



January 2005

**Response to the Committee on Radioactive Waste Management report
'The Options for Long-Term Management
of Higher Active Solid Radioactive Wastes in the United Kingdom.'**

SUMMARY

Greenpeace welcomes the opportunity to respond to the above report (Options report). Greenpeace also notes the 'Preliminary Report on in the Inventory' (the Inventory) which CoRWM has also published and provides some brief comments on this. In brief Greenpeace's views are:

- The options listed as suitable for the proposed preliminary short list (published since the Options document was released) are: interim storage; deep disposal and phased deep disposal. This listing does nothing to assuage concerns that the Committee is leaning heavily towards disposal *before* other options, such as indefinite storage, as given full consideration.
- Greenpeace notes that interim storage is inevitable as some of the wastes currently held are in no condition to be assigned to disposal – and also a nuclear dump site is not expected to be operational for at least 30-40 years. Given this might become a main option recommended by the Committee; it should define what is meant by 'interim' storage.

The issue of interim storage notwithstanding, deep disposal appears to be favoured as the main option - primarily because of the amount of research already done in this area. The large amount of research on disposal is due mainly to the fact that the nuclear industry had a preconceived idea in the 80s that this was *the* solution. The subsequent 1997 inquiry on NIREX's repository proposal revealed that the science did not meet the expectations of the industry. Concerns raised in 1997 over NIREX's proposal remain today. The continued lack of certainty over the deep disposal option means then that indefinite storage might result through default rather than by design. To prevent indefinite storage happening by default - with the risk, for example, that wastes stored are not conditioned to the best standard for indefinite storage - CoRWM should include indefinite storage on the preliminary short list for further investigation to ensure it receives as much research as the disposal option.

- The Committee should also recommend that plutonium, uranium and spent fuel be designated as wastes and should also recommend against any new nuclear build program. Burning plutonium or uranium stocks in reactors, creating more spent fuel through operating new reactors and continued reprocessing of spent fuel will only serve to continue or exacerbate the problem of nuclear waste (in terms of volume and/or radioactive content of the wastes which have to be dealt with) for which it, the Committee, has no 'solution.' All of the above also breach the criteria set by CoRWM but also the environmental principles Greenpeace has submitted to the Committee (see appendix 1).
- It should improve the inventory to fully explain the different types of waste and the implications (for future generations) of wastes created from a new build programme e.g. a

proposed programme of 10 reactors would mean doubling the amount of spent fuel the UK would have to deal with.

POLICY CONTEXT

Future waste creation: CoRWM has been charged with a very significant task: that of finding a ‘solution’ to the more highly radioactive waste materials currently in the UK. As is common knowledge, the search for a ‘solution’ foundered in 1997 when NIREX was refused permission to build an underground laboratory as a precursor to a national nuclear dump. There were both scientific and social reasons behind this decision to reject the proposal.

In terms of the social concerns, there was (and still is) a keen public awareness that the public may be urged to accept a ‘solution’ – one perhaps with many compromises and uncertainties attached – while the Government and nuclear industry continue to allow or promote activities which create more wastes. The public will not be coerced into accepting a ‘solution’ for hazardous substances (particularly on claims over environmental or security reasons) if the industry creating those substances is hell bent on creating more.

The public is well aware that the industry’s claim there are environmental/security imperatives to ‘solving’ the waste problem (i.e. by disposing of it deep underground) are totally contradicted by its proposals to allow for waste creating activities like reprocessing or new nuclear reactors. This has naturally led to a lot of public scepticism around this debate.

The Committee too is aware that a recommendation to dump wastes will be seen as a green light by the nuclear industry to push for more reactors and to support future reprocessing contracts (with the possibility of more ILW staying in the UK under the recently announced substitution policy).

Were CoRWM not aware of the industry’s plans for new build then it could plead that if recommending disposal leads to a push for new build then that would be an unintended *and* unforeseen consequence of its decision. As it is, the Committee is well aware of that nuclear industry’s plans for new build are predicated on finding a ‘solution’ for nuclear waste – preferably deep disposal. Thus if CoRWM recommends deep disposal it will do so in the full knowledge that a push for new build by the industry was not unforeseen, albeit that it might be an unintended consequence.

CoRWM has to ask itself if it is reasonable to ask the public to accept a ‘solution’ (a deep disposal site) - on questionable scientific ‘evidence’ - if the activities giving rise to nuclear waste and its attendant environmental and security concerns are going to be continue for decades to come?

Setting a boundary: In addition to the political dimension of how the industry will react to CoRWM’s recommendations the Committee has to be seen to take itself seriously. At present the Options document and the Inventory acknowledge there may be issues (and extra waste) associated with new build or future reprocessing. But neither of these documents says anything about whether these are acceptable in terms of what the Committee is setting out to do i.e. find an *acceptable* waste management solution that meets the needs of all stakeholders. In this context, CoRWM has failed particularly in terms of the discussion around the amount of radioactive material to be dealt with, in not setting a boundary around the amount of waste that has to be managed or disposed of.

The issue of recommending against future waste creation activities is something CoRWM will have to consider in its deliberations. In this respect it will also have to be mindful that the soon-to-be-

established Nuclear Decommissioning Authority (NDA) will also create more waste and will not – as originally thought – simply get on with tackling legacy waste issues.

Recommendation: Greenpeace advises that CoWRM should recommend against a new build programme on the basis that such a programme would simply continue to add to what the Committee, the Government, the public – and even the nuclear industry – all agree is a major problem. In conjunction with this CoWRM should recommend against the use of plutonium or uranium as fuel for reactors. To take relatively non-radioactive substances and use them in a reactor – a hazardous process in itself – could only be construed as reckless. These materials would only be converted into highly radioactive spent fuel – which would continue to present a risk to future generations and provide security problems (this is also dealt with further under the Burning in Reactors p 8 of this response).

Setting a boundary on the amount of waste that has to be dealt with and/or taking action to prevent or minimise further waste creation is one of a number of crucial steps in the process of addressing the issue of what to do with radioactive waste.

Is there a solution waiting to be found? Another major issue is whether the science behind any of the options is water tight. Is there is a ‘solution’ to nuclear waste ready to hand that can be recommend with certainty? CoRWM acknowledges there is probably not a one-size fits all solution to nuclear waste – because of the many different characteristics of the different materials being discussed. There may be a ‘solution’ for some wastes. However, for the more problematic wastes such as high level waste, spent fuel, plutonium – as with other intractable wastes created by modern society - there may not necessarily be a ‘solution’ that can be applied to them which CoRWM will feel able to recommend within the time allotted to it. This is why there is such concern in particular over the seeming rush by CoWRM to examine deep or phased deep disposal at the expense of other options – which are options not solutions. Indeed, disposal may not be a solution but a cop-out, where out-of-sight out-of-mind is passed off as a scientific certainty and, therefore, somehow environmentally acceptable.

In the case of the more highly radioactive wastes Greenpeace believes that at present there is no environmentally, socially, ethically or totally scientifically acceptable method of waste disposal. In fact there are many questions even over the disposal of low level wastes, many of which have been proven to be wrong in the past (witness recovery and reconditioning of some of the wastes at Drigg and Dounreay which were previously thought to have been safely disposed of).

As noted earlier, CoRWM looks to be leaning in favour of deep disposal – because of the amount of research already undertaken on this option. That has only come about because that was the option targeted by the nuclear industry. As CoRWM knows, the decision to spend huge amounts on research into deep disposal was predicated mainly on a political imperative by the nuclear industry to be seen to have a ‘solution’ to its waste problems so it could continue making more of the same. As we also know, the scientific research did not result in findings which supported the deep disposal option. Whether more money and research thrown at the deep disposal option will resolve this issue once and for all time is highly questionable. As the Royal Commission on Nuclear Power and the Environment quoted in 1976 ‘If a problem is too difficult to solve, one cannot claim that it is solved by pointing to all the efforts made to solve it.’¹

¹ Hannes Efvén, Energy and Environment, Bulletin of the Atomic Scientists, May 1972, quoted in the Royal Commission on Environmental Pollution Sixth Report Nuclear Power and the Environment September 1976.

Greenpeace is concerned that because the nuclear industry has spent so much money on the deep disposal/phased deep disposal option for waste that other options (such as indefinite above ground storage) are at risk of being 'dumped' at a very early stage. There is a danger CoRWM will advocate deep disposal at a time when the science is still uncertain. True, the same might hold for above ground indefinite storage. However, this has been the subject of very little research and needs a lot more examination.

Recommendation: Greenpeace recommends the Committee place the option of indefinite storage (long term, above ground storage) on the preliminary short list for further examination.

CRITERIA and PRINCIPLES

CoRWM list of options are to be judged based on the following criteria

1. There is no proof of concept in the form of a) actual implementation of the option in the UK or elsewhere, or evidence of ability to achieve implementation within the foreseeable future b) sufficient research and development on the part of the international scientific community to demonstrate confidence 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 that 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.

Greenpeace has provided CoRWM with a copy of the environmental principles it believes should be applied to nuclear waste management. These are provided in Appendix 1 of this submission. Greenpeace believes that whatever options remains on the shortlist following this round of consultation should be subject to the environmental principles it has provided (Appendix 1).

SPECIFIC OPTIONS

There are several options which Greenpeace believes should be abandoned by the Committee immediately as being impractical because of environmental or social/ethical reasons. Some of these have already been discarded by CoWRM. These are:

- disposal in ice sheets;
- disposal in subduction zones;
- direct injection;
- disposal at sea; and
- dilute and disperse.

Greenpeace agrees with the decision to discard these options. Several of them fail the criteria set by CoRWM (e.g. disposal at sea would be in breach of international treaties) and Greenpeace's environmental principles (e.g. dilute and disperse does not meet the concentrate and contain

principle). Greenpeace also opposes any option which would see wastes exported from the UK. All wastes created in the UK should be dealt with in the UK. Apart from the ethical and political considerations of using another country to either store or dispose of radioactive waste created here, it is highly likely any move to send wastes overseas would be in breach of international conventions to which the UK is a signatory.²

Discussion on options kept on the list by CoRWM:

These fall into two categories as given by CoWRM³ (see press release):

Needs more discussion to finalise decision:

- Disposal in space
- Sub sea disposal
- Indefinite storage
- Near surface disposal

Proposal to keep on preliminary shortlist

- Interim storage
- Deep disposal
- Phased deep disposal

Disposal in space should be discarded for the same reasons as those given for rejecting those options already rejected. Similarly sub-sea disposal should be rejected for the same reasons.

Options for further consideration

Above ground interim storage/Above Ground Indefinite Storage

It is difficult to divide these two options as there is no agreed definition on what is 'interim.' Greenpeace is concerned that above ground 'interim' storage might be down played in some quarters in order to push for deep disposal – the preferred option of the nuclear industry.

However, as the Options document notes, there are good reasons for allowing for longer-term storage (albeit interim) as this will allow for the science of nuclear waste encapsulation and management to be improved. Interim storage is seen as some as been unacceptable as it does not represent a solution – although as CoRWM notes, 'interim' storage may become indefinite by default. Rather than wait for that to happen by accident; to prevent disposal happening because of concerns over the meaning of 'interim' - and also avoid a rush to dispose of wastes when there are so many uncertainties over immobilisation, types of waste and volume, the option of storage should be taken through both as an interim measure (because it is inevitable) along with the indefinite storage 'option' because this may be what will happen and should be planned for accordingly (indefinite storage is already the preferred option of a number of environment groups).

Interim storage: Given that interim storage is unavoidable for many types of waste it is hardly surprising that the Committee has suggested putting this on its proposed short-list. Interim storage

² IAEA's Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

<http://www.iaea.org/Publications/Documents/Infcircs/1997/infcirc546.pdf>

³ Nuclear Waste Options Reduced, CoRWM's first thoughts on rough short list, Friday 2 November 2005. CoRWM

should therefore not be described as a “do nothing” option. There are large quantities of waste which are currently stored inadequately, and need to be placed into ‘passively safe’ storage. Even where ‘interim storage’ is implemented on a ‘wait and see’ basis, it should be done in such a way which keeps all options open for the future. One of those options would be continued/indefinite storage. One of the questions CoRWM will have to answer is whether, if interim storage is chosen solely as the interim option must this then be followed by disposal as the next option in line?

Indefinite storage: Greenpeace believes it would be wrong to assume that deep disposal or phased deep disposal are any more worthy of a place on the short list than indefinite storage. It is known that the timeline for the building of a deep repository is estimated at 30-40 years hence – assuming it is ever built. For wastes to be kept in the safest condition possible it would be sensible to assume that they should be conditioned with indefinite storage in mind – precisely because a deep disposal option can’t be guaranteed. Such an option would, hopefully, prevent wastes conditioned for ‘interim’ storage having perhaps to be reconditioned for ‘deep disposal.’

There are bound to be criticisms that ‘indefinite storage’ is not as well known, in terms of the science of conditioning and management, as the deep disposal concept. But deep disposal is not a ‘proven’ option either. The push behind deep disposal research was primarily political and undertaken on the assumption that the science would validate this idea. That didn’t happen. The industry’s proposal was an expensive gamble not only on scientific certainty, but also on social, financial, political and ethical support for an option which did not enjoy broad support.

Many of the criticisms levelled in relation to indefinite storage can also be levelled at deep disposal. For example, ‘what happens if future generations choose not to continue with this option’ could also be asked of deep disposal? Should we be taking irreversible steps now to dispose of wastes when there are uncertainties we may be leaving for future generations? At what point can we be sure a waste management route is *the* right route? What if compromises have to be made? And if the public is asked to accept compromises to deal with a problem now – how can the nuclear industry be allowed to promote activities which create more of the same problem.

Another point in relation to storage that CoRWM has to answer is that why, if it chose storage, it would have to decide now on any new stores that might be needed when old/current stores reach the end of their lifetime? Since storage facilities are unlikely to have a life beyond around 100 to 150 years, there is very little difference between the Interim Storage option and the Indefinite Storage option beyond deciding what happens in the next immediate step that should be taken.

Underground interim and underground indefinite storage: It is highly unlikely an underground storage site would be built near surface. If such options were progressed it is more likely they would be seen as an option either as part of deep disposal or phased deep disposal – on the basis that neither a deep disposal site nor a phased deep disposal facility would be opened and closed very quickly. In this case ‘storage’ would be seen as part of a disposal system that initially would have monitoring and retrievability built in. It is highly unlikely that such an option would be recommended on cost grounds alone (issues of environmental acceptability etc. notwithstanding).

Recommendation: Greenpeace recommends that the above-ground storage option is taken forward to the next stage of the CoRWM process. To continue only with interim storage (inevitable) and deep or phased deep disposal (not inevitable) would be wrong. The indefinite storage option should be placed on the preliminary shortlist and subjected to the same investigation, and scrutiny, as the other options proposed for that short list.

Stores would be designed to be as strong and long-lasting as possible – with specific attention given to making them as ‘terrorist proof’ as possible. Waste conditioning and storage should be designed so that waste could easily be transferred to either new stores or some other management option at the end of the life of the original stores. An important part of this option is that research programmes should be implemented into the best way of containing nuclear waste into the far future, both above and below ground. Equally important is that sufficient funds need to be put into segregated accounts by waste producers to finance future waste management operations. Finally, none of the “screening criteria” would remove this option from the list.

Underground Storage

Near surface disposal

Greenpeace would note that if promoting this option is premised mainly on it being a ‘secure’ half way house between the uncertainties of storage and the uncertainties over disposal then that would be false premise for an industry which continues to create many security issues above ground.

Many of the types of waste that need to be managed would not be suitable for near-surface disposal. This option provides little in terms of security and environmental safeguards over indefinite above ground storage.

Deep disposal and phased deep disposal

These option(s) have clearly received support for placing them on the short list as they are the options with the most research behind them - because this is the option the nuclear industry proposed even before it had fully studied the issue. As the 1997 public inquiry into the Rock Characterisation Laboratory near Sellafield revealed, making a decision and then getting the science to ‘fit’ is not always a formula for success.

Greenpeace is of the opinion that the distinction between deep disposal and phased deep disposal as separate options implies making decisions about the future which it is not necessary to make now, and thus confuses the issue.

Costs alone make these options extremely difficult to justify at present, particularly given the uncertainties over the suitability of any site; the ability to monitor and retrieve wastes; uncertainties over the amount of wastes that would go to the site and lack of firm knowledge over the integrity of conditioning for the more long lived wastes.

Recommendation: Greenpeace does not believe that deep or phased deep disposal is an option at present – and indeed may never be. Rushing into this (and recommending this would be rushing given the number of outstanding problems for this option) would foreclose on many other options being given serious consideration.

Other ‘options’

Greenpeace notes that CoRWM originally proposed:

- Partitioning and Transmutation;
- Burning in reactors;

⁴ Press release, CoRWM, Nuclear Waste Options Reduced, 19 November 2004.

- Incineration; and/or
- and Melting of Metals

These are mainly ‘options’ which deal only with some types of radioactive wastes in the inventory. If implemented some might be able to be carried out in conjunction with another option, but others should be discarded immediately.

- **Partitioning and Transmutation**

This should be discarded now as an unproven option which, even if it did eventually become workable, would require a commitment to both nuclear power and reprocessing – both of which are environmentally unacceptable and fail all the principles that Greenpeace supports; as well as failing many of the criteria CoRWM has laid out.

Although research is continuing on reactors which can ‘transmute’ plutonium, there are still major outstanding problems. With regard to this the US Energy Secretary, Abraham Spencer has noted “Nuclear energy technology has the potential to improve the quality of life for people around the world if we are successful in solving issues such as economics, waste and proliferation.”⁵ To overcome these problems would be no small task – and is hardly likely to happen for quite some time. Given the scale of the problems the challenges the industry has to overcome in order to exploit partitioning and transmutation of waste it is doubtful CoRWM will want to wait to explore this option further.

- **Burning in reactors,**

This option – mainly for uranium and plutonium – is rejected on the same grounds as those given for partitioning and transmutation. It fails on a number of CoRWM’s criteria and certainly does not meet the principles Greenpeace has submitted.

As noted in the summary of this response, Greenpeace opposes any options for waste management or ‘disposal’ which encourage activities which lead to the creation of more nuclear waste. In particular this includes ‘burning’ plutonium and uranium in reactors.

As CoRWM knows from reports it has commissioned, this option could not be employed (well, certainly not at a realistic cost) in existing reactors in the UK. As it is highly unlikely the UK’s plutonium stockpile would be used overseas, it could then only be ‘burnt’ in new reactors in the UK. It is widely known that new build is a highly controversial subject and is certainly not guaranteed. If the Committee recommended this option it would, inter alia, be recommending new build – hardly a sensible action for an organisation which is asking the public to tackle the current nuclear waste problem.

Apart from the very real issues of risks, terrorism, costs and other major social, political and ethical dilemmas posed by the burning in reactors option, there is also the fact that this option doesn’t make the plutonium or uranium disappear. Burning these materials either changes them into other radioactive materials or incorporates them into spent nuclear fuel – a substance which is extremely hazardous, indeed far more dangerous than the original plutonium and uranium used to make the fuel.

⁵ *France gives USA access to Next Generation Nuclear Technology*, ENS, 25 August 2004
http://home.earthlink.net/~cevent/8-25-04_france_shares_next_gen_nuc_tech.html

There are also wider implications for the use of plutonium and uranium in reactors. As CoRWM is aware the Competition Commission of the EU is currently undertaking a state aid investigation of the Nuclear Decommissioning Authority and BNFL because of a range of potential subsidy issues. It is reasonable to assume that the use of subsidised plutonium and/or uranium – created from subsidised reprocessing operations – would also raise state aid issues. If the NDA proposes to rid itself of plutonium by advocating the use of it in reactors, then this would be a state aid subsidised act. In terms of meeting Euratom commitments (taking a relatively non-radioactive substance and making into a very radioactive one) it is highly unlikely it would meet any of Euratom's criteria either.

In respect of all waste management options Greenpeace also refers CoRWM to the UK's 'National Report on Compliance with the Obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management': http://www.defra.gov.uk/environment/radioactivity/internat/pdf/ukreport_pt1.pdf (particularly waste minimisation and sustainable development principles and policies referred to in the document

(see also IAEA's Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management – which we understand CoRWM is getting expert opinion on <http://www.iaea.org/Publications/Documents/Infcircs/1997/infcirc546.pdf>)

- **Melting of metals**

Greenpeace is not opposed to this option per se as a means of reusing materials from the nuclear industry. However, this is certainly not an 'option' for all nuclear waste – but a sub-option for some types of waste. Any proposal to employ this method would have to meet the environmental principles which Greenpeace has published.

- **Incineration**

As with melting of metals, this option would have to meet Greenpeace's environmental principles. Discharges to the environment alone from this option would probably rule it out. There would also be significant concerns about what would happen to the waste products from incineration because, as with so many other parts of the nuclear fuel cycle, this process does not get rid of the radioactivity it simply changes the form of the material.

Brief notes on the inventory:

- The inventory should reflect the amount of radioactivity which will result from various options, as well as the volume of waste. For example, it is crucial people understand how much more radioactivity will be created through burning plutonium and uranium in reactors than if this material is treated as waste.

CORWM should try to put the relative amounts of radioactivity in different materials in context e.g.

- HLW in general contains X amount of radioactivity per square metre, spent fuel from conventional reactors contains Y amount of radioactivity per square metre – and so on for MOX spent fuel, intermediate level waste and low level waste.
- The main radioisotopes – and the half-lives – should be given for different types of wastes;
- The inventory should also contain information on projections of waste from potential reprocessing contracts e.g. if BNFL/NDA secure new contracts X amount of LLW will

result and Y amount of ILW from reprocessing overseas fuel – and similar for LLW, ILW and HLW from reprocessing spent fuel in the UK.

May 2004

ENVIRONMENTAL PRINCIPLES FOR RADIOACTIVE WASTE MANAGEMENT

Issued by Greenpeace UK, May 2004

Introduction

The UK nuclear industry, its regulators, government agencies and policy advisory bodies have in recent years attempted to change policies and activities related to nuclear waste management. Many of these have failed in gaining public support. This lack of confidence is, Greenpeace believes, due primarily to the fact that the policies and their implementation are not based on clear environment principles.

Current policy on nuclear waste management is based on a 1995 document⁶ - this assumed a deep geological repository would proceed. That in itself (as will be discussed below) would have breached a number of key principles that the environment movement, with public support, has been arguing for i.e. the dump was an attempt at a 'solution' without the principle of waste minimisation/avoidance being discussed. The whole process behind the NIREX dump proposal was not informed by environmental principles. Had it been, a clearer path for dealing with radioactive waste may have emerged that may have gained public support.

As it is, at present the UK's nuclear waste system is in disorder, with policy being made 'on the hoof'.⁷ In an effort to break some of the impasse, the Radioactive Waste Management Advisory Committee (RWMAC) has called for a review of the principles underlying the regulatory system.⁸ But policy is slowly being re-written, without underlying environmental principles. Proposals are appearing piecemeal, objectives are contradictory, priorities unclear, and policy often so vague that regulators and nuclear operators can take from it what they wish.

The decisions in the last two years put RWMAC in abeyance, establish the Nuclear Decommissioning Authority (NDA), continue with NIREX (with its very limited remit) and set up the Committee on Radioactive Waste Management (CORWM) underline the scatter gun approach to nuclear waste issues by Whitehall. At the time of writing at least five other consultations are ongoing, all dealing with small parts of policy, revealing a lack of 'joined-up government'. Westminster is not well-served by this

Ministers refusal to include underlying environmental principles in the Energy Bill, which will establish the Nuclear Decommissioning Authority (NDA) adds to concerns about the Government's real agenda on this issue – are financial considerations, or nuclear revival, really driving the nuclear waste agenda rather than protection of human health and the environment? Similarly, accommodating future plans for waste creation under military activities (to which these principles should also apply) means that best environmental practice is not being followed.

⁶ Review of Radioactive Waste Management Policy: Final Conclusions. HMSO (1995). Cm2919.

⁷ RWMAC (March 2003) Management of Low Activity Solid Radioactive Wastes within the United Kingdom. Para A3.21

⁸ RWMAC 23rd Annual Report para 3.13

If new policies are to inspire public confidence, and have the affect of protecting human health and the environment there should be a clear set of environmental principles underpinning all future activities. Once these are agreed, discussions on updating the regulatory system and nuclear policies can take place. It is in this spirit that GP offers the following for discussion. These principles are not set in stone, but are, we believe, a start in laying the foundations upon which any good nuclear waste policy and programmes should be based. The principles are not in a particular order of priority - priorities will differ depending on the wastes being dealt with.

Environmental Principles – the key objective

This document outlines the environmental principles Greenpeace believes should underlie all Government policy, nuclear regulation and activities. The combined objective of these principles is:-

to maximize protection of human health and the environment from the harmful effects of radiation in all operations involving the production or management of radioactive materials and waste.

(1) The Waste Minimization/Avoidance Principle

Definition: The creation of radioactive waste (solid, liquid and gaseous) should be minimized.⁹ First and foremost this means we need to stop producing more nuclear waste; nuclear power stations need to be phased-out as quickly as possible, and reprocessing, which magnifies the waste problem, should end. Existing waste management and the decommissioning of nuclear facilities needs to minimise the production of new waste during their operations.

Example of current policy failures: The NDA will allow the continued operation of waste-producing facilities e.g. the THORP reprocessing plant at Sellafield. It should instead get on with the job it was originally thought of for which is to focus “squarely on [dealing with] the nuclear legacy”¹⁰, not on generating new nuclear waste which will exacerbate current problems.

(2) The Passively Safe Principle.

Definition: Radioactive material in existing waste should be immobilized in a stable chemical and physical form utilizing Best Available Technology (BAT), so that the need for maintenance and human intervention is minimized. Waste stores should be monitored and waste should be capable of being retrieved from storage for further remedial action or repackaging if necessary.¹¹

Example of current policy failure: RWMAC says 88% of Intermediate Level Waste (ILW) is stored in a potentially dangerous condition - some in 40-50 year old buildings.¹² ILW remained largely untreated prior to 1997 because it was thought best to delay treatment and packaging in case

⁹ From DEFRA (2000) Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites: Consultation Paper.

¹⁰ DTI (July 2002) Managing the Nuclear Legacy: A Strategy for Action, para 1.12

¹¹ See for example: HSE Nuclear Safety Directorate (13/03/01) Guidance for Inspectors on the Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites. Appendix 4.

¹² RWMAC & NuSAC (June 2002) Current arrangements and requirements for the conditioning, packaging and storage of Intermediate Level Radioactive Waste.

a particular form of treatment proved incompatible with the characteristics of a future underground dump.¹³ Although a dump is unlikely to happen (if ever) within decades, ILW continues to be stored in hazardous conditions.

(3) The Reversibility Principle.

Definition: Allied to the passively safe principle is the principle that any waste management technique needs to be reversible. Given the uncertain state of scientific knowledge of the way radionuclides behave in the environment and their impact on the health of humans and other biota, it is important to be able to retrieve radioactive waste to take account of any unexpected changes in conditions and prevent detrimental impacts on the environment.

Example of current policy failure: Plutonium discharged to the Irish Sea from Sellafield was expected to remain bound to sediments mainly within the Irish Sea region. However, recent studies have shown that this plutonium is potentially more bioavailable than hitherto believed.¹⁴ Plutonium is now being found on the Eastern Scottish and Norwegian coasts.¹⁵

(4) The Concentrate and Contain Principle

Definition: Where possible gaseous and liquid radioactivity should be trapped instead of being discharged from a nuclear facility, and then concentrated, immobilised, and stored as a solid waste. This is far preferable to releasing gaseous or liquid radioactive wastes into the environment – the so-called dilute and disperse approach. If possible, advantage should be taken of radioactive decay to reduce levels of radioactivity by keeping wastes in storage as an alternative to increasing or continuing discharges.

Example of current policy failure: Draft Guidance to the Environment Agency (EA)¹⁶ says “*the unnecessary introduction of radioactivity into the environment is undesirable, even at levels where the doses to both humans and non-human species are low, and on the basis of current knowledge are unlikely to cause harm*”. However, the UK Strategy for Radioactive Discharges 2001-2020 accepts that some discharges may increase as a consequence of decommissioning. At Springfields Nuclear Fuel Fabrication Plant, BNFL is planning to ‘decontaminate’ some equipment, and scrap metal¹⁷ leading to totally unnecessary increases in discharges. Decommissioning should not automatically lead to, or be used as an excuse, to increase radioactive discharges into the environment.

(5) The Hazard Prioritisation Principle.

¹³ Environment Agency Guidance on the Conditioning of Intermediate Level Waste

¹⁴ SNIFFER (August 2003) “Studies on the solid speciation and remobilisation of plutonium in northern Irish Sea waters” AIR(99)01 <http://www.sniffer.org.uk/>

¹⁵ New Scientist 27th February 1999. By Rob Edwards; Sellafield waste poisoning the east coast, says study. Sunday Herald 4th April 1999. By Rob Edwards; Now you see it... It's official: some of Sellafield's plutonium is missing. New Scientist 24 April 1999. By Rob Edwards

¹⁶ DEFRA (2000) Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites: Consultation Paper. The Scottish Executive has yet to publish a similar draft document for the Scottish Environment Protection Agency.

¹⁷ BNFL submission to the Environment Agency's Review of Springfields Radioactive Discharge Authorisations. Sect.

Definition: The magnitude of the radioactive hazard should influence the timing of the implementation of passive storage and immobilisation. High Level Waste (HLW) in a liquid form represents one of the most significant radioactive waste hazards in the UK (if not the most hazardous) and should be placed in a passively safe state as soon as possible.¹⁸

Example of current policy failure: Solidifying the liquid, heat-generating HLW at Sellafield and Dounreay is the most urgent step required to reduce the hazard of existing waste. Extremely dangerous liquid HLW must be constantly cooled. If just 50% of the HLW stored in tanks at Sellafield were to escape due to an accident or malicious act, the radioactive plume could be equal to 44 Chernobyls in terms of radioactive release.¹⁹ The Nuclear Installations Inspectorate (NII) has ordered BNFL to reduce stocks to a buffer level by 2015.²⁰ This timetable is too lengthy, as is the UKAEA's plan to deal with Dounreay's HLW around 2010.^{21, 22}

(6) Sustainable Development and Intergenerational Equity

Definition: Development which meets the needs of the present without compromising the ability of future generations to meet their own needs and that of environmental protection.²³

Example of current policy failure: Nirex's sustainability principles²⁴ say that we should seek to minimise the further burdens imposed on this, and future generations for the management of radioactive waste. Our scientific understanding is not sufficiently advanced to be able to predict the impact of underground nuclear waste dumping on human health or the environment. The concept relies on diluting and dispersing waste in groundwater, rivers and the sea – it is not nuclear waste containment. It would be more responsible to bequeath future generations a well-managed, monitorable retrievable waste store than a waste dump from which radioactive materials will eventually return to the surface. A nuclear waste dump with all its potential problems is, therefore, not a way to protect future generations from problems arising with radioactive wastes. The most sensible way to reduce further burdens on present and future generations would be to stop creating more nuclear waste now by closing existing facilities as soon as possible.

(7) The Polluter Pays Principle

Definition: Nuclear operators producing waste should pay for its management. Because much of the waste doesn't arise until after the facility has closed and stopped producing an income and because of the longevity of the wastes created during operations (e.g. spent nuclear fuel), operators need to accumulate adequate funds, in a segregated account, over the lifetime of the facility for long term management. Private sector problems should not become public sector problems - taxpayers should not be expected to shoulder the ever-increasing financial burden of wastes from the private nuclear sector. Similarly, Government owned entities should not assume that the taxpayer should continue to fund the management of their ever-increasing waste stockpiles.

¹⁸ HSE Nuclear Safety Directorate (13/03/01) Guidance for Inspectors on the Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites. Appendix 4.

¹⁹ European Parliament, Scientific and Technological Options Assessment (November 2001) Possible Toxic Effects from the Nuclear Reprocessing Plants at Sellafield (UK) and Cap de La Hague (France). Para 5.5

²⁰ HSE (Feb 2001) Progress on BNFL's Response to Three Reports issued by HSE on 18th February 2000.

²¹ RWMAC (September 2001) Advice to Ministers on the Restoration of the UKAEA Dounreay Site.

²² RWMAC (December 2003) 23rd Annual Report.

²³ See http://www.sustainable-development.gov.uk/what_is_sd/what_is_sd.htm

²⁴ Nirex (December 2000) Managing Radioactive Waste.

Example of current policy failure: BE's segregated fund proved insufficient to fund its liabilities. The Government is taking financial responsibility for around £3.3bn of its waste management & decommissioning costs. The Energy Bill, currently passing through Parliament, would be an ideal opportunity to ensure the taxpayer doesn't end up paying for similar liabilities in future. Unfortunately the Government is refusing to do this. The provisions in the Bill to allow the BE rescue are written generally so if "... a private sector operator cannot meet its nuclear obligations [the Government] retain[s] the possibility of ... meeting such costs."²⁵ Further, the Government has also said that other private nuclear operators may need to be bailed out for their liabilities and decommissioning and has provided for this in the Energy Bill.

(8) The Precautionary Principle

Definition: Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.²⁶

Example of Current Policy Failure: Uncertainties in estimates of radiation doses and the risks associated mean a precautionary approach to discharging radioactivity into the environment should be followed. The Draft Guidance on Radioactive Discharges to the EA says:-

"The principle of 'progressive reduction' is a central tenet of the way in which radioactive discharges should be controlled. It takes primacy over other considerations, apart from safety ..."

Yet the EA's proposed authorisations for Sellafield will allow BNFL to increase discharges, compared with 1998, (apart from Technetium-99), so that BNFL can increase the throughput of its two reprocessing plants until around 2010.²⁷

(9) The Proximity Principle

Definition: Radioactive waste should, as far as is compatible with the safety of the management of such material, be managed in the State in which it was generated. There should be no international trade in waste. Within States waste should be managed as close as possible to where it is produced to avoid unnecessary transports.²⁸ This, however, should not be taken to condone the Government's policy of substitution.

Example of current policy failure: The Environment Agency's (EA) policy is that waste with an authorised disposal route should be disposed of as soon as possible.²⁹ Yet the 1995 policy³⁰ says waste should be "*disposed of at appropriate times and in appropriate ways ... in a manner that*

²⁵ Lord Whitty, House of Lords, 15th January (Column GC170)

²⁶ Nearly 180 countries met at the 'Earth Summit' in 1992 (UN Conference on Environment and Development) in Rio de Janeiro to discuss how to achieve sustainable development. The Summit agreed the [Rio Declaration on Environment and Development](http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm) (<http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>)

²⁷ See for example Figure 7 in Appendix 1 of the UK strategy for radioactive discharges.

²⁸ See Article 130R(2) of the Single European Act

²⁹ Environment Agency (September 2002) Decommissioning Of Nuclear Installations: The Environment Agency's Role And Objectives.

³⁰ HMSO (July 1995) Review of Radioactive Waste Management Policy Final Conclusions.

commands public confidence”, and the Government’s proposed decommissioning policy accepts that waste may need to be stored until long-term solutions are available.³¹

This EA policy, which is also being applied by the Scottish Environment Protection Agency (SEPA) and the Nuclear Installations Inspectorate (NII), is leading to, for example, the unnecessary transfer of low-level waste from Dounreay to Drigg in Cumbria. This may well set an unhealthy precedent for the future management of intermediate and high-level waste on the Dounreay site.³²

(10) The non-proliferation principle

Definition: All plutonium and highly enriched uranium stocks should be declared wastes and all necessary steps should be taken to prevent their use in, or availability for use, in nuclear weapons. These wastes should be immobilised in waste forms that would make their recovery for use in weapons virtually impossible. This should take into account not just diversion to nuclear weapons programmes by government, but also the threat of terrorism. Real security cannot be achieved by armed guards, but requires removal of the threat by ending the further separation of plutonium and the production of enriched uranium.

Example of current policy failure: BNFL has contracts to supply plutonium (MOX) fuel to utilities in Germany, Switzerland and Sweden, and is seeking contracts with Japanese utilities. This will involve transporting weapons-useable plutonium over long distances. Plutonium can be separated from MOX relatively easily.³³ BNFL is researching various plutonium immobilisation technologies, but this work may stop when the NDA is established. Work on immobilising all stocks of civil and military plutonium should be one of the priorities of the NDA when it is established.

(11) International Best Practice.

Definition: The most effective processes (including clean technology) and long-term containment of existing nuclear waste should be used to prevent radioactive pollution of the environment. This should not be about end-of-pipe solutions, but should investigate whether the industry is using the right products and processes in the first place. Decisions on waste management should be based on an assessment of alternative options and should involve the public in their evaluation – this cannot be left to scientists and regulators alone.³⁴

Example of current policy failure: *The UK Government has failed to look at clean technology (for example dry storage) for spent fuel management as an alternative to reprocessing. Over its remaining life the throughput of the Sellafield Thermal Oxide Reprocessing Plant (THORP) will be dominated by reprocessing spent fuel from BE’s reactors. This fuel can readily be dry stored – it does not have to be reprocessed. BE has previously called for an end to its reprocessing*

³¹ DTI et al (November 2003) A Public Consultation on Modernising the Policy for Decommissioning the UK’s Nuclear Facilities.

³² RWMAC (2003) para 6.14

³³ US DoE Office of Arms Control and Non-proliferation (January 1997) Non-proliferation and Arms Control Assessment of Weapons-Useable Fissile Material Storage and Excess Plutonium Disposition Alternatives. P84

³⁴ RCEP (1998) The Twenty First Report, Setting Environmental Standards.
(<http://www.rcep.org.uk/studies/standards/s-chap9.htm#top>),

contracts³⁵, but the Government has chosen instead to subsidise BE's contracts with BNFL, thus allowing for continued reprocessing.³⁶

³⁵ Nucleonics Week (2001) BE Blames Reprocessing Charges for Higher UK Operating Costs. Vol. 42 No. 46. 15th November.

³⁶ See for example "Taxpayers pick up reprocessing bill in £2 billion British Energy bail-out" ENDS Report December 2002