



SELLAFIELD LTD, LLWR AT DRIGG AND UKAEA WINDSCALE

WEST CUMBRIA SITES STAKEHOLDER GROUP

QUARTERLY REPORT FOR 1 JULY TO 30 SEPTEMBER 2007

FOREWORD

This report is issued to the West Cumbria Sites Stakeholder Group (WCSSG) to provide a summary of the regulatory activities of the Environment Agency relating to the above nuclear licensed sites.

Environment Agency nuclear regulators attend meetings of the WCSSG, and some of its sub-committees, and will be happy to respond to questions raised there. Alternatively please contact us at our Penrith office:

Team Leader (Sellafield), Nuclear Regulation Group (North), Environment Agency, Ghyll Mount, Gillan Way, Penrith, Cumbria, CA11 9BP. Email: nrg.north@environment-agency.gov.uk. Tel: 01768 215705.

We wish to improve this report over time and would be happy to hear your views on its format and content.

1 INTRODUCTION

This report presents a summary of our work at Sellafield, Windscale, Calder Hall and the Low-Level Waste Repository (LLWR) at Drigg over the 3 months to the end of September 2007. In particular it covers progress against our regulatory strategy.

The contents of this issue are:

[General regulatory strategy progress](#)

[Authorisations and permits](#)

[Compliance assessment](#)

[Enforcement](#)

[Emergency preparedness](#)

[Events and incidents](#)

[Annex 1 – Our role](#)

[Annex 2 – Glossary](#)

Our role

Our role is to ensure the protection of the public and the environment from the radiation exposure that may result from the disposal and discharge of radioactive waste. We also aim to prevent pollution, to protect and enhance the environment, and to contribute to the sustainable development of the UK.

The operation and clean up of nuclear sites generates radioactive and non-radioactive wastes. To ensure that the impact of those wastes on people and the environment, now and in the future, is as small as it can be, we supplement direct regulation with partnership working involving regular dialogue and joint problem solving. If you want to know more about our role on nuclear sites see [Annex 1](#) or our website at the address below:

<http://www.environment-agency.gov.uk/business/444304/945835>

2 REGULATORY STRATEGY PROGRESS

Our work at nuclear sites is driven by our regulatory strategy. Our strategy sets out, among other things:

- our long term strategic objectives;
- our expectations of the operator;
- the connection with the wider Environment Agency vision and goals.

Our core business processes – authorisation (permitting), compliance assessment, enforcement and emergency preparedness – are covered elsewhere in this report. Progress against the strategic objectives is reported in this section under various 'environmental themes'.

2.1 Sellafield Ltd

Integrated Waste Strategy (IWS)

We have undertaken a preliminary assessment of the revised Sellafield IWS. The strategy includes a useful analysis of the disposal and discharge routes for wastes over time, and effectively identifies waste bottlenecks. It includes good recommendations for action, although it is not clear whether the resources required to implement these actions will be made available.

We consider that Sellafield Ltd needs enhanced capability and capacity to sort, segregate and decontaminate solid low level and intermediate level wastes (LLW/ILW). We also consider that the impact of storage and treatment of nuclear fuels should be covered in more detail – this is important because it has the potential to affect all the downstream waste and treatment decisions.

We expect to receive an IWS improvement plan in October 2007 which is a requirement under the site authorisation.

Solid waste disposability

In order to minimise the potential for having to re-treat or rework stored wastes in the future so that they can be disposed of, we work with the operator to ensure that they get it right first time.

During this quarter, we held a meeting with Sellafield Ltd to discuss the direct encapsulation of ILW from the wet silo. This is an important project because it will generate substantial quantities of ILW, and there are a number of uncertainties and risks associated with it. We are satisfied that Sellafield Ltd has addressed recommendations we provided in 2006.

Recent inspections carried out by Sellafield Ltd at the Magnox Encapsulation Plant (MEP) have identified anomalies in some of the waste drums. In response to these findings we are developing a position statement on the conditioning of Magnox wastes, and will use this to inform our future discussions with NII and Sellafield Ltd on the best way forward.

We are concerned that plans for retrieval and conditioning of solid wastes from the Site Ion-Exchange Plant (SIXEP) are delayed and are being revisited. We will continue to press for progress in this area. We are commissioning a study to consider the characterisation of Magnox sludges, including those which are accumulating within the SIXEP plant.

Future end states

We attended an NDA meeting to reconcile stakeholder views on end states with their stated objectives for end uses of the Sellafield site. The Sellafield site has been zoned taking account of known levels of contamination and how difficult it is likely to be to remediate the area. Stakeholders recognised that complete restoration was impracticable in most cases. The meeting considered 2 end states:

- In-situ disposal site

- Unrestricted use site

Descriptions of these end states are available at <http://www.wcssg.co.uk/currentconsult.htm>. The meeting concluded that the NDA should adopt the “unrestricted use” end state for the whole site, unless a strong justification could be made that this was impracticable or undesirable. The current Sellafield Ltd case that this was impracticable for the central zone was not felt to be sufficiently justified; we consider that further characterisation of the contaminated land and clarification of the waste management strategy (particularly for the high volume low radioactive wastes) is required.

We drew attention to the contribution from contaminated land at Sellafield to discharges to the marine environment which will become the main source as the main operational activities on the site are shutdown. Therefore decisions on end states should take account of groundwater or aquifer status.

Waste treatment and infrastructure

We provided comments on a new process for assessing the Best Practicable Environment Option (BPEO) developed by Sellafield Ltd.

Best Practicable Environmental Option (BPEO) for LLW

Sellafield Ltd has agreed that a high-level strategy for LLW needs to be written down. This will be useful to stakeholders and will set the context for the BPEO process planned for the autumn of 2007. The strategy needs to set out approaches to waste prevention and minimisation to enable stakeholders to consider the options for re-use, recycling, treatment, energy from waste and disposal. The environmental implications of the options could be considered using a Strategic Environmental Assessment (SEA) approach. Environmental Impact Assessments (EIA) will be required for any new developments, e.g. an incinerator. We have offered to support the forthcoming workshops to consider the BPEO for Low Level Waste.

Site landfills

We met with Sellafield Ltd to ensure that our recommendations for improving the safety and environmental case for the Sellafield landfills were clear. We agreed that it would be more effective to deal with recommendations to improve the assessment of the older landfills and the new Calder Landfill extension (CLESA) separately.

We consider that onsite disposals of lightly contaminated soil and rubble etc would help to relieve pressure on the LLWR at Drigg, and would minimise the volume of waste being transported. We consider that the disposal of such wastes should proceed in a phased manner at the new CLESA facility.

Magnox legacy fuel pond

Sludge from the legacy Magnox fuel pond will be treated and stored in the Sludge Packaging Plant (SPP1). Sellafield Ltd are currently developing a BPEO for this plant. The options selected for further consideration are three variants of direct encapsulation. Sellafield's current strategy includes plans to ensure that reactive metals are not encapsulated directly because of concerns about reactions with cement encapsulant

and the resulting effects on the integrity of the waste. However, we recognise that due to issues with the current storage conditions and the need for passive safety, Sellafield Ltd may be able to justify direct encapsulation of the sludge in cement.

We have asked for improved characterisation of the sludge which is needed to inform the way the sludge is temporarily stored in buffer tanks, e.g. it may be advantageous to separate sludge that contains corroded or non-reactive uranium from that containing more reactive uranium to allow this to follow a different treatment process.

Retrievals from the silos

We have considered the BPEO for the maintenance facility that will support retrievals from the wet and dry silos. Our comments mainly relate to the need to consider contaminated land issues in deciding on the site and size of the facility.

Effluents

Discharges to sea

The total alpha and total beta discharges to sea from Sellafield have been declining for sometime and have dropped below the UK discharge strategy Sellafield targets for 2020. The dose to the most exposed group of the public from discharges to sea of radionuclides subject to numerical limits is currently less than the strategy aim of no more than 20 microsieverts per year by 2020 (see section 4.2). These developments are attributed to the recent low fuel reprocessing rates and to the pursuit of the application of best practicable means (BPM) to minimise discharges from the site. However, over coming years, several factors may result in discharges rising above current levels i.e.:

- Increased reprocessing rates;
- Prolonged storage of Magnox and oxide fuel in fuel ponds; and
- Clean-up of the site.

A clear challenge for us over the coming years is to encourage Sellafield Ltd to consolidate the achievement of these targets, and to pursue greater reductions over the longer-term. The UK discharge strategy is currently being reviewed, and a new version is expected to be published in December 2008.

SIXEP operating plan

We continue to engage with Sellafield Ltd over the developing operating plan for the Site Ion-Exchange Plant (SIXEP) – one of the key liquid waste treatment facilities. SIXEP removes activity from high volume, low activity concentration alkaline effluents arising at Sellafield to minimise the radioactivity discharged to sea. This work is an important aspect of the developing aqueous waste strategy at Sellafield. It considers optimisation of the SIXEP process, what will happen if there are any problems with SIXEP, and what will replace SIXEP in the longer term.

Gaseous waste strategy

The developing long-term gaseous waste strategy for Sellafield is an example of good practice at the site. However, the analysis of how well the current strategy and standards are being implemented could be enhanced, which would help identify improvements.

Control of radioactive waste

Pile fuel pond decommissioning

NII have imposed a requirement that sludge retrieved from the Pile fuel pond must be contained in modern stainless steel tanks by 2009. The strategy of early retrieval and sludge treatment is designed to reduce the hazard from this legacy facility.

We have concerns about storing potentially corrosive waste in stainless steel, and the implications of developing a new facility that will give rise to secondary wastes when it is eventually decommissioned. We attended a workshop to discuss the BPEO during this reporting period. Early provision of sludge treatment facilities will be necessary to minimise the time at risk.

Calder Hall Cooling Towers

We have reviewed and accepted a best practicable means (BPM) assessment carried by the operator to demonstrate how the environmental impact of the demolition will be minimised and how wastes will be controlled.

Management of spent fuel and nuclear materials

National strategy

We have developed a joint regulatory position statement on the management of spent nuclear fuel with NII. This is being issued to members of the NDA working group on spent fuel and nuclear materials, and to site operators.

We prepared a formal response to the Department for Business Enterprise and Regulatory Reform (BERR, formerly known as DTI) consultation document on their proposal on how to manage overseas spent nuclear fuel awaiting processing at Sellafield.

Oxide fuel reprocessing

Together with NII, we have been pressing for an integrated strategy and plan for oxide fuel reprocessing for some years. NDA is expected to take responsibility for establishing an Oxide Operating Plan (OOP). Sellafield Ltd has established an Oxide Operating Strategy Regulatory Forum, which will provide an opportunity to highlight issues from Sellafield Ltd and British Energy's oxide fuel storage strategies to the OOP. We welcome these developments.

Magnox reprocessing

We have attended meetings of the Magnox Operating Plan Regulatory Forum during this reporting period.

We are aware that recent poor performance of the Magnox Reprocessing Plant and associated facilities at Sellafield present a number of challenges to the timely reprocessing of all the Magnox irradiated fuel. Sellafield Ltd and Magnox Electric are examining the implications of these through this year's review of the Magnox Operating Plan. We are also aware that the NDA is undertaking a Magnox Engineering Strategic Review looking at contingencies and strategic options for Magnox fuel. We continue to monitor these developments closely due to their implications for the UK discharge strategy and our future regulation of the Sellafield site.

A strategy for the reduction of the amount of spent Magnox fuel stored underwater ('wetted fuel') has been developed in response to concerns about the hazard and potential risk from the build up of such fuel. It involves prolonged storage of Magnox fuel in reactors, and should achieve a significant reduction in the stock of wetted Magnox fuel over the next couple of years. We welcome this approach.

Stakeholder engagement

Keeping others informed about, and engaged with, our regulatory activities is important to us. We want to ensure access to good quality information that allows genuine participation in the decision making related to the clean-up of the Sellafield site.

During the quarter we continued to support:

- NDA transition programmes for the Sellafield, Windscale and LLWR sites;
- WCSSG sub-committee meetings; and
- A range of stakeholder workshop, NDA, industry and regulator working groups.

We also added a briefing note on the enhanced beach monitoring near Sellafield to our NW Region website.

2.2 UKAEA Windscale

Regulation of the Windscale site is now carried out by our Sellafield team. Due to a high regulatory workload at Sellafield, our site presence and regulatory activities at Windscale have been lower than normal in recent months. We expect our regulatory activities to increase again over the coming period, although the extent of this increase is likely to be influenced by the level of funding which Windscale attracts to undertake site clean-up and restoration.

Late reporting of discharges and disposals

During the past few months, we have not received all the reports on discharges and disposals of radioactive waste from the Windscale site within the timescales required by the authorisation. All discharges and disposals have been within the limits specified in the authorisations, but we have required UKAEA to investigate this late reporting and are currently considering whether any regulatory action is required.

Improvement condition submissions

We are currently reviewing three submissions from UKAEA Windscale:

- Progress with improvements identified through BPEO and BPM assessment processes;
- The labelling and identification of environmental systems and equipment within a written maintenance schedule; and
- Radiological characterisation of the surface water drainage system at Windscale.

2.3 LLWR at Drigg

Vault 9

LLW Repository Ltd has now submitted a planning application for Vault 9. We are currently reviewing the documents we have to support the construction of Vault 9, and will feed back to the LLWR on their acceptability and any further information requirements.

Outo Kumpu slag pots

Four slag pots were contaminated at a Sheffield steel works by what was believed to be a heart pacemaker. The first pot was delivered to the LLWR for disposal in June, and two further pots were delivered in September. The fourth and final pot is expected to be delivered by the end of the year. LLW Repository Ltd has applied for a variation to their authorisation to enable receipt of this pot, which contains two thirds of their annual disposal limit of 'other alpha emitters'. We will consult on this application shortly.

End states

LLWR have now reviewed their approach and are proposing further options appraisal and consultation. We are continuing to monitor the development of the process.

3 AUTHORISATIONS AND PERMITS

The issue and maintenance of the environmental authorisations and permits held by the sites is a key part of our regulatory strategy. One of our strategic objectives states that: *"We will ensure that permits and authorisations are appropriately reviewed and revised to ensure that they are up to date, flexible and fit for purpose."*

3.1 Sellafield Ltd

Pollution Prevention & Control (PPC)

The prevention and control of non-radioactive pollutants at the Sellafield site is subject to regulation under a number of different regulatory regimes including the Integrated Pollution Control (IPC) regime. The site's IPC authorisations will shortly be replaced by a single permit under the new Pollution Prevention and Control (PPC) regime. We met with Sellafield Ltd and Fellside CHPP in August 2007 to discuss their comments on the draft permit. We intend to issue the permit at the beginning of October.

Radioactive Substances Act (RSA93)

Disposals and discharges of radioactive wastes are only permitted subject to strict limits and conditions under an RSA93 authorisation. We have notified Sellafield Ltd, NDA, NII and FSA that we have commenced the 2007/08 periodic review of Sellafield's RSA93 authorisation. If the outcome of this review requires any changes to be made to the limits and/or conditions of the authorisation, we would expect this to take place around April 2008.

3.2 UKAEA Windscale

Transfer to the Sellafield SLC

NDA plans to transfer the management and operation of the Windscale site to the Sellafield Site Licence Company (SLC). We have been involved throughout the process of planning and preparing for integration of the Windscale site with Sellafield, attending all meetings of the Windscale Transition Regulators Working Group (WTRWG).

UKAEA and Sellafield Ltd made a joint application to transfer the RSA93 authorisation for the site on 16 July 2007. The application is being assessed and statutory consultation will take place during autumn 2007. During the period of shadow working expected to start in November, we will inspect Windscale site/Sellafield Ltd arrangements to ensure they are able to comply with the transferred authorisation. We expect the transfer to become effective on 1 April 2008.

3.3 LLWR at Drigg

Transfer to LLWR SLC

The transfer of the LLWR RSA93 authorisation from BNGSL to LLW Repository Ltd became effective on 29 July 2007.

4 COMPLIANCE ASSESSMENT

Compliance assessment is an important part of our regulatory strategy. One of our strategic objectives is that *we will continue to assess compliance with the limits and conditions of the permits and authorisations*. This section provides highlights of our assessment and site inspection activities.

More details of discharge and environmental monitoring data can be found in our Radioactivity in Food and Environment (RIFE) report published annually jointly with the Food Standards Agency, Scottish Environment Protection Agency (SEPA) and the Environment and Heritage Service of Northern Ireland. The RIFE report for 2005 can be found at:

<http://publications.environment-agency.gov.uk/pdf/PMHO1006BLJP-e-e.pdf>

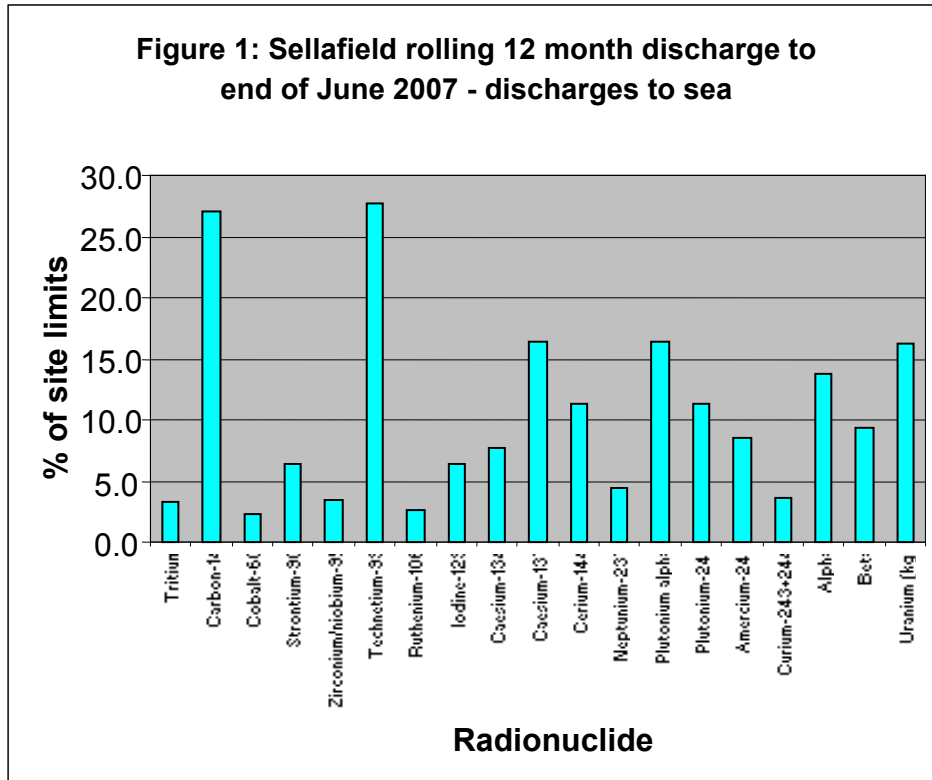
Another source of data is our Pollution Inventory:

<http://www.environment-agency.gov.uk/maps/info/pi/>

4.1 Radioactive discharges

There have been no breaches of the site limits on radioactive discharges to land, sea or air during the reporting period at any of the sites.

Radioactive discharges to sea from Sellafield for the 12 months to the end of June 2007 were all well below the authorised limits – see Figure 1 below. Note that for certain radionuclides the site limits for calendar years relate to the amount of spent fuel reprocessed ('throughput related limits').



Our assessment of the annual radiation dose to the most exposed group of the public from the discharges of radionuclides subject to numerical limits is given in Figure 2. The total dose was about 16 microsieverts, which is about 3% of the constraint on dose from discharges from a single site (500 microsieverts per year). Note that this dose assessment does not include the radiation dose from radioactivity already in the environment from discharges made in the past.

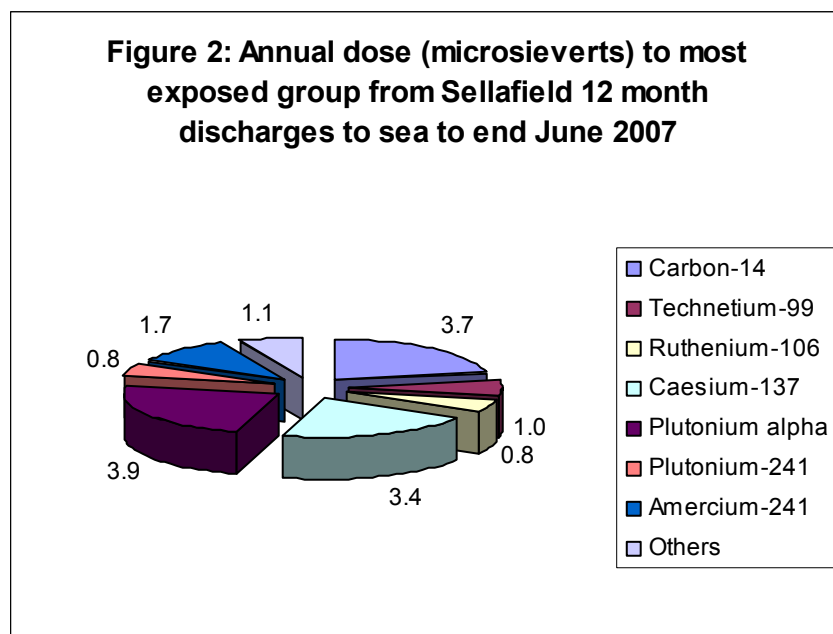
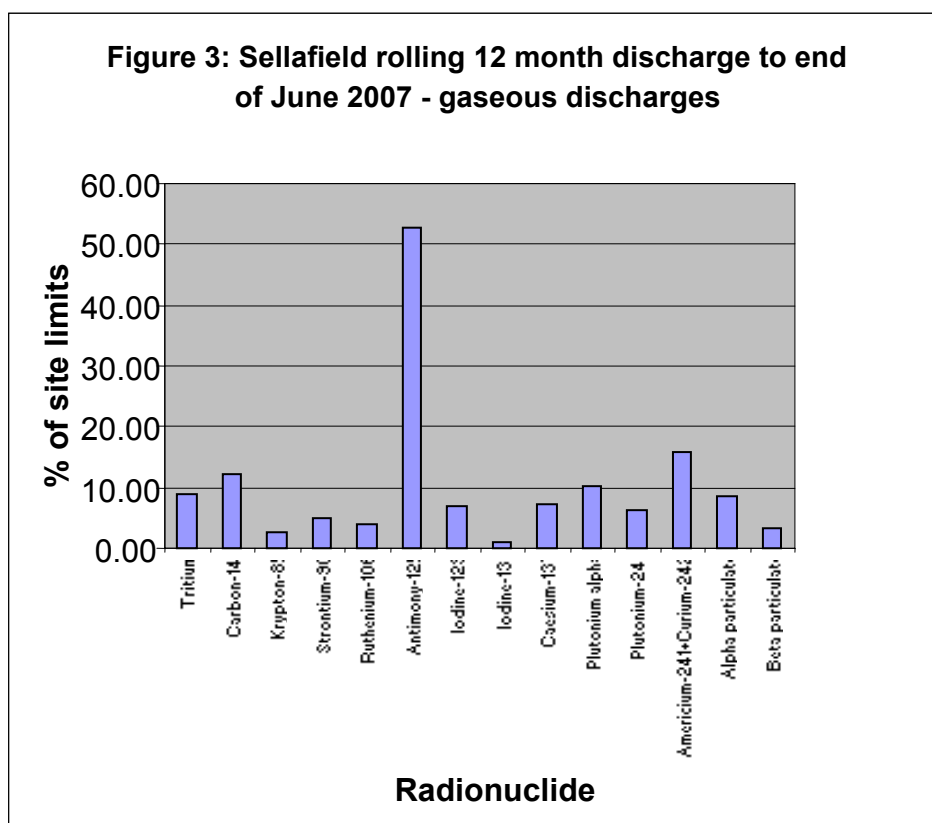


Figure 3 gives the rolling 12 month discharges to air to the end of June 2007 as a percentage of the site limits.



4.2 Environmental monitoring

Enhanced beach monitoring

Monitoring recommenced in September 2007 at a lower survey speed to improve the level of detection. At the end of the first week of monitoring, 19 contaminated objects had been found (in addition to the 69 found previously). It was notable that one of these objects, an americium-241 particle, had the highest activity to date (600 kBq – the previous highest was 400 kBq). The monitoring continued for a further two week period during September 2007.

As indicated in our earlier reports, we will keep the results of the monitoring and the advice on the use of the beaches under review. The latest survey results have been issued to the Health Protection Agency and following review there is no change to their advice, *i.e.* no special precautionary actions are necessary regarding access to or use of the beaches.

We continue to work with others to support the development of and inform the monitoring programme, this includes but is not limited to:

- a beach-specific habit survey;
- a desk top review of potential sources;

- implementation of R&D to improve monitoring capability;
- detailed analysis of particles;
- assessment of the ways in which potential release of particulates is prevented and minimised; and
- progression towards a seabed monitoring programme.

Groundwater monitoring

The groundwater monitoring programme has increased significantly in recent years in order to develop the understanding of the distribution and migration of contamination in groundwater at Sellafield. Over the past year, we have introduced independent groundwater check monitoring in line with the approach we take for other environmental monitoring. Initially, we experienced poor agreement between the groundwater results generated by our independent laboratories and results from Sellafield Ltd's laboratories. Subsequently, Sellafield Ltd identified errors in the way their results were extracted and converted from their results database into a report for the Environment Agency. These data transcription problems have been resolved and there is now fairly good agreement between the two sets of results.

Recently, some positive results have been reported by Sellafield Ltd for carbon-14 and chlorine-36 in groundwater. These are currently being investigated.

4.3 Site inspection and assessment

Site inspections and assessment by our nuclear regulators are essential for effective regulation of nuclear sites. One aim of our site inspection and assessment is to provide assurance that an operator is complying with the relevant limits and conditions of its authorisations issued under the Radioactive Substances Act 1993 (RSA 93), the Environmental Protection Act 1990 (EPA 90) and other relevant legislation and policy. The following provides some highlights of our site inspection and assessment activities over the past 3 months.

Overall environmental performance

During this reporting period, our regulators have participated in annual business reviews for the major directorates/operating units across the Sellafield site. Importantly, for us, these reviews include a review of environmental performance.

It would appear that there are significant improvements in environmental performance in some areas – for example, increased awareness and application of the waste management hierarchy, leading to better waste prevention and minimisation. In addition, general environmental performance indicators suggest that environmental performance is stable and satisfactory or good.

However, we have concerns in a number of areas in particular:

- the potential for spent fuel to become a future waste legacy if it continues to buildup in fuel ponds as a result of the low reprocessing rates in recent years;
- delays in clean-up and decommissioning which deal with the existing waste legacies; and
- the vulnerability of operations at the site to failures at, for example, waste processing plants and other infrastructure facilities.

If not resolved, we believe these issues could result in avoidable environmental impacts in the longer-term, as well as being potentially costly to deal with. We are seeking to understand the cause of these issues and to encourage Sellafield Ltd and NDA to find a solution.

Oxide reprocessing

THORP re-start

THORP re-started in June 2007. A limited fuel shearing campaign is underway. This will provide process liquor for blending with the leaked material recovered from the floor of the Feed Clarification Cell (FCC), to ensure that the final liquor meets the required specification. This will mean that all liquors can be removed from the buffer tanks in FCC, which will reduce risk and place THORP in an appropriate state in the event of a long-term outage.

Interim storage of Advanced Gas Cooled Reactor (AGR) Fuel

AGR fuel may be stored in the THORP fuel storage pond as an interim measure, pending a decision on the future long-term management strategy for this fuel. To enable this Sellafield Ltd need to remove and decontaminate multi-element bottles (MEBs) which are currently stored in the fuel pond. We have received a final report on MEB decontamination trials. The environmental impact from these decontamination procedures is small. We have given our "no objection" to the NII, who can now instruct the operator to proceed with to active commissioning of the export facility.

Magnox reprocessing

We have continued to monitor Magnox reprocessing operations to assess whether they are being conducted in a way that minimises environmental impacts both now and in the future.

Reprocessing performance

Following resolution of operational difficulties with the downstream treatment plants, the Magnox reprocessing plant has been operational for some of this reporting period. However, it is currently shut down for a planned steam outage. Operational difficulties at the Magnox uranium finishing plant could result in Magnox reprocessing being shutdown until mid-October 2007. To overcome these difficulties and to re-start reprocessing earlier, Sellafield Ltd intend to re-use an old medium active storage tank. We have indicated that we do not support the re-use of this tank as we do not believe that it meets modern standards.

Reprocessed fuel stands at about 90 tonnes this financial year, including 4 tonnes of corroded fuel (compared to targets of 800 tonnes and 45 tonnes, respectively).

Magnox reprocessing is making cuts in planned spending on asset care, in response to the NDA budget constraints. We continue to explore this issue with NII, Sellafield Ltd and NDA and to make sure that all key stakeholders are aware of this issue, and to understand what the implications might be.

Import of Swedish fuel from Studsvik reactor

The Environment Agency has been asked by the Swedish regulator to approve the import of a small quantity of fuel for reprocessing in the Magnox reprocessing plant. We are considering our response.

Effluents

Gaseous waste team inspection

We completed a week long team inspection of the management and control of gaseous radioactive waste at Sellafield in June 2007. We have just completed and issued the team inspection report. The key conclusions were:

- We valued the learning we gained from working with other regulators (internal, and from ASN (France) and SEPA);
- There was positive, professional participation by Sellafield Ltd staff at all levels;
- Good practice was found to be balanced with opportunities for improvement;
- Good practice was seen in the areas of written standards, internal audits and strategy development; and
- Key concerns, seen in some areas, were the lack of implementation of standards, plant care and maintenance and laboratory quality assurance.

We have required Sellafield Ltd to develop a programme to address all the recommendations and potential compliance issues detailed in the report, and to respond to all of the observations in writing.

Low active effluent drains

During camera inspections in October 2005, a number of fractures were observed in connections to the drain system which carries liquid effluent of low radioactivity. A project was set up to lift the covers off the ducts that the drain runs into, to visually inspect the drain pipework and label all pipes running in the duct. Investigation into the condition of one zone of the drainage and cleaning of this zone has recently been completed. Additional inspection hatches will be installed this year.

Processing of legacy waste flocs

Due to issues raised in the "readiness for operation" inspection in June, BNGSL wrote to NII to retract their application for Consent to Operate and have subsequently applied for an extension to active commissioning. This has been granted, but the processing of floc is currently suspended due to contamination in the seal flush system. We expect to receive a full BPM assessment for the processing of floc in December 2007.

Medium Active Concentrate (MAC) tank wash-out

Sellafield Ltd have started processing residual effluents from the bottom of the tanks previously used to store medium active concentrate. Sellafield Ltd have obtained a Letter of Compliance (LoC) from NDA, regarding the disposability of the solid waste arising from this process and we have confirmed that we have no objection on radioactive waste management or environmental protection grounds.

Solid waste

Solid waste audit

We have sent the written report of our team audit to Sellafield Ltd – early feedback was given shortly after the audit which took place in September 2006. There are 29 high level recommendations. We have held preliminary discussions with Sellafield Ltd on the findings, and expect a response shortly.

LLW metal waste

Around 50 tonnes of metal LLW have been identified during the wet silo floor clearance project. Sellafield Ltd propose to dispose of several large metal items to the LLWR at Drigg. We challenged whether this disposal route was correct. Unfortunately, limited site facilities for metal decontamination or temporary storage mean that recycling is not an option and therefore there is no alternative to the transfer. Development of these site facilities is recognised as a priority in the revised Sellafield IWS.

LLWR at Drigg

An inspection of the LLWR in September addressed the adequacy of maintenance arrangements for environmental equipment and systems, as well as the adequacy of record keeping.

5 ENFORCEMENT

The purpose of enforcement is to ensure that preventative or remedial action is taken to protect the environment or to secure compliance with legal requirements. The need for enforcement may stem from an unauthorised 'incident' or from a breach of the conditions of an authorisation or permit. Although we expect full voluntary compliance with relevant legislative requirements and authorisations, we will not hesitate to use our enforcement powers where necessary. This section contains a summary of enforcement activity during the quarter and any follow-up of previous action.

Solids in aqueous discharges from Sellafield

Progress is being made on the BPM study into the removal of entrained solids from radioactive aqueous waste before it is discharged to the sea. Reviews for donor plants are currently being finalised, and will be submitted to Technical Committees for approval. The next stage of the work is to review the submissions from across the site, to enable reviews of the treatment plants to be carried out. The programme is currently behind schedule, but we expect that this difference will be made up between now and the middle of December.

Sealines Enforcement Notice follow-up

We issued an Enforcement Notice to BNGSL in January 2007 relating to the maintenance of the sealines, following the discovery of small holes in the secondary containment in Sealine 3 in August 2006.

BNGSL were required to review the routing of liquors from the pipe bridge to the soakaway and to provide a written report on options for improving the system. The preferred option is to justify the continued use of the soakaways, either as uncontaminated surface water discharges (outwith the RSA authorisation) or as trace

active discharges under RSA. If this option is not viable, then the alternative is to install a collection facility that continuously monitors activity in drainage arisings and discharges periodically to one of the two sea discharge lines.

AGR Storage Pond Enforcement Notice inspection

We undertook a joint inspection with colleagues from the NII to determine the progress made in closing out the recommendations arising from Enforcement Notice concerning the loss of pond water from the AGR Storage Pond in February 2006.

We are satisfied with the progress made to date and will not therefore require any major changes to the programme at this stage. However, a number of observations were made with regard to:

- amendments to operator's and maintainer's instructions;
- plant information and knowledge;
- the integrity of the pond's water bars; and
- factual inaccuracies within the interim BPM case.

We have required the operator to respond to these specific issues and will follow-up separately. The Enforcement Notice requires that the recommendations arising from the initial incident are rolled out across all operational and legacy ponds on the Sellafield site. Consequently we shall undertake similar inspections across these other facilities in the coming months.

6 EMERGENCY PREPAREDNESS

We believe that it is important that we support and encourage the development of the multi-agency nuclear emergency planning and response arrangements. This is one of our strategic objectives which stems from our commitment at a national level to support this process.

OSCAR

It is likely that the next full exercise of the off site arrangements (OSCAR) will be held in October 2009. A smaller off-site exercise may be held in Spring 2008.

7 EVENTS AND INCIDENTS

THORP

On 4 June, hydroxylamine nitrate was detected in the THORP out-cell drainage system due to a faulty drain valve. A very conservative assessment would suggest that the discharge to sea represented about 20% of a provisional Environmental Assessment Level (EAL). The actual environmental consequence of this release is therefore considered to be small. However, it has highlighted the need to review arisings and the sentencing and analysis requirements. Sellafield Ltd has agreed to undertake this work.

SIXEP discharges

Discharges of caesium-137 from the Site Ion Exchange Plant (SIXEP) have been elevated since July 2007. This is being investigated and is believed to be due to insufficient removal of contaminated ion-exchange material (known as clinoptilolite) during the last bed change. We are currently following up this issue.

ANNEX 1: THE ROLE OF THE ENVIRONMENT AGENCY AT NUCLEAR SITES

The Environment Agency has two Nuclear Regulation Groups (NRGs), one covering nuclear sites in the north and the other group covering sites in the south. NRG (North) is based at the Environment Agency's offices at Penrith in Cumbria and includes a small team of Nuclear Regulators, which cover Sellafield, Windscale and the Low Level Waste Repository.

Internally, we collaborate with a number of other Environment Agency groups – in particular those, which advise on policy, process, radiological monitoring and assessment and nuclear waste assessment. We also receive support from colleagues in other functions such as water quality, waste, contaminated land and ecology. Close working ensures an integrated approach to environmental protection.

Externally we work with a wide range of stakeholders – local, national and international. In particular, we have close working arrangements and liaison with our colleagues in the Nuclear Installations Inspectorate (NII) of the Health and Safety Executive (HSE). We also maintain good contacts with the Food Standards Agency (FSA), the Nuclear Decommissioning Authority (NDA), other regulatory bodies, local authorities and our sponsoring department, the Department for Environment, Food and Rural Affairs (Defra). We also have good links with our regulatory counterparts abroad, particularly in Norway, Ireland and France.

The NRGs work to ensure the protection of the public and the wider environment from radiation, to prevent pollution, to protect and enhance the environment and to contribute to the UK's aim of sustainable development. This is achieved through influence and education in addition to licensing/authorisation, compliance assessment and enforcement under legislation such as the:

- Environment Act 1995 (this gives us our regulatory powers etc),
- Radioactive Substances Act 1993 (RSA 93) (which deals with the disposal and discharges of radioactive waste from nuclear sites),
- Pollution Prevention and Control Regulations 2000 (PPC) (which covers the environmental regulation of industry and non-radioactive pollution),
- Environmental Protection Act 1990 (EPA 90) (which deals with Integrated Pollution Control (IPC) among other things), and the
- Control of Major Accident Hazards Regulations.

The Environment Agency also has teams who deal specifically with water abstraction licensing, non-radioactive waste management licensing and liquid effluent discharges not covered under the above regulatory regimes but by 'consents' issued under the Water Resources Act 1991.

The Sellafield site is moving from an operational to a decommissioning and clean up phase. Decommissioning and clean-up will not only involve the current operational facilities but also the legacy facilities which contain radioactive wastes from the early days of civil and military operations. In this period of change it is important that the strategic long-term aspects of the regulation of Sellafield are managed so as to prevent and minimise future environmental impacts and risks.

In summary, we have responsibility for regulating and encouraging the prevention and minimisation of the **current** and **future** environmental impacts and risks from the operational and clean-up activities at Sellafield.

ANNEX 2: GLOSSARY

Not all terms may have been used in this report

Absorbed radiation dose: Quantity of energy imparted by ionising radiation to unit mass of matter such as tissue. Unit gray, symbol Gy. 1Gy = 1 joule per kilogram.

Activity: The rate of radioactive decay. Measured in the standard international unit, Becquerels (Bq).

Alpha particle/radiation: A particle consisting of two protons and two neutrons. Emitted by some radionuclides.

Authorisation: Permission given by the Environment Agency under certain environmental legislation e.g. the Radioactive Substances Act 1993, subject to limits and conditions which must be met.

Becquerel: The standard international unit of radioactivity equal to one radioactive transformation (decay) per second.

- . MBq equals 1 million transformations per second.
- . GBq equals 1 billion transformations per second.
- . TBq equals 1000 billion transformations per second.

Best Available Techniques (BAT): The use of the most effective process in preventing, minimising or rendering harmless polluting emissions taking into account availability.

Best Practicable Environmental Option (BPEO): A concept developed by the Royal Commission on Environmental Pollution, it implies that decisions on waste management have been based on an assessment of alternative options evaluated on the basis of factors such as the occupational and environmental impacts, the costs and social implications.

Best Practicable Means (BPM): Within a particular waste management option, the BPM is that level of management and engineering control that minimises, as far as practicable, the release of radioactivity to the environment whilst taking account of a wider range of factors, including cost-effectiveness, technological status, operational safety, and social and environmental factors.

Beta activity: Radionuclides that decay by emitting a beta particle.

Beta particle/radiation: An electron emitted by the nucleus of a radionuclide.

BNGSL: British Nuclear Group Sellafield Ltd – the company that operates the Sellafield and Calder Hall sites i.e. the Site Licence Company and Authorisation holder.

Critical group: A term used in radiation protection which refers to a small group of members of the public whose radiation exposure (or radiation dose) is reasonably uniform and is typical of people receiving the highest dose from a given source such as a nuclear power station. If the radiation exposure of this group is within statutory limits,

then it can be inferred that the exposure of all others will also be within limits.

Dose: A measure of the radiation received. Various forms of dose are commonly referred to, including equivalent dose, effective dose and absorbed dose (measured in Sieverts and Grays). In this document it is used primarily to mean the effective dose.

Dose limit: For the purposes of discharge authorisations under the Radioactive Substances Act 1993, the UK applies a legal limit of 1 milliSv/y (1,000 microSv/y) to members of the public from all man-made sources of radiation (other than from medical exposure).

Effective dose: The quantity obtained by multiplying the equivalent dose to various tissues and organs by a weighting factor, appropriate to each, and summing the product. It allows the various equivalent doses in the body to be represented by a single number giving a broad indication of the health impact on an individual from an exposure to ionising radiation, regardless of the energy and type of radiation. This is the radiation dose quantity most often used and is often shortened simply to “dose”.

Environment Act 1995 (EA 95): The main piece of legislation giving the Environment Agency its powers, aims and objectives.

Equivalent dose: The quantity obtained by multiplying the absorbed dose by a factor to allow for the different effectiveness of various types of ionising radiations in causing harm to tissue.

Food Standards Agency (FSA): The Food Standards Agency was formed in April 2000. It took over responsibility for food safety issues in the UK from MAFF.

Fuel reprocessing: The processing of spent uranium fuel from nuclear power stations to separate it into plutonium, uranium and waste fission products. The plutonium and uranium may be used again in new nuclear fuel.

Gamma ray/radiation: A discrete quantity of electromagnetic energy without mass or charge. Emitted by a radionuclide.

Half-life: The time required for the radioactivity of a radionuclide to decrease by radioactive decay to one half of its initial value.

Integrated Pollution Control (IPC): A statutory means of controlling pollution from major (non-nuclear) industry set up under the Environmental Protection Act 1990 (EPA 90). The main objectives are to prevent, minimise or render harmless polluting substances and to consider discharges from industrial processes, to all media, in the context of the effect on the environment as a whole.

Intermediate Level Waste (ILW): Waste with radioactivity levels exceeding the upper boundaries for low level waste but which does not require heat generation by the waste to be accounted for in the design of disposal or storage facilities.

Isotope: Any of two or more species of atoms of a chemical element with the same number of protons but different numbers of neutrons.

Lifecycle Baseline (LCBL): The long-term plan covering the remaining lifetime of a nuclear site covered by the NDA.

Low Level Waste (LLW): Waste containing levels of radioactivity greater than those acceptable for disposal with normal refuse but not exceeding 4 GBq/tonne alpha-

emitting radionuclides or 12 GBq/tonne beta-emitting radionuclides.

Magnox: A magnesium/aluminium alloy that is used in the manufacture of the canister for uranium metal fuel that is used in a certain type of nuclear reactor.

Magnox reprocessing: The reprocessing of Magnox fuel. See fuel reprocessing.

Medium Active Concentrate (MAC): A liquid waste arising during fuel reprocessing. It is concentrated by evaporation for storage purposes. It is similar to highly active liquor but is less radioactive.

Microsievert: See Sievert.

Most exposed group: Those members of the public who share similar habits and receive the highest dose from radioactive discharges. It should be noted that unlike the critical group definition, this does not take account of direct radiation from the site and therefore the most exposed group may not always be the same as the critical group.

Multi-media Authorisation: Authorisation issued by the Environment Agency under the Radioactive Substances Act 1993 of a 'multi-media' or integrated type covering radioactive waste disposals to land, sea and air.

Near Term Work Plan (NTWP): The detailed work plan over a three-year period for a nuclear site covered by the NDA. See also Life-cycle Baseline.

NII: Nuclear Installations Inspectorate is the part of the Health & Safety Executive which has responsibility for enforcing legislation relating to nuclear safety under the Nuclear Installations Act 1965 (NII 65). The NII is also responsible for regulating the storage and accumulation of radioactive waste on nuclear sites while the Environment Agency is responsible for regulating the disposal of that waste.

Nuclear Decommissioning Authority (NDA): A public body to come into force on 1 April 2005 to oversee and manage the decommissioning and clean-up of the UK's civil nuclear legacy.

Pollution Prevention and Control Regulations 2000 (PPC): The system of Integrated Pollution Prevention and Control applies an integrated environmental approach to the regulation of certain industrial activities. This means that the non-radioactive component of emissions to air, water, and land, plus a range of other environmental effects, must be considered together. The PPC regime is gradually replacing the Integrated Pollution Control regime (IPC).

Radioactive Substances Act (RSA) 1960, 1993: Statutory legislation to control the keeping and use of radioactive substances and the accumulation, discharge or disposal of radioactive waste.

Radioactive waste: Material that contains radioactivity above the appropriate levels specified in the Radioactive Substances Act 1993 and which meets the definition of waste given in the Act.

Radionuclide: A general term for an unstable nuclide that emits ionising radiation (e.g Cs-137).

Sievert (Sv): A measure of radiation dose received.

- **millisievert (mSv):** one thousandth of a sievert.
- **microsievert or microSv (μ Sv):** one millionth of a sievert.

Often presented as a dose received over a period of time (dose rate) e.g. microSv per year

Site Licence Company (SLC): Responsible for the day to day operation of a nuclear licensed site under contract to the NDA. They hold the nuclear site licence and the majority of the environmental authorisations.

SL: Sellafield Limited – the company that operates the Sellafield and Calder Hall sites i.e. the Site Licence Company and Authorisation holder.

Technetium-99 (Tc-99): A radioactive element (half-life of 213,000 years) that is a product of nuclear fission. An emitter of low energy beta particles.

Terabecquerel (TBq): see **Becquerel**.

UKAEA: United Kingdom Atomic Energy Authority – the company that operates the Windscale site i.e. the Site Licence Company and Authorisation holder.