UPDATE ON DEVELOPMENTS AT DOUNREAY

Norman Harrison
UKAEA Director of Dounreay

INTRODUCTION

1. UKAEA Dounreay has seen significant changes to the way it is managed and operated during the last 2 years. The establishment of the Nuclear Decommissioning Authority (NDA) on the 1st April 2005, has lead to a welcomed national strategic focus on nuclear decommissioning within the UK. While UKAEA remains responsible for decommissioning and restoring the environment of the Dounreay site, UKAEA’s relationship to the NDA is as a contractor for the management of the site. We believe that our own aspirations are closely aligned with the NDA’s; that is:

- to challenge the timescales and cost of decommissioning;
- to support the regeneration of the communities around our site;
- to create a vibrant British company capable of competing with the best in the world and contributing to a healthy decommissioning market that is not dominated by overseas players; and most importantly
- to maintain the safety, security and environmental standards that are absolutely vital in the nuclear market

2. The focus on decommissioning, lead by the NDA, has energised the nuclear industry and, in line with the NDA’s vision, we have been able to announce substantial cuts in the forecast timescales and estimated cost of the clean up programme for Dounreay. We very much look forward to working in partnership with the NDA to develop and build on these plans.

CHANGES IN THE WAY DOUNREAY IS MANAGED

3. When UKAEA Dounreay became a contractor to the NDA there were a number of significant changes required to restructure the organisation of Dounreay Division towards an organisation that clearly reflects our new role of delivering decommissioning to the NDA. The new organisation reflects a common organisation structure that is employed in many successful project delivery companies. The objective is to provide the appropriate person on the right project at the right time, whilst ensuring everyone within the organisation is fully utilised.
4. The new organisation reflects the focus on delivering Decommissioning Projects; ie. Reactor Decommissioning, Process Plant Decommissioning and New Build Projects. The structure is based on drawing down staff from functional groups on a defined part-time or full-time basis into project “core teams”. The difference from previous arrangements is that staff are responsible to a Senior Project Manager for the delivery of project goals and targets and not to their core departmental base or line manager. There is no distinction drawn between the status of staff that are working for a support service and those in the project teams. The focus of the structure is to ensure that we deliver, and that delivery is managed in accordance with UKAEA’s project management process.

5. As we develop in our understanding and experience in acting as a contractor to the NDA it is anticipated that there will be further changes the UKAEA organisational structure. However, the prime focus is to achieve a flat structure with clear lines of responsibility for both delivery and safety for all projects.

DEVELOPMENT OF THE DOUNREAY SITE RESTORATION PLAN (DSRP) INTO THE DOUNREAY LIFE CYCLE BASELINE (LCBL)

6. UKAEA Dounreay lead the way in the UK nuclear industry with the publication of the DSRP in 2000, detailing a way forward for returning the Dounreay site into passive safety by 2063. With the introduction of the NDA, UKAEA has radically improved the original DSRP with the publication of the Dounreay LCBL in September 2004.

7. The introduction of new estimating tools has allowed a complete integration and correlation of activity duration and cost across the whole decommissioning programme. The introduction of a new Dounreay Programmes Department with appropriate expertise ensured consistency and quality of decommissioning schedules and costs.

8. As a consequence, the Dounreay Decommissioning Programme was reduced from the original DSRP of 2063 to a new accelerated and accurate decommissioning programme which ends in 2036, with consequential savings of about £1billion. Central to this development was the concept of an “interim endpoint”. This has lead to the following benefits in planning the decommissioning programme:

   - The concept of a definable interim endpoint (waste safely conditioned and stored pending the availability of a National ILW repository) removed any incentive for delaying decommissioning until the availability of a repository.
   - Creation of, and accurate definition of an interim endpoint effectively removed all “hotel” costs from 2036-2063.

9. New planning tools allowed UKAEA Dounreay to prioritise resources into projects that reduced and removed significant safety and environmental hazards.
DECOMMISSIONING ACHIEVEMENTS OF THE DOUNREAY SITE

10. Since the government’s decision on the future of fast reactor programme, the UKAEA Dounreay focus has moved firmly on to decommissioning. Whilst working up the plans for the accelerated decommissioning programme we have also delivered a number of notable achievements. These include;

Prototype Fast Reactor (PFR)

11. In March 2004, full operation began at Dounreay’s £15million PFR sodium disposal plant – the world’s largest facility for destruction of liquid metal. Following the success of the plants active commissioning phase, which destroyed 280 tonnes of sodium coolant, the NII approved the processing of the remaining 1500 tonnes. This key part of the PFR decommissioning project has already destroyed 975 tonnes of sodium and bulk sodium destruction is planned to be completed later this year.

12. Innovative steam cleaning techniques that will be used to flush out residues left in the reactor after the bulk sodium is removed were trialled at Dounreay in 2004. We have already deployed these techniques to clean redundant tanks that stored coolant, enabling 500 tones of steel to be removed from PFR and released as clean waste.

Dounreay Fast Reactor (DFR)

13. The DFR reactor fuel pond has been successfully emptied of pond furniture and we are currently cleaning up the pond water, through an ion exchange process, in preparation for final decommissioning.

14. UKAEA also achieved inactive commissioning of the DFR ion-exchange plant which will be utilised for removing caesium from effluent generated by the DFR NaK destruction plant.

15. In 2004, the DFR team achieved the technically difficult process of retrieving a sample of the crust from the NaK primary coolant circuit.

Dounreay Fuel Cycle Area (FCA)

16. The last batch of nuclear fuel to be manufactured at Dounreay was completed on schedule in March 2004, signalling the end of fuel fabrication at the site. Work is now underway on decommissioning the Fuel Fabrication Plant.

17. A successful campaign through the Dounreay Cementation Plant has seen the immobilisation of 260m$^3$ of raffinate over the last 2 years, which represents around 35% of the total raffinate inventory.
18. The Dounreay Waste Receipt Assay Characterisation and Supercompaction (WRACS) facility has achieved outstanding throughput of 25,871 drums since operations commenced.

Other Nuclear Facilities at Dounreay

19. Dounreay has successfully demolished, in 2004, the site of Scotland’s first criticality reaction, the D1249 building.

20. UKAEA have also reached the final decommissioning stage of the Dounreay Materials Test Reactor (DMTR), Scotland’s first reactor.

21. UKAEA is currently undertaking trials to implement an innovative solution to isolating the shaft through the injection of a fine cementitious grout to form a concrete curtain around the shaft to isolate it from the environment. This is an essential first step towards the retrieval of approximately 700m$^3$ of radioactive waste from the shaft.

22. Dounreay has also opened the Low Level Liquid Effluent Treatment Plant (LLLETP). The plant which has improved the systems for collecting, cleaning and disposing of effluent from site decommissioning, is already providing environmental benefits. This facility combined with a reduction in the radioactivity levels of the effluent in recent years has enabled UKAEA to operate with much smaller discharge limits for disposal of LLW liquid effluent.

People and Systems

23. UKAEA has also maintained Level 8 of the International Safety Rating System (ISRS), which underlines UKAEA’s determination of placing safety at the heart of decommissioning.

24. UKAEA Dounreay also launched Britain’s first modern Apprenticeship scheme for Decommissioning, which mirrors UKAEA’s commitment to ensuring that nuclear skills will be available in the UK for many years to come. In the same year, UKAEA Dounreay also celebrated the recruitment of its 1000$^{th}$ engineering apprentice.
NUCLEAR SAFETY CASE UPDATE

25. Following the 1998 Safety Audit, Dounreay provided NII with a programme for producing Modern Standards Safety Cases for all Category 1, 2 and 3 operational facilities. Production of all these Safety Cases has now been completed. The remaining facilities are either in decommissioning or are in care and maintenance phase. Decommissioning Safety Cases for these facilities are being progressed to a programme agreed with the NII. The site has also completed a Site Services Safety Case. All these Modern Standards Safety Cases will contribute to the period safety review planned for completion by 2008.

26. Implementation of the Modern Standards Safety Cases continues to proceed to programme. The majority of the facilities achieve the target date for implementation and adoption which is one year after the Safety Case has been endorsed. A number of facilities have been re-categorised to a lower category as a result of the work undertaken and this reflects the reducing hazard potential of the Dounreay site.

27. In the light of the progress made with the Safety Case programme and with implementing improvements to facilities, NII lifted the Direction on the Fuel Cycle Area in December 2004. Information from the Modern Standards Safety Cases has been used in assembling the site-wide Article 37 submission for Dounreay, on which the Scottish Executive have now received a favourable opinion from the European Commission.

SAFETY PERFORMANCE

28. The safety performance at Dounreay is routinely monitored using a number of measures. This allows us to review trends and compare our performance with comparable industries.

Lost Time Accidents

29. The following shows the total number of LTAs (1 day +) and shows a similar overall performance in both years.
30. All the following Frequency Rates/Ratios graphs are based on a rolling 12 months and are calculated per 100,000 hours worked. The injury and illness graphs are based on all UKAEA staff on the Dounreay site, excluding members of the Civil Nuclear Constabulary (formerly UKAEA(C)).

**Accident Frequency Rate (AFR)**

31. Over the 2 year period the UKAEA AFR has remained at a roughly constant level; the contractor AFR has increased slightly possibly as a result of increased project work over the period. The AFR is comparable with that of other nuclear sites (Sellafield = 0.44, Magnox = 0.24 for 2003/4 - BNFL employees only) and is significantly better than that in the construction industry.
Accident Frequency Ratio (Rolling Year)

Accident Severity Ratio (ASR)

32. The Accident Severity Ratio is based on the number of days lost after an accident. The figures for 2004/5 are dominated by 2 long term restrictions which have now dropped out of the rolling 12 monthly figures; current figures are 3.5 for UKAEA and 4.2 for contractors.
Injury Frequency Ratio

33. The IFR includes all injuries both minor and major. There is an increasing number of injuries in 2004/5 which coincides with a drive to report more minor safety occurrences (UNOR). Hence, some of the increase is likely to be improved reporting.

Worker Health

34. UKAEA have reviewed the data on its workforce in relation to the mortality rate as a result of exposure to radiation. The review has shown that the overall mortality rate of the UKAEA workforce is substantially lower than the mortality rate for the general population. Amongst UKAEA workers, the mortality rate for radiation workers is significantly lower than that for non-radiation workers. For all UKAEA staff, the number of cancers amongst radiation workers is lower than that for non-radiation workers.

Occupational Illness Frequency Rate

35. The Occupational Illness Frequency Rate shows the lost days which have resulted from work related illnesses such as stress, dermatitis, etc. Rolling year frequency data is not available for 2003/4. However, there were 10 cases during 2003/4 of which one incurred 15 lost days. The number of cases in 2004/5 was 22 and this was significantly higher than in 2003/4 and was associated with increased stress.
36. The majority of occupational illnesses are stress related and, therefore, UKAEA has carried out a further analysis of workplace stressors using the ASSET tool. The data is now available and workload is proving to be one of the major stressors in all areas. Action is being taken to relieve the workload in some key areas. The establishment of the Dounreay Resource Management Project which will allocate personnel to projects as required will also help to alleviate these stressors.

**Longer Term Event Trend**

37. The next figure shows how improved reporting of UNORs has lead to a reduction in the number of more serious Events. The number of Events has started to plateau over the last 3 years. There has been a drive over the last 12 months to improve reporting of minor occurrences which should lead to reduced Events in the next period. Further changes are proposed in the Safety Improvement Plan which is designed to promote a further decrease in the number of Events.
SAFETY IMPROVEMENTS PLAN

38. Following analysis of the UNOR and audit data over the last few years, the key areas for improvement to the site have been identified. It is proposed to concentrate resources in these areas for improvement.

Behavioural Safety

39. Analysis of all the minor occurrences has indicated that there are some underlying behavioural issues that need to be addressed (e.g. failing to follow procedures or failing by supervisors to correct unsafe behaviours). It has been decided to conduct a baseline survey to assess the state of the site with respect to behavioural safety. By improving awareness and by getting a culture of identifying and correcting unsafe acts, it is expected that the number of Events and LTAs should reduce from their current levels. A Workshop involving some 5% of UKAEA staff took place in Edinburgh concentrating on safe behaviours; in addition half of Dounreay personnel have completed the HSE Climate Survey tool. These will provide a building block for future behavioural safety initiatives. Some behavioural techniques are already being used, e.g. local safety meetings, local improvement teams, etc.

Works Control Issues

40. A second area where we believe improvement is required is in ensuring that the site system for identify and controlling hazards is robust and effective in the planning of all work. An improvement initiative is underway to ensure that works control, the issue of permits, and isolation management is fully effective. A pilot has already taken place in one area of site and it is proposed to introduce the improvements in other areas.

Environmental Protection

41. A number of environmental improvements have been implemented over the last 2 years. Most notable of these has been the introduction of a suite of 9 UKAEA corporate environmental standards in September 2004. This approach is consistent with our accreditation to the Environmental Management System, ISO14001. These standards cover a wide range of environmental topics including biodiversity, transport and energy efficiency, etc. The introduction of the standards have been undertaken in consultation with the environmental regulator, SEPA, and an agreed timetable has been put in place to ensure the full implementation of the standards.

42. In addition to the introduction of the environmental standards, UKAEA have embarked on an extensive programme to re-assess the adequacy of the drainage systems in place around the Dounreay site.
43. UKAEA Dounreay has also undertaken extensive environmental studies and assessments as part of its Site Wide Environmental Statement (SWES) project. Key studies such as ecology, noise, air quality, contaminated land, offshore environment, etc have been undertaken to provide an environmental “baseline” for the site. A key component to the SWES is the development of a cumulative assessment model, unique to UKAEA Dounreay, which has the ability to predict the environmental effects of all the activities on the Dounreay site over the duration of the decommissioning programme. Its interactive ability allows it to be used as an environmental management tool when assessing the impact of the accelerated programme at Dounreay.

THE DOUNREAY RESOURCE MANAGEMENT PROJECT

44. The radical change from client to contractor, brought about by the introduction of the NDA, has lead to an alteration to the skills requirements throughout UKAEA Dounreay. In order to manage this process a Resource Management Project has been established, lead by a Senior Manager within the Dounreay Executive team.

45. The purpose of the Resource Management Project is to identify the roles that can be reduced or eliminated and establish the new roles that are emerging, as the Dounreay site readies itself for eventual competition. We must stress at this stage that we are identifying roles that are no longer required rather than personnel. As our latest LCBL demonstrates there will be a period of lowering our staffing levels, but it is fully anticipated that these levels will be met through ‘natural wastage’. Instead, we are developing a process, whereby an employee whose current role is no longer required, is re-trained and developed to take on new roles that will add value to the decommissioning programme. It is anticipated that these roles will reduce the support requirement and re-focus the workforce towards the decommissioning delivery areas.

STAKEHOLDER CONSULTATION

46. In 2002, UKAEA launched its commitment to consult with stakeholders on projects. A two stage approach was developed for Best Practicable Environmental Option (BPEO) assessments, for significant decisions within the Dounreay Site Restoration Plan where more than one viable option was available:

- Stage 1 - facilitate a BPEO assessment by a panel of stakeholders. Two panels were organised – an internal panel made up of a random selection of people working on the Dounreay site and an external panel drawn from the Dounreay Local Liaison Committee and supplemented by additional participants as appropriate.

- Stage 2 - submit the panel’s views to a wider list of over 800 stakeholders, including over 150 individuals who registered their interest in response to
advertisements in the Scottish press, together with elected representatives, government officials and members of the local community.

Public Participation

47. Four consultations have taken place to date:

**How to deal with radioactive solvents and oils:** This was our pilot project and lessons were learnt as we moved through the process. The consultation has just recently been put in abeyance. Because of funding constraints and the reprioritisation of our decommissioning plan it is necessary to delay the start date of this particular project until 2010. UKAEA is committed to readdressing consultation on this topic at the appropriate time.

**The long term management of low level waste:** An additional ‘youth’ panel was set up which involved local children from the high schools. The outcome of the BPEO process provided a substantial input to the decision-making process for the overall strategy of low level waste on the site. In March 2005, the overall strategy paper was discussed with regulators and made available to stakeholders.

**The end state of the Shaft:** The consultation was to review the options for remediating the rock once the waste has been removed from the shaft. The agreed end state is an important factor in choosing the most appropriate techniques for its hydraulic isolation and retrieval of the waste. The consultation recommended that the way forward was to grout the shaft and isolate it from the environment.

**PFR Raffinate:** This participation was slightly different in that the project was further developed before public participation commenced. However, UKAEA made it clear that the reference strategy had changed from vitrification to cementation and the public participation was to allow UKAEA to set out its rationale and thinking behind the change of strategy; it also highlighted the reclassification of the waste from high level to intermediate level waste. Most stakeholders were pleased to be given the opportunity to scrutinise UKAEA’s current thinking and the feedback from the panels and the public response was that we should continue with the cementation strategy.

Ongoing Consultations

**Dealing with radioactive particles in the marine environment:** Because of the public perception of this issue, UKAEA set up an independent steering group to oversee the consultation process and ensure transparency. As a result of the Dunnet beach monitoring, UKAEA are now reviewing the future programme of work on particles and this will be developed over the coming months. The consultation process has been ‘slowed’ down as a consequence but UKAEA is still committed and
it is expected that a factual information campaign will start at the end of August as a precursor to the consultation on available options.

Other projects identified as potential subjects for consultation are:

- All-waste BPEO
- Plutonium contaminated material
- Site end point

Next Steps

48. UKAEA continue to develop their public participation process. An external review in 2004 made a number of recommendations and these are being systematically implemented.

49. UKAEA recognised that while the Dounreay Site Restoration Plan was well received it was also criticised for not involving stakeholders. With the advent of the NDA, UKAEA has developed Life Cycle Base Lines (the Plan) and are currently in the process of producing the Dounreay Site Restoration Strategy.

50. The Dounreay Local Liaison Committee has now been replaced by a new, more independent, Dounreay Stakeholder Group. It is possible that the Dounreay Stakeholder Group will set up sub-groups to look at different aspects of the activities of the site, i.e. waste, fuels, environmental, socio-economics.

CONCLUSIONS

51. The safety performance on the Dounreay site has improved drastically since 1998, when the HSE/SEPA audit was carried out. During the last 3 years the amount of decommissioning work has steadily increased and safety performance has remained relatively constant. Initiatives are now in hand to further improve safety in line with our aspirations to be “best in class”.

52. The decommissioning programme is focused on removing the major hazards on site and considerable progress has been made on dealing with the bulk liquid metals and immobilising the raffinate from historical fuel reprocessing operations. In parallel there is an ongoing campaign of decommissioning redundant fuel cycle facilities and reactor components.

53. The introduction of the NDA has provided us with the challenge of improving both our programme planning and delivery. We are meeting this challenge by recognising that good business performance and safety performance go hand in hand. By aligning responsibility of delivery and safety, the UKAEA is seeking to meet the requirements of the NDA, both on safety performance and delivering decommissioning.
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