

Nuclear Free Local Authorities Secretariat

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Sue Riley
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Dear Ms Riley,

ENVIRONMENT AGENCY CONSULTATION ON RADIOACTIVE WASTE DISCHARGES AND DISPOSALS FROM NEW NUCLEAR POWER STATIONS.

1. NFLA official submission

I enclose the official submission of the UK and Republic of Ireland Nuclear Free Local Authorities (NFLA) to the Environment Agency's consultation on radioactive waste discharges and 'disposals' from the two proposed new nuclear reactor designs – the European Pressurised Reactor by Areva (1) and the AP1000 design by Westinghouse (2). The submission was discussed at the NFLA Steering Committee on September 17th and was fully endorsed by the committee.

The NFLA response is in relevant themes that outlines its observations and concerns with parts of the consultation.

2. Introduction

The role of the EA is to ensure the impact of radioactive wastes on the environment is minimised. (3) However, the casual attitude to the issue of new reactor wastes shown in these consultation documents is a matter of serious concern to the NFLA. Recent research from Germany (known as the KIKK Study) has shown that there is no question of the link between the **routine** releases of radioactive wastes from nuclear power stations and childhood cancer. (4) This means that under the requirement for the application of 'Clean Technology' (see below), the NFLA believes nuclear power has no place – any further electricity capacity should be supplied by renewable energy.

The NFLA fears that the communities that host a new reactor site could easily end up becoming a dump site into the indefinite future – since there is no known safe method for 'disposing' of nuclear wastes. On top of this there would be risks associated with waste handling facilities and as yet unknown risks along potential transport routes.

In the NFLA's view, the nuclear industry has yet to provide a credible scientific case for nuclear waste 'disposal' – yet the EA propose postponing this critical issue until some unspecified time in the future. The NFLA notes the importance of addressing the risks associated with the creation of radioactive wastes *before* construction costs of billions of pounds are sunk – as waste creation quickly develops its own financial momentum.

The NFLA believes that it must be made clear to the Environment Agency that this *laissez faire* approach is wholly unacceptable.

3. Radioactive Waste Discharges – OSPAR rules out new reactors.

Under an international treaty known as the OSPAR Convention on the Protection of the Marine Environment of the North East Atlantic, the UK Government is committed to:

“...progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of [achieving] concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances.” [by 2020].

This is set out in the Department for Energy and Climate Change’s (DECC’s) Guidance on Radioactive Discharges. (5)

The EA’s consultation documents mention OSPAR only in connection with annual reporting requirements. (6) The requirement to reduce concentrations in the environment to close to zero is simply not referred to.

One of the Guiding Principles of the OSPAR Strategy with regard to radioactive substances is the application of *“best available techniques and best environmental practice, including, where appropriate, clean technology”*. (7) This requirement for ‘Best Available Techniques’ (and clean technology) for producing electricity should rule out the possibility of building new electricity generating stations which produce highly dangerous wastes when better alternative ways of generating electricity are available - renewable energy sources.

In contrast, the EA claim that both reactor types utilise the best available techniques (BAT) to prevent and minimise the discharge of radiation. This interpretation of OSPAR is wholly inappropriate. In the NFLA’s view, authorising the continued release of radioactive wastes into the environment is clearly incompatible with the OSPAR agreement.

4. Reactor Sites as Waste Sites for almost Two Centuries – Possibly Indefinitely

Once waste fuel is taken out of the planned reactors it may need to remain at the reactor site until almost the year **2200** – and possibly longer. There are two reasons for this. Firstly, the waste fuel would be very hot and would need to be stored for nearly 100 years to allow it to cool. Adding the 60 year planned operation of the reactor gives a storage time of 160 years. Although it is generally assumed that it is the need to allow for the cooling that would determine how long a reactor site would have to double as a waste site, the EA state that, even after the fuel has cooled, there may not be a disposal facility available. (8)

New reactors are currently expected to come on stream between around 2020 and 2025 and remain in operation for 60 years – until 2080–85. So the final load of fuel might need to be stored until 2180 – 2185. The Government’s Fixed Unit Price Consultation suggests that the emplacement of legacy waste may not be completed until 2130 in any case, and that is assuming a Geological Disposal Facility opens on schedule in 2040. (9)

In the NFLA’s view, the nuclear industry has not provided a credible case that they would be able to store the wastes for the minimum period of the 160 years required. (100 years cooling for the final fuel load after a reactor life of 60 years). The EA often refers to stores designed to last for “at least 100 years”, whereas they should be designed to last at least 160 years. (10)

As current planning arrangements stand, there will be no opportunity for communities affected by new reactor build plans to say whether or not they are prepared to also accept long term waste storage. It would simply be imposed upon them. This means that the principle of ‘volunteerism’ put forward by CoRWM (i) would not have been met. (11)

This is of particular concern to the NFLA, as due to the problems associated with 'disposal' – set out below - these 'reactor sites' could in fact end up becoming wastes sites – possibly indefinitely.

5. Risks due to Waste Packaging at Reactor Site

The Agency says “*clarification will be needed of how and where the spent fuel will be packaged*”. (12) The NFLA believe that this clarification is required **now**, not at some unspecified point in the future.

According to the EA it is assumed that waste fuel would be packaged before being sent for disposal. However, no description of how this would be achieved is provided. This is important as the packaging facilities could involve further discharges of radioactivity together with an increase in the risk of accident whilst waste is transferred around the site. The information supplied by EDF on this issues was supplied too late to be available for this consultation. (13) Although information was supplied by Westinghouse, this adds to uncertainties for communities because it is not clear whether the packaging would be done at the reactor site – or at a central facility. (14)

6. Communities Affected by Possible Waste Transport Routes

The EA consultation documents provide very limited information about the possible transportation of wastes to a disposal facility or central store. The Agency's statement below will offer little reassurance to people living on potential transport routes:

*“The safety of transport operations ... have been considered ... One important consideration ... is that increased burn up and irradiation of the fuel will result in an increased concentration of fission products and higher actinides [the group of chemicals that includes plutonium] which causes the fuel assemblies to have a **higher thermal output and dose rate.**”* (Emphasis added) (15)

The Agency does not examine the implications of the potential for higher dose rates from the transport flasks. (16)

7. Incineration of Intermediate Level Waste

EDF assume that certain Intermediate Level Wastes (ILW) can be incinerated leaving no radioactive residue. The EA state that this assumption: “*needs further explanation*” – and that the incineration of ILW would be “*novel*”. (17)

The EA should rule out incineration of these wastes at this stage, as it would clearly fail to meet the requirement 'Best Available Techniques' discussed above.

8. Radioactive Carbon in ILW – Possible breach of dose limits as soon as GDF opens.

Work by Nirex has indicated that carbon from a nuclear disposal facility could escape as radioactive methane gas and carbon dioxide. This would be able to quickly reach people at the surface. Nirex have calculated the resultant risk could be as high 100 times the allowable limit as soon as the dump has been closed. (18)

There would be a relatively large inventory of radioactive carbon in decommissioning waste. The NDA's Radioactive Waste Management Division (RWMD) says this need not be a significant concern. The EA says these arguments are rather speculative at this stage and will need to be underpinned more convincingly. Yet EA recognise the NDA is unlikely to have more confidence in their risk estimates associated with radioactive carbon in repository-generated gases before a site for the GDF has been selected. (19) So there will be a continuance along the road of new reactor

construction before there is knowledge of whether or not waste containing radioactive carbon can be 'disposed' of safely.

9. Key Information on Wastes Kept Secret

Information from the nuclear industry on the 'disposal' of waste from new reactors is available in several reports. (20, 21, 22)

However, at Section 3.3 of the EA assessment reports on the disposability of ILW and spent fuel, a number of unspecified issues are referred to that the EA has raised with the nuclear industry. Neither the issues – nor the industry response is made available to the Public. The Agency states that it recognises these issues will have to be addressed at some unspecified point in the future, but that in general they consider plans for dealing with them are adequate.

In the NFLA view, this kind of 'pretend' consultation is unacceptable. It makes it difficult to fully respond to the consultation without knowing this important information – what are the 'unspecified issues?'

10. No realistic basis to NDA 'disposal' risk calculations

To predict the contamination of water or gas that could leak from a nuclear disposal facility, the chemical characteristics and surroundings of the radioactive atoms must be known. However, inventory information set out in the NDA 'Disposability Assessment' reports (23) is limited to information on the 'atom type' (the 'isotopes')¹ alone – not the characteristics and chemical surroundings of these atoms. The critical importance of this type of information may be appreciated by comparing the solubility of carbon in a diamond and carbon in sugar. In one chemical form the carbon will not dissolve at all – whilst in the other form the carbon is completely soluble.

Although there is some mention in the Disposability Assessments of the presence of materials such as concrete and cellulose that would affect the chemical environment, to all intents and purposes, the information required is simply absent. Therefore, there is no way in which the NDA would be able to realistically predict how contaminated the leaks from a nuclear dump would be. This means their risk calculations do not reflect the reality.

11. Waste 'Disposal' – risks too high

The EA has set a limit on the risk that may be caused by the burial of radioactive wastes of 10^{-6} yr^{-1} (i.e. one person in a million per year contracting a fatal cancer, a non-fatal cancer or inherited genetic defect as a result of radiation exposure). (24) In comparison the NDA calculates the dose from the spent fuel arising from 6 new EPR reactors (almost 10GW) would be more than half this total risk. (25)

As the Agency points out:

"...this does not leave a large margin to the regulatory risk guidance level". (26)

The (November 2009) Draft "Nuclear National Policy Statement" (27) proposed ten reactor sites, each with up to two reactors. Thus, in addition to current wastes, the wastes from up to 20 new reactors would need to be considered.

¹ An 'isotope' is a particular version of an element in which the number of 'protons' (the positive particles at the centre of an atom) remains the same; but the number of 'neutrons' (neutral particles – also at the centre of the atom) varies.

The assumption that the nuclear industry may meet the regulatory target of a 'one in a million' risk simply by beginning the construction of an additional disposal facility cannot be legitimate. A second dump would result in double the original dose – even if this was spread geographically.

It should also be noted that a large number of problems have been identified with the NDA's disposal project indicating that the NDA dose figures represent an extreme underestimate. For example, in March 2010 Nuclear Waste Advisory Associates (NWAA) compiled a register of current technical issues which remain to be resolved if a technical case for radioactive waste disposal is to be made. Over one hundred issues were identified. (28)

The EA simply states that:

“At the time of disposal it will need to be confirmed by the GDF [disposal facility] licensee that the performance of the GDF with its whole inventory will be consistent with our risk guidance level”. (29)

At present it is quite apparent the nuclear industry would not be able to 'dispose' of new build reactor wastes safely. It would be wholly irresponsible to wait until such wastes are created to confirm this. Unless and until the nuclear industry are able to demonstrate that new reactor wastes could be disposed of safely there should be no further steps taken towards the development of new reactors.

12. Waste and Pollution Issues must be Resolved Prior to Construction

Given that all doses of radioactivity have an associated risk; it is a legal requirement that facilities which discharge radiation must produce a benefit that offsets the risk. This is the so-called 'Justification' requirement. However, it is essential that the risk / benefit assessment is carried out before the construction expenditure has been spent. If the assessment is carried out after the construction costs are spent, then these costs will be ignored – and the evaluation will be distorted in favour of allowing the plant to operate. This is what happened in the case of the 'Sellafield Mox Plant (SMP) and also the plutonium separation plant 'THORP' at Sellafield.

In October 1998 the Environment Agency published its proposed decision on the Justification for Sellafield Mixed Oxide fuel fabrication plant. In this document the Agency complained that it:

“...received the application from BNFL [British Nuclear Fuels Ltd] in November 1996, when construction of the Mox plant was virtually complete and after the capital cost (£300 million) had been incurred. It is unsatisfactory that the Agency has no powers under RSA 93 [The Radioactive Substances Act 1993] to require an application to be submitted for a new plant prior to its construction ... The Agency is dissatisfied that it was unable to consider the full economic case for the Mox plant. It is seeking a change in the legislation to prevent a similar situation occurring in future”. (30)

Ten years after the decision to build the Sellafield Mox Plant (SMP) and after five separate public consultations, the Government finally approved operation of the plant in October 2001. However, the comparison of the costs of the plant as compared to the benefit (the 'Justification' comparison) ignored the construction costs on the grounds the money had already been spent. (31) Had these costs been included in the calculation, then the cost / benefit comparison would have shown the plant should not have been built.

In NFLA's view, SMP has been an economic and technical failure. (32) Designed to manufacture 120 tonnes of Mox fuel every year, for overseas customers, the plant had produced just 6.3 tonnes in its first seven years at a cost to the taxpayer of more than £1bn. (33) If the case for building the plant had been open to proper scrutiny before construction started this huge waste of money could have been avoided.

13. The Commercial Requirement for Early Consideration of Waste Issues

The Environment Agency's 'generic' evaluation of new reactor wastes prior to construction is meant to avoid a similar situation re-occurring. The Government says that potential new reactor developers have made clear they want national issues to be dealt with in advance of a public inquiry otherwise they will not consider investing in new nuclear power stations. (34) Similarly, the Environment Agency says a key objective of utility companies is that uncertainties associated with regulatory matters are reduced so they can make well informed commercial decisions. (35)

The Environment Agency oversees waste issues associated with the nuclear industry, including nuclear waste 'disposal'. (36) The NFLA would have been expected, therefore, that the Agency would look in some detail at the disposability of spent fuel from new reactors. The NDA's Radioactive Waste Management Division (RWMD) has produced reports on behalf of the nuclear industry on the disposability of nuclear waste and spent fuel arising from both EPR and AP1000 reactors. (37) The nuclear vendors, or Requesting Parties (RPs) as they are known, responded to RWMD's Disposability Assessments. (38, 39)

Yet the EA's consideration of this issue in the Consultation Document covers just **seven** out of over 170 pages. (40) The report highlights several technical issues that are not fully resolved. Crucially, the EA has already stated that it is not known whether or not it will be possible to safely 'dispose' of waste fuel. (41) But, in effect, the Agency postpones these outstanding disposability issues to some unspecified time in the future.

The EA has produced additional 'assessment' reports on waste fuel and also the disposability of Intermediate Level Wastes (ILW) and waste fuel. (42) These reports also indicate the EA plans to postpone the question of whether or not safe disposal is achievable.

The EA states that it expects EDF:

"...to identify at least one complete credible route by which the higher activity wastes from a fleet of UK EPRs could be safely disposed of and to provide grounds for reasonable confidence that the route(s) could be followed successfully." (43)

It is difficult to see how such a 'credible route' can be identified at this stage when the NDA's RWMD has yet to publish its draft safety case for the GDF, and when there are so many unresolved uncertainties regarding the deep geological disposal of nuclear waste. (44)

The fact that the outcome of future research may be that wastes cannot be 'disposed' of safely has been referred to extensively by the EA. (45, 46)

It is imperative this issue is resolved prior to the expenditure of billions of pounds on reactor construction. If the nuclear industry is not required to prove they have a safe disposal route for wastes until after the planned reactors are built, then a powerful financial momentum would be created towards allowing the reactors to operate – and so produce waste fuel for which there was no long term safe management route. This should be a 'deal-breaker' for new reactors yet the EA simply chooses to postpone the problem until some unspecified time in the future. This is wholly irresponsible.

14. EA Draft Certificate postpones 'disposal' issue

For both types of reactor, the EA propose to issue an interim certificate to state the designs are 'acceptable' – pending the resolution, at some stage, of the 'disposability' issue. (47)

What the NDA's has called "disposability assessments" (48) were relied upon by the Government to reach the conclusion that it was "*satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations.*" (49)

The NDA argues that – because it would not be able to use a site for disposal unless it was approved by the regulators, then - necessarily - the chosen site would meet regulatory standards. (50) Of course, this argument does not follow. It is possible the NDA could select a site, but be unable to meet the necessary standards. There has been a precedent for this in the rejection of the site proposed in the 1990s, partly for generic technical reasons, but partly for site-specific reasons.

In March 2010, the House of Commons Energy and Climate Change Select Committee stated:

“...the Government has no choice but to find a solution [for nuclear wastes], regardless of a decision on nuclear new build [and] waste arising from new nuclear power stations will not pose a significant additional challenge in terms of finding a permanent storage solution.” (51)

This ‘*King Canute*’ argument that because the waste problem exists, the Government must be able to solve it, similarly makes no sense. Clearly, just because radioactive waste exists, it does not necessarily follow that it will be possible to safely dispose of it.

The EA must make it clear that it rejects both of these arguments. There is no safe disposal route available for new reactor wastes, therefore the Agency must refuse to authorise its creation.

15. Overall Conclusions from the Nuclear Free Local Authorities

The NFLA has made a number of conclusions throughout this submission. These can be summarised as follows:

1. The EA fails to explain how the proposal to approve new gaseous and liquid radioactive waste discharges into the environment from new reactors can possibly be consistent with commitments made by the UK Government to OSPAR to achieve concentrations in the environment of artificial radioactive substances close to zero by 2020.
2. The EA ignores one of the Guiding Principles of the OSPAR Strategy with regard to radioactive substances which is the application of “*best available techniques and best environmental practice, including, where appropriate, clean technology*”. In the case of electricity generation clean technology would include the various forms of renewable generation.
3. The emplacement of legacy waste in a ‘Geological Disposal Facility’ (GDF) is unlikely to be completed until at least 2130. New reactor spent fuel could require storage on site for at least 160 years. This means communities around new reactors might be expected to host a waste site for almost two centuries and possibly indefinitely.
4. The EA consultation leaves communities around nuclear sites with far too many uncertainties. As well as not knowing how long waste fuel might be stored on site, or what kind of a store will be used, they don’t know whether they will be required to host an encapsulation facility, with its associated risks, or even an Intermediate Level Waste incinerator. Communities on transport routes don’t know when waste may be transported through them, and some unsuspecting community may be asked to host a centralised storage and encapsulation facility at some point in the future.
5. If the nuclear industry is not required to prove they have a safe disposal route for wastes until after the planned reactors are built, then a powerful financial momentum would be created towards allowing the reactors to operate – and so produce waste fuel for which there was no long term safe management route.
6. The EA Assessment Reports fail to fully analyse the NDA’s ‘Disposability Assessment’ reports and the Requesting Parties responses. Instead they postpone dealing with outstanding disposability issues to some unspecified time in the future. This is unacceptable.

7. The consultation documents fail to acknowledge other work by the EA which states that it is possible that an acceptable safety case for a GDF cannot be made.
8. If a new build programme is much larger than around 6 new reactors, two sites for Geological Disposal Facilities are likely to be sought – doubling the risk to the UK population.
9. At present it is quite apparent the nuclear industry would not be able to dispose of new build reactor wastes safely. It would be wholly irresponsible to wait until such wastes are created to confirm this. Unless and until the nuclear industry are able to demonstrate that new reactor wastes could be disposed of safely there should be no further steps taken towards the development of new reactors.

Yours faithfully,



Sean Morris
Secretary of UK and Ireland Nuclear Free Local Authorities
(as endorsed by the NFLA Steering Committee of 17th September in Manchester)

16. References

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- (2) See <https://www.ukap1000application.com/index.aspx>
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- (9) Consultation on a Methodology to Determine a Fixed Unit Price for Waste Disposal and Updated Cost Estimates for Nuclear Decommissioning, Waste Management and Waste Disposal, DECC, March 2010 Para 3.2.23 – 3.2.24
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- (11) In its Implementation Report CoRWM indicated that its recommendations must also be applied at least to central and regional long terms stores (and, by implication, to on-site stores) if they are to inspire public confidence (See 'Moving Forward' para. 25 p.10 CoRWM 1703 Feb. 2007
[http://www.corwm.org.uk/Pages/Archived%20Publications/Tier%20%20\(7\)%20-%20Implementation/Tier%203%20-%20Implementation%20advice/1703%20-%20Moving%20Forward%20-%20Report%20on%20implementation.doc](http://www.corwm.org.uk/Pages/Archived%20Publications/Tier%20%20(7)%20-%20Implementation/Tier%203%20-%20Implementation%20advice/1703%20-%20Moving%20Forward%20-%20Report%20on%20implementation.doc))
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- (13) Generic Design Assessment: UK EPR Nuclear Power Plant Design by Areva NP SAS and Electricite de France SA. Assessment Report Spent Fuel, Environment Agency, June 2009. Section 3.7 para 95 <https://consult.environment-agency.gov.uk/portal/ho/nuclear/qda?pointId=1276871117935>
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- (15) Ref 13 Section 3.7 para 86
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- (18) C-14: How we are addressing the issues, Nirex February 2006, Technical Note No: Number: 498808 See p12 (Fig 1)
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- (20) See <http://www.nda.gov.uk/news/disposability-assessment.cfm>
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- (22) See https://www.ukap1000application.com/PDFDocs/UN%20REG%20WEC%20000098%20DCP_JNE_000105%20Passive%20Pressurised%20Water/UN%20REG%20WEC%20000098%20DCP_JNE_000105%20Passive%20Pressurised%20Water.pdf
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- (24) Geological Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation, page 46 para 6.3.10, Environment Agency, February 2009 <http://publications.environment-agency.gov.uk/pdf/GEHO0209BPJM-e-e.pdf>
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- (42) There are 14 Assessment Reports available on each reactor type here:
<https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda?pointId=1277285023953>
- (43) Generic Design Assessment UKEPR nuclear power plant design by Areva NP SAS and Electricite de France SA, Assessment Report: Disposability of ILW and Spent Fuel. Environment Agency, June 2010, para 29, section 3.1.3
<https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda?pointId=1276871149397>
- (44) See for example "Nuclear Waste Advisory Associates Issues Register: Outstanding Scientific and Technical Issues Relating to the Production of a Robust Safety Case for the Deep Geological Disposal of Radioactive Waste, March 2010" which lists 101 unresolved issues.
<http://www.nuclearwasteadvisory.co.uk/uploads/6901NWAA%20ISSUES%20REGISTER%20COMMENTARY%20letterhead.doc>
- (45) Environment Agency, Response to Nuclear Decommissioning Authority Consultation on – Radioactive Waste Management Directorate Proposed Research and Development Strategy, November 2008. http://www.environment-agency.gov.uk/static/documents/Research/1976_RWMD_Proposed_RD_strategy.pdf
- (46) Proposed Research and Development Strategy, NDA RWMD, May 2008
<http://www.nda.gov.uk/documents/loader.cfm?url=/commonspot/security/getfile.cfm&pageid=20962>
- (47) For the EPR, see page 142 for the draft certificate and page 144 for 'Schedule Two' which refers to the need to resolve the issue of waste fuel disposability: Generic Design Assessment UKEPR nuclear power plant design by Areva NP SAS and Electricite de France SA,

Consultation Document, Environment Agency, June 2010 <https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda?pointId=1270818651893>

For the AP100, see page 144 for the draft certificate and page 147 for 'Schedule Two' which refers to the need to resolve the issue of waste fuel disposability: Generic Design Assessment AP1000 nuclear power plant design by Westinghouse Electric Company LLC, Consultation Document, Environment Agency June 2010. <https://consult.environment-agency.gov.uk/portal/ho/nuclear/gda?pointId=1276873205732>

- (48) See <http://www.nda.gov.uk/news/disposability-assessment.cfm>
- (49) Draft National Policy Statement for Nuclear Power Generation (EN-6), DECC, November 2009 Paragraph 3.8.20 <http://data.energynpsconsultation.decc.gov.uk/documents/nps/EN-6.pdf>
- (50) Paragraph 4.3.1 (page 75) and paragraph 5.4 (page 95) of Generic Design Assessment: Disposability Assessment for Wastes and Spent Fuel arising from the operation of the UK EPR, Part 1 Main Report both use the phrase "...any selected site necessarily would need to be consistent with meeting regulatory risk target" or in the latter case "regulatory guidance values".
- (51) The proposals for national policy statements on energy, Energy and Climate Change Committee, Volume 1, 23rd March 2010. Para 71, page 28 <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenergy/231/231i.pdf>