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Prospects for Nuclear Waste Clean Up: Is Consensus Achievable?

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An industry in retreat

The nuclear industry is in a period of transition as it shifts from its historic commitment to military weapons and nuclear energy to the rear-end problems of clean up, decommissioning and the long term management of radioactive waste. As political attention is focused on these issues the future of the industry becomes dependent on the 'nuclear oases', those places where rear-end processes of reprocessing and waste management are located. Political solutions to the problems of clean up are not simply technical but involve social considerations which must also be addressed.

The social dimensions of radioactive waste management revolve around conceptions of risk. There are several issues here. One is the problem of uncertainty and its relationship to risk assessment. Another is the difficulty of assessing the risks of different management options involving as it does probabilistic and subjective criteria. Another is the variation of risks over time and between places. There are also issues of institutional survival and financial risks that must be considered in any long term proposals for managing wastes. The problem of risk is at the heart of the industry's major problem – the identification of acceptable options and of acceptable sites where radioactive wastes can be managed. The political obstacles that have been everywhere encountered by the industry in its search for solutions demonstrate the fundamental difficulty in solving this problem.

This paper provides a brief review of past attempts to find solutions to the problem of clean up in a number of western countries. From this analysis it is possible to draw out the reasons for the current impasse and to suggest ways forward for the future.



THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES

An industry in conflict

As each nuclear country has turned towards the problem of clean up and waste management it has encountered political resistance usually resulting in the deferral or withdrawal of plans. In almost every case a political re-evaluation has been necessary focusing on the political imperative of achieving both broad public acceptability and the commitment of potential host communities.

In some areas of waste management a broad consensus on the approach has been achieved. In most countries there are purpose built facilities for the management of low level wastes (LLW). In some countries there is the problem of historic wastes from earlier phases of the industry which create serious problems of contamination that must be dealt with urgently. And most countries are also turning their attention to the problem of decommissioning redundant facilities.

Controversy focuses mainly on the problems of managing longer-lived highly radioactive intermediate level wastes (ILW) and spent nuclear fuel and, in the case of those countries with reprocessing, managing vitrified high level wastes (HLW) and excess plutonium stocks. Three groups of countries can be conveniently identified in terms of the progress being made towards politically acceptable solutions. The first group includes those which are developing policies for managing their own wastes (examples here are Sweden, Finland, Spain and Canada). A second group includes those, like Germany and Switzerland (and those East European countries whose nuclear cycles were formerly linked to the Soviet Union), which have used foreign reprocessing and where future management options are more uncertain. Thirdly, there are those countries with a military as well as a civil nuclear cycle which have extensive problems of clean-up and waste management resulting from reprocessing in the past (the United States) or where reprocessing still continues (France and the UK). In all countries plans are meeting with opposition and the future management options remain uncertain. The problems encountered in various countries are discussed briefly in the next section. From this survey some general conclusions are possible which suggest possible ways of achieving consensus on the future management of nuclear wastes.

Political prospects for clean up

Countries managing their own wastes

This group includes those countries which are pursuing policies of managing within their own territory the spent fuel derived from their civil nuclear industries. *Sweden's* 12 reactors producing 10,000 megawatts (MW) deliver around 46% of the country's electricity. Despite this high dependence and the apparent lack of alternative sources to bridge the gap, Sweden remains committed to the eventual phasing out of nuclear power. In terms of volumes of radioactive waste, therefore, the problem is defined, at least for the time being. Sweden has embarked on a comprehensive programme for managing its wastes with LLW and some ILW disposed of in the Forsmark repository beneath the Baltic and spent fuel stored at the intermediate storage facility, Central Interim Storage Facility (CLAB), at Oskarshamn with a life of up to 50 years. For HLW, deep disposal is favoured requiring the identification of sites and characterisation of the most promising candidates. *Detailed public scrutiny is encouraged throughout the process and the proposed host municipality will receive financial incentives and have a right of veto (which may be overridden in the national interest).* Despite this, a successful outcome is by no means certain given the strong anti-nuclear movement in Sweden.

Similarly, *Finland*, with around 30% of its electricity from nuclear power, is following a policy of self-sufficiency having ceased the export of spent fuel for reprocessing in Russia from its Loviisa plant. LLW and ILW will be disposed of at the two reactor sites, Loviisa and Olkiluoto and a site selection process for a deep repository for spent fuel is under way at three sites. *Here, too, the provision of incentives together with the right of veto* is intended as the means to ensure public acceptability for the

eventual site selected. Opposition is likely to slow down the process with no certainty of a successful outcome.

It may be that, 'A pragmatic step-by-step approach, practical organisation and open discussion have enabled Sweden and Finland to take positive steps towards solving their radioactive waste disposal problems' (Radioactive Waste Management Advisory Committee - RWMAC - 1996, p. 24). On the other hand, opposition is well organised and likely, at the very least, to slow down the process.

Spain produces around 7,000MW of nuclear electricity, a third of the total generated, from nine plants. It should be noted that Spain has considerable clean up problems arising from uranium mining and from decommissioning of the Vandalos 1 reactor which was shut down after a fire in the turbine hall. In the early days, some spent fuel was sent for reprocessing to France and there were plans for a substantial Spanish reprocessing capability which were subsequently abandoned. LLW and short-lived ILW is disposed of in a repository at El Cabril near Cordoba while spent fuel is currently managed at each power plant. Spain is approaching the problem of the long-term management of spent fuel with caution, adopting the French approach of legislative direction and a measured site selection process aimed at drawing in the various interests in a *participatory search for volunteer communities attracted by compensatory measures and a right of veto*. Having embarked on the process relatively late Spain may hope to learn from experience elsewhere. However, opposition, which secured the cancellation of plants during the 1980s, is likely to re-engage in demanding a phase-out of nuclear power and long-term surface storage.

In *Canada* there has been considerable effort to elaborate the processes necessary to secure sites for the disposal of radioactive wastes with *an emphasis on the volunteer principle*. Efforts by the Siting Task Force to relocate historic LLW and contaminated soil from the Port Hope district on Lake Ontario appeared to have succeeded when the community of Deep River volunteered to take the wastes. Deep River is the community next to the Chalk River nuclear research complex on the Ottawa River where a repository to dispose of the wastes was to be constructed. As part of the agreement Deep River required that employment at Chalk River be sustained at its 1995 level until 2010, a commitment that the Federal Government was not prepared to undertake. This example suggests that, *even when volunteers are found, the compensation demanded may be too high a price to pay*. Apart from this abortive exercise Canada's efforts to discover a successful process for securing sites for its wastes have, so far, yielded little practical outcome.

In these four countries the problem is, relatively speaking, straightforward. They are committed to a deep disposal solution, based on careful site selection using the volunteer principle backed by compensation and veto. *Nevertheless, in each country there is well-organised opposition able to mobilise support determined to frustrate the process in order to achieve the wider objective of ensuring the phase-out of nuclear energy*. And, even where local support can be found, the terms of compensation may prove an obstacle to progress.

Countries dependent on overseas reprocessing.

The examples discussed here are Switzerland and Germany though it should be noted that Japan, the world's third largest producer of nuclear energy, is also included in this group. These are countries which have exported substantial quantities of spent fuel for reprocessing to France and the UK and which, while developing interim facilities, have not proceeded far in the process of finding a solution for the long-term management of high level wastes. In consequence, they are countries where conflict over nuclear waste has become a significant national political issue. Countries in the former Soviet bloc such as the Czech and Slovak Republics were required to send spent fuel to the Soviet Union for reprocessing. Given the different political circumstances of this dependent relationship these countries are not considered here.

Switzerland is a small producer with around 3.000MW from four plants although nuclear electricity accounts for around 40% of total supply. At present nuclear waste arisings are held overseas or at the power plants with non-nuclear wastes at a central store - Bunderszwischenlager (BZL). A facility for the central interim storage of all wastes (known as ZWILAG and incorporating BZL) has been constructed in the north of the country near Zurich. Thus, in principle, Switzerland has the capability of managing its wastes while it searches for a permanent solution.

In a country highly dependent on foreign sources of energy (83%) domestic production of nuclear power is important. Despite this, a referendum in 1990 approved a moratorium on the further development of nuclear power. Swiss policy, under Energy 2000, is based on conservation, stabilisation of fossil fuel consumption and modest increases in hydro and nuclear energy from existing sources. Nuclear energy has proved a sensitive political issue with both pro and anti nuclear interests able to exploit the participatory democracy based on referendum. A proposal to construct a repository for low and intermediate wastes identified four sites before selecting Wellenberg as the preferred location. This is in a relatively remote and disadvantaged community which stands to benefit from the generous financial package on offer. *Although the local community supported the proposal, a cantonal referendum voted narrowly against.* Further efforts are being made including assurances about retrievability and emphasising benefits but the future of this site remains, for the time being, uncertain.

As for spent fuel and vitrified wastes returning from overseas, Switzerland is in the early stages of decision making. Given its alpine location much of the country must be ruled out on geological grounds leaving a relatively small area that is suitable for investigation. However, *there are fears 'that a suitable disposal site in Switzerland for HLW may simply not exist'* (RWMAC, 1998, p.43). If that is the case, self-sufficiency will prove impossible and Switzerland will have to seek an international solution for its waste problem.

Switzerland faces two difficulties. One is the potential lack of suitable locations for a permanent repository; the other is a political system which is based on the need to secure consensus where local and especially cantonal interests can be powerful obstacles to federal policies. Given a well organised anti-nuclear movement the vigorous and open attempts by the nuclear industry to secure solutions may prove still born.

Germany has experienced the most sustained conflict over nuclear waste in recent years (Blowers and Lowry, 1997). In earlier years opposition was directed at nuclear weapon deployment and at nuclear power. Opposition to reprocessing, which was an integral part of the German nuclear fuel cycle, resulted in the cancellation of plans for an Integrated Waste Management Concept at Gorleben in Lower Saxony followed by a similar defeat at Wackersdorf in Bavaria. Attention has since focused on plans for nuclear waste management especially those for interim storage of HLW and spent fuel and possible future disposal at Gorleben and for LLW/ILW at Konrad also in Lower Saxony. Although the Atomic Law has been amended to legalise the direct disposal of spent fuel there are substantial quantities of vitrified waste and other arisings from reprocessing operations in France and the UK which must be repatriated under return-to-sender clauses.

Although Germany ranks fourth in world capacity for nuclear power (22,000MW) producing around 30% of the country's electricity, proposals for dealing with the management of its wastes have been consistently delayed or blocked. The reunified Germany inherited a LLW disposal facility at Morsleben near the border between the two Germanies which, declared unsatisfactory, was closed in 1991 but subsequently reopened until 2000 though halted again in 1998. The abandoned iron ore mine at Konrad destined to be the national LLW/ILW repository has been the subject of legal challenge by the state government of Lower Saxony and actions by environmental groups and has not yet been licensed.

Gorleben was selected as the potential site for a deep repository for HLW in a salt dome. The lack of options for comparison together with doubts about the feasibility of the site have proved powerful weapons for an opposition which, with the election of a new federal government in 1998, has succeeded in challenging the policy. A wider search for a co-disposal site for ILW/HLW is now in prospect. But, Gorleben (and to a lesser extent Ahaus) has also been a centre of resistance to the opening of its interim HLW/spent fuel store. Major demonstrations attempting to block the transport of spent fuel from German power stations resulted in massive deployments of police and border troops. Although wastes have reached the store there remain doubts 'that a full programme of waste return could be implemented' (Sadnicki, et. al, 1999, p.33). The problem also affects the repatriation of wastes from France, which have begun, and from the UK, which are imminent.

At the present time Germany effectively has no agreed facilities for the permanent management of its nuclear wastes. The uncertainty has been exacerbated by an incoming SPD/Green government which is equivocal as to the future of the industry. Among the issues needing resolution are: the timing of any phase-out of nuclear power; the future of reprocessing contracts; and the policies for both the interim and long-term management of nuclear wastes. Attempts at consensus have, so far, failed. The anti-nuclear movement has proved capable of building broadly based coalitions linking local, national and international interests in its efforts to prevent waste shipments as part of a campaign to end nuclear power. Moreover, the persistent uncertainty over nuclear waste in Germany has international ramifications, most notably over the trade in nuclear materials with France and the UK.

Countries with civil reprocessing and military nuclear cycles

Three states, France, the UK and the USA, are considered here. Russia, which also has a closed cycle including civil and military reprocessing is also included in this group but its very different political context precludes its examination here. Although the three countries have similar nuclear cycles, the following brief accounts indicate the political contrasts between them.

France is second after the USA in installed nuclear capacity (60,000MW) from 54 reactors which produces around three-quarters of the country's electricity as well as a surplus of 20% for export. The French nuclear industry is comprehensive, large (employing 120,000) and purposive. France has a complete fuel cycle including reprocessing at Marcoule (including for military purposes) in the South and at La Hague near Cherbourg in the North. Although there was considerable resistance in the earlier years of development, the contemporary industry has secured widespread, if not enthusiastic, support among the population at large. Yet, even in this bastion, the future management of nuclear waste is emerging as a potentially controversial issue.

France, in a typically organised fashion, has identified a policy and the means of implementation for its policy on radioactive waste. LLW and short-lived ILW is disposed of in surface repositories, formerly at Centre de la Manche adjoining the reprocessing site at la Hague (1969-94) and subsequently at Centre de l'Aube near Troyes (since 1992). This site has achieved local acceptability as a result of 'the employment it brings and as a result of the conscious effort to secure good community relationships through liaison, economic 'spin-offs' and social and community benefits' (RWMAC, 1994, p.5).

Site selection for HLW proved less successful. During the 1980s four sites in different rock formations were identified as possible locations for a deep repository but, in each case, met with opposition leading to the abandonment of the proposals in 1990. This led to a more measured approach backed by legislation in 1991 which inaugurated three parallel research programmes (into partitioning and transmutation, into deep disposal and into long-term storage) which would be evaluated in order to make a decision on a preferred approach in 2006. *The deep disposal option is based on the volunteer principle, backed by processes of community involvement, substantial financial payments and other*

incentives and the consent of representatives at communal, departmental and regional levels. In applying the criteria the list of potential candidates has been gradually reduced with only one option so far going forward for the construction of a laboratory. The site, in Eastern France, is predictably in a relatively remote and disadvantaged area but opposition is developing both local and more widely based. A further site remains to be identified and, given the opposition likely to be aroused, the deadline of 2006 already looks unlikely to be met.

Although France has, in recent decades, escaped the deep controversies over nuclear issues which have beset other countries, even here there is no certainty that a carefully contrived package designed to ameliorate opposition and to gain public acceptability will succeed in securing a long-term solution to the problem. The French commitment to nuclear energy remains strong but it may still prove difficult to achieve a consensus over radioactive waste without further concessions to a hitherto dormant but potentially forceful opposition.

The *United Kingdom* has experienced considerable political difficulties with its attempts to develop a strategy for the management of nuclear wastes. Although a much smaller producer of nuclear energy than France (with around 13,000MW) the UK's early start and commitment to Magnox power systems has resulted in large volumes of lifetime spent fuel accumulations amounting to an estimated 16.6% of the world total in 1995 (compared to US, 18.3%, Canada, 15.4% and France, 14.9%). The UK's reprocessing facilities (civil and nuclear) are mainly located at Sellafield in North West England though Dounreay in northern Scotland has reprocessing (now closed) associated with its experimental reactors. At both Sellafield and Dounreay there is a need to manage historic wastes and Dounreay, in particular, has problems of dealing with wastes that were disposed of in a shaft and with particles that are being washed ashore from a yet undetermined source (RWMAC, 1999). However, at Dounreay, with production having ceased (possibly for good) the situation is clearer in that it will become predominantly a site focusing on the clean up of wastes and the eventual decommissioning of the plant.

LLW is disposed of in a shallow facility at Drigg near Sellafield which has been fully upgraded. An initial attempt to find suitable sites for exploratory drilling for HLW disposal were aborted in the early 1980s following stiff resistance from local communities. Subsequently, opposition to the dumping at sea of nuclear wastes narrowed the policy options down to the search for sites for LLW and ILW disposal on land. Efforts to secure a deep disposal site for the disposal of long-lived ILW at Billingham in North East England were frustrated in the 1980s. Similarly, the identification of four potential candidates in Eastern England for shallow burial of short lived ILW and LLW were vigorously opposed and the plans were dropped in 1987. This led to the selection of Sellafield as the politically most promising site for ILW disposal and proposals for a laboratory to enable full characterisation of the site. At the subsequent public inquiry, the lack of scientific consensus on the potential safety case for the site and opposition to the process of site selection led to refusal of permission both on technical grounds and the failure 'to select the site in an objective and methodical manner' (Decision Letter, 17 March, 1997). This resulted in the UK having no plans or proposals for the long-term management of its ILW and HLW.

Radioactive waste policy is now under review in the UK with the House of Lords Select Committee affirming a policy of deep disposal but also arguing the need for 'widespread public consultation before a policy is settled' and the 'further need to secure local acceptance of a recognised national need' (House of Lords, 1999, p.7). *The need for open and transparent policy making is now stressed by all sides in the debate.* But, radioactive waste has become enmeshed in the politicisation of reprocessing in the UK. Opposition to the continued operation of THORP which reprocesses foreign as well as some UK wastes has focused attention on Sellafield and the trade in nuclear wastes. The substantial waste arisings accumulating at Sellafield can be managed on site in the short term but the longer term management options are uncertain. *Anti-nuclear groups argue for the phasing out of the nuclear industry combined with a commitment to long-term storage while the industry's preference is to*

achieve the deep disposal option. Site selection for either option is likely to prove a difficult and lengthy process. While the UK remains a long way from defining its policy it has the potential advantage of learning from past mistakes and building on the experience of other countries.

The *United States* is the world's largest producer of nuclear energy which supplies a little over a fifth of the country's total. It also has a massive military nuclear complex. Unlike France and the UK, the US has kept the military and civil nuclear streams separate. Military sites are scattered across the country. With the ending of the Cold War production at these sites has virtually ceased and the emphasis has switched to the clean-up of contamination and the decommissioning of facilities. Clean-up is a major operation on the major sites such as Savannah River (South Carolina) and Hanford (Washington state) where a major project has been launched to remediate leaking tanks of HLW, a legacy of the post-war years. Reprocessing at these sites has ceased and decommissioning of the reactors and other plants has begun.

The US abandoned civil reprocessing in the 1970s and clean-up of the facility at West Valley (New York state) is continuing. Since the 1970s no new commercial power plants have been ordered and several plants are now being decommissioned. Meanwhile, a number of LLW disposal sites have been closed leaving only two operating (Hanford in the North West and Barnwell in South Carolina). Spent fuel has remained stored at the power stations. During the 1980s detailed legislation was passed to ensure a process of site selection for repositories for LLW and spent fuel. In the case of LLW interstate compacts were set up with *the aim of finding volunteer states and host sites for LLW repositories.* *A combination of procrastination and opposition has frustrated the search* and so far no new sites have been finally agreed.

The search for a HLW site has been highly controversial. The legislation envisaged a selection from candidate sites but eventually by legislative amendment only one, Yucca Mountain in Nevada, was put forward. Although considerable effort has been vested in site characterisation, progress has been delayed as a result of scientific uncertainty and political controversy. Efforts to find an interim storage site have also encountered political obstacles. However, the US has managed to construct and open a deep repository (the Waste Isolation Pilot Project, WIPP) at Carlsbad in the salt formations of south east New Mexico. This, too, was severely delayed and its role is limited to the disposal of transuranic wastes from military sites.

The United States has made some progress towards cleaning up contaminated military sites though this will require substantial expenditures and sustained commitment over many years. In the case of radioactive waste management, carefully constructed legislation has been prey to political opposition and vulnerable to the problem of seeking compromise and consent at federal level and among the states and local communities involved. As a consequence milestones have been set but routinely missed and uncertainty prevails. *Along with France and the UK, the US has yet to demonstrate that a long-term solution can achieve both scientific and social consensus.*

Prospects for Clean-up

From all the countries surveyed a common theme emerges in relation to the prospects for clean-up and management of radioactive wastes. That is, the process is liable to frustration, to delay, to the abandonment of plans and subsequent review. In the UK specific policy objectives, confidently asserted, have been, one by one, abandoned until there are no options left. In the US and France legislative intent is no guarantee of policy outcome. In Germany uncertainty and confusion prevail. Elsewhere, in countries like Sweden and Finland which have adopted a measured stage by stage process and concern to seek social consensus, progress has been slow and the locations for final disposal of HLW have yet to be found. *In short, no country has in place a long-term solution for radioactive waste.*

Despite this, some progress is being made. In the US and UK there is commitment to the clean-up of contaminated sites and the remediation and management of historic wastes. Most countries have disposal facilities for LLW and have begun the process of decommissioning redundant plant and buildings. *But, in all countries, the key problem, the management of long lived, highly radioactive ILW and HLW and spent fuel remains unresolved.*

There are technical, political and social reasons for the lack of consensus over future policy. At the technical level it cannot be concluded that deep geological disposal is the agreed solution for the near future. Although every country still professes disposal as its preferred policy objective, in every case an array of scientific problems are encountered which render a safety case difficult to sustain under scrutiny. Scientific dispute concerns hydrogeological conditions (groundwater flows), geology (faulting, seismic activity) and the behaviour of radionuclides. Predictions of risk to the future environment from natural occurrences are based on probabilities which take on a more subjective character beyond, say, 10,000 years. Risks arising from human action are difficult to predict even beyond a generation. In conditions of such uncertainty **it must be concluded that a scientific consensus does not exist sufficient for a repository solution to proceed at the present time.**

There is also a lack of political consensus. In every country the nuclear industry is beset by anti-nuclear movements able to construct powerful coalitions combining local opposition to specific sites with national and even international antagonism to nuclear energy. At the same time, the nuclear industry has become more defensive, weakened by the reduction in its military role and the loss of its commercial market in energy. The weakening of the case for reprocessing and the development of experimental technologies such as breeder reactors have compounded the loss of confidence. Sensing its opportunity, the anti-nuclear movement has focused on controversial policies for radioactive waste management as a key element in its strategy to secure the phase-out of nuclear power. **So long as production continues it is likely to prove more difficult to achieve a political consensus over the ways of dealing with the radioactive waste problem.**

Given the lack of scientific and political consensus, it is not surprising that there is also a lack of what may be termed social consensus on the prospects for clean-up. While there may be a general, if vague, awareness of the issue, it cannot be said there is widespread understanding of the nature of the problem, the risks it produces or the validity of the options for dealing with it. The anti-nuclear opposition has been able to exploit this prevailing ignorance by arousing anxieties among people. The nuclear industry has contributed to the unease by its reputation for secrecy and cover up of accidental releases which have fostered a lack of trust in its exaggerated claims for safety. In addition there are concerns that the solutions being proposed to deal with radioactive wastes are inequitable, impacting either on specific communities or on future generations unable to protect their interests. In terms of public acceptability there has been precious little effort so far to build the understanding, trust and confidence that are the essential components for a social consensus on clean-up.

Is Consensus Achievable?

A way forward out of this policy impasse can only be perceived and pursued if the technical, political and social aspects of the problem of clean-up are recognised and confronted. A necessary condition is that clean-up and radioactive waste management must be identified as a *process*. It is a process that involves scientific expertise, political agreement and social acceptability developing over time. Conceived in this way it may be possible to avoid the premature legitimisation of solutions which has thwarted the development of a consistent policy so far. It is necessary to envisage a process which has at its core the need to construct consensus on the management and future clean-up of wastes.

A process based on consensus will need to be informed by a set of principles which reflect the technical, political and social components of the problem. These principles are drawn from a report prepared by the Radioactive Waste management Advisory Committee (RWMAC, 1999).

Two principles are necessary if technical consensus is to be achieved.

First, **adequate time must be allowed for the resolution of scientific issues**. In the past, partly under political pressure but also in the belief that technical solutions were available, proposals have been put forward only for the technical case to founder under examination (as, for example, in the case of the proposed Nirex laboratory at Sellafield). The development of a robust scientific case requires a consensual process, stage by stage, consolidated as it proceeds. Thus the case for early disposal of HLW and spent fuel has to be established, not asserted. If it is accepted, then options need to be evaluated taking account of the range of issues (volumes, geological, hydrogeological etc) at various potential sites. It has to be recognised that the process is iterative, that any scientific consensus must be provisional and related to the prevailing state of knowledge.

The second principle is a **commitment to rigorous, independent and participatory review**. This indicates a need to expose the limitation of risk assessment especially when applied to the far future. There is a need for disinterested peer review that is transparent and opened up to participation by a wider body of informed opinion, including social and ethical perspectives. In this way the scientific and technical case for a particular policy will be seen to be both credible and authoritative.

Political consensus requires the adoption of two further principles.

A third principle is to ensure **the early involvement of all those potentially affected by proposals**. Greater confidence in the process is more likely to be secured by informing people and giving them a stake in decision making. At an early stage a wider public will need to be informed about the generic issues and, as proposals become more specific and especially when they focus on particular locations, those affected need to become involved. This may not avoid opposition but it will provide time for explanation and negotiation at the formative stage. Past attempts based on the Decide-Announce-Defend approach unravelled once opposition was aroused.

Early involvement should be combined with a fourth principle, that of **openness and transparency** which should pervade the whole policy making process. Openness has become a mantra but this does not signify its universal acceptance. Openness is vital if the residual cultural inertia of secrecy and parsimonious release of information is to be overcome. It is an essential precondition for establishing trust as the basis for a broader social consensus.

The construction of a sufficient social consensus implies 'the achievement of a sufficient concurrence of view at various stages to legitimise a decision to proceed with a particular course of action' (ibid., para. 3.4). A social consensus embraces the four principles discussed so far with the addition of a further two.

One of these, a fifth principle, is the **development of a deliberative, accessible process of decision making**. There is a need to create a dialogue between the scientific community and the wider public in which each contributes to the process. An effort is necessary to achieve intelligible communication recognising that understanding is the prelude to public acceptability. There are a variety of dialogue management techniques (surveys, hearings, consultative processes, consensus conferences and so on) which can be used to gain appreciation of both generic issues and to facilitate specific and localised decision making.

No policy is likely to achieve acceptability unless it is seen to be fair. The need to ensure **equity** provides the final principle on which the development of consensus rests. In the past, proposals for specific sites for radioactive waste management have usually resorted to communities near existing nuclear sites or to areas of economic disadvantage. These are peripheral locations that are economically marginal, politically powerless, remote and often contaminated. However, as the search

for sites becomes more difficult these communities are better able to exercise leverage over the industry as it seeks suitable volunteers. The volunteer principle is only likely to prove successful if appropriate compensation and participation in decision making (probably including the right of veto) are built into the process. The management of radioactive waste at specific locations should not be based on exploiting disadvantaged communities but rather on fully recognising the rights of communities to participate and to be compensated for accepting the responsibility for risks created by society as a whole.

Ways of dealing with the most persistent and dangerous wastes have yet to be agreed. The lessons from past failures to secure acceptable solutions suggest that a new approach is needed. Such an approach must be based on a process of forming a social consensus. *Radioactive waste is a social problem and requires solutions agreed by society in order to secure the maximum safety for the present generation and for those to come.*

References

Blowers, A. and Lowry, D. (1997) 'Nuclear Conflict in Germany: the Wider Context', *Environmental Politics*, Vol. 6, No.3, Autumn, pp. 148-155.

House of Lords (1999) *Management of Nuclear Waste*, Select Committee on Science and Technology, Session 1998-99, 3rd. Report, London, HMSO.

Radioactive Waste Management Advisory Committee (1994) *Study Tour of France*, June.

Radioactive Waste Management Advisory Committee (1996) *Study Tour of Sweden and Finland*, September.

Radioactive Waste Management Advisory Committee (1998) *Report on Radioactive Waste Management Practices in Switzerland*, January.

Radioactive Waste Management Advisory Committee (1999) *Advice to Ministers on Radioactive Waste Management Issues at UKAEA Dounreay*, January.

Radioactive Waste Management Advisory Committee (1999) *Advice to Ministers on the Establishment of Scientific Consensus on the Interpretation and Significance of the Results of Science Programmes into Radioactive Waste Disposal*, April.

Sadnicki, M., Barker, F. and MacKerron, G. (1999) *THORP: The Case for Contract Renegotiation*, London, Friends of the Earth.