



BNGSL SELLAFIELD, REPOSITORY SITE AT DRIGG AND UKAEA WINDSCALE

WEST CUMBRIA SITES STAKEHOLDER GROUP

QUARTERLY REPORT FOR 1 JULY TO 30 SEPTEMBER 2006

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:

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We would like 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 2006.

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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 see our website at the address below:

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

2 GENERAL REGULATORY MATTERS

2.1 BNGSL Sellafield

Highly Active Liquor Evaporation and Storage

We have been working closely with our colleagues in the Nuclear Installations Inspectorate (NII) on assessing a proposal by British Nuclear Group Sellafield Ltd (BNGSL) to add nitrate to the cooling water system in order to inhibit corrosion. One of the factors involved in our considerations will be the potential for increased nitrate discharges to the sea.

THORP

We continue to meet with the NII to discuss our participation in a joint inspection of THORP prior to any decision to restart.

Magnox fuel storage

We have informed BNGSL that we will wish to assess a proposal to extend the storage period for spent magnox fuel. The current 500 day operating assumption has helped resolve the difficulties which arose during the mid to late 1990s which led to the build up of stored Magnox fuel and elevated discharges.

Together with the NII we have continued to monitor the rate of processing of corroded fuel, which has been relatively slow recently due to a number of factors.

Legacy Ponds and Silos

We continued to monitor and assess progress with the options and plans for the retrieval and treatment of the wastes to be removed from these facilities. Our aim is to ensure the reduction of hazard and environmental risk at these facilities and that this is done in a way that has the minimum impact on the environment in the short and long term i.e. is the best practicable environmental option.

In response to a best practicable environmental option (BPEO) study carried out by BNGSL we have worked with the NII to produce a joint position on the treatment of solid waste from the wet silo. Both regulators continue to support the reference strategy, which involves the early retrieval and treatment of the waste in the modified Sellafield DryPac Plant. Nevertheless we remain sufficiently concerned about the inherent risks with this treatment strategy to have intervened with a number of proposed actions for improvement. BNGSL are currently considering their response to these actions.

We have agreed to the trial use of the Site Ion Exchange Plant (SIXEP) for the treatment of liquid waste from the wet silo. The results of this trial will be used to inform the decision on the BPEO for the longer-term treatment of this waste.

We continue to monitor developments with BNGSL's plans for the treatment of aqueous waste from the first generation Magnox fuel pond decommissioning project. Again the reference strategy is treatment at SIXEP. BNGSL are considering whether more flexible approaches can be adopted, perhaps in combination with SIXEP.

We have challenged BNGSL about the assumption that the high organic fraction (especially algae) present in Pile Fuel Pond sludge can be encapsulated using conventional processing routes without pre-treatment. Without consideration of the risk of rework, the assessment may be biased towards forms of encapsulation that 'score' well in the short term. In response to our suggestion, BNGSL are reviewing approaches to reduce the risk from rework.

We provided a letter of 'no objection' to the NII to input into their assessment of the proposal by BNGSL to install a local effluent treatment plant in the Pile Fuel Pond.

Calder Hall

We have received BPEO and BPM reports for the cooling tower demolition. We are assessing whether any air quality issues could arise from demolition.

Low-level waste (LLW)

We attended a BNGSL workshop with NDA and NII to provide advice on the use of BPEO to take forward issues associated with LLW.

BNGSL have been reviewing treatment options for asbestos and have determined that some form of high temperature treatment could be developed at Sellafield to treat both Calder Hall and Sellafield asbestos. A route for disposal of non-radioactive asbestos now exists at Lillyhall Landfill Site in a non-reactive stabilised cell.

Calder Landfill Extension Segregated Area (CLESA)

We have undertaken an inspection of CLESA (a new on-site disposal facility for LLW with radioactivity content at the lower end of the range sent to the LLWR at Drigg) with our hydrogeological and landfill specialists as part of our assessment of the facility prior to permitting. BNGSL is to seek permission to use the basal area initially (about 30% of total capacity). We have urged BNGSL to prepare an application for the remainder as soon as possible after the basal layer is permitted. As a contingency (to allow for any delay in approval as a disposal facility) BNGSL is producing a proposal to allow the basal section of CLESA to act as a storage facility in the short-term.

Exempt wastes

We have continued to discuss with BNGSL the use of soil and spoil from demolition and construction projects, which is essentially free from radioactive contamination, for landscaping purposes both within, and just outside, the site licence boundary (e.g. close to Calder gate).

Contaminated land and groundwater

We continued to work very closely with the NII on this issue.

We have received a short-term contaminated land strategy from BNGSL. We wish to see practicable options for the remediation of contaminated land considered whenever the opportunity arises during demolition projects.

Surface water drainage systems

BNGSL are undertaking a programme of characterisation and cleaning of the surface water drainage systems including those within the Separation Area as required by the RSA authorisation. We continue to monitor and assess progress.

Lagoon

The on-site lagoon at Sellafield (a facility which takes surface drainage from the Separation Area and other trace active effluent streams) has had a duckweed infestation for about a year. Although this problem is controlled through the use of herbicide and physical removal, a permanent solution is required. BNGSL propose to return to operating the lagoon dry, i.e. water will only go into the lagoon when input exceeds the outflow (e.g. in times of heavy rainfall). Prior to operating the lagoon dry, it needs to be cleaned to remove the sediment from the bottom. We have encouraged BNSGL to progress with lagoon basin cleaning at the earliest opportunity.

World Association of Nuclear Operators (WANO)

We have discussed the implementation of the WANO Performance Objectives and Criteria (PO&Cs) at Sellafield and BNGSL's programme of WANO peer reviews in the operational areas at Sellafield. We are encouraged by Sellafield's development of a set of environmental PO&Cs to supplement the official WANO set of PO&Cs.

2.2 UKAEA Windscale

Demolition projects

We have been monitoring UKAEA's management of demolition wastes arising as a result of the dismantling of redundant buildings on the site. UKAEA now store potentially useful demolition materials (concrete and brickwork) on the site for future re-use in landscaping or other activities. Some other materials are removed from the site for recycling, and some are disposed of to off-site landfill or as Low Level Waste. To ensure appropriate measures continue to be used for demolition materials we have suggested to UKAEA that they improve their management arrangements for these types of operations and establish cross-site policies and procedural requirements for those managing the demolition projects to follow.

WAGR decommissioning

We have been working with UKAEA on asbestos waste management from WAGR decommissioning including dealing with the large volumes of filter wastes that arose from previous dismantling operations. We recognise the extensive efforts that UKAEA are now making to ensure that the best practicable means are being used to reduce waste volumes and to package the waste appropriately for disposal.

Surplus source disposal programme

Receipt of sources from the Surplus Source Disposal Programme is still being constrained by safety case and operational constraints. Safeguard International have now proposed taking back some of their transport containers which remain un-emptied. This will require a variation to the UKAEA Windscale RSA93 authorisation.

Disposal of contaminated oil

UKAEA submitted a 'Best Practicable Environmental Option (BPEO)' study report to us relating to the disposal of contaminated oil from the site, concluding that incineration at Fawley, Hampshire was the 'BPEO'. The report was provided in response to a requirement in the RSA93 authorisation. Written feedback has been provided to UKAEA regarding the driving factors behind the study conclusions and reflecting on what might become the 'BPEO' for dealing with the much greater volume of contaminated oil on the Sellafield site. The latter is an issue that will be raised again with NDA should UKAEA apply to us for authorisation to dispose of the oil via the identified route.

3 COMPLIANCE ASSESSMENT

We assess compliance with authorisations and permits using a range of activities including data assessment and site inspection. This section provides highlights of various compliance assessment activities. More details of, for example, discharge or

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 and the Environment and Heritage Service of Northern Ireland. The RIFE report for 2005 is due shortly, the 2004 report can be found at:

<http://publications.environment-agency.gov.uk/pdf/PMHO1005BJUM-e-e.pdf>

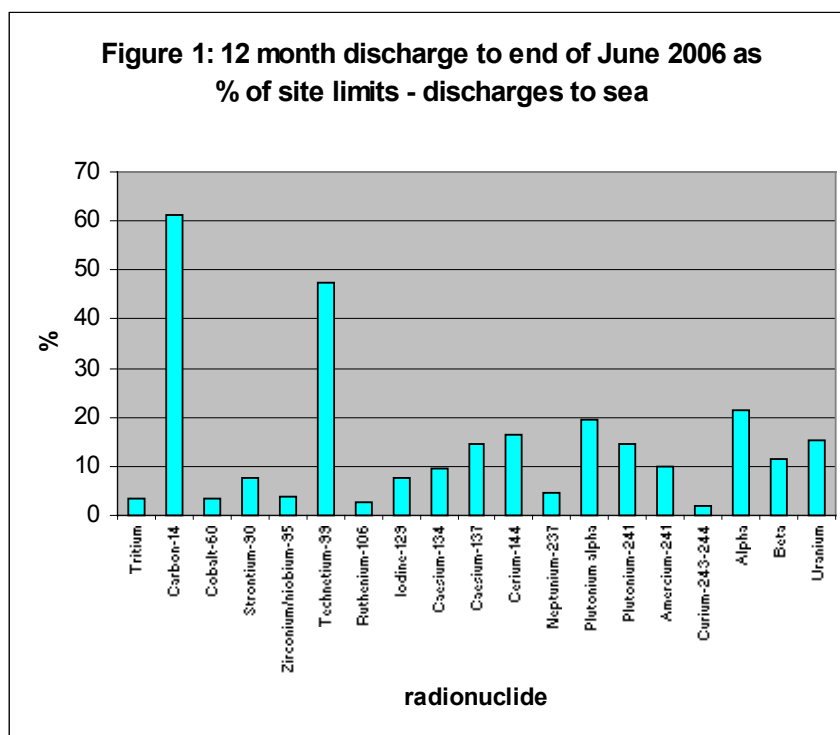
Another source of data is our Pollution Inventory:

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

3.1 Radioactive Discharges

There have been no breaches of site limits during the reporting period at any of the sites. See section 6 for news of a potential breach of a plant limit at the Fuel Handling Plant at Sellafield.

Radioactive discharges to sea for the 12 months to the end of June were all well below the authorised limits for Sellafield – see Figure 1 below. Note that for certain radionuclides the site limits for calendar years depend upon 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 these discharges is given in figure 2. The total dose was about 23

microsieverts, which is less than 5% of the constraint on dose from discharges (500 microsieverts per year).

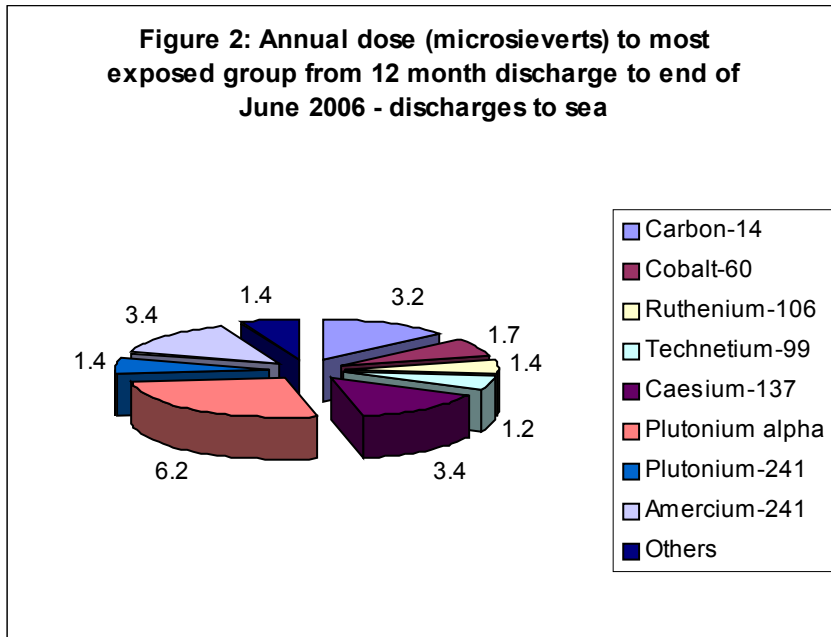
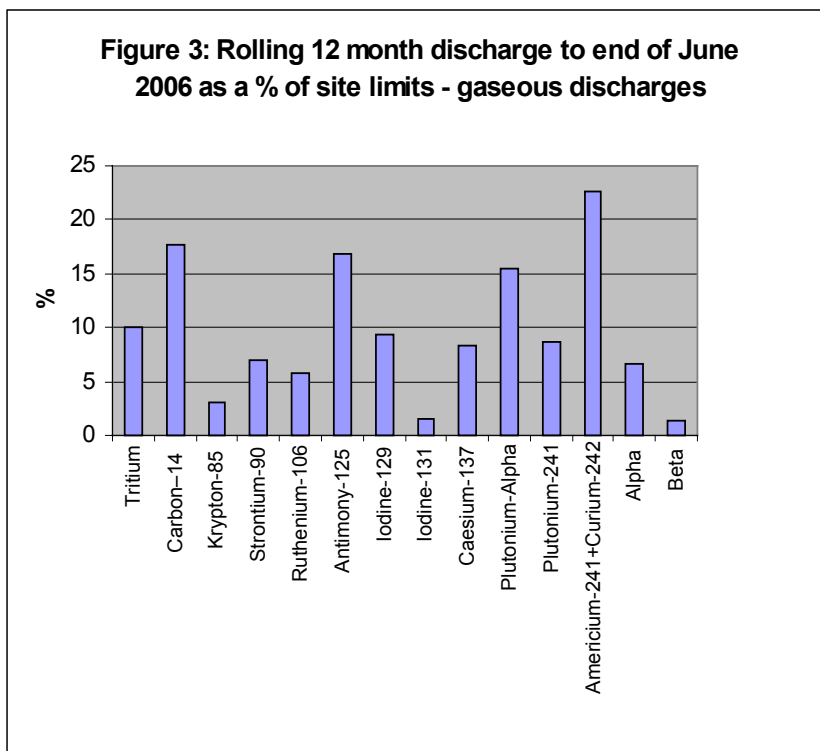


Figure 3 gives the rolling 12 month discharges to air to the end of June as a percentage of the site limits.



Environmental Monitoring

A summary of the main issues:

- The annual review of the monitoring programme is progressing to schedule and we are seeking to develop an agreed documented process which will be linked to the periodic RSA authorisation review.
- Enhanced beach monitoring is being planned but the contract is yet to be placed.
- Further analysis of the particle found on the Sellafield beach in July 2003 has confirmed the presence of small particles of uranium held within a much larger particle of calcite.
- Monitoring data for the onsite 'SM4' drainage catchment and Sellafield Tarn have been compiled by BNGSL. Initial analysis of the data suggests that the drainage system sediments have concentrations of radioactivity consistent with those measured in samples taken from Sellafield Tarn (i.e. up to a few Bq/g total alpha and total beta activity). The source of the radioactivity is not clear, possible sources may include routine discharges from Sellafield, Chernobyl and the Windscale fire.
- Local air monitoring of krypton-85 (discharged from reprocessing operations under authorisation) will be installed by December 2006 at the earliest.

3.2 Inspection Visits

Site inspections by our Nuclear Regulators and independent monitoring of disposals are essential for effective regulation of nuclear sites. One aim of our inspections 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 a summary of our inspection activity – note that inspection activity is also covered under other sections of the report where relevant.

Waste oil burner

In July we inspected the waste oil burner, which has not been used for many years, and found it to be showing serious signs of neglect. We instructed BNGSL not to operate the oil burner without our specific approval, to carry out remedial actions and to improve its maintenance. We also required BNGSL to define a strategy for the treatment of waste oils on the Sellafield site as soon as possible so that the future use (or otherwise) of the waste oil burner is resolved. We have recently been told by BNGSL that they intend to decommission the facility.

Solid waste team audit

At the time of writing we are putting the final arrangements in place for a large-scale team audit to be held during the week beginning 25 September. Areas will include ILW, LLW, PCM and exempt waste and quality systems and records. The audit will include colleagues from the Nuclear Installations Inspectorate, the Scottish Environment Protection Agency, Lloyds Register and Nirex.

LLW Checking

A visit was made to the Waste Monitoring and Compaction plant (WAMAC) on 2 August to provide support to staff from our Waste Quality Checking Laboratory

(Winfrith) during independent calibration checks on LLW monitoring equipment at the plant.

Active Area Services

We inspected the on-site laundry in August and commended ongoing work to modify the treatment of the effluent from the non-active side of the facility in line with good waste segregation and minimisation practice. We viewed preparatory work for the repair of the north sump lining.

We inspected the decontamination facility in August. There has been a number of improvements at this facility in the aftermath of our liquid effluent team inspection in 2005 and in line with the facility's own 'BPM case' improvement plan. Discussions are being held about the possible use of an adjacent facility to house additional decontamination facilities.

UKAEA Windscale

A number of 'tenant' companies operating from the Windsale site hold registrations under RSA93 for the keeping and use of radioactive sealed sources. During the period we inspected source management arrangements against a registration held by Johnson Controls on the site. The arrangements were found to be satisfactory.

We visited the site of the B53 demolition and the compound near B76 where rubble from demolition of buildings is being crushed and stored for landscaping etc., across the site. These areas appear satisfactory.

4 AUTHORISATIONS

4.1 BNGSL Sellafield

RSA 93

A meeting was held in August with BNGSL to discuss the forthcoming periodic review of the RSA93 authorisation. The potential complications of the authorisation transfers required for the NDA competition schedule were discussed.

EPA 90

We issued a variation to the THORP IPC authorisation to allow an increase in the concentration limit for mercury. The change in the limit is not associated with any change in the process but is related to unavoidable impurities in the caustic soda supplied to the process.

4.2 Application from Studsvik UK Ltd

Responses have been received to our consultation on applications for a registration for open sources and an authorisation to dispose of aerial, liquid and solid radioactive wastes from premises at Lillyhall industrial estate, Workington. The proposed activities at the site relate to volume reduction of metallic LLW to be delivered to the site from various nuclear and non-nuclear sites.

We met with Studsvik and Defra to discuss the requirement to make an Article 37 submission to the EU for the site because of the nature of activities to be carried out. Defra confirmed the view that since the operations appear to fit a category that requires a submission that one will have to be made, regardless of the low levels of discharges.

We also met with Studsvik to discuss short-term progress that could be made with registration of the Workington premises for the storage of contaminated tools and equipment used by the company in nuclear decommissioning work at sites including Sellafield. They will make a new application for registration, similar to the one they already hold for their premises in the north-east but for equipment normally to be kept at Workington. Studsvik also requested we progress the original registration application to allow them to proceed with the use of radioactive materials associated with the operation of a health physics laboratory on the Workington premises.

Studsvik wrote to us with a request to revise their original authorisation application to reduce the volume of waste to be accumulated at the Workington premises from 2000m³ to 400m³, and to adjust the accumulated radioactivity from 1TBq to 300GBq. These revised figures are closer to NII's internal guidelines on what constitutes "bulk quantities of radioactive material". We are waiting for formal NII views on whether the proposed activities at the site are licensable under the Nuclear Installations Act 1965.

4.3 LLW Repository at Drigg

LLWR separation

We have attended liaison meetings with NDA, NII, BNGSL and OCNS to discuss progress with the separation of the Low Level Waste Repository (LLWR) at Drigg from BNGSL. A joint inspection with the NII covering current arrangements/procedures and progress in preparing for separation of the LLWR from BNGSL was carried out in June 2006. A number of issues were highlighted to BNGSL where we wished to see improvements in written procedures and instructions.

On 24 August 2006 we received a joint application and supporting information from BNGSL and the LLWR SLC for transfer of the RSA93 authorisation from BNGSL to the LLWR SLC. We plan to consult HSE, FSA, Cumbria County Council, Copeland Borough Council and West Cumbria Fisheries Committee on the application. A documentation package has been prepared for the consultation that will begin in September 2006 and last 2 months. The consultation package will be sent to Defra, Dept. of Health and NDA for information.

Shadow working leading up to the separation of the LLWR from BNGSL is planned to begin in late September 2006 and to continue for around 3 months. During shadow working, we will undertake further inspections to ensure the LLWR SLC is capable of taking over the role of the LLWR operator and complying with the RSA93 authorisation. We will issue a decision document in early 2007 that will provide details of our findings during shadow working and our decision on whether the authorisation should be transferred to the LLWR SLC.

PCM removal

BNGSL submitted on 11 July 2006 an application for a minor variation to the RSA 93 authorisation. The application requested that the currently specified end date of 31 December 2006 for transfer of radioactive waste to Sellafield be changed to 30 September 2007. BNGSL previously anticipated the earlier date would be achievable but have recently encountered difficulties in the dismantling and monitoring of a bulk Plutonium Contaminated Material (PCM) item in a storage magazine. There are a number of bulk PCM items in the magazine that may present similar problems. The new date should allow the storage magazines to be cleared of bulk items of PCM.

We consulted NII, FSA, Cumbria County Council and Copeland Borough Council on the proposed variation. Copies of the draft variation notice were sent to Defra and Dept. of Health and NDA for information.

Based on our own considerations and responses from consultees, we decided that the requested change to the end date for waste transfers to Sellafield to be justified. Consequently, a variation notice was issued on 11 August 2006 (effective date 1 September 2006) with a revised date of 30 September 2007. In addition, we have introduced a new information requirement in the authorisation. BNGSL are required to provide by 31 December 2007 a written report including a programme for the decontamination and demolition of the waste storage magazines and BPEO/BPM assessments for all associated wastes.

5 STRATEGY AND PLANNING

We believe that it is important for us to work in partnership with other organisations in order that nuclear site clean-up is carried out so as to ensure the best overall environmental outcome and that future environmental impacts are minimised.

We have previously reported that we have been developing our own long-term strategy for our regulation at Sellafield. We finalised the first version of our 'Developing Regulatory Strategy for Sellafield' in August and sent it to BNGSL, NII and NDA, who had all seen a very early draft.

5.1 BNGSL Sellafield

Waste and effluent strategies

We have been gaining support for the development of an Effluent Strategic Issues group. This would probably involve NDA, BNGSL, NII and ourselves. This would seek to ensure that we all share a common understanding of the effluents issues and seek to identify a way to resolve them which is acceptable to key stakeholders. The group would be aligned to the developing Integrated Waste Strategy (IWS) at Sellafield and would link to the UK discharge strategy review.

As part of the development of the IWS BNGSL have provided a programme for the development of the gaseous and solid waste strategies as required by the RSA

authorisation. The programme includes for their integration with the strategy for aqueous waste for which a draft first version (baseline) has recently been received.

Spent Fuel Management

We have developed a paper with our colleagues at the NII, which sets out a joint regulatory approach on spent fuel management. An associated paper covering uranium spent fuel and associated ILW continues to be developed. These papers will feed into the on-going NDA review of the strategic options for the management of spent fuel.

Plutonium and Uranium Disposition

We have attended a NDA Material Issues Group Stakeholder meeting. This covered the NDA's review of the strategic options for spent fuel management and also the analysis of options for plutonium and uranium disposition, which will inform NDA and DTI strategy. We are considering, with NII, whether to start to develop a paper setting out our joint regulatory approach to plutonium and uranium disposition.

5.2 UKAEA Windscale

We participated in reviews of Lifetime Plans for the Windscale site before submission to NDA. UKAEA are maintaining an action plan against areas of concern to us to ensure long term issues are dealt with. We remain generally satisfied with progress against the key issues identified.

We attend regular Windscale Site Regulator Forum meetings that involve UKAEA, NDA, NII and ourselves. The latest of these meetings included discussion on the possible merger of the Windscale and Sellafield sites. We have been consulted on proposals by NDA and will be providing a written response during September.

6 EVENTS AND INCIDENTS

Elevated gaseous discharges at the Fuel Handling Plant

There has been a gradual unexplained increase in discharges to air from the Fuel Handling Plant (FHP) at Sellafield over recent months. It is likely that the 12 month discharge to the end of August will be slightly above the plant limit for caesium-137 (Cs-137) and that the site quarterly notification level for antimony-125 (Sb-125) may be exceeded.

Note that 'plant limits' relate to individual facilities and are, in the main, set at a fraction of the overall 'site limits'. Plant limits are generally set at a tight level to allow discharges within normal operating fluctuations based on historical data but do not generally cater for abnormal situations. Their principal purpose is to encourage rigorous application of the best practicable means (BPM) to prevent and/or minimise discharge at each major facility at the site. In this case the plant limits involved are no more than 5% of the corresponding site limit.

The maximum radiation dose that could occur as a result of a discharge made at the plant limit for the FHP for 12 months is less than 0.2 microsieverts which is more than 5,000 times less than the statutory radiation dose limit for the public (1,000

microsieverts per year). There is no suggestion from the site's environmental monitoring results that levels of radioactivity in the local area are unusually elevated.

We undertook inspections with NII in August and September to inspect and check on progress with the on-going investigations. BNGSL has provided us with a written notification and explanation of the issue and their response to it, as required by the RSA authorisation.

BNGSL's investigations into the reasons for the increased discharges have so far been inconclusive, although the latest information suggests that the operation of the pond water purge system and recent work undertaken on the ventilation system may be implicated. BNGSL is applying its in-house expertise in ventilation systems to investigate further.

We are continuing to monitor and investigate.

Sealines and Pipebridge

The recent removal, by BNGSL, of the concrete shielding from over one of the sea discharge pipes on the R Ehen pipebridge has allowed improved visual inspection. BNGSL has subsequently discovered a small area of corrosion of the secondary containment (an outer protective shell separate from the inner pipeline) in the vicinity of one of the pipe supports. A temporary repair has been effected. There is no evidence of any spillage from the inner pipeline itself. As more pipe supports are removed, it is likely that other areas of corrosion will be uncovered, which will need similar repairs.

We have inspected the facility and are monitoring the situation closely.

7 ENFORCEMENT ACTIVITY

AGR fuel pond

In response to an incident in February 2006 (see previous report) we issued BNGSL with an enforcement notice in July. As required by the enforcement notice, the programme detailing the time scales for implementing the improvements was submitted at the end of August. Together with the programme we have also received an indication of the evidential material that will be provided to demonstrate close-out of the corrective actions.

8 EMERGENCY PREPAREDNESS

We presented the outcome of a workshop that we held to explore milk disposal strategies for Cumbria in the aftermath of an accident, to the national Nuclear Emergency Planning Liaison Group Recovery seminar in July.

We continued to assist Cumbria CC with planning for the 'Oscar 8' exercise on 3 October.

ANNEX 1

THE ROLE OF THE ENVIRONMENT AGENCY AT NUCLEAR SITES

The Environment Agency has two Nuclear Regulation Groups (NRG), one covering nuclear sites in the north and the other covering sites in the south, with responsibility for the delivery of environmental regulation at such sites. NRG (North) is based at the Environment Agency's offices at Penrith and includes a team of Nuclear Regulators which cover Sellafield, Calder Hall, Windscale and the low-level waste repository at Drigg.

The NRGs work with numerous other Environment Agency groups in particular those which advise on policy, radiological monitoring and assessment, and nuclear waste assessment. We also work very closely with colleagues in other functions such as water quality, waste, contaminated land and ecology to ensure an integrated approach.

We also work closely with a wide range of external stakeholders - local, national and international. In particular we work very closely with our colleagues in the Nuclear Installations Inspectorate (NII) of the Health and Safety Executive (HSE). We also work with the Food Standards Agency, local authorities and the Department for Environment, Food and Rural Affairs.

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:

- 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),
- 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.

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.

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.