



TECHNICAL NOTE

Concepts That Could Aid a Site Selection Process

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Concepts That Could Aid a Site Selection Process

1 Introduction

In the UK the history of inadequate public involvement in decision making in radioactive waste management has contributed to the overall failure to implement government policy. A key feature of any analysis is the nature of the 'contract', implicit or explicit, between a host community, the developing agency and UK plc in general. One perspective on the UK experience is that the implicit 'contract' between UK plc and Cumbria 'required' a repository in return for the continued prosperity of the nuclear industry in West Cumbria. This was not acknowledged openly and certainly not generally accepted by the local population. In future we believe the process within which issues surrounding the location of a radioactive waste management facility are discussed will need to involve open and transparent discussion of the terms of the 'contract' between society in general and any host community. Any such 'contract' must be based on the absolute need to meet appropriate safety requirements.

The process itself of how a site selection methodology is established, communicated and implemented will be a strong determinant of how legitimate final decisions are perceived to be. It may be the case that features of processes used elsewhere would be helpful in creating a framework for future public involvement in the UK. Two of the most common concepts in site selection processes are 'volunteerism' and 'veto'; however, even these need to be set within the overall framework of public involvement and government commitment to the process. A wider commitment to financial or structural support for potential future host communities may well have to be a feature of any future site selection process **whether or not communities 'volunteer', or have a veto.**

This note outlines certain features of the site selection processes used in a number of national programmes for the management of solid radioactive waste. Some programmes have encompassed aspects of 'volunteerism' in selecting potential sites for radioactive waste facilities.

By 'volunteerism' we refer here to a community expressing an interest in participating in a process to determine the suitability of siting a radioactive waste management facility in its location. Such an expression of interest must be seen as independent, but may be in response to an invitation by those authorities responsible for carrying out a site selection exercise or it may be an unsolicited offer. It should also be recognised that some countries (notably France and the US) actively encourage volunteerism through cash or social incentives.

With some national programmes, the additional concept of a local community veto has been applied. The term 'veto' perhaps also needs expansion and should be seen in the context of the decision-making hierarchy between the local and the national government levels. In some examples overseas, communities may have a *de facto* veto whereby the implementor may agree to abide by the voting of the community (as in Sweden) although there is no legal requirement to do so. There are also examples of where a formal veto may be overridden by a higher decision making authority. Moreover, in other examples, while a definitive veto does not exist, the community may exert a high degree of influence on the development of a programme.

The long-term management of radioactive waste involves issues of intra- and inter-generational equity. We define intra-generational as meaning ‘between members of the same generation’, and inter-generational as meaning ‘between members of different generations’. The current generation has benefited from the electricity, medical treatment and other processes that have led to the creation of the wastes. It could therefore be argued that there is a duty to find a solution to the waste problem on behalf of future generations and to ensure that they do not suffer a detriment at the expense of the present generation’s activities.

Finding a solution to radioactive waste could also entail one community ‘hosting’ the waste. This could be viewed as intra-generational inequity, as one group is agreeing to ‘host’ the waste for the rest of the population. The issues of intra- and inter-generational equity need to be addressed and any inequity towards the ‘host’ community or future generations must be dealt with.

Table 1 provides an overview of volunteer siting experiences and the use of a local veto in site selection for radioactive waste facilities around the world; while Appendix One provides more expansive comment on:

- the legal framework that applies to the process;
- the role of Government and / or the legislature in the decision-making process;
- the role and nature of local decision making, including voluntary involvement and rights of veto;
- the benefits on offer for local communities and related issues.

2 Legislative Considerations

In some countries, wide public involvement is part of the history and culture of their democratic process. The degree of legislative basis for interaction with the public in the site selection process, whether volunteerism and/ or use of the veto is part of the process, varies between countries, for example:

- in France, specific legislation (the so called ‘Law of 1991’) specifies the process in some detail, either directly or through secondary legislation;
- in both Sweden and Finland, more general Environmental Impact Assessment legislation is used to formalise the interactions between the developer and the public;
- in Belgium, the interaction arrangements have been established through initiatives of the waste management organisation, supplemented by signed contracts between the parties.

It is recognised that in the UK context, consideration may have to be given in the consultation exercise to introducing measures, which may or may not require special legislation, to enable formal interactions to take place between the siting authority and the hosting community. In particular, consideration may need to be given to integration with planning law and environmental impact assessment legislation.

3 Technical and Socio-political Requirements

There is a general consensus that, as with any controversial project, the future consideration of siting options for whichever option is chosen for the long-term management of radioactive waste, will comprise both technical and socio-political aspects. While technical aspects of site selection may be seen to follow internationally accepted methods (such as the guidelines published by the IAEA), socio-political processes do vary quite considerably between nations. In particular, the extent and manner of local community engagement with the site selection process is worthy of careful review. What should not be overlooked, however, is that the technical requirements themselves encompass both socio-political and socio-cultural choices and can become highly contested and controversial. Thus, it should not be taken for granted that there is a clear division between technical and social issues; the technical aspects of site selection need to be open to deliberative consultation, and a common understanding of their interpretation established as part of the site selection methodology.

However, it should also be recognised that in countries such as Canada, Finland and Sweden, (and to a certain extent France), the nature of relatively large areas of uniform potentially suitable geology, makes volunteerism in respect of a deep geological facility, less of a technical challenge to the investigating organisation. Within the UK, greater consideration would need to be given to the variance in geology across the country and the relatively small continuous areas of potential suitability.

It needs to be made clear that ‘volunteering’ is against a background of *openly discussed and agreed conditions*. The ‘volunteer sites’ are not given any technical dispensation to favour them on such requirements over other sites – they have to satisfy the same technical, safety and environmental requirements as any other site. However, volunteering may be linked to anticipated social and economic benefits. For example, France historically has provided such benefits for nuclear power station sites as a normal part of the development process; and the US has offered financial benefits to States hosting the monitorable retrievable store, and to the State of Nevada for hosting the Yucca Mountain HLW facility (although in return for relinquishing its right to object to the facility).

Site selection processes therefore have to be seen in the context of a comprehensive package of measures, specifically tailored to meet the socio-political and cultural needs and expectations of the communities involved. Volunteer processes and the use of a local veto are potentially important concepts in developing an effective process, but they must be seen to be part of a wider package of procedural measures.

4 Levels of Decision Making and Representation

Decisions to slow down or opt out of the process have not tended always to be made by those directly engaged in the dialogue, but often at higher levels of Government (Regional, Federal, or Cantonal) where wider socio-political issues appear to have contradicted local decisions. Related considerations are:

- recognition by all affected parties as to who is deemed to represent local communities;
- how the views of a wide range of members of those communities are elicited and encompassed; that is, who has the right to volunteer; and

- the extent to which this commands support from all those within the community.

Taking these considerations, when looking at overseas examples, one must be clear as to what the ‘entity’ is that is taking the decisions on participation in the procedures, what level that represents in government hierarchy, and whom such an entity represents. Again this varies between countries, for example:

- in Sweden, it is the Municipality (the administrative unit below county level) that takes the decisions, based on referenda, on accepting the waste management organisation into its area;
- in France, it was at Département level that decisions on the question of expressing an interest in the volunteer site selection exercise were made. However, it was at the town council level that local public inquiries were heard and at Ministerial level that the final directions on investigations were made. In some cases local Mayors arranged for referenda to be carried out, but these are regarded as non-constitutional and carried no legal weight;
- in Switzerland, the Wellenberg site, in the community of Wolfenschiessen, proposed by the waste management company NAGRA, was accepted through a referendum by that community but rejected in a further referendum at the higher Cantonal level; and
- in Canada, there has been some dispute over representation and the meaning of local acceptance. Given the dispersed and diverse nature of the populations in some areas, there was not always agreement between various interested groups on representation.

Moreover, it should be recognised that site selection is progressively definitive. The Swedish example is quite instructive in this sense. Siting studies range from countrywide studies, through to ‘county specific general studies’, then to feasibility studies at municipality level. This has the aim of identifying ‘areas of interest’ and ultimately prioritising these for further investigation, before deciding on a more exact location.

5 Features of Volunteerism and the Veto

Based on observations of other programmes, the features of allowing or encouraging communities to put themselves forward for consideration as a potential host site, include the following:

- the early establishment of open dialogue at the local level;
- communities do not feel that selection has been imposed upon them by some unknown entity applying only technical criteria without due consideration of their involvement in decision making;
- local representatives, including Members of Parliament, are fully aware of the commitments and are not embarrassed by an unanticipated announcement;
- an early understanding by all parties that meeting the technical selection requirements is essential, but not sufficient, for the establishment of a facility;

- clear commitments from all stakeholders to engage in open discussions;
- increased accountability between the facility development organisation and the local community;
- the volunteering community has to recognise its responsibilities with respect to the long-term nature of its decisions. A local government representative is elected typically for four years but may be participating in a decision, which will last well beyond that timescale and span generations. Further, the siting organisation needs to receive some comfort that such a decision will not be revisited within the timescales suggested by its degree of commitment to the stage it has reached within that community. Feasibility studies may take place within an election period, underground investigations within several, and if the site is ultimately chosen, operations may last well over one or two generations;
- related to the last point, a risk that, assuming veto powers to ‘walk away’ from the process are established, they may be exercised at some point, thereby resulting in wasted expenditure. Experience suggests that this risk is primarily related to those who are not directly engaged in the dialogue process from the outset. Those who are so involved are less likely to exercise the veto. This emphasises the need to encourage opponents and critics to participate in dialogue;
- the potential misinterpretation of the arrangement – for example that relaxed safety principles may be applied to a site that has ‘volunteered’. Effective communication and dialogue should overcome this; and
- the need to make clear that any social and/ or economic investments in a volunteer community are entered into within a transparent and agreed framework. Any future processes will need to establish the range of appropriate measures or agreements that can legitimately be entered into.

6 Equity and Community Benefits

The equity issue may need to be addressed in the form of benefits to the local community; these might be, for example, in the form of enabling them to participate in the dialogue surrounding the siting and development of the waste management facility, and/or the provision of community facilities. Providing community benefits has to be handled carefully to avoid the criticism that the local community is being ‘bribed’ to accept a facility, and the benefits must be appropriate to the facility and of the right order of magnitude.

In the case of future generations, it may be necessary to set up a trust fund (as has been considered in Switzerland), to help them to deal with any issues identified as being passed to them by the present generation (e.g. evaluation of long-term monitoring results to inform consideration of eventual repository closure).

Issues to be considered include:

- are the community benefits defined before the community volunteers to host a facility, or do they develop over time?
- at what stage should benefits be provided? e.g. when a community volunteers, when the investigations start, when the site is identified as technically feasible, when construction begins or when the facility is operational;
- who controls the community benefits funds and how they are spent?
- who should be involved in negotiation about the community benefits: can the community influence what is paid and where the money is spent? and
- should the community benefits be defined by law?

Table 2 indicates where community benefits measures have been used in other countries. Several types of benefits have been made available to local communities and most of these are to enable a community to engage in the debate surrounding the siting of a facility or to help to alleviate the increased pressure put on infrastructure due to the development. Thus there is a timing issue of when benefits are first paid, which can date from the initial approach to carry out initial investigations, all the way through to construction and operation of a facility. Moreover, in the examples shown it can be seen that the contributions associated with the various phases escalate by orders of magnitude.

The benefits can be categorised as follows:

Community Empowerment Measures: Such measures are designed to enable the community to participate and influence the debate surrounding the development of the site:

- provision of information about the development;
- establishment of local groups to monitor the facility and engage in debate with the development organisation;
- funding for the community to hire their own experts to check the investigations carried out by the development organisation; and
- funding for the community to hire advocates to present their case in formal proceedings.

Social Benefits: These are designed to offset the potential stigma attached to volunteering to host a facility.

- payment of local taxes;
- guarantees of employment for local people;
- local training, so people in the area can be recruited for jobs;
- support of local service industries;
- investment in public services (e.g. new roads, hospitals, recreation facilities); and
- guaranteed property prices.

Economic Benefits (or Recompense): These benefits could include a variety of mechanisms for economic regeneration at a local and regional level. Infrastructure projects and ongoing business incentives could be partly tied to the project. The ideas for exact form(s) of assistance would have to be worked up with representatives of key stakeholder groups.

Under the existing legal regime in the UK the possible range of benefits to a local community include:

Planning benefits, often referred to as ‘planning gain’. The Department of the Environment Circular 1/97 sets out guidelines for the types of benefits which can be accepted by the local planning authority in connection with the grant of a planning permission. The benefits are usually proportional to the size of the development and its perceived impacts on the local community.

Provision of an assistance scheme for property owners indirectly affected by the development. Under present UK law compensation for ‘planning blight’ is only available where the developer has powers of compulsory purchase and is further restricted to those owners whose property is required for the development or will be physically affected by the development. It is possible for a developer to establish a voluntary system of assistance which goes beyond the requirements of the law, which may assist in meeting public concerns with regard to the perceived impact of proposals on property prices. There are precedents for such schemes in the UK.

Payments of consultants fees for the planning department and local community. A fee has to be paid when a planning application is made that in part reflects the amount of time and resources that the planning department will have to incur to review the plans. There are also precedents where the developer has voluntarily reimbursed the fees of consultants hired by the local planning authority. This could be extended to pay for consultants hired by the local community.

The land use planning system in countries providing host fees is very different to the system in the UK. The UK system is founded on the principle that planning permission should be neither bought nor sold. Therefore, current UK law would not allow the payment of host fees.

The consideration of community benefits should not be dependent on a community volunteering, all communities should qualify, independent of how their area had been chosen.

At another level consideration could be given to a change in policy, whereby a particular community was seen to be taking the waste on behalf of the rest of the UK. In this situation ethical issues would be key, safety must be sacrosanct and recompense could be substantial and geared at meeting the key requirements of the community. The requirements of surrounding, associated communities would also need to be considered, but to a lesser degree. This approach would allow the community itself to define the need for benefits.

7 Conclusions

To conclude, experiences in other countries indicate that while ‘volunteer sites’ have been encouraged, they have not always necessarily proved to be successful in terms of ultimately establishing a facility at that site. However, they have been successful in establishing a process of open dialogue between the facility developer, regulators, and other stakeholders at the local level. Taking account of these experiences, and recognising that there are historical and cultural differences, consideration of a contract between society and a local community and within that context volunteerism, the use of the veto and benefits for a community should be an integral part of the forthcoming DETR consultation exercise. Several other issues are also worth debating at the beginning of the process:

- the establishment of mechanisms to promote open dialogue with all stakeholders at all levels;
- consideration of communities involvement in decision making about siting and facility development;
- early understanding by all parties that meeting the technical selection requirements is essential, but not sufficient, for the establishment of a facility;
- increased accountability between the facility development organisation and the local community; and
- the range of and control of community, social and economic benefits that could be made available during the siting, development and operation of a facility.

Summary Table 1

Country	Experience of Site Selection including aspects of 'volunteerism'	Application of local Veto powers	Comment
Belgium	Yes, ongoing now for L/ILW disposal. HLW programme under consideration.	Yes, partnership community can 'walk away' at any time.	Several communities have agreed to enter into 'partnerships' with no irrevocable commitment to establishing a facility
Canada	Some, for LLW and historic wastes, but now in abeyance for these and HLW.	Yes.	LLW siting seen as good example of volunteerism, despite failures.
Finland	Yes. Potential sites selected through mixture of volunteer and geological screening process.	Yes, law requires local community to give a positive indication.	Volunteer sites have been actively engaged by the EIA consultation.
France	Yes, for URLs, under 1991 French Law a Mediator was appointed to guide the process.	Public Inquiry process results in Govt. decrees directing ANDRA to investigate.	Volunteer URL site under investigation. Volunteer sites are common in France for a wide range of industrial activities including NPPs in return for economic and social benefits.
Germany	No.	Historically no.	Since new German Government elected, site selection process under review through 'consensus talks'.
The Netherlands	Site selection by Govt. committee in 1984 identified 3 'willing' sites. Borsele storage site chosen by COVRA.	No.	Dutch policy is above ground storage for 100 years at an industrial site.
Spain	No. HLW programme in abeyance. El Cabril L/ILW facility was an existing storage facility.	In effect for El Cabril, through planning process.	Site selection for HLW in abeyance. El Cabril L/ILW facility in operation since 1992.
Sweden	Yes. Since 1992 SKB have invited participation of communes.	SKB have agreed to abide by community decision. But Govt can override local veto.	A total of 8 sites have volunteered for feasibility studies, 3 have nuclear traditions, and 2 have withdrawn.
Switzerland	No.	Yes through referenda at various local levels but which can be overridden by higher Cantonal and Federal Govt.	Role of referenda important and question can be re-put at later dates.
USA	Yes for LLW and the temporary fuel store (MRS), but not for the operating TRU deep disposal facility (WIPP) in New Mexico or the HLW programme at Yucca Mountain, Nevada.	Yes, but Congress can override State's decision.	Historically proactive and innovative processes but limited success away from established nuclear sites. Siting of the MRS failed despite financial compensation and use of special Negotiator.

Table 2 Overseas Examples of Community Benefits

Country	Community benefits offered*
Belgium	ONDRAF/NIRAS finance the costs of the local partnerships within budgetary limits. Other economic benefits are not prescribed.
Canada	In the LLW siting programme, property values and employment were 'guaranteed' for a potential host community. Pure financial recompense had been proposed for a particular site, but the programme is now in abeyance. Finance was made available for community liaison groups, 'open houses', publicity materials and visits to other management facilities.
Finland	<p>No incentives or compensation required to be paid directly by the Government. However, nuclear facilities pay a local property tax at the highest rate of 2.2% while the average rate is 0.5-1.0%. This property tax is seen as the most obvious benefit for the local community.</p> <p>As reported in the 1999 EIA report, the direct effect of such increases in tax revenue from the siting a facility (income, property, and corporation) may be partially offset by 'national tax revenue equalisation'.</p>
France	<p>In the URL programme, financial aid to contribute to local development and improving the natural environment is required to be paid under the 1991 Law.</p> <p>FF5 million / year (~£0.5M) is payable to a local authority during the borehole drilling phase to compensate for loss of business tax due to the peripatetic nature of process.</p> <p>Up to FF60 million (~£5.6M), as a 'economic supporting measure' for the Département hosting the URL (both Meuse and Haute Marne receive this payment as the URL is located near the border of the two). FF60 million (~£5.6M) is equivalent to twice the 'host fees' payable to a Département hosting a single reactor 900 MW(e) PWR. Moreover, this package is in addition to the normal finance received from the Central Government for local government purposes.</p> <p>For the near-surface repository at Centre de l'Aube, which commenced operation in 1992, ANDRA (with the Ministry of Industry) set up a 'matching' fund of FF35 million (~£3.3M) which has to be targeted at specific projects attracting equal funding from the local community. ANDRA also pays an additional FF1.5 million (~£0.1M) in local taxes each year and guarantees to fill specified proportions of construction and operational jobs with local labour.</p>
Germany	Notwithstanding the new site selection process, no incentive requirements are currently explicitly stated in the Law. However, the Government of Lower Saxony was offered an annual grant of several million DEM (DEM 1 million ≈ £0.3M) from the Federal Government in respect of Gorleben, but the payments were refused and the arrangement remains suspended.
The Netherlands	No specific incentive requirements regarding the interim storage site at Vlissingen are specified.
Spain	<p>Allocation of monies from the Waste Management Fund for guaranteeing minimum incomes to hosting communities is prescribed by Ministerial Order and is dependent on the type of facility under consideration (nuclear site spent fuel storage, central fuel storage, NPP undergoing decommissioning, L/ILW storage / disposal facility) population density, and distance from the facility. No compensation order yet exists for a deep disposal facility for HLW / spent fuel.</p> <p>Low and short-lived intermediate-level waste is disposed of at El Cabril near Cordoba, which came into operation in 1992. About Ptas 3,000 million (~£1.1M) is paid each year to the town councils located near to El Cabril.</p>

* Note: Currency conversions are as at October 2000 so should be treated with some caution when referring to historical figures.

Country	Community benefits offered*
Sweden	Volunteering communities can request up to up to SEK 2 million (~£0.14M) from the Waste Management Fund to support local review groups, to monitor SKB's work and for public information programmes. No specific provision for other community benefits.
Switzerland	<p>Swiss law also requires both the host community and the Canton to receive financial and material 'remuneration' once it has accepted hosting a facility.</p> <p>For the proposed L/ILW repository at Wellenberg, it is understood that a one off payment of SFr 2.3 million (~£0.9M) would be have been made available to the Canton government. If a facility had been developed, then about SFr 3.5 million (~£1.4M) per year for the 40 year operational period would have been paid. On a similar basis at Community level a one off payment of SFr 3 million (~£1.2M) and an annual payment of SFr 300,000 (~£0.12M) would have been made.</p>
UK	
USA	<p>To facilitate the siting of a Monitorable Retrievable Store, the 1987 Nuclear Waste Policy Act (NWSA) established the Office of the Nuclear Waste Negotiator whose task was to find a willing host state or Indian Tribe in exchange for negotiated benefits. However, although some progress was made with a number of Indian Tribes, the negotiation process was terminated without result.</p> <p>For Monitorable Retrievable Store: Payments or grants to assist the affected community in deliberating the issues. \$10 million (~£6.7M) in annual payments to State/Local governments, during the lifetime of the facility. Note that the MRS siting process now in abeyance.</p> <p>Potential benefits available also included: infrastructure, recreational and environmental improvements, public and higher education programmes, health care programmes, tax subsidies, local employment agreements and direct financial assistance.</p> <p>The siting programme for HLW and spent fuel is centred on Yucca Mountain, Nevada under the 1987 Nuclear Waste Policy Act (NWSA). The NWSA provides for a benefit package for Nevada of \$10-20 million (~£6.7-£13.4M) per year provided the right to object to the proposal is waived; but to date this has not been taken up by the State.</p>

Appendix One

1 Introduction

This appendix considers the processes of site selection in the following countries:

- Belgium
- Canada
- Sweden
- Finland
- France
- Germany
- Spain
- Switzerland, and
- the USA.

The information has been derived from a number of sources, some published and some provided directly by the radioactive waste management agencies, or equivalent, in the countries concerned. As precise provisions of overseas law and policy may be complex, this note attempts no more than a summary.

2 Belgium

2.1 General

There is no specific legislation covering site selection in Belgium, nor is financial compensation required to be made to affected local communities. The radioactive waste management agency, ONDRAF/NIRAS, a public body set up under Royal Decree, is responsible for site selection and for proposing waste management strategies to Government.

2.2 Low and short-lived intermediate-level waste

Following an unsuccessful attempt to site a near-surface facility in the mid-nineties, for low and short-lived intermediate-level waste, ONDRAF/NIRAS since 1999 has concentrated its activities on the development of local 'partnerships' to facilitate project proposals in sites showing an interest to host a facility.

Such local partnerships involve ONDRAF/NIRAS working through independent (University research – based) mediators with local stakeholders in the development of a proposal for a disposal project which is seen as an integrated part of local development. The project is intended to satisfy both technical/scientific and socio-economic criteria before being proposed to government.

Membership is specific to the individual partnership but the general intent is that it should comprise representatives of all the local political parties (opposition included), the various economic, social, cultural and ecological stakeholders actors, and local industry. It is structured around a general assembly, a management committee, and working groups who perform most of the detailed work. The partnership has its own budget provided by ONDRAF/NIRAS.

On 30th September 1999, the first partnership was signed between ONDRAF/NIRAS and the local authorities of Dessel (on whose territory the centralised interim storage buildings of conditioned waste are located). The local authority of Mol (where the national nuclear research centre CEN/SCK is located) was signed in October 1999. The authorities of the zone Fleurus-Farciennes (where the national Institute for Radio-Elements - IRE - is located) were initially interested but decided to let their final agreement depend on the results of preliminary soil examinations on the site of the IRE that are presently taking place.

The authorities of the municipality of Huy (where Tihange NPP is located) have shown no interest so far, while the authorities of the municipality of Beveren (where Doel NPP is located) have yet to decide on starting negotiations with ONDRAF/NIRAS.

The partnerships function at four levels:

1. The 'general assembly' (or Partnership Council) which involves all the parties and formally represents the 'Partnership';
2. The management committee which is appointed by the general assembly;
3. Project Co-ordination on a day-to-day basis; and
4. Working Groups which are the active basis of the partnerships.

Briefly, the working groups will review and develop draft project proposals with the support of ONDRAF/NIRAS acting as 'partner and expert', but also with access to independent expertise. The partnerships as a whole will decide on priorities and take decisions, organise dialogue and be responsible for keeping the local population informed. Final proposals will have to be approved by the local councils concerned prior to submission to the federal government in 2001–2002.

2.3 High-level waste and long-lived intermediate-level waste

For the disposal of high-level and long-lived intermediate-level waste, ONDRAF/NIRAS has been investigating the Boom Clay geological formation at the Mol-Dessel nuclear site. If the safety assessment results continue to show that Mol is favourable then ONDRAF may propose detailed investigations in the Boom Clay at a potential site in 2015 (though not necessarily at Mol itself). Disposal could commence from 2050, but possibly not before. Current plans are to publish a technical report - SAFIR 2 – by the end of 2000, on research undertaken to date, which will be submitted to the NEA for independent peer review. An accompanying strategic document will address potential approaches for stakeholder dialogue on high-level waste and long-lived intermediate-level waste in Belgium.

3 Canada

3.1 General

Canada has a diversity of wastes arising from nuclear power generation (spent fuel and LLW), industrial and medical wastes, and uranium mining and milling (which is not considered further here). In July 1996 the Federal Government announced a new policy framework for radioactive waste intended to guide Canada's disposal approach for all such wastes into the next century.

3.2 Nuclear fuel waste

There is no specific legislation relating to siting of disposal facilities for spent fuel. In 1978 the Governments of Canada and Ontario established the Nuclear Fuel Waste Management Program. This provided for a disposal concept to be developed by Atomic Energy of Canada Limited (AECL, a Crown Corporation) in co-operation with Ontario Hydro (now Ontario Power Generation, OPG), the largest single producer of spent fuel.

In 1989 the Government appointed a Federal Environmental Assessment Review Panel to review the disposal concept prior to the start of work on siting. Public hearings to consider AECL's Environmental Impact Assessment ('EIA') for the concept were held between March 1996 and March 1997, covering a broad range of issues. Included in AECL's EIA were its recommendations for the siting process, which included volunteerism and shared decision-making. Whilst the new Policy Framework does provide that an organisation be put in place to implement the disposal concept, none exists as yet. However, AECL and OPG have formed a joint task team to consider such an action.

The hearings, held in numerous communities across Ontario, took place in front of a panel of experts drawn from both technical and sociological backgrounds, and was managed by the independent Canadian Environmental Assessment Agency (CEAA). Organisations and members of the public who wished to make submissions to the panel were able to apply for so-called 'intervenor funding', which allowed for the use of external consultants and advisors. 'Participant funding', to allow individuals and members of community councils etc. to attend hearings in their localities, was also made available.

The Panel publicly released its report on 13 March 1998. Chairman Seaborn said that although AECL's plan appeared technically sound, *'in its present form it does not have the required level of acceptability to be adopted as Canada's approach for managing nuclear waste.'*

Amongst its recommendations the Panel said that a new nuclear fuel waste management agency (NFWMA) should be set up. By May 2000, the utilities had signed an MOU to create a waste management organisation and a draft plan for long term options is being developed, but it is understood that no decision on deep disposal will be taken before 2004.

3.3 Low-level waste

Low-level waste is defined in Canada to include all waste from nuclear activities (except spent fuel and uranium mine and mill tailings). It includes materials which in the UK would be classified as short-lived intermediate-level waste. It is further administratively classified as either 'historic waste' or 'ongoing waste'.

3.4 Historic waste

A large proportion of the LLW inventory comprises historic wastes, consisting mainly of contaminated soils (1,000,000m³) for which the original producer is no longer responsible. In 1982, the Government established a Low-level Radioactive Waste Management Office to assume responsibility for these wastes. In 1988 the Minister for Natural Resources appointed an independent Siting Task Force to carry out a voluntary siting process to find a disposal site. In 1995, the Task Force issued its final report to the Minister, identifying Deep River in Ontario as a willing host community.

However, problems arose during late 1996. Natural Resources Canada (NRCan) refused to accept the '*Community Agreement in Principle*', which had been negotiated between the Deep River community council and the Task Force. The Agreement formally lapsed at the end of 1996.

Employees of AECL dominate the population of Deep River, and plans announced in late 1996 to downsize that organisation, as a precursor to privatisation, had caused uncertainty about long-term employment prospects in the area, and so job guarantees were included in the Agreement.

The issue finally came to a head in late October 1997 when the Council formally voted to withdraw from the process completely, although NRCan has still not ruled the community out.

In August 1997, Hope Township asked to be considered as a potential repository host location.

3.5 Ongoing waste

LLW from continuing nuclear research and power generation will require disposal in one or more facilities. The waste producers are working on options that include developing an independent OPG facility or a multi-user facility. AECL has developed a prototype Intrusion Resistant Underground Structure for the disposal of short-lived waste at its Chalk River plant in Ontario. This is currently undergoing licensing.

4 Finland

4.1 General

The Nuclear Energy Act, as amended in 1994, requires radioactive waste generated in Finland to be disposed of within the country and prohibits the import of such waste. The Ministry of Trade and Industry (MTI) formulates disposal policy, sets objectives, supervises activities and undertakes its own research and development. The power companies, IVO and TVO, are responsible for waste management and disposal and in 1995 they set up the spent fuel disposal company, Posiva Oy. Operational arisings of low and short-lived intermediate-level waste from the two power station sites (Olkiluoto and Loviisa) are disposed of in repositories constructed at around 100m depth at those sites and are not considered further here.

The Ministry of Trade and Industry sets target schedules for Posiva to implement spent fuel disposal policy, including the siting process. Community benefits are not required to be provided at any stage of the process.

Spent fuel

In 1983 TVO drew up a list of 101 sites and undertook a consultation process with the affected communities. This resulted in the identification in 1985 by TVO of 5 potential 'volunteer' sites at which more detailed investigations were carried out. In 1992, TVO announced that further investigations would only be carried out at Romuvaara in Kuhmo, Kivetty in Äänekoski and Eurajoki (near to the Olkiluoto nuclear site). Interim reports on these sites were produced at the end of 1996. However, following indications by the local community in Loviisa, that they too wished to be included, that site was also added to the list.

According to the Nuclear Energy Act, the first authorisation step towards a final repository of nuclear waste is the so-called Decision in Principle (DiP). At this step the Government had to consider whether ‘the construction project is in line with the overall good of society’. In particular, the Government paid attention to the need of the facility, the suitability of the proposed site and its environmental impact.

Under the legal requirements the Radiation and Nuclear Safety Authority (STUK) had to make a preliminary safety appraisal of the DiP application and the proposed host municipality must state its acceptance or rejection for siting the facility. The decision has then to be endorsed by the Parliament. The application for the DiP includes also an Environmental Impact Assessment (EIA) report for the planned facility.

In May 1999, Posiva Oy submitted an EIA report to the MTI and a DiP application to the Government. The EIA report addressed all four candidate sites. After hearings in November 1999, the Ministry gave its statement, which completed the EIA process. During the hearing period 15 authorities and public bodies, 5 civic organisations and communities and 23 municipalities submitted their statements on the EIA report to the MTI. In addition, some 15 private persons sent their opinions.

The opinions expressed by the authorities and municipalities were mainly positive and the EIA report was regarded as wide and thorough, although one concern was the potential deterioration of the image of a municipality. The anticipated impact on health rendered by the transport of spent fuel was also of concern. The opinions of private individuals and civic organisations on the EIA, as well as on the whole disposal project, were in general critical and opposing. Their viewpoints were, however, mainly focused on issues outside the scope of the EIA.

The MTI concluded in its statement that the EIA was sufficiently comprehensive and detailed and fulfilled the requirements set by the EIA legislation. The Ministry, however, points out that a construction licence application for the disposal facility, scheduled to be submitted after 10 years at the earliest should include an enclosure corresponding to an updated EIA report.

The DiP application addressed only the Eurajoki municipality. STUK engaged an international review team, to support its preliminary safety appraisal of the DiP application. The team summarised their findings in a consensus report to STUK in October 1999. In addition, STUK requested statements from several Finnish research institutes which have participated in the publicly funded waste management research programme. STUK submitted a preliminary safety appraisal of Eurajoki to MTI in January 2000. In this appraisal STUK concluded that the prerequisites for a DiP from the standpoint of nuclear and radiation safety were met.

In January 2000, the Eurajoki council gave its approval to the DiP application (20 votes for, 7 against). The Government’s decision and Parliament’s ratification may be delayed due to an appeal to administrative court by a citizen of Eurajoki but are expected to take place by the end of this year. The Nuclear Energy Act provides that the Council must reject the application if either the municipal council or the safety authority is opposed and that Parliament has to confirm or veto the Decision in Principle by the Council of State.

It is planned that in 2003 an investigation shaft will be constructed at the chosen site and in 2010 a construction permit will be sought. If the permit is granted by 2013 then construction will start and first emplacement of spent fuel could take place by 2020.

5 France

5.1 General

The waste management organisation in France is ANDRA, established as the national disposal agency under the 'Law of 30 December 1991' governing research activities on HLW disposal. It operates near-surface disposal facilities for low and short-lived intermediate-level waste at Centre de la Manche (now closed and not considered further here) and Centre de l'Aube.

5.2 Low and short-lived intermediate-level waste - Centre de l'Aube

The site selection process for the near-surface repository at Centre de l'Aube, which commenced operation in 1992, began in 1985. ANDRA's predecessor organisation identified five potential sites, from which the Aube site was selected as the preferred one. The original shortlist included a number of 'volunteer' sites where the local mayors had indicated that they wished for their communities to be considered by ANDRA, but none was eventually deemed geologically acceptable.

5.3 High-level waste and long-lived intermediate-level waste disposal

5.3.1 The Law of 1991

The 1991 law on R&D redirected the French deep site investigation process following the abandonment of an earlier HLW programme; (that programme sought to identify promising disposal sites primarily by reference to geological considerations). The 1991 law contains several parallel provisions:

- a 15-year research programme covering:
 - separation and transmutation of long-lived radionuclides in waste,
 - deep disposal studies 'through the creation of underground research laboratories (URLs)', and
 - long-term surface storage techniques;
- at the end of the 15-year programme (in 2006) the preparation of a report (by a National Review Board) together with a draft law to be submitted to Parliament for a decision on the creation of a deep disposal facility at one of the URL sites; and
- a requirement that local officials and members of the public from the affected sites be consulted before any site investigations begin preliminary to URL construction.

5.3.2 The Underground Research Laboratories

A mediator - M. Christian Bataille - was appointed under the 1991 law and was specifically 'charged with leading public involvement prior to the selection of URL sites'. His mediation mission established three objectives: information provision to the public, open dialogue and decision facilitation.

The siting process for the URLs began in January 1993. By December of that year some 30 sites had volunteered for consideration. Ultimately, M. Bataille recommended four potentially suitable sites. Two were subsequently merged so that three locations were then under consideration: a clay geology in north-eastern France on the border of the Meuse and Haute Marne Departments (the Bure site); a clay geology beneath the Marcoule nuclear site in the south of the country in the Gard Department; and a granite geology in the Vienne Department in western France. Programmes of surface-based investigations at these sites, which comprised drilling between two and four boreholes plus geophysical measurements, were completed in April 1996.

In May 1996 the Council of Ministers authorised ANDRA to submit requests for the installation and operation of URLs at each of the three sites. Authorisation of the URLs was scheduled to be completed in 1998, following review of the submissions by DSIN (the nuclear regulator) and Ministry of Research, together with public hearings and other forms of local consultation. Public hearings at the sites ran from January to May 1997.

In December 1998, the Government confirmed that two sites should be investigated: the Bure site and a granite site to be selected. A decree was issued in August 1999 allowing ANDRA to commence construction of the URL and the establishment of a local information committee at Bure, and launching the consultation exercise to select the granite site.

The granite site selection process is expected to finish in 2002/3. An initial geological screening, begun in February 1999, identified 180 'plutons' (granite formations) in the country and by July 1999 this had reduced to about 15 sites following consideration of hydrogeology. After a further screening phase, 7 sites were still under consideration in February 2000. The Granite Advisory Committee of 12 experts involving ANDRA and BRGM (national geological agency) manages the programme which comprises a number of stages:

- Stage 1 - seek consensus through consultation / volunteerism (by June 2000, but essentially stalled at the moment);
- Stage 2 - selection by government by end of August 2000 of a sites or sites wishing to be considered further;
- Stage 3 - confirmation by ANDRA of geological suitability; confirmation by DSIN; setting up of Local Information Committees;
- Stage 4 - public inquiries plus endorsement by local authorities within 10km radius of sit. This is seen as a consultation process rather than giving the LA's a specific veto.
- Stage 5 - 2002/3. Decision by government to authorise construction of URL.

6 Germany

6.1 General

The overall regulation of radioactive waste management is controlled by the Federal Atomic Energy Act, but licensing of disposal facilities lies with the *Länder* (State) Government. As radioactive waste disposal in Germany is intended to be undertaken exclusively in mined repositories, the Federal Mining Act is also relevant.

The Federal Government is currently considering amendments to the Atomic Energy Act. If accepted, licensing would become a federal responsibility through the Federal Office for Radiation Protection, BfS.

BfS is currently responsible for the construction and operation of repositories, with technical work sub-contracted to the company DBE. If BfS do take over the licensing responsibility from the Länder, then disposal responsibility would be given to a new body yet to be created.

Two potential repositories are located in Lower Saxony (Gorleben and Konrad) and a facility at Morsleben, in Saxony-Anhalt in the former East Germany, has been in operation since 1970. Until 1978, some disposal was undertaken at a salt mine at Asse, but subsequently the site has been used for research purposes only. Government policy is that all toxic waste, both chemical and radioactive, should be disposed of (though not co-disposed) in geological formations.

Under the new German government, a working group on site selection has been set up by BMU, membership of which includes anti-nuclear experts, use of the Internet, MP's workshops, NGO's and unions. They will review existing criteria and will look at international practice and propose the 'relatively best site' in the country. Their first report is expected later this year. The existing sites under investigation will be part of the process. There is also a stated government aim of having just one repository for all German wastes but this conflicts with some arguments in Germany that heat generating and non-heat generating wastes should be separate.

6.2 Gorleben

The Gorleben site (for the disposal of heat-generating radioactive waste in a salt dome) was proposed in 1977 by the President of Lower Saxony. By way of financial benefits, the Government of Lower Saxony was offered an annual grant of several million DM from the Federal Government, but the payments were refused and the arrangement remains suspended.

Two shafts are linked at a depth of about 840m and underground infrastructure is in place. Given the pattern of ownership of mineral rights, only part of the area has been investigated to date but this is expected to provide sufficient capacity for the expected disposal volumes. It was intended to complete long-term safety assessment at a date between 2003 and 2005 but currently there is a moratorium of further detailed investigations. If a licence were then granted by 2008 the repository could be operational by 2015.

6.3 Konrad

Investigations carried out from 1976 indicate this is a potentially good site for low and intermediate-level non heat-generating waste. Konrad was previously an iron ore mine and in 1976 the Federal Government asked GSF (Federal Research Centre) to investigate its suitability for repository use.

The current licensing process allows for public consultation of the licence application. In the case of the Konrad application, the Lower Saxony Ministry of Environment held a public hearing to consider technical objections to the application. A report was subsequently submitted by the Ministry to BfS resulting in a number of changes. The licensing process is still continuing but a stand off exists between BfS and the *Länder*.

6.4 Morsleben

Since the start of operation in 1970, until September 1998 when the Länder courts stopped disposal, some 22,320m³ of waste (mostly LLW) had been disposed of. The licensing procedure for the sealing and closure of Morsleben is under way.

7 The Netherlands

Following abandonment of its sea-dumping programme, in 1984 the Dutch Government produced a policy paper on radioactive waste management, which called for long-term (100 years), above ground storage, and also set up the waste management company COVRA. A site selection procedure was started under the direction of a Government committee. In less than a year the committee found three sites in two municipalities willing to accept a long-term storage facility.

A pre-requisite for the siting choice was that it should be an industrial location, large enough to store 100 years worth of radioactive waste. COVRA had the final say in site choice and having chosen Borsele (close to the nuclear power station) the licensing procedure for the construction of low and intermediate level radioactive waste storage facilities started in 1987.

For the handling and storage of HLW the construction of a naturally cooled storage vault is in its engineering phase. The construction of this vault started in 1997 and the first shipment of conditioned HLW from reprocessing is scheduled for 2001.

R&D on final disposal is a task primarily for Government since no final decision has been taken on the policy for disposal. As the volumes of waste produced are small, only a single facility for LILW and HLW is required.

8 Spain

8.1 General

Responsibility for siting, constructing and operating repositories lies with ENRESA under a Royal Decree of 1984. ENRESA is a limited liability company, independent of the waste producers and responsible to the Ministry of Industry. Further Decrees (the latest issued in 1998) authorise ENRESA to compensate local communities for hosting both storage and near surface disposal sites.

Periodically, ENRESA prepares and submits to Government a General Radioactive Waste Plan (GRWP) covering all aspects of radioactive waste management. Four such plans have been adopted in the past and a fifth is currently before the Government.

8.2 High-level waste and spent fuel

The policies for identifying definitive solutions for these wastes are presented in the Fifth General Radioactive Waste Plan of 1999. That indicated that the strategy adopted until then regarding geological disposal would be supplemented by research on separation and transmutation. Decisions on options, including site selection, will now not be taken until 2010.

8.3 Low and short-lived intermediate-level waste disposal

Low and short-lived intermediate-level waste was initially stored at a facility sited at El Cabril near Cordoba. Characterisation work to assess suitability for disposing of waste there began in 1986. In 1989 the local planning authority approved a disposal application and the facility came into operation in 1992.

9 Sweden

9.1 General

Under the 1984 Nuclear Activities Act, the disposal company SKB is required to submit R&D plans for review every three years; these include proposals on site selection. As site selection progresses beyond drilling into more detailed characterisation, an investigation permit is required under the Act from SKI/SKN (the nuclear inspectorate and the nuclear fuel board respectively). Approvals are also required under the Conservation of Natural Resources Act and the Planning and Building Act.

9.2 CLAB spent fuel store and the Swedish Final Repository

The siting in 1978 of a 'CLAB' facility, for the interim underground pond storage of spent fuel, was decided following open negotiation with Government, regulators, external reviewers and local authorities at a number of sites. The site chosen lies alongside the Oskarshamn nuclear power station on the Baltic coast which also hosts the Äspö underground rock laboratory.

The siting at Forsmark of the Swedish Final Repository (SFR) for low and short-lived intermediate-level waste underwent a similar process to CLAB, with no objections to the proposal from the local authorities. Forsmark is also the site of an established nuclear power station on the Baltic coast.

9.3 Spent fuel

In 1995 SKB published plans for site investigations and other work envisaging first stage operation of a deep repository in 2008. The Government gave broad approval to SKB's proposed siting process and emphasised the importance of a well-defined and transparent process. The main steps include publication of siting factors (covering safety, technology, land and environmental impact, and societal aspects); publishing countrywide siting studies; and undertaking feasibility studies of between five and ten sites. These would be followed by more intensive surface-based investigations at two or more sites, after which an application would be made for construction of a shaft and/or tunnel for detailed investigation of a preferred site.

In September 1998 SKB submitted its new programme to SKI. The programme has been reviewed by a large number of national organisations, including SSI. In April 1999 SKI delivered its recommendations to the government. In its decision in January 2000 on SKB's RD&D programme -98 the government said that the programme fulfils the requirements in the Act on Nuclear Activities.

Whilst there is no special legislation governing siting in Sweden, SKB has agreed to respect the results of local referenda in municipalities proposed for siting studies. But any veto has no statutory force and the Swedish Government could override local objections and grant permission for studies to be carried out. KASAM (the Swedish National Council for Nuclear Waste, an independent review body) has requested the Government to specify the circumstances in which it might judge such action appropriate.

Environmental Impact Assessments are to be carried out at a number of sites and information in a standardised format is to be provided to the municipalities concerned. In 1996 the Government appointed a National Co-ordinator to promote information exchange and co-ordinate liaison between local authorities.

A feasibility study for Malå (a mining community) was completed in March 1996. A negative local referendum result in September 1997 led SKB to announce that it would not proceed further there. Similarly, the town of Storuman (southern Lapland) rejected further involvement in the siting process in September 1996. However, six further surface-based feasibility studies are taking place:

- in the Nyköping municipality, near the nuclear research centre at Studsvik, which started in 1995;
- in the Östhammar municipality, near the Forsmark nuclear power station site which again started in 1995;
- at three sites in the municipality of Oskarshamn, a location with the spent nuclear fuel store (CLAB) and the Äspö underground research laboratory. The municipality volunteered to take part in the process in October 1996 where sophisticated arrangements have been developed to build confidence in the concept of co-operation between communities and SKB – the so called ‘Oskarshamn model’;
- in the municipality of Tierp, where the council, in June 1998, voted unanimously to allow SKB to conduct a feasibility study;
- in the municipality of Hultsfred, where again the council, in May 1999, voted unanimously to give SKB the go ahead to conduct a feasibility study; and
- in the municipality of Älvkarleby where the council gave their assent to SKB in June 1999.

By the end of 2000 SKB will have completed its compilation of reports on the feasibility studies. Following evaluation of these reports, and taking account of the views of the Regulators, in 2001 SKB will propose two sites for further more detailed surface-based investigations to commence in 2002; it is anticipated these will take between 4 and 8 years. Following this period will be a 6 to 10 year period of detailed underground characterisation and construction. Before a decision is taken on continued operation, a trial phase of ‘deposition’ of 10 per cent. of the spent fuel inventory (about 400 canisters) which could be as early as 2012.

10 Switzerland

10.1 General

Waste management in Switzerland is governed by the 1959 Atomic Law, amended in 1978; a complete revision is expected in 2000. All licensing procedures are within the remit of the Federal Government whilst the Cantons and Communities grant building licences. The Federal Commission on the Safety of Nuclear Installations (KSA) and the Federal Office of Energy, Nuclear Safety Department (HSK) draw up guidelines for disposal.

In 1972 the Swiss Federal Government and nuclear utilities set up the National Co-operative for the Disposal of Waste (NAGRA) to deal with radioactive waste arising in the country. The company is responsible to the Department of the Interior and to the Department of Trade and Energy.

A licence is required from the Federal Government before a repository can be constructed. Federal law also requires that Cantons be consulted prior to the grant of licences. In practice this means that the public are consulted through a referendum, ballot or a Cantonal assembly, although the outcome is not legally binding on the Federal Government. To accelerate the licensing procedure, an amendment to the Atomic Act has been proposed in which all local and federal licensing requirements (both nuclear and conventional) would be encompassed into one Federal licensing process.

An expert Group on Disposal Concepts for Radioactive Waste (EKRA) was set up by the Federal Council in June 1999 and presented their final report in February 2000. They proposed, as a new concept ‘monitored long-term geological disposal, which combines final disposal with the possibility of reversibility’. In March 2000, the Federal Council opened discussions on the draft of a new nuclear energy law. This will be considered by Parliament in 2001. Important decisions will be made on keeping open the option of nuclear energy; restricting the operating lifetime of the nuclear power plants; the waste disposal concept; reprocessing; licensing procedures; right of expropriation.

10.2 Low and short-lived intermediate-level waste

The Swiss concept for the disposal of low and short-lived intermediate-level waste is a repository mined into the side of a mountain. NAGRA began the process of selecting a suitable site in 1978. In 1993 one hundred locations were identified for their geological promise rather than because they volunteered. Through a screening process, these were narrowed down to four in three different host rocks. From these, in 1994, NAGRA selected Wellenberg (in the community of Wolfenschiessen within Canton Nidwalden) for recommendation to Government as its preferred repository location.

NAGRA sought the opinion of the Government inter-agency body AGNEB when it proposed Wellenberg. AGNEB agreed that the process had been transparent and that the site was a ‘good choice’. However, in 1995 the Canton Nidwalden voted narrowly against NAGRA continuing its investigations despite the local community voting in favour.

EKRA has recently indicated support of this project. A decision by the Federal Government and the Canton on developing Wellenberg is expected soon and if the decision is positive a technical group will be set up together with an Advisory committee set up by GNW (a daughter company of NAGRA) and a Cantonal referendum is expected to be held on constructing exploratory drift in 2001.

10.3 High-level waste and long-lived intermediate-level waste

For HLW, spent fuel and LLILW, official Government policy requires NAGRA to look at international solutions for its small volume of waste as well as looking at disposal options within the country. Deep repository site selection is focused in the north of Switzerland (away from the Alps in the south of the country) in areas containing crystalline and sedimentary rock formations. A feasibility study and the site selection report is expected in 2002.

11 USA

11.1 General

The Federal Low-level Waste Policy Amendments Act of 1985 made disposal of commercially generated LLW (as defined in the US, which includes certain materials classified as SLILW in the UK) a State responsibility. Disposal of longer-lived transuranic (TRU) waste (roughly comparable to UK LLILW) Defence LLW, spent fuel and HLW are the responsibility of the US Department of Energy (DOE) as set out in the Nuclear Waste Policy Act of 1982 amended in 1987.

11.2 Low-level waste

LLW repositories have been operating at Barnwell, South Carolina, and Richland, Washington, and at several other locations across the USA prior to the 1985 LLW Act. Site selection for new LLW repositories began in 1985 under the 1985 LLW Act. This required states to have repositories operational by 1992 and allowed for inter-state 'compacts' to be created. Many compacts engaged in siting processes which included the possibility of communities 'volunteering' to be included in the site assessment process. All of the siting programmes initiated by the inter-State compacts are suffering legal delays and political difficulties.

11.3 Transuranic waste

A Waste Isolation Pilot Plant (WIPP) for the disposal of TRU waste opened for disposal in May 1999. It was constructed between 1980 and 1990, following siting studies which commenced subsequent to a 1957 report by the National Academy of Sciences recommending disposal in salt formations. WIPP is located in a salt formation at 650m depth some 30 miles from Carlsbad, New Mexico.

In 1996 DOE submitted a Compliance Certification Application (CCA) to the EPA to demonstrate that the WIPP complies with the EPA criteria. EPA public consultation, including public hearings in New Mexico, began in February 1997. The EPA concluded in October 1997 that, subject to certain provisions, WIPP complies with its disposal standards and should be certified. This action initiated a 120-day public consultation period involving further hearings. The details of the EPA CCA and Resource Conservation and Recovery Act (RCRA) consultation and permitting processes, including the relationship between the State of New Mexico, Carlsbad and the US DOE are extensive and complex. Suffice to say that the licensing of the WIPP facility was subjected to some of the most innovative and transparent methods of stakeholder review to have been applied in the USA if not elsewhere.

11.4 High-level waste and spent fuel

The US siting programme for HLW and spent fuel is centred on Yucca Mountain, Nevada, following an amendment in 1987 to the 1982 Nuclear Waste Policy Act (NWPA) which directed DOE to examine only that site. (Previously, a number of locations in various geological settings across the USA had been under consideration.) The 1987 legislation was criticised by the State of Nevada as ‘unfair’, although the Act specified that if studies showed the site to be unsuitable then investigations would cease..

The NWPA requires DOE to take title to the spent fuel from utilities prior to disposal in a deep repository. To cater for this it is proposed to store the fuel on the surface in a centralised Monitorable Retrievable Store (MRS). To facilitate the siting of this facility, the 1987 NWPA amendment established the independent Office of the Nuclear Waste Negotiator. The negotiator’s task was to try to find a willing host state or Native American Tribe in exchange for negotiated benefits. However, although some progress was made with a number of Tribes, the negotiation process was terminated without result. Characterisation work at Yucca Mountain has included the construction between 1993 and 1997 of an Experimental Studies Facility. Taking the form of a tunnel five miles long, it allows the direct *in situ* study of rock conditions and the hydrogeology at depths of up to 1,000 feet.

Progress at the Yucca Mountain site has been criticised as being slow and expensive by a number of review bodies. The ‘Viability Assessment’ published in 1998 was seen as a positive indication that site investigations should continue (and money appropriated).

In the next year or so, DOE will recommend the site to start the licensing process which will require the approval of the President. However, the State of Nevada enjoys a State’s rights of veto powers over the President’s decision. If exercised, however, the State veto can itself be overturned by a two-thirds majority vote of the US Congress.

If the site is found to be technically suitable, DOE state that a repository at Yucca Mountain could become operational by 2010.