



**Sellafield, Windscale and LLWR at Drigg**

**WEST CUMBRIA SITES STAKEHOLDER GROUP**

**QUARTERLY REPORT FOR 1 JULY TO 30 SEPTEMBER 2008**

**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](mailto: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.

## **EXECUTIVE SUMMARY**

This provides a brief summary of highlights of environmental performance and key challenges at the West Cumbria sites during the period 1 July-30 September 2008. The figures in brackets indicate where to find more detail in the report.

### **Authorisations and permits**

- We have started our annual review of the Sellafield RSA93 authorisation. (2.1)
- We are consulting on a draft minor variation to the EPR permit for Fellside CHP, which will allow the replacement stacks to be installed in October. (2.1)

### **Compliance assessment and enforcement**

- Radioactive discharges to air and water were all well below the authorised site limits in the year to the end of June 2008. (3.1)
- We estimate that the annual radiation dose to the most exposed group of the public as a result of current discharges to sea from Sellafield was around 20 microsieverts. This is about 4% of the legal constraint on radiation dose to the public from a single site. (3.1)
- Beach monitoring halted during July and August due to an equipment failure. (3.2)
- We issued two warning letters to Sellafield this quarter and continued to investigate the chimney stack corrosion event at the Combined Heat and Power plant. (3.4)

### **Progress against our strategic objectives**

- We have continued to raise concerns over the delays to clean-up and remediation work at Sellafield (4.1)
- We are encouraged by a new Sellafield initiative to improve asset management and asset care arrangements (4.4).
- We met with Nuclear Management Partners; selected by NDA as the preferred bidder for Sellafield's new parent body organisation. (4.9)
- Characterisation of high activity sludges from the Legacy Ponds & Silos needs to be improved to support their successful retrieval, conditioning and disposal. (4.2)
- Sellafield Ltd have commissioned an independent BPEO assessment for the Sludge Packaging Plant. (4.2)
- LLWR's revised Lifetime Plan, LTP08, includes most of the scope we expected. (4.9)
- We have told LLWR that we have no concerns about construction of Vault 9 proceeding for storage. (4.10)
- We inspected Sellafield's arrangements for managing contaminated land and groundwater with NII in July. (4.8)

## 1 INTRODUCTION

This report presents a summary of our work at Sellafield, Windscale, Calder Hall and the Low-Level Waste Repository (LLWR) near Drigg over the three months to the end of September 2008.

The report covers progress against our regulatory strategy which steers our work at nuclear sites. Our strategy sets out, among other things:

- our long term objectives;
- our expectations of the operator;
- how our strategy connects with the wider Environment Agency vision and goals.

The contents of this issue are:

[Authorisations and permits](#)

[Compliance assessment and enforcement](#)

[Strategic objectives](#)

[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 is as small as it can be, now and in the future, we supplement direct regulation with partnership working. If you want to know more about our role in regulating nuclear sites see Annex 1 or our website at the link below:

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

## 2 AUTHORISATIONS AND PERMITS

The West Cumbria sites hold various environmental authorisations and permits. We aim to issue, regularly review and revise these as necessary to ensure that they are up to date, flexible and fit for purpose.

### **2.1 Sellafield Ltd**

*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 started the annual review of Sellafield's RSA93 authorisation. We believe that a variation is likely to be required in April 2009 to incorporate changes to some discharge limits and to incorporate some operational changes.

We have asked Sellafield Ltd, NII, NDA and FSA for any input they wish to make to the review.

#### *Environmental Permitting Regulations (EPR)*

The prevention and control of non-radioactive pollutants, and other environmental impacts, at the Sellafield site is now regulated under the Environmental Permitting (England and Wales) Regulations 2007.

We are currently consulting NII, Copeland Borough Council and Sellafield Ltd on a minor variation to Sellafield's EPR permit. This will allow the stack height at Fellside Combined Heat and Power Plant to be reduced from 55 metres to 45 metres when new stacks are installed from October 2008.

## **2.2 LLWR**

#### *Water Resources Act (WRA) consent*

LLW Repository Ltd applied for a WRA consent to dispose of surface run-off water to Drigg Stream in July. This is required to enable construction work on Vault 9 to start. The case is considered as 'significant' and requires consultation due to the large volumes involved and proximity to a Site of Special Scientific Interest (SSSI).

#### *RSA93 authorisation*

We expect LLWR to submit an application for a variation to their RSA93 authorisation to accommodate segregation and sorting of wastes. LLWR are currently developing a best practicable environmental option (BPEO) case for metals, and will consider VLLW and combustible wastes over a longer timescale.

## **2.3 Studsvik**

#### *RSA93 authorisation*

We met with Studsvik UK Ltd in July to discuss the authorisation requirements for the transfer of low level metallic wastes from nuclear sites to the metals recycling facility (MRF) at Workington, both for the commissioning phase and for future routine operations. We believe that several sites will apply for variations soon to enable the transfer of metal and some soft wastes to Workington for processing. We will coordinate the consultation for these applications with Cumbria County Council and Allerdale Borough Council.

## **3 COMPLIANCE ASSESSMENT AND ENFORCEMENT**

Compliance assessment is an important part of our regulatory strategy. We continue to assess compliance with the limits and conditions of the permits and authorisations we have issued. This section provides highlights of our assessment and site inspection activities over the reporting period.

More details of discharge and environmental monitoring data can be found in our annual Radioactivity in Food and Environment (RIFE) report. RIFE is published jointly with the Food Standards Agency, Scottish Environment Protection Agency (SEPA) and the Environment and Heritage Service of Northern Ireland. The latest RIFE report (2006) can be found at:

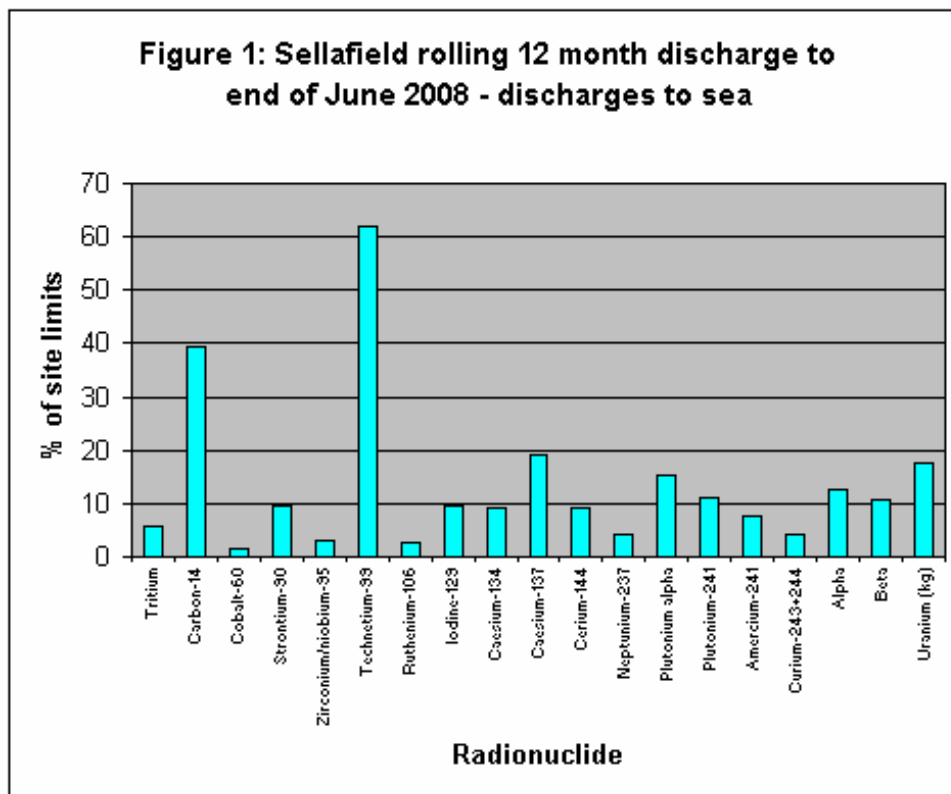
[RIFE report for 2006](#)

### 3.1 Radioactive discharges

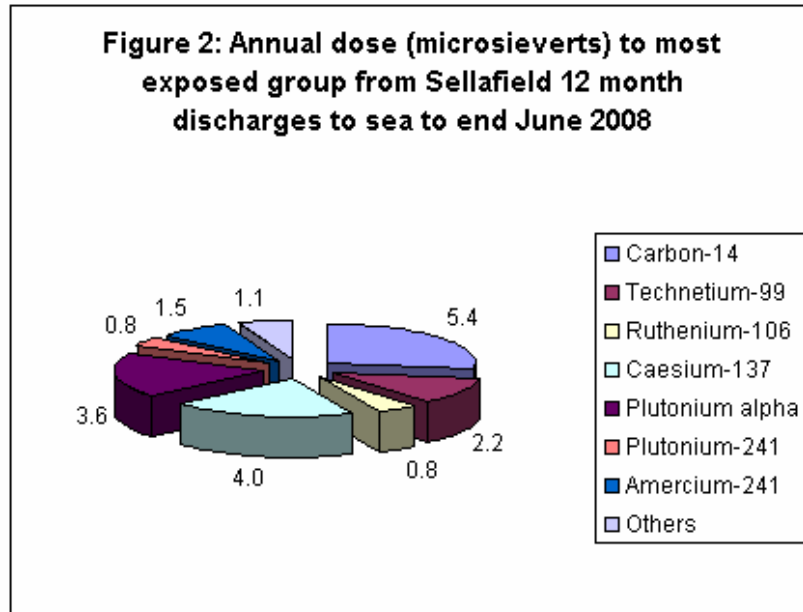
There were no breaches of the authorised site limits on radioactive discharges to land, sea or air during the reporting period at any of the West Cumbria sites.

#### *Discharges to sea*

Radioactive discharges to sea from Sellafield for the 12 months to the end of June 2008 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 predicted annual radiation dose to the most exposed group of the public from current discharges of radionuclides subject to numerical limits is given in Figure 2. The total dose was about 20 microsieverts, which is about 4% of the constraint on dose from discharges from a single site (500 microsieverts per year) and less than 1% of the average dose from natural background radiation.

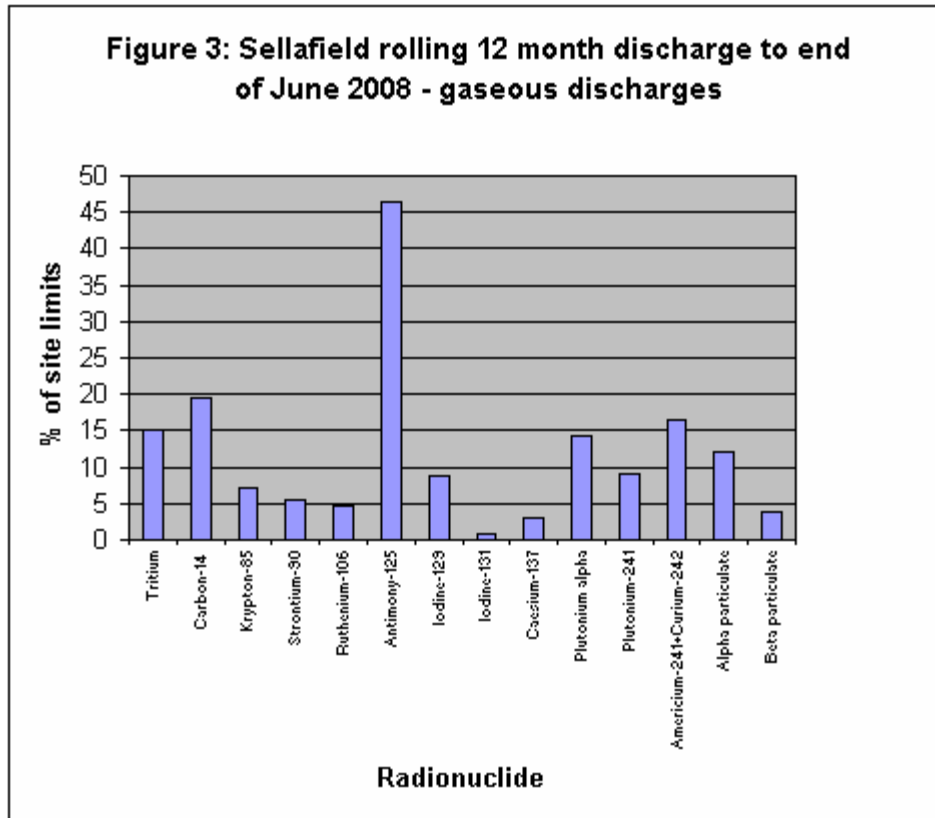


Note that the above dose assessment does not include the radiation dose from radioactivity already in the environment from discharges made in the past. The dose assessments presented in the RIFE reports (see page 5) are based upon measurements of radioactivity and radiation in the environment and therefore will include a contribution from radioactive discharges made in the past. The latest assessment of annual radiation dose to the most exposed group from sea discharges is 230 microsieverts via seafood consumption and external radiation.

The latest RIFE also states that the seafood consumer group receives an additional dose from the presence in local seafood, of enhanced levels of natural radionuclides resulting from past discharges from the former phosphate processing plant at Whitehaven. The discharge, which has now ceased, contained natural radionuclides, for example uranium isotopes and their decay products such as polonium-210 and lead-210, which were present in the materials used in the process. It is estimated that the dose from this source was 240 microsieverts in 2006 giving a total dose of 470 microsieverts. This dose is less than the dose limit for the public of 1,000 microsieverts per year.

*Discharges to air*

Figure 3 gives the rolling 12 month discharges to air to the end of June 2008 as a percentage of the site limits.



### 3.2 Environmental monitoring

#### *Sellafield beach monitoring programme*

Beach monitoring stopped temporarily in July following a failure and subsequent submersion of the 'Groundhog' vehicle. Monitoring is scheduled to re-start in early September, and Sellafield Ltd have committed to making up the lost time by deploying two monitoring vehicles in parallel for a period.

Monitoring of the local seabed using a remotely operated vehicle (ROV) similar to the one used at Dounreay should commence later this financial year. This will establish the extent of any offshore contamination.

Monitoring techniques which may improve the ability to detect americium-241, strontium-90 and plutonium isotopes on beaches were reviewed at a workshop in July.

Sellafield Ltd have agreed to commission additional analytical work to improve understanding of the relationship between the size, mass and radioactivity of alpha bearing particles, and to investigate the range of Cs-137: Sr-90 ratios in beta bearing particles.

Independent auditors began a quality (QA/QC) review of Sellafield Ltd's procedures and arrangements for the beach monitoring programme in September 2008.

For more details see our website at:

## [Beach monitoring and Sellafield particles](#)

More details are also available via the Sellafield website:

<http://www.sellafieldsites.com/page/what-we-do/case-studies/beach-monitoring>

### **3.3 Site inspection and assessment**

Site inspections and assessment by our nuclear regulators are essential for effective regulation of nuclear sites. The main 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 Permitting Regulations 2007 and other relevant legislation and policy. The following provides highlights of our site inspection and assessment activities over the reporting period. Inspection work is also covered in section 4.

#### *Drains characterisation and cleaning at Sellafield*

We inspected the CCTV survey work in Separation Area in July. Steady progress is being made in cleaning and characterisation. A new mobile centrifuge unit is to be used to dewater material extracted from gully pots and catchpits. This work is due to be completed by 31 December 2008. We will continue to monitor it closely.

### **3.4 Enforcement**

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

#### *Warning letters for Sellafield Ltd*

We issued two warning letters this quarter, in relation to the following:

- Submission of an inadequate written management standard for aqueous waste (a CEAR requirement);
- Damage to the final effluent filters on 31 January 2008.

#### *CHP stacks*

We are continuing to investigate the serious corrosion around the bases of the stacks at the Fellside Combined Heat and Power plant, which provides steam to the Sellafield site. Key root causes of the event relate to control of contractors and 'intelligent customer' capability. We are pressing to see the learning from this event lead to improvements in the back-up steam supplies.

#### *Sealine maintenance enforcement notice*

We met with a Sellafield in August to find out what progress had been made on the requirements of the enforcement notice issued in January 2007.

The Engineering, Inspection, Maintenance & Testing (EIM&T) strategy for the sealines is mainly complete, and good progress is being made on EIM&T strategies for the Effluents & Encapsulation Plants (E&EP), Utilities, Magnox and THORP Operating Units. We expect to receive a final report on this work in January 2009.

#### *Exclusion of solids from aqueous effluents enforcement notice*

We provided feedback to Sellafield Ltd on their response to the enforcement notice relating to exclusion of solids from aqueous effluents in July, and met to discuss their forward programme of work. We continued to give priority to this important area of work and have appointed an overall co-ordinator of the various areas of work related to the prevention and minimisation of solid matter in aqueous waste, and the prevention of particulate releases to the environment from other potential sources.

### **3.5 Events and incidents**

This section contains a report of events and incidents of relevance from an environmental perspective.

#### *Acid liquor leak at Waste Encapsulation Plant (WEP)*

A leak of non-radioactive hydrochloric acid occurred in WEP at Sellafield on 16 July. This was believed to be the result of an overflow from an acid storage tank. Sellafield Ltd responded swiftly to the spill but a small volume may have run to drain and to the sea via the River Calder. We inspected the scene and no environmental impact was evident.

We will continue to follow-up Environmental Permit compliance aspects and determine whether any enforcement action should be taken in line with our Enforcement and Prosecution Policy. Sellafield Ltd are also investigating this event.

## **4 STRATEGIC OBJECTIVES**

In addition to the areas covered in sections 2 and 3, we carry out a wide range of other work aimed at achieving the objectives set out in our strategy. This section provides a summary of progress against these other objectives.

### **4.1 Reduction of environmental risk and avoidance of further legacies**

#### *Lifetime plan*

We want to see old nuclear industry sites cleaned-up as soon as possible. This is not only good practice but consistent with Government and International Policy. We are therefore concerned about continual delays to decommissioning work at Sellafield.

We wrote to Sellafield Ltd jointly with NII to express our concern about changes to the Lifetime Plan and associated delays to cleanup work at the site brought about by funding shortfalls and project delays.

#### *Legacy Ponds & Silos (LP&S) – Sludge*

We completed our review of Sellafield Ltd's characterisation of the high activity sludges from the Legacy Ponds and Silos (LP&S) in July. We concluded that, in general, the characteristics of these wastes are not yet adequately known. We highlighted a number

of challenges that Sellafield Ltd will need to address to enable these accumulated wastes to be retrieved, conditioned and disposed of effectively, and provided some suggestions for improvement to address these issues. We require a written response from by October 2008 to all of the conclusions and major observations in the review report, together with a summary of the plans for sludge characterisation on a facility by facility basis with key dates linked to decision points for sludge management.

#### *SIXEP Waste Retrieval (SWR) project*

If solid waste (spent ion exchange material etc) storage capacity at the Site Ion Exchange Plant (SIXEP) is exhausted then this would impact on SIXEP operation and hence its capability to support the Magnox Operating Programme and legacy waste retrievals. We are concerned about the delay in opening a route to condition stored wastes at SIXEP and have encouraged Sellafield Ltd to accelerate this work. The project is currently focussing on one option, the use of the Waste Encapsulation Plant and Sellafield Direct Encapsulation Plant, to start treating the wastes by 2016.

#### *Sludge Packaging Plant (SPP1)*

Sellafield Ltd have commissioned an independent BPEO. If the independent BPEO indicates that options other than cement encapsulation should be pursued, Sellafield Ltd will re-assess the direction of the current project.

## **4.2 Integrated waste strategy and its improvement**

#### *Legacy Ponds and Silos strategy*

We have requested that Sellafield Ltd consider an open and transparent review of the Legacy Ponds and Silos strategy, supported by a BPEO assessment.

## **4.3 Disposable waste forms**

We continue to progress our reviews of the disposability of high activity wastes from the Legacy Ponds and Silos (LP&S) and on the treatment of reactive metal high activity waste.

## **4.4 Infrastructure and asset care**

#### *Environmental impact of new evaporators and high activity storage tanks (HASTs)*

We met with Sellafield Ltd in July to discuss their early thoughts on the integrated environmental assessments (IEAs) in support of Evaporator D. We have asked them to consider the potential environmental consequences of a crane collapse at and how to mitigate them. We have also asked them to consider the implications of a loss of site utility and to take on board any learning from the recent issue of reduced steam supply.

We met with Sellafield Ltd and Jacobs to discuss the early thinking behind replacement HASTs and evaporators, the potential environmental consequences from this facility and the necessary regulatory interactions and permissioning.

#### *Sellafield asset care workshop*

We took part in an asset care workshop with staff from Sellafield Ltd, HSE/NII, Nuclear Safety Advisory Committee and NDA in July. The workshop allowed the site owner,

operator and regulators to discuss their concerns regarding maintenance and asset care on the Sellafield site. A significant number of ideas and information were exchanged during the workshop. Sellafield Ltd will review these and identify a number of key work streams to take forward immediately, with more to follow over a longer timescale. We emphasized the importance of strategic asset management and the use of appropriate UK and international standards for asset management.

#### *Sellafield annual safety & environment reviews*

We attended several annual reviews of environment, health and safety during the quarter. For example at the Site Services and Plant Services operating units review in July we highlighted good work at the on-site landfill, the Decontamination Facility, the development of a site Travel Plan and increased environmental awareness. However, we emphasised the need for improvement in the area of strategic asset management and asset care, noted our disappointment with several aspects of the Fellside CHP stack event (see above), and re-iterated our concerns about limited resourcing in some areas (particularly in the Ventilation Technology Support Group).

### **4.5 NDA issues and national waste strategy**

#### *NDA strategic developments*

We continue to be involved in the NDA's development of topic strategies (e.g. waste, fuel and nuclear materials) and Site Strategic Specifications (SSSs). We met with NDA in July to discuss the development of a national integrated waste strategy and integration with the overall NDA strategy.

#### *LLW Strategy Group*

At the third meeting of this group, NDA presented the developing LLW strategy along with site strategies for Capenhurst and Sellafield. Concerns were raised about the accuracy of LLW inventories. NDA agreed to establish a separate meeting with the regulators in September to discuss this further.

#### *Intermediate level waste (ILW) storage review*

We contributed to the development of the report on Phase 1 of the NDA review of ILW storage. The recommendations for further work reflect many of our written suggestions. We have discussed the scope of the next phase of this review with NDA in July.

### **4.6 Integrated fuel and nuclear materials management**

#### *Magnox Operating Plan (MOP)*

In August the reprocessing of Magnox fuel was marginally ahead of programme. However, the reprocessing of corroded fuel was behind programme. Stocks of wetted fuel in ponds have reduced significantly and there is currently less than 800 tonnes in the ponds in the Fuel Handling Plant at Sellafield.

A planned 3-month maintenance outage in the Magnox Reprocessing plant started in September.

### **4.7 Contaminated land and groundwater**

#### *Joint inspection of contaminated land & groundwater*

We carried out a joint inspection of arrangements for managing contaminated land and groundwater with NII in July. We found that the administrative arrangements for borehole drilling were well managed, and that the 'chain of custody' for routine groundwater sampling and arrangements for transport of samples and radioactive waste management associated with the characterisation contract were well administered. We are still finalising our report and recommendations.

### **4.8 Management of organisational change**

#### *Sellafield PBO transition*

We met with NDA and staff from the preferred PBO bidder, Nuclear Management Partners (NMP), in July. We set out our general expectations and strategy for environmental risk and impact reduction and were told that these aligned with NMP's aims and expectations.

We continued to be involved with NII on advising on the development of Sellafield's induction training for the new PBO secondees. We also continued to be involved in assessing the transition process for the SLC's Board and Executive Management Team. The transition indicators continue to show no significant issues at present.

#### *LLWR*

A revised Lifetime Plan (LTP08) for the LLWR is due to be submitted to NDA on 1 October. Work to realign plans with the PBO's aspirations is continuing. We are generally satisfied that most of the scope we expected to see is captured in LTP08, particularly in relation to the Environmental Safety Case. Key new elements are the intention to develop VLLW cells on site in 2009, to progress with increased waste segregation and treatment, and to replace the proposed LLW Activity Monitor. LTP08 indicates that LLWR do not intend to apply for disposal into Vault 9 until around 2013, after submission of the full Environmental Safety Case in 2011.

We reviewed the management of change for the LLWR in July.

We met with the independent non-executive director on the LLWR SLC Board, to discuss how we see his role and current topical issues related to development of the LLW strategy. Key areas discussed were environmental leadership, advocacy, awareness and independent steer. We agreed that periodic meetings will be valuable.

### **4.9 Post Closure Safety Case (PCSC) and future options for LLWR at Drigg**

#### *PCSC-related developments*

We are continuing to review LLWR's impact assessments submitted as required by the RSA authorisation. We have provided initial feedback to LLWR.

#### *Development of Vault 9*

We sent a 'close out' letter to LLWR in July, summarising our understanding of the current position and highlighting a number of minor outstanding issues. We are still waiting to receive an engineering brief for the modular vaults and a design justification

report, and updates to several other documents include the BPM documents. We have no concerns with the construction of Vault 9 proceeding for the storage of waste only, provided that the outstanding information is provided and our outstanding comments are addressed satisfactorily.

We have stated our concerns and expectations of the design before we could consider the future use of Vault 9 for disposal of low level radioactive wastes. These include, but are not necessarily limited to, the need to demonstrate that this remains the preferred option and that environmental performance will be acceptable and consistent with the Environmental Safety Case, to provide a suitable hydrogeological risk assessment, and to demonstrate that the closure engineering (including vertical drains, cut-off wall and final cap) will perform adequately.

We intend to carry out a range of inspections during Vault 9 construction against Environment Agency guidelines.

#### *Disposal issues*

Disposal of uranium hexafluoride cylinders has been delayed by requirements for further characterisation.

We have asked LLWR to consider the implications of increasing the use of smaller (Type 0075) ISO skips e.g. increasing number of consignments.

#### **4.11 Communication of wider benefits**

##### *Nuclear sector plan – environmental performance in 2006*

The Environment Agency and the nuclear industry agreed eight key environmental objectives in 2005 as part of the Nuclear Sector Plan. We published the first environmental performance report (for 2006) against the plan in April.

Overall, the environmental performance of the sector was very good during 2006. However, we identified a number of areas on which it needs to focus its attention in order to further improve performance. The full report can be found on our website at:

[Nuclear Sector Plan - 2006 Environmental Performance Report](#)

##### *Current consultations*

Defra are currently consulting on their statutory guidance to the Environment Agency, and on the revised UK radioactive discharge strategy. The consultation documents can be found on the internet:

<http://www.defra.gov.uk/corporate/consult/rad-discharges-eaguidance/index.htm>

<http://www.defra.gov.uk/corporate/consult/rad-discharges-ukstrategy/index.htm>

The statutory guidance makes reference to our Radioactive Substances Regulation Environmental Principles (REPs), which are also at the consultation stage. We are also consulting on our guidance on Best Available Techniques (BAT). These documents can be found at:

<http://www.environment-agency.gov.uk/yourenv/consultations/2066484/?version=1&lang=e>

The Government published a white paper on a framework for geological disposal in June. This can be found at:

<http://www.defra.gov.uk/environment/radioactivity/mrws/pdf/white-paper-final.pdf>

We are also consulting on revisions to our guidance on requirements for authorisation for solid radioactive wastes both for near surface and deep geological disposal:

[http://www.environment-agency.gov.uk/yourenv/consultations/current\\_consultations/?version=1&lang=e](http://www.environment-agency.gov.uk/yourenv/consultations/current_consultations/?version=1&lang=e)

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

We have two Nuclear Regulation Groups (NRGs), one group covering nuclear sites in the north and the other covering sites in the south. NRG (North) is based at our office at Penrith in Cumbria and includes a team of nuclear regulators who cover Sellafield, Windscale and the Low Level Waste Repository.

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.

We also work with a wide range of external 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 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. We achieve this through influence and education in addition to licensing/authorisation, compliance assessment and enforcement under legislation such as the:

- Environment Act 1995, which 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,
- Environmental Permitting (England and Wales) Regulations 2007, which covers non-radioactive pollution and non-radioactive waste management licensing, and
- Control of Major Accident Hazards (COMAH) Regulations.

We also have 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 involve the facilities which are currently operating, as well as the legacy facilities which contain radioactive wastes from the early days of civil and military operations. It is important during this period of change 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 are responsible for regulating and encouraging the prevention and minimisation of the current and future environmental impacts and risks from all 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.

**CEAR:** see EAR

**COMAH:** Control of Major Accident Hazards Regulations

**CHPP:** Combined Heat & Power Plant

**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).

**EAR:** Environment Agency Requirement – a supplement to an RSA93 authorisation which details an approval, agreement, specification or notification referred to in the authorisation. The set of EARs for a particular authorisation is known as the Compilation of Environment Agency Requirements (CEAR).

**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.

**Exposure:** In the context of radiation, exposure refers to the radiation dose - see effective dose.

**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.

**Lifetime Plan (LTP):** 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.

**LLWR:** Low Level Waste Repository near Drigg

**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 Lifetime Plan.

**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.

**Non-radioactive waste:** Solid waste that contains no radioactivity of manmade origin and with sufficiently low levels of natural radioactivity for it to be excluded from the provisions of the Radioactive Substances Act.

**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.

**PBO:** Parent Body Organisation. The company or group of companies that owns the shares in the Site Licence Company. The PBO has no direct operational responsibilities. However, for the SLC it owns, the PBO should provide the vision for the site, the key personnel to be seconded into the SLC to translate the vision into reality and provide the leadership and management support for the SLC to deliver the

NDA contract.

**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 replaced 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 ( $\mu$ 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.

**SIXEP:** Site Ion Exchange Plant

**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.

**THORP:** Thermal Oxide Reprocessing Plant

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