A NIREX PERSPECTIVE OF ONGOING DEVELOPMENTS IN THE MANAGEMENT OF RADIOACTIVE WASTE IN THE UK

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ABSTRACT

The history of radioactive waste management in the UK has been well documented in previous papers to the Waste Management conference by Nirex, the UK organisation responsible for advising on long-term radioactive waste management, the Nuclear Decommissioning Authority (NDA) which will be responsible for cleaning up the nuclear sites, and others.

The paper discusses the latest progress in radioactive waste management in the UK from a Nirex perspective within the last year, in particular:

- the confirmation that Nirex is to be made independent of the nuclear industry in April 2005;
- the progress of the Department of Environment, Food and Rural Affairs and Devolved Administrations' *Managing Radioactive Waste Safely* consultation exercise and in particular the activities of the Committee on Radioactive Waste Management appointed to oversee this phase of the consultation;
- the creation of the Nuclear Decommissioning Authority in April 2005 to manage the civil nuclear site clean-up programme.

The paper concludes that whilst there have been certain criticisms aimed at the slow progress of policy development and implementation, the UK is engaged in a process which seems to have resolved issues surrounding the structure of the nuclear industry and Nirex's role. However, policy development is on target to be concluded by 2007 with implementation of that policy by 2008. Nirex believes that policy should be the implementation of its phased geological repository concept.

INTRODUCTION

Previous papers to the conference have monitored the progress of UK Government policy reviews and potential changes to the nuclear industry's structure [see for example1, 2, 3 and 4]. For example, since Nirex's failure to secure a site for a deep geological repository for intermediate and some low-level waste in 1997, Government policy on disposal has had to be reviewed and has still not been finalised. Moreover, the industry's failure to address its nuclear liabilities has forced the Government to create the Nuclear Decommissioning Authority (NDA) to take over the management of those liabilities.

These institutional and policy developments have amounted to an evolution of the back-end of the fuel cycle that represents the most radical transformation in the UK nuclear industry for many years, made necessary by past failures in trying to impose a solution to the radwaste problem on the general public.

The UK's history on implementing radioactive waste management policy has been very poor and not all failures can be attributed to the Nirex programme. In brief, the historical perspective on radioactive waste disposal for the past 25 years is:

1981 - suspension of high-level waste (HLW) decision for 50 years and termination of geological investigation started in 1979;

1982 – Nuclear Industry Radioactive Waste Executive (NIREX) created to take forward policy on intermediate level waste (ILW) and low level waste (LLW);

1983 – Sea disposal of ILW suspended under moratorium agreed at the London Dumping Convention; near surface site for L/ILW and deep site for long-lived ILW announced:

deep site abandoned by the end of the year and three other near-surface site were to be investigated, but only for LLW;

1985 – NIREX reconstituted as UK Nirex Ltd;

1986 –the three additional near-surface sites announced;

1987 – abandonment of near-surface programme and adoption of policy that all LLW and ILW should go deep; new deep site selection process started (this was subsequently revised so that Nirex would only take that LLW unsuitable for disposal at the Drigg near-surface site);

1991 – following site selection process, Sellafield and Dounreay to be investigated first;

1993 – Nirex concentrates on Sellafield in Cumbria, and announces plans for a Rock Characterisation Facility (RCF); the plans were eventually considered at a public inquiry which ended in 1996;

1997 – decision by Government to not allow Nirex to go ahead with the RCF and thus the UK's siting programme is terminated.

This timeline should also be viewed against Government radioactive waste management policy discussions which started as early as 1956 resulting in several reports by various Government Committees and associated White Papers over the years, and are only due to be finalised by 2007-08.

Since 1997, Nirex has reviewed what went wrong and this has culminated in a shift from it being an entirely scientific organisation to one which is additionally open, transparent , accountable and which encompasses social considerations also [1,3]. Post 1997, there have been several attempts by others to determine when wrong with the Nirex programme, such as the House of Lords Enquiry and subsequent report in March 1999 [5] and the consensus conference held by the UK Centre for Economic and Environmental Development (UKCEED) involving a Citizen's Panel [6]. Government's eventual response was to set up the *Managing Radioactive Waste Safely* consultation exercise under the Department for the Environment, Food and Rural Affairs (Defra) and the Devolved Administrations of Scotland, Wales and Northern Ireland [7]. Subsequently the independent Committee on Radioactive Waste Management (CoRWM) was established in November 2003 to oversee the second phase of the exercise which will recommend to Government its preferred long-term waste management option or options.

This paper provides an update of the latest situation in the UK and reports on the progress being made. It very much reflects Nirex's perspective on the issues.

NIREX AND ITS INDEPENDENCE

The Independence Debate

Nirex was originally set up by the nuclear industry with the support of Government to find a disposal solution the nation's intermediate and low level wastes. Since its inception in 1982 it has been owned and financed by the nuclear industry, its current shareholders being BNFL, British Energy and the United Kingdom Atomic Energy Authority. These, together with the Ministry of Defence, finance Nirex's activities. The Government, through the Department of Trade and Industry (DTI), owned a special share designed to guarantee that Nirex remained free of commercial pressure from the industry; however, this did not translate into a view held by the public. To them we were compromised by short-term commercial considerations and seen as acting more on behalf of the waste producers rather than on behalf of society as a whole and the environment.

As a result of its post 1997 analysis, certain non-Governmental organisations (NGO's), the "greens" and Nirex itself have argued that Nirex should be made independent of industry, the waste producers and the Nuclear Decommissioning Authority (NDA). An independent Nirex would be seen as more legitimate by the general public and other stakeholders, therefore allowing it to make a more legitimate contribution to policy development and ultimate implementation.

The Government supported this view and announced in July 2003 that the Company would become "independent of industry" [8]. Following consultation with shareholders, the Government further announced in July 2004 [9] that it would create a holding company to acquire all their shares formed as a Company Limited by Guarantee (CLG). The CLG will have two members: the DTI and Defra. (A CLG is a type of incorporation that is used for not-for-profit companies). There will be no nuclear industry or NDA representation on the Boards of either the CLG or Nirex. The NDA however, and in line with Government policy, be the principle funder of Nirex. The arrangements come into operation on 1st April 2005. Such a move is seen by the Nirex as a necessary and important step towards greater transparency and accountability.

It should be noted that these arrangements will hold until CoRWM makes its recommendations to Government in July 2006 following which future radioactive waste management policy will be decided together with the longer-term future of Nirex.

A New Mission

As a result of the changes, the Nirex mission has been modified:

> *"In support of Government Policy, develop and advise on safe, environmentally sound and publicly acceptable options for the long-term management of radioactive materials in the UK."*

Note that the statement refers to "options" because no choice on strategy has yet been made, and it also refers to "radioactive materials" rather than "radioactive waste". This latter point refers to the fact that the UK has radioactive material which in the future may be declared as waste such as spent nuclear fuel (which is currently regarded as a resource in view of the nation's reprocessing policy), and plutonium and uranium stockpiles associated with the strategic deterrent.

Thus the Company is now engaged in looking at options for more than just its historic remit of intermediate and some low-level waste. To this end Nirex is actively undertaking research to establish disposal concepts for these additional materials and has forged close links with other waste management organisations to assist this: SKB of Sweden, Nagra of Switzerland and NUMO of Japan.

Within the objectives of the mission is that Nirex will continue to be responsible for the UK inventory (together with Defra). The following table [derived from 10] summarises the latest waste inventory data and that for materials yet to be declared as waste:

Table I. Reference Disposal Concept Volumes (packaged).

Waste Category / Source	Volume
Other Materials	
Uranium	75,000m3
Plutonium	4,000m3
Advanced Gas Cooled Reactor (AGR) fuel components	1,000m^3
Highly Enriched Uranium	1,000m^3
Submarine spent fuel (estimate)	100m^3
Recovered sealed sources	1m^3
HLW/ Spent Fuel	
AGR Spent Fuel	4,500m^3
Vitrified HLW	1,600m^3
PWR Spent fuel	1,300m^3
ILW/LLW (includes stage 3 decommissioning wastes)	
ILW	350,000m^3
LLW unsuitable for Drigg	35,000m^3

The table excludes LLW, VLLW and contaminated land which come under the remit of the NDA.

Transparency

One of the criticisms of Nirex pre 1997 was that it lacked transparency and that was part of the reason for the failure of its proposals for an RCF. In order to address this, Nirex set up an independent Transparency Panel in 1998 as part of its comprehensive Transparency Policy [11]. The panel's membership (to increase to seven) is all external to Nirex. It is chaired by Andrew Puddephatt, Executive Director of Article 19, and an international human rights group promoting freedom of expression and access to information. Until now the panel has just considered Nirex's response to requests for information, but is now extending its role to cover all aspects of its transparency policy which includes how Nirex operates internally and how decisions are made.

COMMITTEE ON RADIOACTIVE WASTE MANAGEMENT

Programme

This independent body was created to oversee the second stage of the MRWS consultation exercise on long-term radioactive waste management options and is to recommend its preferences to Government in July 2006.

CoRWM are mainly focusing on the UK's high and intermediate level waste. As a result of the creation of CoRWM, the Radioactive Waste Management Advisory Committee (RWMAC) has been put into abeyance. The Committee comprises thirteen members drawn from a range of disciplines and interests and is chaired by Gordon MacKerron (for more details on its activities see www.corwm.org.uk). The Committee holds monthly meetings at venues around the UK which are held in public and members of the public are free to ask the Committee questions if they so wish. In addition to these meetings the Committee are also engaged in stakeholder consultations at the nuclear sites around the UK.

In considering its choices, CoRWM started looking at all options for dealing with radioactive waste and have produced a "long list" of these. This will be reduced through consultation to a short-list in the summer of 2005. At the time of writing the Committee had produced a provisional short list and its views on other options by way of a "traffic light" system, shown in Table II [12]:

Table II. CoRWM's Provisional Short-listing of Options.

Proposal to screen off long list	Needs more discussion to finalise decision	Proposal to keep on preliminary shortlist
1. Disposal in Ice Sheets	6. Disposal in Space	8(b) Interim Storage
2. Disposal in Subduction Zones	7. Sub-seabed Disposal	10. Deep Disposal
3. Direct Injection	8(a) Indefinite Storage	11. Phased Deep Disposal
4. Disposal at Sea	9. Near Surface Disposal	
5. Dilute and Dispose		

The criteria used by CoRWM to select and reject options are:

1. There is no proof of concept in the form of:
   - Actual implementation of the options in the UK or elsewhere
   - Sufficient research and development of the international criteria to demonstrate that the option can be implemented
2. It causes us to breach our duty of care to the environment outside national boundaries
3. It causes harm to areas of particular environmental sensitivity
4. It places an unacceptable burden (in terms of cost, effort, or environmental damage) on future generations

5. It involves a risk to future generations greater than that to the present generation which has enjoyed the benefits
6. It results in unacceptable risk to the security of nuclear materials
7. It poses unacceptable risk to human health
8. Cost is disproportionate to the benefits achieved
9. It breaches internationally recognised treaties or laws and there is no foreseeable likelihood of change in the future

Of most interest to Nirex, and which is its preferred solution, is phased deep disposal for which it has developed a concept following consultation with stakeholders [13]. In short this takes a previous concept for deep disposal and builds in the capability not to backfill the caverns until a future society may decide to do so, maybe as long as 300 years, thereby aiding monitoring and retrievability. In our post 1997 analysis, it was clear that Nirex had not addressed this area to the satisfaction of stakeholders and so two workshops were held involving them in the redesign process.

Following the short-listing phase, CoRWM then aim to further refine their list through stakeholder engagement and before making their recommendation on an option or options to the Government by July 2006.

The CoRWM exercise on options is part of the wider Government consultation, Managing Radioactive Waste Safely (MRWS), which started in September 2001. The submission of the CoRWM recommendations will see the ending of the second stage of the MRWS process and the start of the third phase in which Government will consult on implementation of the recommendations. This is scheduled to last about one year prior to actual implementation itself sometime in 2008.

Nirex, like other interested parties, is submitting information to CoRWM and to date has sent in over 50 documents and reports covering all aspects of what CoRWM is looking at.

The House of Lords Science and Technology Committee have considered the work of CoRWM and the Government's approach to radioactive waste management policy development. They take a keen interest in the Government's development of policy on radioactive waste management. As mentioned earlier they undertook an enquiry into radioactive waste management in the aftermath of 1997.

In December 2004 they published their report on radioactive waste management after taking evidence from the Minister responsible and from the Chair of CoRWM [14]. In it the Committee were somewhat critical Government accusing them of procrastination on Policy development, particularly between 1997 and the setting up of CoRWM. Whilst commending CoRWM for being open and transparent, the Committee were also criticised on a number of points including spending too much time of talking about decision-making methodologies at the expense of identifying the right solution.

The Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority (NDA) will also be formally established on 1st April 2005. A paper describing in more detail the activities of the NDA is also being presented at this conference [15]. With the creation of the NDA, existing site licensees such as BNFL and UKAEA will become contractors to the NDA.

The NDA will ultimately be responsible for ensuring that the UK's civil nuclear legacy is dealt with safely, securely, cost effectively and in ways that protect the environment. The task that the NDA will undertake in financial terms amounts to costs of about £48bn and the Government saw it as essential that they establish a single publicly accountable body to take control of the clean-up process. Moreover, they saw that the NDA should carry out its remit openly, transparently and with the involvement of a wide range of stakeholders.

Whilst the NDA's work is focused on the next 150 years, Nirex's work addresses much longer periods of time - up to 100s of thousands of years. However, decisions taken by the NDA will have an impact on the work Nirex does and the long-term waste management options available for the UK. Therefore, the relationship and interactions between Nirex and the NDA will also be very important.

ORGANISATIONAL INTERACTIONS

The Industry

With the structural changes taking place as mentioned above, this effectively places the nuclear industry into three sectors, each with a different focus:

Commercial - fuel fabrication, nuclear power production, plant construction and operation, and contracting to the NDA.

Decommissioning & Clean-up which is the responsibility of the NDA and will provide a short-term focus, meaning up to 150 years.

Long-term Management which is currently the responsibility of Nirex and dependant on the ultimate long-term solution chosen by Government.

Clear separation between these areas will allow potential conflicts between long and short-term issues to be visible to stakeholders. Nirex believes that this is a key factor to developing legitimacy in policy development and will provide transparency of process for any trade-offs that have to be made between long and short-term consideration for waste management.

The NDA will be responsible for the conditioning, packaging and storage of most of the legacy wastes in the UK. Nirex will be involved in developing plans for its long-term management. This requires a strong direct relationship between the NDA and its contractors, Nirex and the regulators to ensure issues are clear for those making decisions.

The Regulators

An integral part of the work undertaken by Nirex involves setting standards and specifications and providing a 'Letter of Comfort' (LoC) to waste producers to confirm that they are treating and packaging intermediate level radioactive waste safely. In future the waste producers will be Tier 1 or Tier 2 contractors to the NDA on their sites.

An associated paper at this conference contains more details on the process [16] but in summary it involves Nirex undertaking a detailed assessment of the packaging proposal against its phased geological repository concept to ensure the final wasteform and package conforms to Nirex's standards. Without the LoC the nuclear regulator, the Nuclear Installations Inspectorate (NII), would be unlikely to give its permission for the proposal to go ahead.

Since January 2004 this process has become formalised under the conditions attached to the nuclear site licence. The arrangements also require Nirex's procedures to be scrutinised and this

is undertaken by the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA) on behalf of the NII through a Memorandum of Understanding.

CONCLUSION

Whilst there have been certain criticisms aimed at the slow progress of policy development and implementation, the UK is engaged in a process which seems to have resolved issues surrounding the structure of the nuclear industry and Nirex's role. Such changes have been made necessary by the failures of the past. Policy development is on target to be concluded by 2007 with implementation of that policy by 2008. Nirex believes that policy should be the implementation of its phased geological repository concept.

The Government is therefore addressing a policy area that has traditionally been politically difficult. Lessons learned from past mistakes are being utilised that should allow for the implementation of a publicly acceptable solution to the issue of long-term radioactive waste management.

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