

Outcome of 1998 Safety Audit of Dounreay Nuclear Licensed Site

SUMMARY

In June 1998 a multidisciplinary team of Health and Safety Executive (HSE) inspectors and an inspector from the Scottish Environment Protection Agency (SEPA) undertook a safety audit of the Dounreay nuclear licensed site. A report of the findings was published in September 1998, which included recommendations. This report describes what was achieved since 2001 when the last report on progress was published and up to April 2008, when the site was relicensed to Dounreay Site Restoration Limited (DSRL).

Of the original 143 audit recommendations, 89 were fully closed-out when the 2001 report was written. The work associated with 27 of the 54 open recommendations needed several years to complete. These were placed on a medium term programme. The remaining 27 recommendations were strategic in nature and consequently had long timescales associated with their completion, in some cases extending to several decades. UKAEA's key milestones for the programmes were included in the Dounreay Site Restoration Plan, which has now been replaced by the Dounreay Lifetime Plan. Regular progress meetings were also held between UKAEA and its regulators to ensure that the overall project timescales were achieved.

All the recommendations were closed-out by April 2008. Most of the work associated with implementing the recommendations is also completed. The work required to meet the on-going programmes from some of the recommendations will be monitored as part of the routine regulatory inspections of Dounreay undertaken by SEPA's and HSE's inspectors.

INTRODUCTION

A report of the findings of the Dounreay safety audit was published in September 1998 (Reference 1), which included 143 recommendations. UKAEA published its action plan to respond to the audit findings, 'Dounreay – The Way Ahead' on 20 November 1998. This plan was discussed with HSE and SEPA and formed the basis against which progress was monitored by both regulators.

The last report on progress made by the UKAEA on meeting the recommendations was published in 2001 (Reference 2). That report indicated the intention to monitor progress with the remaining recommendations through normal regulatory processes. However, UKAEA recognised the importance of closing out the recommendations formally and hence Dounreay provided specific information on progress with each of the recommendations to allow a regulatory judgement to be made by HSE and SEPA when close-out could be declared.

All the recommendations have been closed-out and this report explains how this was achieved. In a few instances not all work required to meet some recommendations has been completed, but such has been the progress and the clear demonstration of improvement in UKAEA's safety and environmental management performance at Dounreay that, rather than continue with a dwindling list, the on-going work will be monitored as part of the routine regulatory inspections on the site undertaken by SEPA's and HSE's inspectors.

Since 2001 parts of the UK's nuclear industry have been reorganised, including the creation of the Nuclear Decommissioning Authority (NDA), which owns the UKAEA licensed sites. The UKAEA underwent significant restructuring and organisational change: this included Dounreay where the decommissioning programme was rationalised and published as the Dounreay Site Restoration Plan. This was superseded in 2002 by the Life-time Plan for the NDA. In addition, a behavioural safety campaign was introduced in 2006 which delivered significant improvements in safety and environmental performance.

UKAEA formed business partnerships with AMEC and CH2M Hill (two global private sector project management organisations), with the aim of identifying ways to accelerate the decommissioning work and to prepare for the NDA site competition process. As a result, in the current Lifetime Plan (2008), the target date for completion of decommissioning at Dounreay has been brought forward to 2024.

As a result of the accelerated decommissioning programme and the priority focus on removing hazards and decommissioning contaminated facilities, many of the recommendations were able to be completed or significant progress made with associated work.

The Dounreay site was relicensed to Dounreay Site Restoration Limited (DSRL) on 1st April 2008. Further details of the structure of DSRL and the decommissioning activities at Dounreay can be found on the web-site "www.dounreay.com".

PROGRESS SINCE 2001

Of the original 143 audit recommendations, 89 were fully closed-out when the 2001 report was written. For these, UKAEA provided adequate evidence to demonstrate that the requirements of the recommendations were met. UKAEA's evidence in support of close-outs was subject to independent confirmation by its Internal Inspection Department and on-site scrutiny by NII and SEPA.

The work associated with 27 of the 54 open recommendations needed several years to complete. These were placed on a medium term programme. The remaining 27 recommendations were strategic in nature and consequently had long timescales associated with their completion, in some cases extending to several decades. UKAEA's key

programme milestones were included in the Dounreay Lifetime Plan. The work that remains is included in the plan for 2008 (LTP08). Regular progress meetings were held between UKAEA and its regulators to ensure that the overall project timescales were being achieved. This process will continue.

Where close-out of a recommendation was based on decommissioning plans and arrangements it is recognised that these plans and arrangements may change and will be monitored as part of normal regulatory duties. Similarly, the impact of changes to strategies (for example, the strategy of a particular fuel type) will be regulated as part of regulatory site inspection activities.

CLOSE-OUT OF THE REMAINING AUDIT RECOMMENDATIONS OPEN IN 2001

RECOMMENDATION 1: “UKAEA should revise its safety and environmental management systems to be in line with modern practice.”

The Dounreay Management System (DMS) was developed in line with modern best practice. It is process orientated, integrating health, safety, environment, quality, business and security management. The system has been independently certified against relevant international standards. Safety and environmental performance show year on year improvements since 2000.

Dounreay continues to make progress in the areas of leadership, responsibilities and safety culture.

Site inspections and inspection of the UKAEA’s computer intranet systems confirmed:

- There is an integrated management system.
- As appropriate, staff are trained and developed to meet shortfalls in their experience.
- Procedures are in place to ensure the management system remains current.
- Corporate documentation was adapted to meet the existing and future structure of the licensee at Dounreay.

RECOMMENDATION 7: “UKAEA, as a matter of urgency should complete the rationalisation of the Dounreay safety documentation system to remove overlap and duplication and should re-issue a comprehensive, user-friendly set of documentation.”

The Dounreay safety documentation system was rationalised. This took place in stages, examples of which follow.

After issuing the first modern standard safety case ‘Facility Instructions’ were revised to reflect new requirements. This was followed by all the working level documentation to aid adoption of the safety cases being approved and published. This was undertaken using a defined process for issue and revision of working instructions.

Facility instructions supported the implementation of the safety cases.

A programme for preparation and approval of safety cases was implemented. All documentation that supports the implementation was controlled and published through the electronic document management system. The quality check on documentation provided assurance that the agreed templates were used and that there was no duplication within this system. The system is maintained.

As existing instructions become due for periodic review, they are reviewed, revised and re-issued in compliance with Dounreay specific templates.

RECOMMENDATION 14: “UKAEA, as a matter of urgency should complete the task of identifying the core skills and competences needed to fulfil its safety related duties and develop arrangements for this to be a continuous activity.”

The UKAEA spent a lot of time and effort producing a technical competency framework for all the core skills and competences needed to meet the safety related activities on the site. This information is reviewed and revised as appropriate to include new activities undertaken on the site. It is applied to both the UKAEA’s staff and those of contractors working on the site.

RECOMMENDATION 15: “UKAEA should establish its own appropriate and authoritative technical resources to be available to Dounreay to enable it to meet its safety duties.”

The UKAEA produced a safety management arrangements document and a design services management document that addressed safety case management and design management at Dounreay. This included a demonstration that there were Suitably Qualified and Experienced Persons within the technical support. Furthermore, the Dounreay Division baseline document summarised the organisation including information on safety case management and design service management. The information in the documents is updated as appropriate over time.

RECOMMENDATION 17: “UKAEA should review its long term staffing and succession needs and it should set up recruitment programmes so that the appropriate technical, managerial, and supervisory staff are available to meet its safety obligations.”

A great deal of effort is expended planning activities needed to decommission facilities on the licensed site. This provides the data used to develop long term staffing and succession needs. In addition, the UKAEA recruits and trains engineering apprentices, including the nuclear industry’s first decommissioning apprenticeship scheme. It re-established scientific training schemes and a Graduate Diploma Programme, with accreditation from the professional engineering institutions.

RECOMMENDATION 28: “UKAEA should monitor compliance with the policy and guidance [on the use and control of contractors] and review the adequacy of its arrangements accordingly.”

UKAEA’s policy and practice in the use and control of contractors is established. A company-wide review of the control of contractors identified a number of improvement actions which could be made. It concluded that none of the shortcomings had affected safety. Improvement actions identified were addressed.

RECOMMENDATION 39: “The UKAEA should produce and implement clear proposals for the processing, reprocessing or other treatment of all fuels on site and other outstanding commitments.”

All of the fuels on the Dounreay site have a strategy of treatment to stable form. The treatment may convert the material into a waste or for re-use. The strategy was incorporated into LTP08.

RECOMMENDATION 40: “UKAEA should review the adequacy of the technical support available to the operating plants in the Fuel Cycle Area (FCA).”

UKAEA reviewed the adequacy of the technical support available to the operating plants in the FCA and all other facilities on the site. The results of these reviews were acted on and there is an on-going process to ensure the technical support remains adequate.

RECOMMENDATION 42: “UKAEA should bring forward firm proposals for the reasonably practicable improvements needed for the safe operation and decommissioning of the FCA plants.”

In addressing this recommendation UKAEA developed and implemented a procedure for assessing safety related plant improvements. It provides the process for assessing, prioritising and reviewing the progress of proposed safety related improvements in support of Waste Management Group facility and project activities. A database tool supports this procedure that records details of requirements and reports progress on action. The procedure and its associated software were reviewed and improved. All necessary guidance and forms to manage the system are in place.

Each week the FCA work control staff produce a five week rolling programme, which is discussed and agreed to ensure work controls and implications of the work are known and in place and the need for waste movements coordinated.

The Labs & Operational Support Manager in conjunction with the Operations Manager and the Plant Improvements Database Application Controller review the status of plant improvements monthly and report progress to the Head of Operations Group.

RECOMMENDATION 46: “UKAEA should establish a clear strategy and plan for the safe management of all types of Prototype Fast Reactor (PFR) fuel.”

A strategy and plan for the safe management of all nuclear fuels on site, including PFR fuel, was prepared and is being implemented.

RECOMMENDATION 47: “UKAEA should establish a clear strategy and plan for the safe treatment and disposal of boron carbide absorber rods.”

The strategy is to dispose of the absorber rods.

The main issues remaining are the potential for tritium release and the passivation of potential sodium residue within the control rods. The design and construction of the tritium release trials equipment is complete and the safety case has been prepared. The trials will be completed shortly.

A programme of future activities, including the disposal of the absorber rods is included in LTP08.

RECOMMENDATION 48: “UKAEA should continue the development of a method for the safe removal, treatment and clean-up of all sodium coolant in PFR.”

The bulk sodium coolant in PFR was removed and treated safely. Work is continuing to develop methods that will remove the residual sodium safely. This will be subject to permissioning under the nuclear site licence and progress monitored through normal regulatory business.

RECOMMENDATION 49: “UKAEA should carry out timely Post-Operational Clean Out and decommissioning work on PFR and associated plant with the presumption that long term care and maintenance is only tolerable where there is a clear safety benefit.”

LTP08 includes details of the stages in the decommissioning of PFR. This will be subject to regulatory monitoring. Operations to decommission PFR are progressing, for example, the bulk liquid sodium in the reactor was removed and treated.

RECOMMENDATION 50: “UKAEA should remove the Dounreay Fast Reactor (DFR) breeder elements as soon as is reasonably practicable and ensure they reach Sellafield before BNFL's Magnox Reprocessing Plant closes, or define an alternative method of treating this fuel.”

The UKAEA demonstrated that DFR breeder elements will be removed as soon as is reasonably practicable. The reference strategy for the elements is to treat them as waste, which removes the need to have a reprocessing option available.

RECOMMENDATION 51: “UKAEA should vigorously pursue its development of a method for the safe removal, treatment, and clean-up of all sodium/potassium coolant in DFR.”

Progress has been made towards the removal of the sodium-potassium coolant in DFR. The steps and projects necessary to remove this material safely are included in LTP08. The projects will be the subject of regulatory permissioning and monitored through normal regulatory business.

RECOMMENDATION 52: “UKAEA should ensure that an adequate plant infrastructure is in place for decommissioning DFR.”

The DFR plant infrastructure was improved in the following areas:

1. Electrical supply and distribution system
2. Ventilation systems
3. Nitrogen supply and distribution system
4. Environmental (radiological) monitoring system
5. Fire detection and alarm system
6. Emergency arrangements including egress and control
7. Welfare arrangements
8. Water supply
9. Cranes
10. Pond

RECOMMENDATION 53: “UKAEA should carry out timely Post-Operational Clean Out (POCO) and decommissioning work on DFR and associated plant with the presumption that long term care and maintenance is only tolerable where there is a clear safety benefit.”

POCO and decommissioning work is programmed and is being carried out in a safe and controlled manner.

Since 1998, progress includes the demolition of the DFR sea water pump house, steam generator building, diesel generator building and an annex. Decommissioning has

progressed well in the DFR pond area, with the removal of irradiated fuel and associated racks from the pond. The sludge in the pond was removed and the pond water decontaminated.

RECOMMENDATION 55: “UKAEA should remove the radioactive materials from redundant laboratories in the FCA and decontaminate them as soon as is reasonably practicable, giving priority to Laboratory 33.”

A significant amount of radioactive material has been removed from the FCA redundant laboratories and many of them have been decontaminated. Intermediate Level Waste debris, loose contamination and actinide samples have been removed from the Laboratory 33 cell using remote techniques. The steel liner in the cell will be removed using additional equipment when it becomes available. All gloveboxes and fume cupboards have been decommissioned from the redundant laboratories. The remainder of the decommissioning work on the laboratories is undertaken as soon as is reasonably practicable.

RECOMMENDATION 56: “UKAEA, as a matter of urgency should carry out Post-Operational Clean Out of the facilities in the amber area of D1203 and decommission the facilities as soon as is reasonably practicable.”

Post-Operational Clean Out (POCO) is completed and decommissioning of the amber area is well advanced. Improvements to the containment, ventilation and access arrangements allowed hygienic and routine access to the area. The decommissioning safety case was prepared. Decommissioning of the area and returning it to ‘Contamination Low’ is nearing completion.

RECOMMENDATION 57: “UKAEA should decommission D1204 as soon as is reasonably practicable giving priority to the pond.”

Decommissioning of the facility is progressing with priority given to the pond, which is nearly empty. In addition, the remainder of the facility is being addressed and redundant services and plant are progressively removed and decommissioning undertaken in a timely manner.

RECOMMENDATION 58: “UKAEA should carry out POCO and decontaminate the cells in D1217 and complete its decommissioning study and implement it as soon as is reasonably practicable.”

The decommissioning study was completed. The POCO of the cells was achieved in September 2005 and their decontamination is close to completion. The pressurised tube measurement cell has been demolished.

RECOMMENDATION 59: “UKAEA should remove operational wastes from all cells and facilities within the Fuel Cycle Area as soon as is reasonably practicable.”

Removal of operational wastes from facilities within the FCA has progressed and is being achieved as soon as is reasonably practicable.

RECOMMENDATION 61: “UKAEA should make and implement plans to empty the Shaft as soon as is reasonably practicable.”

The shaft has now been isolated from the rock structure surrounding it. This work has already resulted in a reduction in risk to the environment. Two rings of boreholes were

drilled and a grout curtain constructed around the shaft to provide containment, which has significantly reduced the level of ground water ingress. The programme in LTP08 will result in waste retrieval from the shaft on a timescale that is 'as soon as is reasonably practicable'. Progress will be monitored by the regulators.

RECOMMENDATION 62: "UKAEA should empty the Wet Silo as soon as is reasonably practicable and not wait for the Shaft to be emptied."

A Modern Standards Safety Case has been made for the Wet Silo. Improvements have been made in leak detection and monitoring of the contents. The LTP08 includes the programme for emptying the Silo, which has been accepted as representing reasonable practicability. It is proposed to empty the Shaft and Wet Silo in parallel, with campaigns centred on one facility or the other depending on the success of retrievals or problems encountered that may require further development of techniques.

RECOMMENDATION 70: "UKAEA should ensure that radioactive waste facilities comply with good engineering and waste management practice."

Modern standard safety cases are applied to facilities and activities on the Dounreay site. Where appropriate, the UKAEA and its subcontractors are seeking further safety improvements at each stage in the decommissioning process.

Examples of the application of good engineering and waste management practise include:

- Decommissioning and demolishing of the former fuel fabrication facility.
- Progress with decommissioning other facilities.
- Ponds cleaned-up successfully.
- POCO of cells and gloveboxes.

RECOMMENDATION 71: "UKAEA should review its strategy for the safe and timely vitrification of highly active waste."

UKAEA reviewed the strategy for this waste in a Best Practicable Environmental Option (BPEO) study, which included public consultation. The results were given in the document 'How to deal with the Management of Prototype Fast Reactor Raffinate – Results of Consultation'. The strategy was changed from vitrification to encapsulation in cement. The classification of the waste was also review and revised to intermediate level waste.

RECOMMENDATION 72: "UKAEA should develop and implement methods for the treatment and disposal of contaminated oils and solvents."

There are strategies in place for the treatment and disposal of contaminated oils and solvents. In order to ensure that these strategies meet best practices, they are due to be reviewed during the next year. In the meantime, the storage arrangements of the oils and solvents have been improved.

RECOMMENDATION 73: "UKAEA should improve waste handling facilities at Dounreay to support the early decommissioning activities at site."

UKAEA improved the operational capabilities of the D2001 waste posting cell and the intermediate level waste handling facilities for decommissioning. As a result, the operational

capability of the waste posting cell has improved considerably so there is no longer a backlog of waste and newly generated waste is processed on demand.

UKAEA is in the process of designing a new waste processing plant, D3900, which will be able to take waste directly from the decommissioning plants.

RECOMMENDATION 74: “UKAEA should build a new import/export facility onto the Dounreay Cementation Plant Store.”

The project is in the inactive commissioning phase. The UKAEA is managing and coordinating all commissioning activities.

RECOMMENDATION 75: “UKAEA should plan for additional handling and storage capacity for plutonium contaminated wastes arising from decommissioning and develop a practical strategy for these wastes.”

The site’s intermediate level waste strategy was reviewed. As a result additional storage capacity was provided for plutonium contaminated wastes arising from decommissioning. Work has also started on the eventual export of the material.

RECOMMENDATION 77: “UKAEA should bring forward the construction of a versatile intermediate level waste treatment plant and associated waste stores.”

The UKAEA has prepared plans for the construction of intermediate level waste (ILW) treatment facilities and associated waste stores that should be able to successfully treat all the ILW on the site. The work to achieve this is programmed into LTP08 and progress will be monitored by the regulators.

RECOMMENDATION 79: “UKAEA, as a matter of urgency should either install a new incinerator for combustible low level waste (LLW) or find alternative methods for treatment, storage and disposal of these wastes.”

The decision was taken not to use the existing incinerator again and it was decommissioned.

The option of replacing the incinerator with one designed to the most modern engineering standard to deal with combustible LLW and, possibly, combustible oils and solvents were considered. Subsequently a BPEO study concluded that the most suitable option for the disposal of combustible LLW is for the waste to be supercompacted and then disposed of through the LLW stream.

RECOMMENDATION 80: “UKAEA, as a matter of urgency should review its capabilities and options for the storage and disposal of LLW.”

The issues involved in developing a new low level waste disposal facility were considered, including an independent peer review and audit. This work was completed satisfactorily and a strategy developed for the storage and disposal of LLW.

Subsequently arrangements for the management and storage of LLW were implemented through the use of interim waste stores and the planned below surface shallow disposal facility.

RECOMMENDATION 81: “UKAEA should develop and implement a strategy for the treatment and disposal of 'very low radioactive material'.”

The UKAEA developed and is implementing a strategy for the treatment and disposal of very low level waste. This included a BPEO study, which concluded that the best option for disposal of Low Activity, High Volume LLW was in a shallow, below surface facility constructed at Dounreay. Where appropriate, the waste is placed in interim waste stores prior to disposal.

RECOMMENDATION 92: “UKAEA, as a matter of urgency should revise its safety cases to bring them into line with modern standards.”

The site's safety cases have been reviewed and updated to bring them in line with modern standards. This process is on-going and the site is building on the progress achieved using experience gained from undertaking its safety related activities.

RECOMMENDATION 93: “UKAEA should ensure that its safety cases are produced in a way which incorporates the needs of the owners and as such should ensure that they are clear and acceptable to plant staff.”

The production of safety cases, in accordance with the procedure for, “Production and Clearance of Safety Documentation” ensures that safety cases incorporate the owner's needs and the needs of facility staff. The method of producing safety cases by their authors while working alongside the facilities' staff is showing additional benefits.

Nevertheless, there are areas where further improvements can be made and the UKAEA's staff and the regulators' inspectors are in on-going dialogues to ensure this is effectively achieved.

RECOMMENDATION 94: “UKAEA should increase resources to enable it to produce, assess, and revise its safety cases in a timely manner.”

The UKAEA has increased the number of professional staff working on safety cases, which includes criticality safety and human factors expertise. It has an ongoing safety case programme which produced over 20 substantive safety cases up to April 2008. It is producing and procuring safety cases for decommissioning, engineering and other projects. There have been stable staffing levels over recent years and the UKAEA has the capability to produce all types of safety cases, which include both complex facility safety cases and modification documentation. The UKAEA developed working protocols to enable the incorporation of engineering substantiation and design substantiation in its Dounreay safety cases.

RECOMMENDATION 95: “UKAEA should ensure that the periodic reviews of safety cases are up to date and that they compare the plant with modern standards, identify shortfalls, and propose reasonably practicable improvements.”

The programme of safety case reviews for Dounreay operational facilities was completed. All the safety cases were produced to the modern standard format. There are ways that the periodic reviews can be improved further and the UKAEA is actively considering how such improvements can be incorporated as opportunities arise.

RECOMMENDATION 96: “UKAEA should provide explicit guidance on the proper safety categorisation of modifications and the procedures related to their management so that proper control, independent safety assessments and regulatory oversight are routinely achieved.”

Several revisions have been incorporated into the guidance on the categorisation of modifications. The procedures incorporating the guidance and the safety case manual ensure safety cases meet the requirements of categorisation, including independent safety assessment and regulatory oversight as appropriate.

The process directly references the site level documents to ensure that due process is followed, including:

- An initial categorisation provided by an appropriate panel.
- Operations, Engineering and Assurance agree this initial categorisation.
- Ensuring consistent categorisation of all modifications.
- Identification of key stakeholders and deliverables.
- Engineering Review Meetings as appropriate.
- Assessing the adequacy of stakeholder involvement.
- Modification classifications endorsement at the appropriate management level.
- The information generated is stored on a centralised database.
- Simplification of Management reporting.
- The status of the modification and hold-ups are identifiable for progress monitoring.
- Electronic signatures are used in the database.
- The computer system automatically identifies key signatories based on final categorisation.
- The system operates through the site’s E-mail system.
- Key stakeholders also have electronic signatures.

All modifications including Engineering Change Controls are independently assessed. The role activity diagrams within the procedure identify the level of independent assessment that is to be carried out.

RECOMMENDATION 99: “UKAEA should update the Maintenance, Inspection and Test Schedules to reflect all the requirements of its revised safety cases.”

The modern standard safety case programme included a review of the engineering schedule for the area covered by the safety case. This in turn identified equipment on the Maintenance, Inspection and Test Schedules. The safety case author used this information and it is placed on the site’s computerised maintenance schedule.

The Maintenance Department monitors the schedules to ensure there are suitably qualified staff and the correct tools and equipment to undertake the maintenance, inspection and test work in a timely manner.

RECOMMENDATION 102: “UKAEA should ensure that document record arrangements are implemented and relevant records are sent to the document centres and the archive in accordance with procedures.”

Training on the importance of appropriate record keeping is undertaken on a regular basis, particularly for all new administration staff who are closely involved in the record keeping process. Such training is recorded in personal training records.

The UKAEA refurbished a building into a ‘fit for purpose’ facility for the storage of records arising on the Dounreay site. This facility will be used to store all records which have a retention period of 30 years or less.

The records no longer required for decommissioning purposes are sent for permanent retention at an archive facility on the Harwell site.

RECOMMENDATION 118: “UKAEA should define, through a site services safety case, all service dependencies for safety-critical or safety-related systems and make arrangements for their adequate and secure provision.”

A comprehensive site services case had been produced for safety related services at Dounreay. It comprises a lead document supported by five substantive stand-alone sections covering:

- Electrical distribution system
- Argon and nitrogen site supplies
- Site water supplies
- Boiler house, steam and compressed air supplies
- Active drains

RECOMMENDATION 119: “UKAEA should restore central monitoring of radiological conditions in the FCA.”

A process to identify buildings that required to be linked to the centrally indicated environmental monitoring system was completed. The results of this process were acted upon and monitoring equipment was installed and commissioned. Data from the equipment can be seen at the emergency facilities.

Additional system will be introduced as the need is identified.

RECOMMENDATION 120: “UKAEA should review and analyse all active area ventilation systems and, where appropriate, bring the systems into line with modern practice so far as is reasonably practicable.”

The UKAEA carried out a site-wide review of the adequacy of the active ventilation system and a number of improvements were identified. Many improvements have been implemented. Other changes are being made at appropriate times to suit the decommissioning activities being undertaken within specific facilities. Examples are:

- The ventilation system at DFR was upgraded using modern equipment.
- The PFR ventilation system is being reviewed.
- The FCA ventilation system is also being improved to modern standards.

The design of new or temporary ventilation systems and modifications to existing systems meet requirements identified by safety and environmental assessments.

The UKAEA is actively involved in a UK working group on nuclear ventilation, which has representatives from across the nuclear industry.

RECOMMENDATION 121: “UKAEA should review the facilities and arrangements for the monitoring and reporting of airborne discharges and implement reasonably practicable improvements.”

A site-wide sampler improvement project was undertaken. The findings of this project are being implemented while sustaining obligations through improved management of the existing discharge control arrangements.

Trend monitoring is now part of the information provided to Authority to Operate holders. Some extracts have been fitted with ‘alarming’ samplers to give early warning of abnormal discharges to air.

RECOMMENDATION 123: “UKAEA should review its procedures for the design and verification of safety related computer software systems.”

UKAEA has a corporate design process, which includes procedures, tools and guidance to manage the design and verification of all projects including safety related computer systems. This process defines the mandatory requirements including British Standards and the appointment of design and verification engineers. Safety related software is also supported by the Safety Assessment Handbook and associated guidance. This aids the safety and engineering processes by defining a methodology for the specification of the required functional safety integrity. There is also corporate guidance for the engineering substantiation of existing facilities.

With these improved engineering management systems UKAEA has appropriate procedures that ensure all safety-related software has appropriate safety functions defined and designed and verified according to the appropriate European standards.

RECOMMENDATION 125: “UKAEA should review the plant in D1206 and its operation against modern standards and practice and implement improvements where reasonably practicable in the light of its future operation.”

D1206 was closed down in 1999. It is being prepared for POCO and decommissioning.

RECOMMENDATION 126: “UKAEA should give priority to the production of a complete and robust safety case for D1206 in line with modern practice and undertake no further processing or reprocessing operations (of new or irradiated fuel) until a safety case for those operations has been produced and assessed as adequate.”

No processing or reprocessing operations are undertaken in D1206. A safety case addressing post operation and decommissioning actions has been prepared.

RECOMMENDATION 127: “UKAEA should review the adequacy of the safety features on plant in D1234 and implement the improvements needed to bring it up to modern standards so far as is reasonably practicable.”

A modern standards safety case has been prepared for D1234 for post operation and decommissioning actions. The safety improvements found to be appropriate from this work are being implemented.

RECOMMENDATION 128: “UKAEA, as a matter of urgency should critically review the current condition of plant in D1208 and implement a programme of necessary improvements.”

A new facility safety case was produced to a modern standard and issued. The review of the condition of plant in D1208 was included in the safety case and a programme of improvements instigated.

RECOMMENDATION 129: “UKAEA should produce a robust safety case for D1208 in line with modern practice and implement a programme of improvements to ensure that the plant meets modern standards so far as is reasonably practicable.”

A modern standards safety case was prepared and the improvements this highlighted were implemented.

RECOMMENDATION 131: “UKAEA should remove all waste materials from the shielded cells in D2670, giving priority to the dissolved Prototype Fast Reactor Fuel.”

All waste materials were removed from the shielded cells in D2670.

RECOMMENDATION 134: “UKAEA should submit a Preliminary Safety Report (PSR) reviewing options and defining the standards to which the equipment for the D2670 laboratory will be designed and constructed, prior to taking any action intended to lead to any routine fuel processing or reprocessing in that laboratory.”

A Modern Standards Safety Case was prepared and adopted for D2670 containing operational and design safety criteria.

RECOMMENDATION 135: “UKAEA should, as a preliminary to Post-Operational Clean Out and decommissioning of DFR, review the condition of the building and its services and carry out any necessary remedial work.”

The condition of DFR building and its services were reviewed. All major and most of the minor recommendations for remedial work have been implemented or are no longer relevant as the associated building has been demolished. Future maintenance and remedial work on the fabric and structure of the remaining DFR buildings will take place as part of the Dounreay site buildings' Life Care plan.

CONCLUSION

All the audit recommendations are closed-out.

UKAEA's progress in meeting the key milestones related to the audit recommendations were included in the Dounreay Site Restoration Plan, which was replaced by the Dounreay Lifetime Plan, currently LTP08.

For most of the original 143 recommendations the work associated with the recommendations is complete. The remainder have been implemented and incorporated into the on-going decommissioning programme. The work is subject to the nuclear safety and environment regulatory regimes.

References:

1. Safety Audit of Dounreay 1998, HSE Books C30 8/98
2. Safety Audit of Dounreay 1998, Final Report 2001, HSE Books C25 01/02