

THE REGULATION OF RADIOACTIVE WASTE MANAGEMENT IN THE U.K.: PROBLEMS AND NEW PERSPECTIVES

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ABSTRACT

Radioactive waste management strategy in the UK has suffered several major reversals in the 1980's, briefly because of serious problems of public acceptability and a lack of political will to face up to the problem of the timely disposal of radwastes. This paper considers these two problems to be related, and seeks to assess the institutional basis for the failures of government policy. In particular, the system of legislative and regulatory control, and the framework for policy formation will be discussed. Both of these have profound flaws which have not withstood the complex of operational regulatory and public/political pressures placed on them over the past decade or so. The paper argues that the scope of radwaste disposal policy should be widened to include HLW's, and that institutional and legislative initiatives will probably be needed to create a robust policy setting which can survive public scepticism. It is not sufficient to argue simply for better information or risk communication. Rather deeper changes are necessary in the way government deals with the problem.

INTRODUCTION

On May 1st 1987 the UK Secretary of State for the Environment announced that NIREX (the industry-sponsored body with responsibilities to develop and operate waste disposal facilities) would discontinue its four-year old search for a shallow land-burial site for low- and intermediate level radwastes. This announcement came as the fourth major reversal of government policy in six years. Each of these decisions has caused new problems for storage of wastes, created new uncertainties for industry and non-industry producers of waste, and reduced the credibility of government and industry action in this area. Three out of these four decisions carried no clear safety, economic, or environmental advantages, often by the government's own admission. In addition, the economic justification of the most recent reversal of policy was overshadowed by the political circumstances of that decision (the site-search program abandonment six weeks before the general election of June 1987).

None of these decisions, and the revised policy statements which have followed them, have gone any way to easing the political environment necessary for the successful implementation of policy objectives. Indeed, the ultimate policy objective of safe and timely disposal of all radwaste types seems often to be lost from the whole process.

Why has such a situation arisen? How is it that the UK is left at the end of the 1980's with one, rapidly filling shallow land burial site for low level solid wastes, and no clear

plans for disposal options for any other solid waste streams? Why has the management of solid radwastes proven to be so intractable? Why, as a pioneer in nuclear power, has Britain fallen behind on this issue?

We will argue that there are five main reasons why this impasse has arisen.

- i) The system of legislative and regulatory control over RWM is obsolete. It was not designed to meet present day circumstances, is over-complex, and contains crucial gaps, especially in relation to financing decommissioning and long-term waste management.
- ii) The present arrangement for policy development is unclear, and the division of responsibility over policy implementation is not conducive to a coherent and optimized waste management and disposal strategy.
- iii) The policy of reprocessing spent fuel has introduced a "myopia" into long-term planning for waste management. Reprocessing can easily become both an excuse and the reason for non-policy. Britain is out of step with other countries in deferring a decision on high-level waste disposal for at least 50 years.
- iv) There has been a lack of commitment on the government's part to pursue a new land disposal program vigorously. It has misused its veto powers over the industry's site-search programs for short-term political gain. Up until 1983 sea disposal operated as the obvious route of disposal for the major volume of

* The views expressed in this paper are entirely the author's own.

reactor wastes. Since the effective closure of this option no politically viable means of establishing land disposal sites has been found. It is all too easy to blame an emotional public for the failures of technically feasible projects, when the real fault lies in the lack of firm political direction over disposal programs.

- v) A cumulative disarray has begun to surround radioactive waste policy-making in general. In this context, there is a diminishing capacity for policy to gain either political, or scientific legitimacy.

The paper will assess these factors in the light of the major political, regulatory and operational pressures on radioactive waste management and policy-making in the UK since 1977, when a government White Paper (1) assigned the current framework of regulatory responsibilities for RWM. It will assess the principal reasons for the lack of consistency in UK policy and make some proposals for the creation of a more robust policy.

REVIEW OF LEGISLATION AND SPREAD OF REGULATORY RESPONSIBILITIES FOR WASTE MANAGEMENT AND POLICY.

There are currently twelve nuclear power stations operating in the UK, each year producing about 7000 cu.m of solid low level wastes (LLW) and about 900 cu.m of intermediate level wastes (ILW). All spent fuel is transferred from the reactor after short-term interim storage to fuel ponds at the British Nuclear Fuels (BNFL) Sellafield facility, where it awaits reprocessing. Magnox processing operations have been operating since 1954, the new oxide reprocessing plant THORP is due to be operational in 1991. The Sellafield operation produces about 35000 cu.m of LLW per year. About 30000 cu.m of ILW are stored at the site.

The only disposal facility currently operating in the UK is a shallow land burial site for solid LLWs, located at Drigg and operated by BNFL. It is due to be filled some time in the mid- to late-1990s, depending on production rates and the licensing of new parts of the site. The plans for developing one or more supplementary sites for LLWs and ILWs are somewhat confused.

The regulatory framework for controlling radwastes is given in Fig. 1.

Non-licensed sites (mainly industrial users) come under the Radioactive Substances Act (RSA) and must be registered with Secretary of State responsible for the environment in England, Scotland, Wales; Her Majesty's Inspectorate of Pollution (HMIP) in the Department of the Environment (DoE) in England, the Scottish Development Department, and the Welsh Office, respectively. They must also hold authorizations to accumulate and discharge radioactive substances. For licensed sites (see below) liquid

discharge authorizations are issued jointly by the Ministry of Agriculture, Fisheries and Food (MAFF) and the DoE. Authorizations for non-licensed sites are issued solely by the DoE.

Nuclear facilities (power reactors and fuel cycle installations) do not come under the Radioactive Substances Act. These so-called licensed sites come under the Nuclear Installations Act (NIA) administered by the main nuclear licensing authority, the Nuclear Installations Inspectorate (NII). The NII is part of the Health and Safety Executive (HSE), based in the Department of Employment (DEmp). The provisions of the Nuclear Installations Act cover only the accumulation of wastes at nuclear sites, not their disposal.

There are four further statutes with force in this area: the Radiological Protection Act 1970, the Control of Pollution Act 1974, the Health and Safety at Work Act 1974, and the Food and Dumping at Sea Act 1985.

The division of regulatory responsibilities under the Radioactive Substances Act/Nuclear Installations Act regime is extremely complex and no more than an accident of history. The RSA was designed to deal with industrial radwastes, not those produced by power reactors or reprocessing. The regulation of the vast bulk of radioactive wastes therefore falls uneasily within the NIA, but supplemented by the RSA.

There are two major consequences of this. First, the effort of coordinating regulatory agencies and of establishing common practice is administratively difficult, and can easily lead to gaps and overlaps in competence. Second, since there is no legislation covering the medium- and long-term management of reactor and reprocessing wastes, no regulatory tool has ever existed to compel reactor operators to develop long-term plans for spent fuel or HLW management.

Such a legislative instrument has become common practice in many other countries where industry has been given executive responsibility over RWM. This regulatory 'push', although it may be painful for utilities, does mean that RWM is conceived of, from the bottom up, as an inherent responsibility and a problem requiring systematic management. In the UK regulatory responsibility has remained too dissipated to provide the necessary impetus for such a perspective.

THE FORMATION AND IMPLEMENTATION OF RADIOACTIVE WASTE POLICY

There is an intimate relationship between regulatory systems and the policy frameworks within which they function. In a sense the lack of clarity of regulatory responsibility in the UK epitomizes the absence of a dynamic policy towards radwastes.

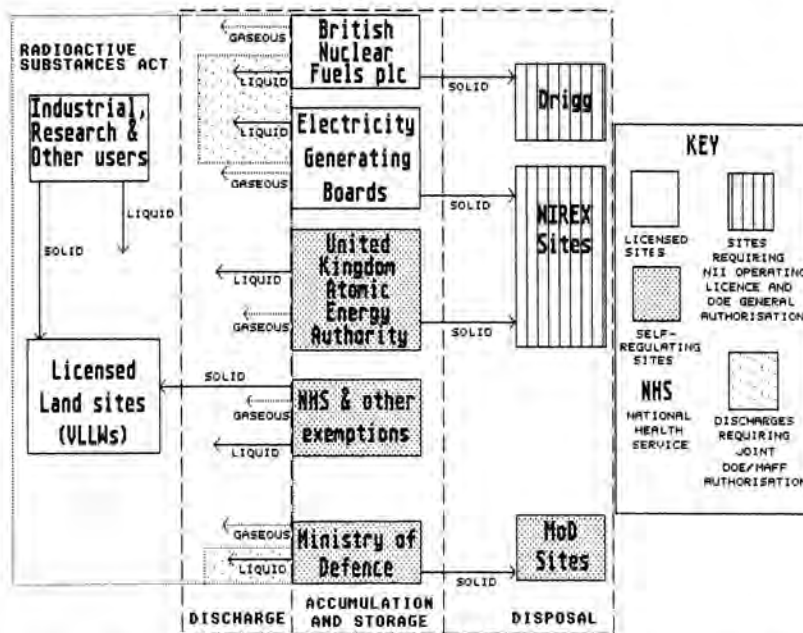


Fig. 1. Regulatory Framework for the Control of Radwaste in the UK.

The debate over who should have responsibility for policy making and disposal stems from the original parliamentary debates about the Radioactive Substances Act in 1959. It has moved through several phases. Before 1977 the United Kingdom Atomic Energy Authority held main responsibility by default. Between 1977 and 1982 the government took a leading role in strategy development, but since then the nuclear industry, through NIREX, has become the dominant influence. How these changes have affected the decision-making process is briefly described below.

The making of RWM policy effectively operates at two separate levels.

First, in the licensing process for new plant under the NIA, and the system of reviews of site accumulation and discharge authorizations organized by the RCI, waste management problems are "optimized" in relation to operator safety. At this level the DoE, MAFF and the NII set design and operating standards for new and existing plant and sites in consultation with the waste producer. Waste management considerations have played an increasing role in this procedure in the last 10 years. The large investments at Sellafield in waste management technology over the past four years are partly a result of this new attitude.

Second, and at a broader level, the 1977 White Paper (1) gave responsibility for overall long-term strategy to the DoE. This was stated in the form of two objectives:

a) [to] secure the programmed disposal of waste accumulated at nuclear sites, and

b) [to] secure the disposal of wastes in appropriate ways, at appropriate times and in appropriate places.

In order to achieve these rather broad goals the DoE receives advice from the Radioactive Waste Management Advisory Committee (RWMAC), NIREX, the nuclear industry, and other government departments. Major decisions are made at Cabinet level.

The DoE was never given any statutory powers to enforce its responsibilities, and was reduced to doing paper studies which were frequently not acted upon. Most research and development was carried out by the industry itself, usually to solve on-site management problems. The result of this lack of effective government regulatory authority has been that, in practice, policy-making has fallen almost entirely onto the shoulders of the licensor. In the absence of any coherent and consistent direction on RWM from the government (the basic problem highlighted in the Flowers Report in 1976 (4)), radwaste policy is merely composed of a collection of design and operating standards prescribed by authorizing departments in the licensing of new plant, including disposal sites. In other words, the short-term provisions for managing wastes from nuclear plant on-site is the sum total of radwaste policy in the UK. In 1986 the NII itself argued that the regulation of radwastes in the UK was under strain because no comprehensive disposal plan was yet available;

"A principal difficulty faced in the management of the site (Sellafield) and its safety is the current lack of national

agreement on the means for....future disposal (of radwastes)." (emphasis added) (5)

NIREX

In 1982, following the government's abandonment of a drilling program in support of a site-search for an HLW repository, NIREX was set up (2) to deal with LL- and ILWs. By deferring HLW disposal for at least 50 years, longer-lived wastes had effectively been legislated out of existence.

The new organization's main responsibility was:

"To develop and implement plans for the safe disposal of wastes of low- and intermediate levels of activity." (3)

NIREX was to approach this task as an integral part of the overall strategy developed by the DoE. In addition, the Department of Energy was to retain a 1% "golden share" stake in NIREX, thereby giving the government veto powers over any plans which NIREX might put forward. A situation therefore now exists where both the government and industry have responsibilities for radwaste policy. From the experience of the last six years this does not provide the basis for decisive and long-term planning, but presents a rather weak and indecisive structure which can easily fall victim to the vagaries of political convenience. There appears to be no firm commitment to any one overall strategy, and the capacity to implement plans for disposal is unproven.

NIREX is an organization used to changing direction. In early 1985 it had to withdraw an application to develop a worked-out salt mine at Billingham for LL- and ILW disposal. In July 1986 it had to re-designate the plan for a new repository site-search programme to exclude ILWs, and in May 1987 it was asked by the Environment Secretary to abandon the search for shallow land burial sites altogether. It now intends to develop a deep site for both LL- and ILWs, whether with more success remains to be seen.

On each of these occasions it has been pressure from government which has intervened. On the last occasion it was claimed that a leak of confidential information on disposal costs had forced the change of heart. There is now widespread dissatisfaction in industry and government with the present set-up.

THE MAIN INSTITUTIONAL PRESSURES ON RADWASTE POLICY IN THE UK SINCE 1977

In the absence of any firm central guidance, policy-making has been shaped in reaction to a complex range of operational, regulatory and public/political forces which are set out below.

Public/political:

i) The emergence of "radwaste" as a major problem in government and parliament, especially in relation to the

siting of disposal sites. This has not increased the likelihood that the problem is considered with any more urgency, but served rather to increase the tendency not to deal with it.

- ii) Increased media attention on the reprocessing plant at Sellafield after a series of accidents, reports, and a court case. Since 1983 there has also been a growing body of evidence concerning raised levels of childhood cancers around nuclear installations, further deepening suspicions of past and present regulatory procedures.
- iii) Well-organized local community and environmentalist opposition to site characterization programs (up to 1981 in crystalline rocks, up to 1985 in a disused salt mine, and up to 1987 in clays).
- iv) Organized trade union action to boycott controversial disposal and research activities.
- v) Since 1979 a non-interventionist government which has shown its willingness to defer all contentious decisions regarding the regulation of RWM.

Regulatory:

- i) The gradual adoption, by the DoE of a more systematic approach to collecting information on wastes, and successive attempts to develop 'optimal' management systems through systems studies for particular waste streams and since the Holliday Report (6) through assessing Best Practicable Environmental Options (BPEOs) (7).
- ii) The adoption in 1985 of the principle of Best Practicable Means (BPM), to insist on a clearer demonstration of the principle of 'as low as reasonably achievable' (ALARA) which has stood, more or less unaltered, as the basic justification for RWM practice in the UK since the late 1950s.
- iii) The adoption of tougher standards for discharge authorizations for nuclear sites, partly as a way of forcing waste producers into adopting waste management methods more in line with government strategy.
- iv) A more interventionist role being played by the DoE in directing some elements of waste management strategy (for instance in quality assurance of waste products), and the decreasing role of the UKAEA. The contradiction of a more interventionist DoE at an official level, and the preference for a 'hands off' style of regulation in the government at a political level, is certainly the source of much of the present confusion and hesitation.

Operational:

- i) The need, expressed in the Flowers Report, for "good housekeeping" at nuclear sites.
- ii) The consequent need to develop processes to treat and immobilize wastes which had previously been stored,

untreated, at nuclear sites; including the whole range of solid and non-solid wastes. Through increased R & D efforts, treatments are now available for many of the waste streams in the UK system. In the absence of disposal routes however, the justification for treatments rests solely on the advantages for interim storage. iii) The requirement to reduce drastically discharges of activity, especially at the Sellafield fuel reprocessing site. iv) The larger volumes of all wastes being produced through running larger programmes and plants to stricter specifications, and bulky new low level wastes (LLW) from remedial actions. v) The halting of the sea-dumping of low- and some intermediate-level wastes (ILW) in 1983 (and the consequent pressure on ILW storage capacity).

- vi) The filling-up of the shallow land disposal site for solid LLW at Drigg, and the need for new capacity from the early 1990s. This has been compounded by the government decisions of 1985, 1986 and 1987 to abandon site-search programmes.
- vii) The need for a disposal route for more active ILW, and PCM which have up until now been stored at nuclear sites because they were deemed unsuitable for sea disposal.
- viii) The government decision of 1981 to place vitrified HLW from reprocessing into dry storage for at least 50 years. The Windscale Vitrification Plant (WVP) and interim dry-store is due to come into operation in 1989/90. No research work is currently being undertaken in the UK on an HLW repository.

The object of listing these factors side-by-side, without emphasizing any single one, is to suggest how important it is in the British context to have a coherent strategy for radwaste management. Without this, a myriad of complex, short-term influences will force decision-makers into making bad decisions which will seriously restrict the technical and political viability of projects in the future. Ad hoc solutions leave too many hostages to fortune.

CONCLUSION

The central argument of this paper has concerned the need for what we may call dynamic planning in radwaste management (RWM), that is, the need for a goal-oriented, long-term strategy for the disposal of all radwastes. The storage of these wastes, whether as a policy or a non-policy is undesirable. A comprehensive strategy for radwastes, which finally ties their production to eventual disposal has never been implemented in the UK because it has never suited a whole spectrum of interests from industry to central and local government, and environmental organizations. There are of course a multitude of reasons for this, and only a few can be briefly mentioned here. RWM has always been underplayed as a technical and managerial problem. In the

UK it has never been considered in its own right by governments who interpreted their only duty as regulating the diffusion of artificial radioactivity into the environment. Experience in other countries has shown that the state must take a far more active role in guiding comprehensive regulatory programs, and in developing a political consensus around them.

The most bulky wastes; liquid, gaseous and some solids, were routinely disposed of along authorized routes which have since been closed. Up to the early 1980s an assumption held whereby the disposal of untreated wastes to the environment (land, sea and air) should be maximized. Other wastes were stored in untreated form, with vague plans for eventual solidification and disposal to the sea.

Containment and land disposal have only been adopted as underlying assumptions in the early 1980's. The pressure for this change of technical orientation had political roots (in the environmental and union movements, in international political pressure and in public opinion). It did not emerge from within the nuclear or nuclear-regulatory community. However, although technical perspectives have been overturned we are left with a legislative and regulatory framework which belongs to the ancien regime.

The civil and military nuclear programmes have always been inviolable givens for UK governments, and reprocessing has stood as an essential component of their commitment. The political priority has subsequently been to defuse potential problems arising out of RWM in the quickest, most cost-effective way. In general this has amounted to the curtailing of available or planned disposal routes and the provision of interim storage and waste treatment capacity.

In many ways the formation of NIREX has reduced the chances of reaching some form of political consensus over what should be done. Government has abrogated its responsibility to generate the political will and legal requirement for solutions to waste disposal to be made available. Regulators remain in their mainly reactive role struggling to implement responsibilities for which they have been given no statutory powers. A seemingly endless array of past and present accidents and miscalculations have come to light which have severely damaged their credibility.

The nuclear industry meanwhile is split on the desirability of NIREX, and interested mainly in establishing in the short-term that it is environmentally responsible. All of this is taking place against a backdrop of deepening disenchantment among national and local publics with all elements of the nuclear fuel cycle post-Chernobyl.

It is time for nuclear activities in the UK to be brought to account for their waste consequences, for a plan to be available which sees nuclear material from the cradle to the grave. To achieve a badly-needed dynamism within the

regulatory and policy-making system it must be simplified and its goals clarified, probably through new, more prescriptive legislation. By this I mean the setting of clear and binding targets for waste producers to design and implement plans for the disposal of all waste types.

Additionally, the precise relationship between industry and government in doing research, planning, implementing and

regulating policy needs to be resolved more clearly. A far more urgent programme of disposal site planning and construction is required in order that optimal decisions regarding treatment and handling of wastes can be made. Finally, the profound problems of public acceptability need to be addressed more seriously, although this probably cannot be done separately from new institutional and legislative initiatives. Public opinion can only be won when it is convinced that the institutional structure for policy-making and implementation is well-founded and competent.

The prospects for this happening are not good. Commitments to civil nuclear power and plutonium production over-ride all waste management considerations. What is apparent in the policy process of other countries is that the problem of dealing comprehensively with radioactive wastes has to be faced squarely at some point. The longer this moment is postponed in Britain, the more serious will be the

political consequences and the threat to the viability of civilian nuclear power.

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