



Subject: **Briefing on the Nirex lists of sites for a radioactive waste repository**

## 1. Introduction

1.1 This briefing is intended to advise local authorities regarding the long list of 537 and the short list of 12 potential sites for a radioactive waste facility compiled by Nirex in the late 1980s but only made public on 10 June 2005. NFLAs consider the sites on these lists (a) are very relevant to current discussions on how and where to manage *existing* radioactive waste and (b) will be equally relevant for the establishment of any second site for the management of any *future* radioactive waste from any new programme of nuclear reactors or nuclear weapons. It considers the background to release of the list; the manner in which the lists were compiled; and implications of the release of the lists for local authorities.

## 2. Background

- 2.1 Nirex (originally the Nuclear Industry Radioactive Waste Executive) is responsible for providing the UK with options for the long-term management of radioactive materials. It was established in 1982 and became a limited company in 1985 funded by the nuclear industry with a controlling share held by DTI. Earlier this year the DTI and DEFRA took Nirex over as a wholly owned government funded company (1).
- 2.2 In May 1987 Nirex began a search for a location for a deep disposal facility for low level and intermediate level radioactive waste (see appendix). It chose 537 sites from which a secret short list of 12 was finally chosen leading to a decision in 1991 to develop the facility at Sellafield. The location of all sites was kept secret apart from Sellafield and Dounreay. However, following an inquiry, the Secretary of State for the Environment refused planning permission in 1997 for a "Rock Characterisation Facility". The RCF was to have been the first phase of the complete facility. NFLAs argued at the time that in law the secrecy of the site selection process was fatal to the legitimacy of the final choice, an argument upheld by both the inspector and the Minister.
- 2.3 This failure required that there be a completely new approach to the formulation of radioactive waste policy: it was recognised that broad public support was required if any decision on managing the waste over the millions of years ahead was to succeed. Secrecy had no place in this.

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- 2.4 A further review of radioactive waste management has now therefore been commenced, is in an advanced state, and is due to be completed in the summer of 2006 (see below). NFLAs consider it lamentable that the communities in which the 537 sites are located were not alerted to this before the consultation began so that they could have been properly involved from the beginning. In NFLAs' view this failure places a question mark against the whole process.
- 2.5 The NFLA Steering Committee was the first to request the list of sites selected by Nirex as potential locations for a radioactive waste facility. It did so in 1989 and has continued to campaign for the release of the short list since then under Freedom of Environmental Information law. This came into force in 1992 long before the current Freedom of Information Act.
- 2.6 Until 2005, Nirex refused to release the list on the grounds that it has been government policy to keep the information confidential to prevent planning blight and protect property prices in areas that had been considered as potential locations. Nirex did virtually nothing to argue against this policy, notwithstanding a new commitment to transparency after the failure in 1997. In January 2005 new powers were given to the Information Commissioner to police the Freedom of Environmental information Law. NFLAs lodged further applications to 14 public bodies for the information. Nirex again refused the information relying on a number of exceptions in the legislation, at the same time stating that they would not release the information while a general election was pending. It is only now after the general election that the information has been released following an NFLA joint campaign with Channel 4 News, and an appeal by NFLAs to the Information Commissioner that Nirex knew they would lose. In anticipation of this, in May Nirex met with local government representatives to discuss its intention to undertake a 'managed release' of the list of 537 sites.

### **3. The site selection process**

- 3.1 The process used by Nirex between 1987 and 1991 to select potential sites for a radioactive waste repository took place through a number of steps which gradually reduced the number of potential locations for the facility (2).

#### ***Regional evaluation***

- 3.2 Nirex had been advised by the British Geological Survey (BGS) that five types of hydrogeological environment were likely to show potential for siting a deep radioactive waste repository:
- 3.2.1 Hard rocks in low relief terrain, where the low relief gives little driving potential for groundwater flow.
  - 3.2.2 Small islands, where the groundwater conditions beneath the seawater/freshwater interface were thought likely to be effectively stagnant.
  - 3.2.3 Seaward dipping and offshore sediments, where groundwater movements are expected to be very slow and under the coast.
  - 3.2.4 Inland basins of mixed sedimentary rocks. Although considered to offer the potential of effectively stagnant groundwater, these were subsequently discarded because they were considered too geologically complicated to understand adequately.

- 3.2.5 Low permeability basement rocks under sedimentary cover (BUSC), where regional-scale groundwater movement occurs predominantly in the sedimentary cover rocks with little connection to the underlying basement.
- 3.3 Approximately 30% of the land area of the UK was identified as falling into one of these geological categories, including large areas of the east and west coasts of England, the Midlands, southern England, the north east coast of Scotland and Scottish Islands (3).
- 3.4 This area was then further reduced by removal of areas where the population density of local districts and boroughs was more than 5 persons per hectare, and removal of nationally designated areas of protection covering landscape and nature conservation interests, such as National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts, National Nature Reserves and, in Scotland, National Scenic Areas. This led to a considerable reduction in the area of search, eliminating much of south west England, the south coast, the Thames valley, Yorkshire moors, and Lincolnshire wolds. (3).

### **Identification of sites**

- 3.5 As the next step in the process, Nirex then identified individual sites within the search areas for further evaluation. 537 sites were identified (4) principally, Nirex says, on the consideration that it had not been granted compulsory purchase powers to enable it to acquire a site. All these sites have now been identified. Sites identified were therefore largely restricted to locations that were owned by central Government or the nuclear industry, with a few privately-owned sites that had been volunteered by the owners. Exceptions to this strategy were sites in Northern Ireland, because of the political situation, and a large number of potential sites in Wales, in particular Forestry Commission landholdings, following experience from previous exercises when personal threats were made to staff involved in the consideration of such sites.
- 3.6 This list of 537 sites was then reduced through a number of steps to sieve out the less viable options. (5)

### **Initial screening: 537 to 204 sites**

- 3.7 An initial screening exercise was conducted to establish the realistic potential of the possible sites identified. 333 sites were eliminated at this stage. This was done at a basic level to eliminate sites that had obvious deficiencies, and was based on a preliminary evaluation of their geology, reviews of environmental impact and planning factors, including whether the site was designated as a Site of Special Scientific Interest (SSSI) or was in an administrative district adjacent to a major population centre.

### **Land ownership: 204 – 164 sites**

- 3.8 All sites where the land was not in public ownership were then eliminated (except for privately-owned sites where the owner was known or thought likely to make land available). This led to the elimination of 39 sites, of which 23 were small islands.

### ***Size of site: 164 – 117 sites***

- 3.9 The next reduction in numbers was brought about by eliminating sites where the area and configuration of land was considered insufficient, although some sites towards the lower limit of land requirements were retained if they were thought to be promising in other respects.

### ***Geological evaluation: 117 to 39 sites***

- 3.10 The BGS provided a geological profile for each of the 117 sites and after further detailed re-examination by BGS in terms of their geological potential for development as a deep repository, the number was reduced to 39.

### ***Initial comparative examination: 39 to 17 sites***

- 3.11 The remaining 39 sites, the majority of which were in public ownership, were reviewed by assessment of current use, (involving consideration of development plans and publicly available information on current and future use of land in the locality of each site), site availability, radiological safety, geology, socio-economic and environmental issues, repository design concepts and transport. The review was undertaken at a meeting held at the CEGB Staff Training Centre at Bricket Wood in December 1987 attended by Nirex, BGS, Pidea Consultants (who were advising Nirex on planning issues) and a team of specialists including representatives from UKAEA and a consortium led by Costain and JMP Consultants.

### ***More detailed comparative analysis: 17 to 12 sites***

- 3.12 The aim of this stage was to identify the most suitable land-based sites for each geological category, to be carried forward to a process for ranking locations representing different geological categories. The analysis again took place at Bricket Wood using a similar process to the previous meeting, but with the benefit of much more detailed assessments, especially radiological safety assessments, of the options under consideration.
- 3.13 Following this stage, the principal Nirex short list of the twelve sites considered most promising for the different geological settings was established. The site consisted of ten land-based locations and two offshore sites. The land-based sites were as follows (4):

- Altnabreac (Braehour), Caithness (low-relief hard rock).
- Bradwell, Essex (coastal BUSC).
- Dounreay, Caithness (low-relief hard rock).
- Fuday, Western Isles, Scotland (small island).
- Killingholme, Humberside (seaward dipping sediments).
- Potton Island, Essex (coastal BUSC).
- Sandray, Western Isles, Scotland (small island).
- Sellafield 'A' (anhydrite), Cumbria (seaward dipping sediments).
- Sellafield 'B' (Borrowdale Volcanic Group), Cumbria (BUSC).
- Stanford, Norfolk (inland BUSC).

- 3.14 It is noteworthy that a body charged with identifying the best sites for aeons to come, should have included Potton Island which in the mere 18 years since it was first identified has, by general consensus, become likely to be of little use in the light of climate change and rising sea-levels. It is also of note that both Bradwell and Killingholme should appear on the list notwithstanding their withdrawal a few years earlier from a prior short list of sites for shallow burial following a vigorous campaign of opposition in their localities.
- 3.15 Two sites at Sellafield with different geology were evaluated separately. In addition, two broad geographical locations (east and west of the British Isles) for a generic offshore repository concept were considered. Assessments were carried out of the suitability of the ports of Hunterston (Strathclyde) and Redcar (Cleveland) to service the west coast (hard rock) and east coast (sedimentary rock) offshore options respectively. It was considered that the definition of a precise location for each of the offshore sites was not necessary for this stage in the process.

### ***Multi-attribute decision analysis (MADA): 12 to 5 sites***

- 3.16 A multi-attribute decision analysis (MADA) was conducted to compare the remaining site options. MADA is supposed to be a formal method for applying logic systematically to help make choices between options which have to be assessed with respect to a range of different attributes and criteria. The analysis took place over the course of five meetings held at the London School of Economics between September and November 1988, facilitated by the LSE's Decision Analysis Unit. Safety, robustness, costs, and socio-economic and environmental impacts were reviewed using the MADA method by a team of Nirex staff and contractors from the BGS, UKAEA, Pleda, and JMP with no outside independent input. As it was, the MADA study was criticised in depth at the public inquiry, not least because the MADA study ranked Sellafield first although its geology was inferior for the purpose envisaged compared with other sites e.g. Stanford.
- 3.17 The MADA exercise recommended that Nirex should investigate 3 to 5 sites with different geological characteristics:
- If three sites were to be investigated: Sellafield-B; Stanford or Bradwell; Dounreay or Altnabreac.
  - If four sites were to be investigated: Sellafield-B; Stanford or Bradwell, Dounreay or Altnabreac; Fuday.
  - If five sites were to be investigated: Sellafield-B; Stanford or Bradwell; Dounreay; Altnabreac; Fuday.

### ***Nirex Board decision: 5 to 2 sites***

- 3.18 The Nirex board then considered the results of the MADA exercise. It recognised that opposition could be expected at a site where there was, to use their phrase "no measure of local support" for nuclear activities, whereas some such measure might be forthcoming at Sellafield and in Caithness. The inquiry showed that a "measure of support" was a turn of phrase which, by failing to define *what* measure between 0 and 100 was being referred to, was fairly meaningless. Fuday was considered to be sensitive on environmental and planning grounds, and there were proposals to establish an SSSI at Altnabreac. The board nominated Dounreay and Sellafield to the Secretary of State for the Environment for further investigation in March 1989.

Remarkably this meant that sites with the best geology, such as Stanford, were excluded, demonstrating the vital lack of a consistent approach.

### **Choice of Sellafield: 2 to 1 site**

3.19 Geological investigations were carried out at Dounreay and Sellafield between 1989 and 1991. Sellafield had considerable advantages over the Dounreay site because an estimated 60% of the wastes destined ultimately for the repository were generated on site, reducing transport impacts, cost, and risks. In addition Highland Regional Council conducted an effective campaign against the proposal at Dounreay. The Nirex Board therefore decided in July 1991 to concentrate future efforts at Sellafield, while retaining Dounreay as an option should the Cumbrian site be unsuitable.

### **Shortcomings with the site selection process**

3.20. Nirex committed a gross disservice to all the communities in which the 537 sites are located by nominating these secretly and refusing to reveal the locations for sixteen years. The company does admit the following mistakes, although these are peripheral compared to the central failure:

- The decision making process at each stage was not documented or trackable.
- There was a lack of clarity over the precise geographical definition of some sites, leading to suspicions that new sites had been added to the list late in the process.
- Hydrogeological environment and land ownership were strong influences on the choice of sites.
- Political constraints were not communicated and ownership of decisions was unclear.
- The process changed at some point during the exercise from a bottom up evaluation against set criteria to a top down process where decisions were made on the basis of the likely measure of local support for the scheme and the proximity to major sites generating waste.

3.21 The key lesson from the exercise was that there was a need for far more transparency and stakeholder participation in the process. Nirex now conceded that, as the process used was conducted in secret and did not involve stakeholders, it was not a legitimate process.

## **4. What next: a new strategy for managing radioactive waste**

*“We believe that it is very important to engage with the public and stakeholders when considering this issue.”* – Committee on Radioactive Waste Management

4.1 Following the collapse of the Nirex site selection process after the 1997 Sellafield planning inquiry, the government launched a new decision-making process on ‘Managing Radioactive Waste Safely’ in 2001 (6), and in 2003 established the Committee on Radioactive Waste Management (CoRWM) to oversee a national consultation on radioactive waste policy. CoRWM is charged by Government to deliver its recommendations on the best option, or combination of options, for managing the UK’s radioactive waste by July 2006 (7). Following delivery of the

recommendations there will be further consultation on their implementation, including consideration of site selection and the criteria for site selection. In recognition of the failings of the earlier Nirex process, CoRWM are committed to openness and transparency in their work.

- 4.2 CoRWM has already undertaken a preliminary round of consultation on background issues, stakeholder involvement, and a broad range of potential options for radioactive waste management. A second round of consultation is currently underway, focusing on the Committee's proposed short-list of waste management options. This is due to conclude on 27 June. CoRWM is proposing to short-list four options for detailed assessment: long-term interim storage, deep geological disposal, phased deep geological disposal, and near-surface disposal of short-lived wastes (8). The first and fourth options affect existing sites. The second and third assume a project similar to that which Nirex sought to develop until its proposals were turned down in 1997. If the second or third option is adopted, then all the 537 sites are likely to be highly relevant. However Nirex has left the revelation of their whereabouts so late that the communities where these 537 sites are situated will only have literally days to make their comments known in this consultation phase on options. Another phase of consultation about policy implementation is planned for later this year but it is not intended to reopen discussion on waste management options.
- 4.3 The CoRWM consultation process is only considering appropriate methods for managing radioactive waste, and not site selection issues, which will be addressed by the government in a subsequent stage of the process. It is natural to ask whether the short-list prepared by Nirex in the 1980s will be used in any future site selection exercise.
- 4.4 In a letter to local authorities announcing disclosure of the list, Chris Murray, Managing Director of Nirex wrote: "The list is historic and there is currently no site selection exercise being undertaken in the UK. If and when a new site selection exercise is needed in the future this old list will not form the starting point of such a process." (9) Nirex point out that changes at or near the sites, such as building work, planning changes, or changes in environmental status or ownership, may make them less suitable for consideration in future, and that developments in the area of radioactive waste management both internationally and in the UK would influence a new site selection process (2).
- 4.5 Nevertheless, the company also points out that "the geology in the UK has not changed, so sites that were considered to be potentially suitable previously on geological grounds could be considered suitable in a future site selection process." New areas could also be opened up for investigation. Although no firm conclusions can be drawn, it is highly likely that at least some of the sites on the 1988 short-list, and longer lists, could feature in any future site selection process.

## 5. Action local authorities can take

*"We are doubtful whether, given the expected level of opposition, it would prove possible to pursue to a successful conclusion a site where there is no measure of support in the local community no matter how good its technical features."* - NIREX

*"People are appalled that such things were considered"* - Donald Manford, local councillor for Barra, close to the proposed repository site at Fuday (10).

- 5.1 Local residents in the vicinity of sites identified by Nirex – especially sites shown on the short-list – may well be concerned about the potential implications for public safety, environmental protection, and property values. Experience suggests that they will look to their local authority to take action in representing their interests, and local authorities may be under political pressure to take a stance on radioactive waste issues.
- 5.2 Local authorities can seek precise details from Nirex as to how it was that the site in question was nominated, what attributes it was considered to have and the reasons for its rejection.
- 5.3 Local authorities can seek to respond constructively by participating in the current CoRWM consultation programme on radioactive waste management. However the deadline for response to the second phase of CoRWM consultation, on waste management options for detailed assessment, is very close, with the consultation period ending on 27<sup>th</sup> June 2005. Plainly this is totally unsatisfactory. NFLAs have therefore called for CoRWM to extend the consultation period by a minimum of three months to allow communities close to sites on the Nirex list the opportunity to participate meaningfully in the exercise (11). After all authorities with known nuclear sites have already engaged in this process because the sites in question are well-known.
- 5.4 Local authorities, who wish to contribute to consultation but face the predicament identified above, are advised to respond to CoRWM with a holding response to inform the committee that they intend to respond. This should be accompanied with a request that the deadline be extended to account for the changed circumstances following release of the Nirex short-list.
- 5.5 The NFLA Secretariat has prepared a response to the CoRWM consultation and can provide technical advice to member authorities on this issue.
- 5.6 From a broader viewpoint, radioactive waste is the product of nuclear energy generation and any new programme of new nuclear power or nuclear weapons will increase the volume of radioactive waste by volume and by activity. Local authorities concerned about radioactive waste can take steps to argue against these developments and also set an example by reducing the need for new nuclear capacity. Authorities can review their policies relating to energy conservation and energy use and investigate opportunities to promote and adopt energy conservation and energy from renewable sources as an alternative to nuclear and fossil fuel sources. Many authorities will have already taken steps in this direction, but a further review may still be worthwhile as this is a rapidly developing area and a number of new opportunities have arisen over recent months. Councils can look beyond their own use of energy and also take steps to encourage energy conservation and the use of renewables in the surrounding area through planning powers and partnerships. The Energy Saving Trust can provide local authorities with practical advice in this area (12).

## Appendix – radioactive waste stocks

More than 10,000 tonnes of radioactive waste are currently stored in the UK at 34 different locations, pending a decision on their long term future. This will increase to 250,000 tonnes when nuclear material currently in use is converted into solid waste. Even if no nuclear power stations are built and reprocessing of spent nuclear fuel ends when existing plants reach the end of their working lives, about another 250,000 tonnes of waste will arise during the clean-up of those plants over the next century (5). The waste contains a massive amount of radioactivity – many times more than was released by the world’s worst nuclear accident at Chernobyl in 1986 - and includes some very long-lived radioisotopes which will remain radioactive and potentially dangerous for hundreds of thousands of years.

Estimates of the amount of nuclear waste which would be created as the result of a programme to construct ten new reactors, published by the Committee on Radioactive Waste Management, show that arisings of spent nuclear fuel or high level waste would double the amount of spent fuel or high level waste which has been created from the UK’s current nuclear programme (13).

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