Intention to Examine
<b>Sellafield Ltd – Windscale – Nuclear Site Licence no. 83</b>		
None		

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**The Storage of Liquid High Level Waste at Sellafield: HSE's 2008 Biennial Review**

**Introduction**

1. Highly active liquor (HAL) is produced at Sellafield from the evaporation of raffinates. The raffinates are a waste stream from the nuclear reprocessing plants and contain the fission products and waste actinides extracted from spent fuel. The safety of the storage of these heat-generating wastes has been a matter of public interest for many years. Recognising this, the Health and Safety Executive (HSE) has published a series of reports<sup>Refs 1,2,3,4</sup> outlining the key safety issues associated with HAL storage and our regulatory approach to these.

2. The HAL is stored in a number of Highly Active Storage Tanks (HASTs) located in the HAL Evaporation and Storage plant (HALES) at Sellafield. In 1990, the Waste Vitrification Plant (WVP) began converting the HAL into glass to retain the hazardous radioactivity in an immobile form. Vitrification enables long-term passive storage of the waste.

3. In January 2001, HSE's Nuclear Installations Inspectorate (NII) used its legal powers under the nuclear site licence to place limits on the quantity of HAL stored at Sellafield. Specification 343 required the backlog of HAL stocks accumulated since reprocessing began in the 1950s to be reduced to a minimal working level, known as the buffer volume, by 2015. The Specification set a limit on the total amount of HAL stored and a secondary limit for oxide HAL (liquors arising from the reprocessing of oxide fuel). This secondary limit was imposed because of the higher hazard associated with the oxide HAL.

4. In October 2007, NII replaced Specification 343 with Specification 679. Specification 679 prescribes a tighter limit on HAL stocks, locking-in the reductions arising from the unplanned, long-term shutdown of the Thermal Oxide Reprocessing Plant (THORP) after the discovery in April 2005 of a leak<sup>Ref 5</sup>. Specification 679 also applies a different form of limit for oxide HAL – this is now set in terms of the mass of uranium in the unprocessed fuel from which the HAL was derived. This change in limit form was necessary since the type of restriction used in Specification 343 was a relatively poor measure of hazard potential and had led to conflicts between the legal requirement and operating the plant in the best interests of safety.

5. HSE's 2001 public report<sup>Ref 4</sup> stated that the Licensee at Sellafield (now Sellafield Ltd, SL) should provide an annual report to NII on its progress in reducing the HAL stocks compared to the specified limits and against its programme of committed improvements to plant and procedures. In addition, to take account of technological advances and any changes in circumstance, we carry out a critical review of the Licensee's strategy and overall programme every two years in order to identify any further reasonably practicable HAL stocks reductions.

6. In line with these commitments, HSE's quarterly reports to the West Cumbria Sites Stakeholder Group (WCSSG)<sup>1</sup> have included information on the Licensee's

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<sup>1</sup> Formally known as the Sellafield & Drigg UKAEA Windscale sites Local Liaison Committee (LLC)

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performance against our Specifications, details of safety and operational issues at HALES and the outcomes of our previous biennial reviews in 2002, 2004 and 2006.  
Refs 6, 7, 8

7. NII has recently completed its fourth (2008) biennial review of Sellafield Ltd's HAL stocks strategy. Our review has concentrated on matters requiring further analysis following our 2006 review including:

- The form of limit used in the Specification, including a review of how well the existing form has worked in practice and Sellafield Ltd's compliance thereof;
- What the long term steady-state (buffer) volume should be;
- Whether uncertainties arising from the Post Operations Clean-Out (POCO) of HALES warrant any change in the forms of limits used in the Specification;
- Operational contingencies and in particular whether the Specification should be changed to account for reducing storage capability due to failures in HAST cooling components..

These aspects are discussed in more detail in the following paragraphs.

**Form of limit used and review of Sellafield Ltd's recent operational experience**

8. The Specification is set currently in terms of the volume (m<sup>3</sup>) of HAL stored in HALES. However, Sellafield Ltd has expressed concerns about continuing to use volume as the unit of measurement for the following reasons:

- a. As HALES is progressively emptied of HAL the long term Specification limit (200m<sup>3</sup> post July 2015) will not be sufficient even to accommodate the wash-out heels left in the near-empty tanks. These wash-out heels are mostly water and acid left over from washing out the tanks, and present a very low hazard and risk compared to HAL. However, as they contain some HAL (albeit greatly diluted) they still contribute towards the volume limited by the Specification.
- b. Continuing to constrain volumes discourages Sellafield Ltd from adding or using water or acid to, for example, maintain its HASTs in optimal operating conditions; attempt to unblock equipment; move HAL from tank to tank in order to prepare batches for vitrification; or embark upon the POCO of empty HASTs. Discouraging these and other activities, all of which are legitimate and appropriate for the safe operation of HALES, is an unintended ramification of applying the Specification in its current form.

9. Sellafield Ltd is now confident it is able to operate applying a limit set in terms of the mass of uranium in the unprocessed fuel from which the HAL was derived (hereafter referred to as tonnes of uranium – te(U)), as a better alternative to liquor volume as currently used. This confidence stems in part from Sellafield Ltd's experience working with the oxide limit, which was recast in terms of te(U) at the previous revision to the Specification in October 2007. NII welcomes this development as it not only facilitates the activities necessary in the interests of safety described in para 9, but allows us to set a limit in terms that more accurately reflect

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the true hazard, bringing the total HAL and oxide limits into a common form. Moreover, NII now considers that the benefits of a te(U) limit outweigh the transparency, consistency and accountability advantages of continuing with a volume limit. In view of these benefits, NII is keen to convert the Specification to te(U) as soon as is practicable. However, recognising that further work will be required to achieve this, no change will likely be possible for several months.

10. It should be stressed that changing the form of Specification limit from volume to te(U) will simply be a change in the units by which we determine the quantity of HAL that Sellafield Ltd has accumulated. In updating the Specification for this, we intend to reset the limit at a level that achieves the same level of safety and hazard reduction as with the current volume-based limit. In preparation for this change, NII has inspected Sellafield Ltd's fuel-mass accountancy procedures and we are confident that these are suitable to underpin the licensee's Specification compliance arrangements.

11. Finally, NII confirms that over the period since the last biennial review, Sellafield Ltd has fully complied with Specifications 343 and 679. HAL stocks are now below 1000m<sup>3</sup>, their lowest levels since the 1980s. These low levels are in part due to Sellafield Ltd's ongoing problems with evaporative capacity, which has resulted in less raffinate being received by HALES than predicted. NII has reviewed whether the resulting reduction in HAL stocks should be locked-in by tightening the Specification, as we did in our 2006 review following the THORP event mentioned in para 4. Here our review concluded that such a tightening would not be reasonable. This is for two reasons: Firstly, the point where the Specification curve becomes significantly steeper (January 2013) is now relatively near, i.e. where the permissible volume of HAL reduces significantly. Thus to tighten the limits now would have no practical effect as it would likely only prohibit stock levels that would in reality be physically impossible to attain without also entailing a breach of the steep portion of the current Specification. Secondly, Sellafield Ltd's current holding of oxide HAL is probably below that needed for efficient steady-state operation of WVP. However the exact holding that Sellafield Ltd might reasonably need to store depends on ongoing detailed analysis (see next section). Hence it is not currently possible to determine where to set any new limit.

**Long term steady-state limit**

12. Specification 679 sets a limit restricting the quantity of HAL stored over time. This limit reduces every year until July 2015, when a steady state level is reached restricting the site's HAL stocks to a maximum inventory of 200m<sup>3</sup> (including wash-out heels). 200m<sup>3</sup> was based on analysis by the then licensee (BNFL) dating from the time Specification 343 was set, and assumed HALES would by then be operating with only two HASTs in routine service. Sellafield Ltd's subsequent experience operating HALES and WVP has however demonstrated to NII's satisfaction that vitrification cannot be undertaken efficiently or effectively with just two HASTs. Consequently NII now accepts that the current limit is set too tightly and needs to be relaxed. The extent of this relaxation depends primarily on the minimum number of HASTs in routine service that Sellafield Ltd considers reasonably practicable. Determining this number requires the completion of further analysis currently being undertaken by Sellafield Ltd. Initial indications are that Sellafield Ltd will need between 3 and 5 HASTs in

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routine service in order to complete its current reprocessing commitments.

13. In deciding where to set the steady state limit, NII needs to ensure that the Specification is not too tight to 'force' the cessation (or significant curtailing) of reprocessing, as this would not be in the best interests of safety – there is currently no viable alternative to reprocessing existing stocks of irradiated Magnox or corroded AGR fuel that could be adopted within reasonable timescales. Equally, we also need to ensure that limits are not set so loose as to undermine the original intent of the Specification, which was to regulate Sellafield's historic accumulation of HAL stocks down to reasonably practicable steady state levels by mid-2015. In view of these considerations, NII has developed six principles to govern our thinking when considering a new steady state limit:

- P1** To prevent any return to excessive accumulated stocks, i.e. more than could be worked off within a reasonable period at nominal full WVP production levels;
- P2** Above the absolute minimum so that Sellafield Ltd:
  - i. takes responsibility for ensuring its stocks are maintained at levels as low as reasonably practicable (ALARP); but
  - ii. has reasonable operational flexibility to carry out its legitimate business activities, e.g. commercial reprocessing;
- P3** To facilitate the maximum overall rate of reduction of hazard potential (e.g. site-wide, nationally ...) without creating excessive waste volumes. In particular, the Specification should not limit WVP vitrification to any significant extent;
- P4** To encourage POCO of redundant HASTs;
- P5** Based on Sellafield Ltd's existing fleet of HASTs, i.e. not taking the possibility of new replacement HASTs into account until there is appropriate confidence in how these will perform (it is anticipated that the new replacement HASTs will be smaller than the existing tanks, raising the possibility of operation with lower stocks of HAL once these are brought into operation);
- P6** In a manner that aligns with HSE's Enforcement Policy Principles <sup>Ref 9</sup> of Proportionality, Consistency, Targeting, Transparency and Accountability.

14. Once Sellafield Ltd has completed the analysis mentioned in para 13, NII intends to reset the steady state element of the Specification in accordance with these principles. This update needs to be implemented as a matter of priority, since this aspect of the Specification has a major impact on Sellafield Ltd's business plans. In view of this, NII intends to revise the steady-state element of the Specification in the next few months. Further, our intent is that this update will coincide with the change of limit form proposed in para 10.

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**Post Operational Clean-Out (POCO)**

15. Specification 679 sets a limit restricting the volume of HAL stored over time. As described above, this volume at present includes any wash-out liquors used for POCO activities even though these pose a significantly smaller hazard than normal HAL. NII is conscious that this aspect of the Specification may discourage or delay Sellafield Ltd's POCO activities and so does not serve the best interests of safety. As such, our 2006 biennial review considered exempting wash-out liquors from the Specification. However, we noted Sellafield's plans at the time were not sufficiently advanced for NII to make an informed decision and so requested further analysis to underpin its planning.

**HALES' Operational contingencies**

16. Our 2006 biennial review reflected NII concerns that the rate and location of failures in HAST cooling components could seriously restrict the volume of HAL that can safely be stored and therefore Sellafield Ltd's ability to deliver its HAL strategy. While failure rates have abated more recently, this issue remains a matter of ongoing concern.

17. Sellafield Ltd's analysis shows that it expects to have adequate capacity from its existing fleet of HASTs to accommodate all the HAL arising from its current Magnox and oxide reprocessing programmes. However, uncertainties are significant and the strategy needs to be robust in case failure rates increase. To increase the utilisation of its tanks with fewest component failures, Sellafield Ltd is looking at more sophisticated methods and strategies for ensuring sufficient spare storage capacity is always available. This analysis may lead to proposals to revise the company's spare coil and spare HAST policies, which require a number of coils per tank and a number of tanks to be maintained as reserves in case of operational failures. NII is monitoring this ongoing work and will assess Sellafield Ltd's proposals in detail once these are finalised. In addition, NII will continue to inspect Sellafield Ltd's operating strategy to ensure that sufficient confidence remains in the integrity of the plant to support ongoing reprocessing operations.

18. In the longer term, NII considers that new replacement HASTs are required to cater for cooling component failure uncertainties, to optimise WVP performance, to allow steady state operation with a lower HAL stocks (see Principle P5), to facilitate POCO and to provide confidence that commitments to complete the Magnox and oxide reprocessing programmes will be fulfilled. NII will therefore continue to work with the Nuclear Decommissioning Authority (NDA) to ensure that funding for new replacement HASTs continues to be made available.

**Conclusions**

19. NII is minded to revise the HAL stocks Specification, replacing the current volumetric limit with an equivalent limit in safety terms based on the mass of uranium in the unprocessed fuel from which the HAL was derived (te(U)). This new form of limit will better reflect the true hazard posed by the HAL and has become necessary

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because the present form of limit does not always promote operations in the best interests of safety. The precise details of this conversion are subject to further analysis currently being undertaken by Sellafield Ltd.

20. Although HAL stocks are at their lowest levels in decades, and significantly below the current limit, NII does not believe that a further tightening of the Specification akin to that applied in 2007 is appropriate on this occasion. This is because imposing a tighter limit would not have any positive regulatory effect. These aspects are explained in greater detail in para 12.

21. NII accepts that the current steady state Specification limit is set too tightly to allow efficient operation of WVP and so needs to be relaxed. However, the extent of any relaxation depends on further analysis currently being undertaken by Sellafield Ltd. To assist us in determining where to reset this portion of the Specification, NII has developed six principles to govern our thinking which we will apply when considering Sellafield Ltd's analysis.

22. The timing of any update to Specification 679 depends on Sellafield Ltd completing its further analysis to our satisfaction. NII intends to make a single change to the Specification to address both the change to te(U) and the resetting of the steady state limit in the next few months.

23. NII continues to be concerned that HAST cooling component failures could potentially lead to insufficient storage being available to accommodate the Magnox and oxide reprocessing programmes. In the short-term Sellafield Ltd is looking at ways and means of getting the best use from its existing HASTs – NII is monitoring this work and will assess Sellafield Ltd's proposals once these are finalised. In the longer-term NII considers that new replacement HASTs will be needed. NII will therefore continue to work with NDA to ensure that funding for new replacement HASTs continues to be made available.

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