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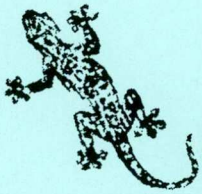

GECOU

AN INTER - DISCIPLINARY RESEARCH GROUP FUNDED BY THE ECONOMIC AND SOCIAL RESEARCH COUNCIL'S GLOBAL ENVIRONMENTAL CHANGE PROGRAMME

Radioactive Waste in Germany: The Dimensions of Conflict

Andrew Blowers and David Lowry

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WORKING PAPER 7

GECOU (Global Environment Change – Open University) is an interdisciplinary research group at the Open University. It consists of six researchers from five different disciplines: four from the Faculty of Social Sciences, namely Professor Andrew Blowers (Geography), Professor David Potter (Political Science), Dr Bernard Eccleston (Social Sciences), and Dr David Humphreys (Political Science); and two from the Faculty of Technology, namely Dr Susan Carr (Systems).and Alan Thomas (Development Studies and Systems).

There are also ten GECOU Research Associates working in Africa, Asia and Britain; Lizbeth Chidley (NGOs and tropical deforestation in Indonesia); Oronto Douglas (NGOs and environmental conflict in the Niger Delta); Dr. Derek Gunby (NGOs and land degradation in Zimbabwe); Dr A. P. Kripa (NGOs and Joint Forest Planning Management in Karnataka, India); Dr David Lowry (NGOs and the transnational trade in nuclear waste); Roger Mpande (NGO influence at the International Negotiating Committee on Desertification); Obasi Ogbonnaya (NGOs and the Kafin Zaki Dam, Nigeria); Uche Onyeagucha (NGOs and human environmental rights in the Niger Delta); Prof. Enoch Okpara (NGO influence at the International Negotiating Committee on Desertification); and Dr Onalenna Selolwane (NGOs and land degradation in Botswana).

The GECOU research examines the advocacy work of environmental NGOs in Africa, Asia and the North and their role in the policy processes which directly effect global environmental problems. The research commended in 1993 and is ongoing. It is funded primarily by the Economic and Social Research Council of the UK as part of its Global Environmental Change Programme and also by the Open University.

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Radioactive Wastes in Germany: The Dimensions of Conflict

by Andrew Blowers and David Lowry

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By Andrew Blowers and David Lowry[1]

The Dimensions of Conflict

Nuclear issues have assumed a more prominent place in German politics than has been the case in France or the UK. The origins of this lie in the country's geopolitical position between East and West. Although the former West Germany renounced the possession of nuclear weapons in 1954, it was a major base for the strategic and tactical nuclear capability of the NATO allies during the Cold War (Küntzel, 1995a). There have been large-scale protests both at the deployment of weapons on German soil and also against the development of the civil nuclear industry which its opponents associate with risks of accident and dangers of proliferation (Hülsberg, 1988). Initially opposition focused on the development of nuclear power stations but, in recent years as the nuclear industry has concentrated more on the rear end of the nuclear cycle, so reprocessing and the management of radioactive wastes have become the main issues of political conflict over nuclear power.

This paper sets out the local, national and international context of radioactive waste management in Germany. It is the result of work undertaken over several years, some of it already published (in Blowers, Lowry and Solomon, 1991) and based on visits and interviews. The aim here is to give a broad overview of the nature of the issues, the agencies involved and the conflicts that have arisen. The focus will be on the conflicts that have shaped the development of radioactive waste management policy.

Four dimensions of this political conflict may be identified.

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[1] The support of the Economic and Social Research Council (ESRC) is gratefully acknowledged. The research reported here was part of the Global Environmental Change programme at the OU (GECOU) on 'Setting Environmental Agendas: NGOs, democracy and global politics'.

1. *The East-West dimension.* During the Cold War there were major differences between East and West Germany in the technology, regulation and pattern of the civil nuclear industry (Küntzel, 1995a). In the Federal Republic (FRG) the Atomic Law required that reprocessing was an integral part of the German nuclear fuel cycle and stipulated that permissions to run nuclear power stations were conditional on the demonstration of plans for managing radioactive wastes for a period six years ahead. Although nuclear facilities were operated and developed in the private sector, the various companies were carefully regulated by both federal and regional *(länder)* agencies and authorities (Goldberg, 1993). In the German Democratic Republic (DDR) the industry was under direct state control and effectively integrated within the Eastern bloc (*Science*, 1993; Shabad, 1981).

   In practice neither country had its own reprocessing facilities and both had to rely on other countries to complete their nuclear fuel cycle. The FRG built up contracts for reprocessing its spent fuel in France and the UK (Weinländer, 1987; Bauder and Blaser, 1994) while the DDR's spent fuel was sent to the Soviet Union which held a monopoly of reprocessing in the Eastern Bloc (Simmons, 1989, p.143; Davey, 1987).

2 *The North-South Dimension.* Within Germany there is a contrast between the energy rich north and the south, especially Bavaria, which has a weak energy base. The north has resources of coal and gas and through its ports can import cheap fuels from other countries. The south, lacking a fossil fuel base or ports, has come to rely more heavily on the nuclear component of its energy balance and, consequently, industry and government are likely to prove more supportive of nuclear power.

3 *Central-Local Dimension.* Germany is a federal country with a strong regional (*länder*) level of government. Although the federal government has ultimate power to determine the location, regulation and licensing of nuclear facilities, the *länder*, with their local political power base and their power as licensing authorities, can obstruct, delay and sometimes prevent the policies of the federal government (Nelkin and Pollack, 1981). This is particularly the case when a *lände* government is politically opposed to the federal government, but there is also a regional/central dimension of

conflict which transcends party politics. There has been long-standing conflict between the federal government and the *lände* of Lower Saxony where most of the proposed radioactive waste facilities are located (Blowers et al, 1991; Falk, 1982). At the more local level individual communities or districts may experience conflict between supporters and opponents of nuclear facilities. Within Lower Saxony, for example, attitudes have become increasingly polarised within the local communities in the area around Gorleben which has been proposed as the site for a deep repository. We discuss this developing situation later.

4. *The International Dimension.* Since Germany exports its spent fuel for reprocessing a trade in nuclear materials has been established which raises real and potential transboundary conflicts. It is a requirement that the plutonium and uranium recovered from the spent fuel will be returned to Germany together with the radioactive wastes which arise from the reprocessing process (Küntzel, 1995b; Berkhout, 1991). There is potential for conflict here over the precise specifications of the wastes to be returned, over the transportation of the wastes and over the management of the wastes both in France and the UK and, once returned, in Germany (Greenpeace, 1991; Environment Ministry, Lower Saxony, 1992). Beyond these bilateral political problems the transportation of plutonium and plutonium-contaminated wastes is likely to stimulate protests related to broader international issues of nuclear proliferation (Butler, 1994; Sanger, 1992).

Despite the international dimension, nuclear policy and regulation remains substantially a matter for individual national governments. The contractual obligation of return-to-sender (and any subsequent proposals to substitute different forms of wastes) are matters for political decision but the specification of the wastes and the timing, routes and methods of repatriation remain largely a matter for the companies involved (Töpfer, 1994; RWMAC, 1994; Greenpeace, 1993). It is, of course, expected that shipments and management will conform to international guidance for safety as laid down by the International Commission for Radiological Protection (ICRP), the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency

of the OECD and the principles, standards and measures required by the European Community (Blowers, 1996; Snihs, 1996).

A History of Protest

Nuclear energy produces about 7% of German primary energy and around 34% of its electricity supply. In the former FRG there are 21 nuclear power stations - 14 Pressurised Water Reactors (PWR) and 7 Boiling Water Reactors (BWR) - with a capacity of 23,000MW. The former DDR had six operating VVER (Chernobyl-type) reactors, all of them shut down after reunification for safety reasons (see Figure 1 on page 5 below for location of reactors). In the early years (1970s) there was opposition to the construction of certain power stations. Some of the protest was internationalised in border areas such as Wyhl near the French and Swiss borders in south-west Germany. The proposals for reprocessing works to close the nuclear fuel cycle in West Germany in accordance with the Atomic Law also gave rise to considerable protest during the 1970s and 1980s.

In 1974 the Federal Government proposed the 'Integrierte Entsorgungskonzept' (the Integrated Waste Management Concept) which would bring together at one site facilities for reprocessing, fuel fabrication and the use of plutonium in fast breeder reactors and the development of a waste conditioning, packaging and disposal system. By 1977 Gorleben had been selected as the potential location for realising this concept. Gorleben satisfied the need for a salt formation which was the accepted host geology for deep disposal for high level waste in Germany. The particular salt dome is 14km in length, 4km wide and lies at a depth of between 260m to 3500m. It is one of around 200 known salt domes and other salt structures in northern Germany. The specific choice rested on political rather than technical factors. Gorleben was in an area of high unemployment, with sparse population and, significantly, was located on the border with the DDR. It was out of the way in the Wendland, a location with the typical characteristics of the periphery, a traditional rural culture, economic problems and a lack of political power (Blowers and Leroy, 1994). It was an area where it was felt the economic investment represented by the nuclear industry

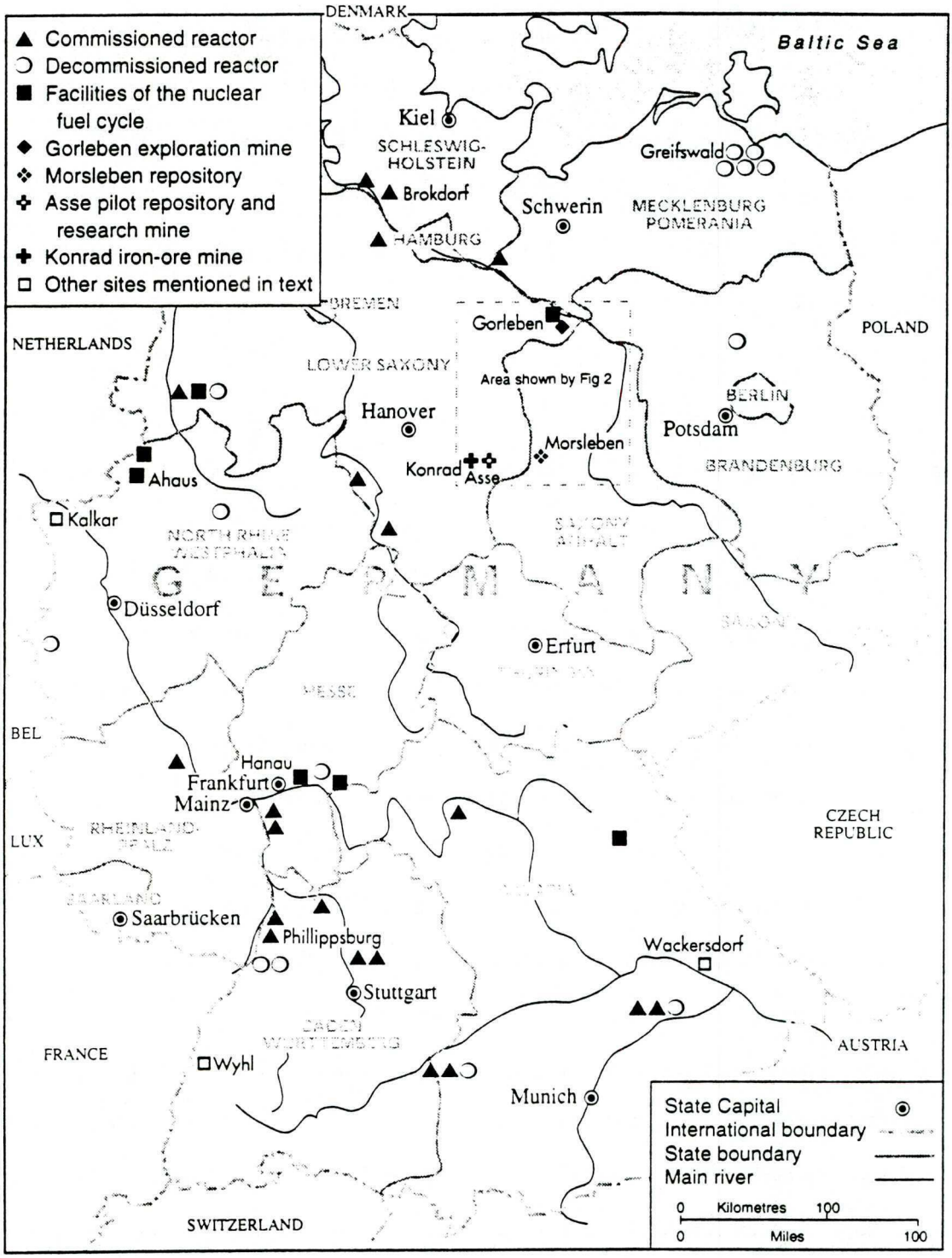

Figure 1

Nuclear facilities in Germany

would be welcomed by some of the population and resistance from opponents would be relatively weak. However, opposition from the local communities supported by groups from outside the area provoked a re-examination of the proposal by the Lower Saxony government which led to the rejection of the reprocessing plant in 1979 although much of the rest of the integrated concept remained intact. A fuller history of the conflict over this project will be found in Blowers et al (1991).

The proposal for a reprocessing plant then shifted to Wackersdorf in Bavaria. Construction began in 1985. Here, too, there was opposition from farmers and local groups in another deeply rural area, again backed by environmental groups operating at a more national level. By the end of the 1980s the economic case for reprocessing had weakened and, with the utilities pulling out of the project in order to secure cheaper reprocessing facilities in France and the UK, the Wackersdorf project, too, was abandoned. In a neat twist of fate, part of its partially constructed site was turned over to the manufacture of solar energy technology. The integrated waste management concept thus had one of its vital components outside Germany. Practically all the fuel elements accumulating in Germany at the rate of 500 tonnes per year are reprocessed at La Hague (two-thirds) and Sellafield (one-third) (Gruppe Okologie, 1991, p.3a).[2]

Since the abandonment of Wackersdorf the case for reprocessing as an integral part of the nuclear cycle has weakened still further in Germany (Roser, 1994; Hibbs, 1993). The use of plutonium in fast breeder reactors has been largely abandoned and the experimental fast breeder reactor at Kalkar on the Dutch border was shut down in 1991. (It is to be redeveloped as an amusement park.) Although a Mixed Oxide Fuel (MOX) fuel fabrication plant has been constructed at Hanau, natural uranium is at present much cheaper. As a result, after much re-evaluation of the economics and potential markets for MOX fuel, the commercial operator of the Hanau plant, Siemens, decided to abandon it in July 1995,

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[2] The contracts between German utilities and the reprocessing plants at Cap de la Hague, France (COGEMA) and Sellafield, UK (British Nuclear Fuels Limited) are as follows:

	COGEMA	BNFL
Old contracts	4660 tonnes	860 tonnes
New contracts	1650 tonnes	1360 tonnes

under pressure from its owners the German power utilities. The German electricity utilities regard direct disposal as a cheaper option than reprocessing and, in June 1994, the Atomic Law was amended to allow the direct disposal option. By the end of that year the utilities running the Krummel (Hamburg) and Gundremmingen (Bavaria) nuclear plants had withdrawn from their reprocessing contracts for the second phase of the Thermal Oxide Reprocessing Plant (THORP) at Sellafield. While these contracts only represent a small percentage of the THORP contracts, further losses incurred before cancellation charges escalate could lose up to a fifth of the total contracts for the second ten years of THORP's operation (MacLachlan and Hibbs, 1992).[3]

Political opposition and economic forces have worked in combination to bring about the abandonment of plans for reprocessing in Germany and the introduction of the alternative option of direct disposal of spent fuel. Meanwhile Germany has been able, for the time being, to export the bulk of its radioactive waste management problem to Britain and France. But, as the deadlines approached for repatriation of wastes from overseas in the mid-1990s, Germany's problem was to ensure waste management facilities were ready and that transportation could be affected despite opposition.

The Contemporary Conflict

Until now all spent fuel in the area of the former FRG has been sent to France and the UK for reprocessing. Reprocessing is a process that vastly increases the volume (though not the activity) of the streams of radioactive wastes. Calculations of the increase in volume vary. One source suggests that for each ton of spent fuel (volume half of a cubic metre) there is about 13.5 cubic metres of radioactive wastes, a 27 fold increase (Lower Saxony, 1993, p.9). Another source calculates an increase in volume of 189 times if decommissioning wastes are included (Large and Associates, 1992). On the other hand, British Nuclear Fuels Limited (BNFL) argue that reprocessing wastes are smaller in volume if account is taken of the uranium mining tailings that would be created if direct disposal

[3] The base-load THORP operating covers the first ten years and BNFL claim that contracts with the UK, Japan and Germany have been secured which will cover the cost of the plant, its decommissioning costs and will yield a £500m. profit.

(rather than reprocessing) were undertaken. While the volumes of intermediate level wastes are higher with reprocessing, the lower volumes of both low and high level wastes result in a lower total volume (15, 200 m^3 for reprocessing as against 20,000 m^3 for direct disposal) (BNFL, 1994, p.4). However, in terms of waste management arising from spent fuel, it is clear that a substantial increase in waste volumes results from reprocessing for which space must be found. Furthermore there is an increase in the variety of wastes that must be dealt with requiring a range of techniques. After reprocessing, the high level liquid wastes (HLW) accounting for nearly 98% of the total radioactivity, must be returned from France and the UK in vitrified form. The long lived intermediate level wastes (ILW) arising from reprocessing include hulls, structural parts and sludges accounting for 2% of radioactivity (DBE, undated). Apart from these wastes there will be large volumes of lower level wastes arising both from reprocessing and accumulating from research and medical facilities as well as nuclear power plants. Low level wastes are at present collected at regional sites in each *lände* and at a waste store in Gorleben. There are programmes for managing radioactive wastes at various stages of development. The plans for HLW and ILW wastes have encountered political conflict which has hampered progress.

High Level Wastes

As in all other nuclear countries deep disposal is the preferred German solution for the long term management of all its radioactive wastes. For HLW, whether in the form of vitrified blocks or in the form of spent fuel it is proposed to construct a deep geological repository in the salt dome at Gorleben (Schutt, 1994) (Figure 1). The site has been under investigation since 1979 including surface exploration, deep drilling, geophysical methods and the construction of an underground exploration mine (Blowers et al, 1991; Berkhout, 1991). Conclusions on its geological suitability, though at present positive, are heavily qualified. 'Today, however, in spite of all positive results, no definite statement regarding the suitability can be made. It has to be emphasised again and again that this will only be possible on the basis of the results of the subsurface exploration of the salt dome' (BfS, 1994a, p16). It is intended to complete the investigation by the end of the century, complete

the licensing procedures by 2004 and begin operation by around 2010 (though some analysts consider 2020 a more likely date).

There is no urgency about the programme for the repository since there is little to dispose of there at present. Various permits were issued during the period of CDU government in Lower Saxony up to 1990 but excavations were halted during 1990-91 when a coalition of SDP and Greens took power in the *lände*. This action was ruled as illegal and the *lände* was ordered to pay compensation to the federal agencies for the delays caused.

Gorleben is also the site of two other nuclear facilities. One is a Pilot Conditioning Plant which is a research facility for preparing and packaging HLW in POLLUX flasks for emplacement in the repository (Hibbs, 1995). But it is the interim dry storage facility designed to accommodate spent fuel and vitrified wastes from reprocessing also located at Gorleben that has been the focus of the most vigorous and sustained protests so far experienced in Germany. The other operating dry store at Ahaus in North Rhine Westphalia which is designed to accept particular fuel elements and which has a limited capacity has not, so far, created much controversy. The Gorleben store is capable of taking up to 1500 tons of HLW encased in specially constructed so-called CASTOR flasks. Although it has been ready since 1983 opposition from the *lände*, combined with protests from anti-nuclear coalitions, prevented it from opening for twelve years. During 1995 there were various actions, mostly peaceful, to prevent a shipment from a nuclear plant in Phillipsburg in southern Germany (see Figure 1). Eventually, on 26 April (coincidentally, the ninth anniversary of the Chernobyl accident) the shipment completed the 360 mile journey running a gauntlet of protests including the blocking of railway lines and clashes between protesters and police over the final twelve miles of the journey by road from the Dannenberg railway depot to Gorleben (see Figure 2 on page 10 below).

Just over a year later, on 8 May 1996, the first shipment of HLW from France completed a 900 mile journey by rail from Cherbourg to Gorleben. During the final phase of the journey it was held up by 3000 protesters using barricades, bonfires and sit-ins with farmers blocking roads with tractors and manure. The protesters were confronted by 6000

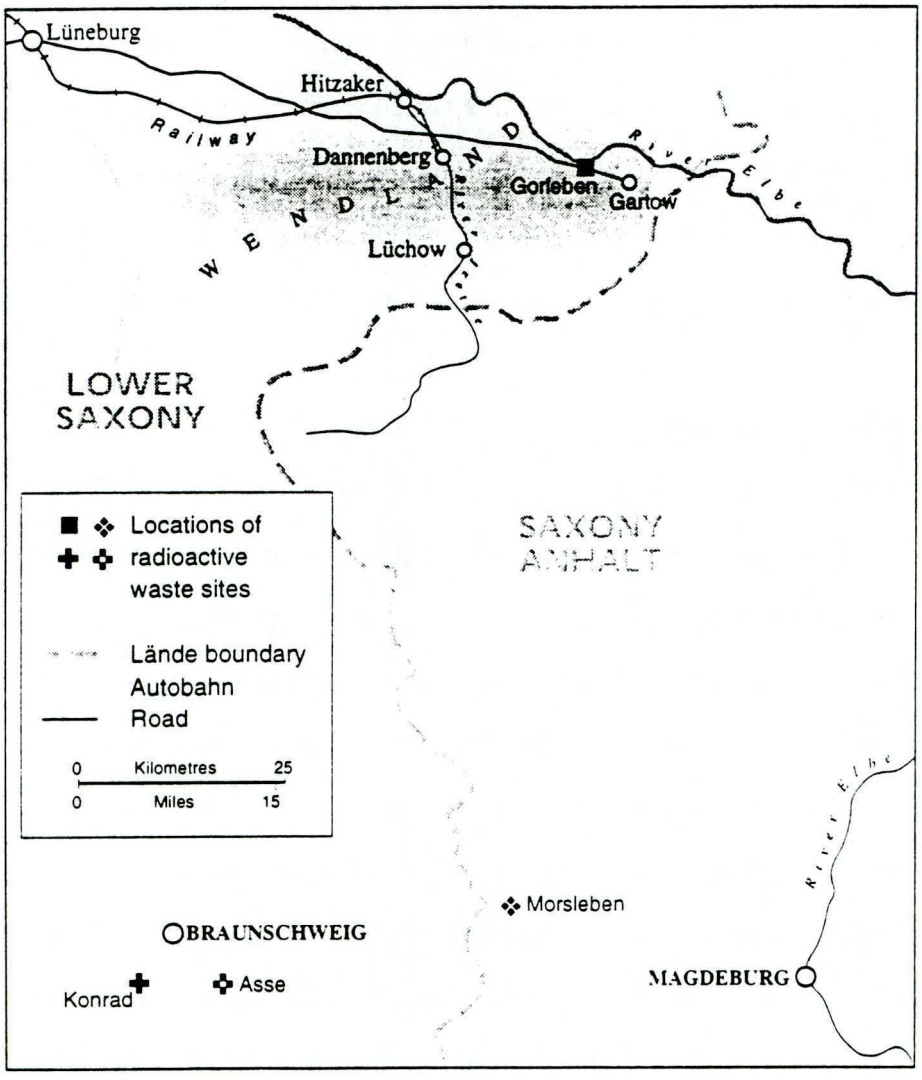

Figure 2

Radioactive waste locations in Germany

police along the route (with 9000 in reserve) using water cannons, tear gas and clubs to ensure the eventual passage of the cargo. The waste was being returned under the return-to-sender contractual arrangement and was the first of 110 shipments planned over the next eight years from France (with shipments also due to begin from Sellafield before the end of the decade). The shipments from Phillipsburg and from France thus opened up the HLW waste management route in Germany.

Intermediate Level Wastes

For non-heat generating ILW it is intended to use a deep abandoned iron ore mine at Konrad, near Salzgitter in Lower Saxony (Figure 1). The mine which was worked between 1956 and 1976 is at a depth of between 800m and 1300m. Investigations for its use as a radioactive waste disposal facility were conducted from 1976 to 1982 and, on the basis of positive conclusions, the licensing procedures were initiated (Brewitz, 1983; Berg and Debski, 1992) Further investigations have been conducted to provide a safety case (Paleokrassas, 1994; Hibbs, 1993). Almost 290,000 people wrote in objecting to the repository plan. A public inquiry - the longest in German history - took place between September 1992 and March 1993. Concerns were raised over the return of wastes from abroad, from the UK and France, and in the latter case the possibility that military origin French waste might be substituted and sent to Konrad was canvassed. The Lower Saxony government continued to refuse a licensing decision on grounds of safety and prematurity (Hibbs, 1994). The Federal Government has the right to override the *lände* by 'instruction' if necessary. If it is eventually approved the Konrad mine, with a capacity over 1M cubic metres, would be able to take about 95% of German ILW and LLW wastes (estimated at approximately 600,000 cubic metres given roughly 50% utilisation of space) for a period of at least 40 years (BfS, 1994b, p.5).

It is intended that the Konrad repository will begin operation before the end of the century. By that time there may be a critical problem of storage in Germany. With foreign wastes returning and wastes already accumulating there could be a shortfall of appropriate licensed storage capacity.

Low Level Wastes

These include some short lived intermediate level wastes. Between 1965 and 1978 the Asse potassium salt mine, also in Lower Saxony (see Figure 1), was used for the storage of about 141,000 drums of nuclear waste. Operations ceased because the mine lacked appropriate approval. It is currently being used as an R and D facility for testing borehole emplacement of HLW and retrievability of ILW. The future management of the drums is unclear at present.

Apart from LLW stores in each *lände*, LLW is presently disposed of at Morsleben (Figure 1), a former rock salt mine, in Saxony-Anhalt in the former DDR close to the border with Lower Saxony. Its siting thus mirrors the Gorleben location, nearby to the North West. The Morsleben salt mine operated between 1912 and 1969 and was chosen from among ten sites in 1970. After investigation a license was granted and the repository opened for tests in 1978 and became fully operational in 1981. It was granted a permanent operating licence in 1986. Under the DDR it was intended mainly for wastes arising from the Greifswald set of reactors on the Baltic coast. By 1990 around 14,000 cubic metres of short-lived ILW and LLW had been disposed of in the mine.

The repository was inherited by the reunified Germany and expert opinion on its safety compiled by the Society for Reactor Safety led to its being shut down in 1991. Under the Treaty of Unification the West German Atomic Law will be enforced with the proviso that 'at the time of introducing this treaty all existing licenses and permissions granted in accordance with the Atomic Energy Act of the GDR continue to be valid for utmost 5 years in the case of nuclear power plants and for a maximum of 10 years in the case of other plants and activities' (Annex II, Ch. III, Economic Union, item 2). This became the basis for the reopening of the repository in 1994 after an expert opinion by the Reactor Safety Commission in 1992. Under the Treaty the license will expire in 2000.

The Morsleben mine has become deeply controversial. Its opponents point out that it has not been through the rigorous licensing procedures normally required and that there appear to be problems of brine seepage, a thin salt wash surface above the salt mine. In addition there may be risks arising from former unsatisfactory disposal practices, including

those risks from toxic wastes co-disposed with radioactive wastes (Lower Saxony, 1993, p.18). Aside from the dubious safety of the repository, opponents regard the designation of Morsleben as a federal repository as an example of 'ecological colonialism' on the territory of the former DDR. Consequently, the Morsleben site has been blockaded by protesters on two occasions. The criticisms are countered by the site's operators who indicate that waste management practices have been much improved since reopening and conclude that groundwater flow is sufficiently slow that they cannot imagine a scenario that would endanger the repository. 'Necessary operational and organizational preconditions for emplacing low and medium level radioactive waste with mainly short half-life have been created' (BfS, 1993, p.9). By 2000 it is expected that around 40,000 cubic metres will have been disposed of at Morsleben. There remains the possibility that a new license could be granted beyond 2000. The pressure for this to happen will increase if there are any further delays in the Konrad project.

Substitution

At the present time Germany has no long-term final disposal repository operating. The Morsleben mine has a licence only until 2000, Konrad may not be licensed and ready to take wastes by that time and, meanwhile, storage capacity especially for ILW is very limited. With the repatriation of plutonium, uranium and wastes from reprocessing in France and the UK now beginning, an acceptable policy for radioactive wastes is crucial. The delays and disruption caused by the nuclear industry's opponents prevented the Gorleben storage facility from opening for some time. The conflict over Gorleben may encourage the repatriation of smaller volumes of waste through a process known as 'substitution'.

The idea of substitution (or 'swaps') is that a small volume of HLW can be sent back equivalent in radioactivity to the much larger volumes of ILW or LLW that is due to be repatriated under the return-to-sender clauses in the contracts. This proposition has the advantage that smaller volumes of HLW incur lower transport and storage costs for the industry. Substitution also matches more closely the waste management routes available in

the two countries. Germany has constructed and now opened interim storage facilities at Ahaus and Gorleben for HLW but, as yet, lacks storage space for the volumes of ILW due back from the UK and France. Much will depend on the future of the Konrad project. On the other hand, the UK has existing storage space at Sellafield and France at La Hague (Butler, 1994).

Despite the economic and technical advantages that substitution may have for the nuclear industry the proposals have become controversial in the UK. There is concern among opponents of the nuclear industry that the specifications of the waste eligible for substitution are too limited. Large (1993) points out that they do not include an allowance for decommissioning and that the specifications exclude considerable volumes of wastes. In addition, whereas the HLW is plutonium depleted, some of the ILW wastes that will be retained are plutonium contaminated (PCM). Large concludes that under substitution the UK will be committed 'to very long term storage of large volumes of PCMs at a cost which is not recoverable from the overseas customers' (ibid, p.31). Furthermore, a number of critics pointed out during the consultation process on the THORP authorisations in 1993/4 that substitution would, in effect, make the UK a permanent home for German ILW/LLW wastes. The government's Radioactive Waste Management Advisory Committee (RWMAC) argued that substitution 'must inevitably include a large measure of final disposal of the foreign waste in the United Kingdom' (RWMAC, 1994, p.54). It went on, 'The retention of plutonium in the United Kingdom is an issue of public concern and has the potential to create heated debate over the UK being labelled the "European dumping ground for radioactive waste" by pressure groups' (ibid, p.56).

A British Government White Paper on radioactive waste policy issued in June 1995 went some way to clarifying how the substitution option could be put into effect (HMSO, 1995). It left unresolved the political potential for conflict. The specifications and the basis for calculation of radiological equivalence have to be agreed. Regardless of substitution there remains considerable concern about the specifications, condition, volumes and form in which wastes from La Hague and Sellafield are to be returned (Gruppe Okologie, 1991). The movement of these wastes, in whatever form, is therefore likely to prove controversial,

especially since it ensures an international context to the conflicts over the German nuclear industry.

The Political Context of Waste Management Policy

From the analysis of conflict over nuclear waste certain conclusions can be drawn about the political context within which German policy is developed and implemented (Keeney et al, 1987; Jesinghausen, 1995). We return to the dimensions of conflict outlined at the beginning of the paper and focus in particular on the local/national and international dimensions. We concentrate on reprocessing and radioactive waste management as these are the issues which link the local, regional, national and international levels. We focus on the role and influence of the various participants, including the nuclear industry and its workers, federal and *länder* governments, NGOs, and community based organisations.

The Local Level

During the past two decades reprocessing and radioactive waste facilities have generated intense local protests at a number of sites. These have included the major demonstration by 160,000 people in Hannover during the International Hearing on Gorleben in 1979 coinciding with the accident at Three Mile Island. Later that year protesters erected a temporary village called 'The Free Republic of Wendland' (Blowers et al, 1991; Bayer, 1990; Zint, 1979). There have been further protests at Gorleben, some of them ending in violent clashes between protesters and police. The repository site is now ringed with razor wire, water cannon and policed by 70 guards with dogs. The Morsleben repository site, too, has twice been occupied by protesters. Elsewhere, local protests have occurred around Wackersdorf, Hanau and Kalkar.

A substantial part of the protest emanates from the local community. Typically the community is divided between those who see the nuclear industry as an asset bringing jobs and investment into an economically deprived area[4] and those who view the industry as a

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4 Interviews with Reinhard Koenig (DBE), Gorleben, March 1995; Dr Rolf Meyer and Dr Klaus Spannbrucker (PTB), Gartow, 3 November 1987, trades unionists.

threat to a traditional and hitherto peaceful way of life. In each case the reaction is defensive, seeking to protect jobs, health or environment. Some workers at the Gorleben nuclear complex have expressed fears of violence to themselves and property from the protesters. Over half of the nuclear workers in Gorleben are outsiders, mainly from the Ruhr. Both in the schools and kindergarten, and in local churches, the nuclear issue developed as a point of debate and conflict.[5] Defensive protest tends to draw support from across the community cutting across sectoral divides of class, politics or residence. Protest is not simply a 'Not In My Back Yard' (NIMBY) reaction; it is more complex than that drawing strength from traditional values that appear to contradict the social trends of modern society (Blowers and Leroy, 1994).

In the Wendland (Figure 2) there survives a sense of community embedded in the deeply rural culture of this former borderland ringed on three sides by the former DDR. Opposition to the nuclear projects of Gorleben is widespread combining farmers and communities who see the nuclear industry as a threat to traditional life-styles and values. Opposition has tended to be mobilised by the *Burgerinitiativ*, a citizen-based organisation akin to a local NGO. From time to time opposition has taken the form of sizeable demonstrations, for example against the shipment of nuclear waste flasks into the area described earlier. This local opposition constitutes a 'broad church that breaks the barriers of age, class, wealth and political affiliation' (*Guardian* , 8 May 1996).

These local environmental protests are often supported and sometimes mobilised by environmental groups and NGOs based outside the area. Thus, at Gorleben and Morsleben, Greenpeace Germany, based in Hamburg, have organised various forms of direct action.[6] But they are working to a broader agenda. The objective of Greenpeace (and other nationally organised NGOs) is to shut down the nuclear industry. They seek to achieve this by a combination of direct action, research, lobbying and mobilisation of

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5 Interview with Cornelia Kamphausen, Hans-Peter Weder and Axl Frohn, trades unionists employed at Gorleben, 13 March 1995.

6 Interview with Heinz Laing, nuclear campaigner for Greenpeace, at Konrad hearing, October 1992.

opposition. Part of the strategy is to exploit the weak points in the industry, hence the focus on reprocessing and radioactive waste management projects.

Opposition at the local level, such as that in Wendland, focuses on specific projects (eg. Gorleben). It draws on traditional rural values to defend its way of life. This defensiveness incorporates various interests including farmers and those citizens who are concerned about the impact on health and the hazards to future generations of the storage and eventual disposal of radioactive waste. This locally based opposition has also been fanned and embraced by external groups, especially NGOs, marching to a different drum, more radical and intent on the destruction of the nuclear industry. The opposition tends to find its greatest political support at *lände* level.[7]

The nuclear industry can also mobilise support from a variety of sources. The power of investment and job creation generates a degree of dependency in the workforce and among local politicians. The local councils are predominantly in favour of the industry.[8] The nuclear industry locally is part of a much larger national and international industry which, despite its commercial problems, still wields considerable influence at federal level among ministries and politicians especially in the CDU (Beard, 1993).

The Regional/Lände Level

Within a federal state, regional governments possess considerable formal and informal power over large sectors of decision making. This is especially the case in environmental decision making. *Länder* governments have regulatory powers which they can use to delay or obstruct the licensing and commissioning of facilities (Hibbs, 1994).[9] But they are also representative political institutions sensitive to and reflecting the political culture and ideologies expressed in their region. This helps to legitimate their position on policies,

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7 Interview with Rebecca Harms, Green member of Lände, Lower Saxony, March 1995.

8 Interview with local councillors and Mayors representing Lüchow - Dannenberg; Gorleben and Gartow, in Garstow, March 1995.

9 Interview with Nikolas Piontek, lawyer engaged by Lüchow - Danneberg BIS, New York, September 1987.

especially when they are in defiance of national policy (Griefahn, 1994). We found this was particularly the case among the SPD politicians elected to the multi-layered village, town and regional councils in the Wendland, covering the area around Gorleben (see footnote 9).

This situation is well exemplified in the long-running conflict between Lower Saxony and the Federal Government over radioactive waste proposals in the *lände*. Until reunification the state/federal government political conflict was complicated by the geographical location of Gorleben very close to the border between East and West Germany. The federal government held secret talks in 1977 with the East German authorities over its nuclear plans, as part of 'Ostpolitik'.[10] Although the *lände* government under CDU control was strongly pro-nuclear and initially, in 1977, supportive of the Gorleben project it abandoned plans for a reprocessing plant in 1979 in response to the considerable protest aroused by the plans and in the light of the findings of an international hearing.[11] Since then opposition to the remaining elements of the Gorleben project has hardened.

Lower Saxony has also sustained opposition to the Konrad proposal. Since 1989 when the licensing process began, and especially since 1990 when the anti-nuclear coalition of SPD and Greens came to power in Hannover, the *lände* government has continued to obstruct the project. Other *länder* such as Hesse and North Rhine Westphalia have also elected SPD/Green coalitions. The SPD leadership has increasingly embraced the idea of a national federal coalition government. In the case of Lower Saxony, Konrad is seen by the former *lände* Minister for the Environment, Monika Griefahn (a former national Chair of Greenpeace, Germany) as part of the wider nuclear debate.

> "For the Lower Saxony government, the debate on final disposal is intertwined with the question of the further use of nuclear energy. Only if, by setting a date for the nuclear phase-out, the types and quantities of the

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[10] Interview with Reinhard Koenig, DBE, March 1995.

11 Interview with Helmut Hirsch, Oko-institut, Hannover, 1 November 1987.

arising nuclear waste is determined, systematic planning for a final disposal becomes possible" (Griefahn, 1994, p.4).

Indeed, Gorleben exemplifies a trend in German politics of radical, local or national activists achieving elected office through the political parties' list system. The Greens, for instance, have sent various local activists from the Wendland area to the *lände* Parliament in Hannover, the federal Parliament in Bonn and the European Parliament in Strasbourg, each representing potent anti-nuclear interests.

With Asse, Konrad and Gorleben (and Morsleben close to its border) Lower Saxony has the majority of prospective nuclear waste facilities within its territory. Although the nuclear industry may bring some investment into economically backward or declining parts of Lower Saxony, there is also the cost (in terms of risk to present and future generations) of such a concentration of facilities in one area of the country. Lower Saxony would bear the risk on behalf of the country as a whole.

It is this problem of geographical and inter-generational inequity that is at the back of conflict between Lower Saxony and the federal government. Of course, the governments of the other *länder* may feel comfortable with a situation which removes the problem of radioactive waste from their doorsteps. Consequently, if Lower Saxony succeeds in preventing radioactive waste projects or in opening up a search for alternative sites it is is likely to find itself politically isolated within the country as a whole on this issue.

Lower Saxony has become locked in a struggle over the respective powers and rights of *länder* and federal governments. Towards the end of 1994 the *lände* government announced it would challenge the federal government's amendment of the Atomic Law on the grounds that it had not been approved by the Bundesrat, the upper house which represents the interests of the *länder*. This represents a constitutional challenge rather than an attempt to prevent the direct disposal of spent fuel which was a major part of the Amendment.

Similarly in North Rhine Westphalia the Greens, in coalition with the SPD, blocked the planned expansion of the Ahaus spent fuel store and the re-start up of the Wesergassen nuclear reactor. In Hesse, the Greens, responsible for the environment ministry, have

forced Siemens to abandon its nearly completed MOX fuel plant (*New Scientist,* 8 April 1995).

The Federal Level

Political Parties. The nuclear issue has become politically polarised in Germany. The CDU, and especially its Bavarian ally the CSU, is pro-nuclear. The CSU is pressing ahead with a controversial new reactor near Munich, despite international concern. The CDU/CSU is liable to be influenced by the utilities but also by the costs of energy options. While opposed to any phase-out of the industry and, in principle, supportive of further construction of power stations, the CDU is under no pressure at present to expand the nuclear sector as the nuclear option is expensive and there is no shortage of supply of electricity.

By contrast the SPD favours a phase-out and would accept a gradual run-down provided no further nuclear power stations are planned. Plans for radioactive waste disposal are regarded as conditional until a phase-out has been agreed. The SPD is susceptible to the green lobby and some of its politicians have a background in environmental movements.

The nuclear industry. This is a powerful influence at national level. The German electricity supply industry is run by regional utilities, most of which use a variety of energy sources. Their predominant interest is in security and economy of supply. At the present time (with one or two exceptions) they are not anxious to construct large nuclear power stations which require long-term investment (at least ten years) that is difficult to secure at an economic return. In any event, there is currently sufficient supply and there are a variety of less expensive and smaller scale options.

By contrast the nuclear infrastructure companies support expansion in order to secure a continuing domestic market as a firm basis for their export drive, especially in Eastern Europe. One interesting example of this was the decision, in 1995, by the Siemens company (which has major collaborative interests in the German nuclear industry) to abandon plans to seek further licences for its MOX plant at Hanau which would re-cycle

reprocessed plutonium returned from Sellafield and La Hague. But Siemens retained its interest in contracting for the management of Eastern European and Russian Highly Enriched Uranium and plutonium, some from dismantled warheads.

The nuclear waste management companies have an obvious interest in ensuring the development of radioactive waste management facilities.[12] These organisations once installed on a site appear to be sustained by an institutional inertia.

Environmental Movements. At the national level environmental groups, especially those prominent in the nuclear field such as Greenpeace, BUND and IPPNW use a variety of methods in pursuit of their objective to phase-out nuclear power. They have had a major influence on the abandonment of plans for reprocessing plants within Germany and have used various direct actions in attempts to block the opening of the interim store at Gorleben. But their success should not be exaggerated since the abandonment of plans for reprocessing have depended more on the increasing costs and the removal of support by the utilities than on environmental campaigns.

Attempts at National Consensus. In view of the entrenched differences over the future of nuclear policy an attempt was made to forge a basis for agreement at the so-called consensus talks which took place during 1993 and 1994. The participants included representatives of the federal government, the *länder* governments, the trade unions, the utilities and the nuclear industry and environmental groups. Although some common ground was found on such issues as restructuring the energy industry, energy conservation and the use of renewable forms of energy, the talks foundered when fundamental areas of disagreement were exposed. The federal government's position which favoured continuing nuclear power for the operating lifetime of current power stations (up to 40 years), the development of a reactor to ensure technology was maintained and the continued development of radioactive waste projects proved unacceptable to the environmental

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[12] These include the DBE (German Company for the Construction and Operation of Repositories for Waste) which is under contract from the German government to install federal facilities for storage and disposal at Konrad and Gorleben and has taken over responsibility for Morsleben. GNS (German Nuclear Services Company) owned by the utilities is responsible, through its subsidiary, BLG, for interim storage facilities and waste treatment processes at Gorleben. Oversight of these operations is vested in the BfS (Federal Office for Radiation Protection), a federal agency under the Ministry for the Environment, Nature Protection and Nuclear Safety which has responsibility for safety standards and protection.

groups. The talks served to establish the precise fault-lines between the pro and anti nuclear interests in Germany, especially highlighting rifts within the SPD, given impetus by the decision of the SPD leadership to sack its chief negotiator to the 'consensus talks,' Lower Saxony Premier Gerhard Schroeder, in September 1995.

The International Level

Environmental NGOs like Greenpeace are particularly concerned to eliminate reprocessing as an integral part of the nuclear fuel cycle because of the dangers of proliferation it allegedly poses. Domestic reprocessing, though still available as an option under the Atomic Law, is unlikely to be chosen in current economic circumstances (Hibbs, 1993; Roser, 1994). Attention now focuses on the international trade with France and the UK arising from reprocessing (Hibbs and Maclachan, 1994; Hibbs, 1996; Homberg et al, 1994). German plans to send research reactor fuel to Dounreay for storage and reprocessing has met with opposition both in Germany and Scotland (Ochert and Abbott, 1995). Although further exports of commercial reactor spent fuel beyond existing contracts are unlikely, the backlog of wastes due to be returned is considerable and there are concerns about the condition, treatment and transportation of these wastes.

The repatriation of vitrified wastes from France (and eventually the UK) has created divisions within the anti-nuclear movement, led by Greenpeace. The national organisations of Greenpeace in Germany and in France have both declared that the repatriation of wastes already abroad should be undertaken since Germany must deal with its own waste problem and not export it. There is agreement that the trade should be stopped by preventing further spent fuel shipments to France (and attempts have been made to block shipments to Sellafield). While Greenpeace France do not oppose shipments leaving France, once shipments have crossed the border German Greenpeace will oppose delivery to the interim fuel store at Gorleben. This strategy is seen as consistent with opposition to reprocessing and the campaign to shut down the nuclear industry. However, Greenpeace International, with its headquarters in Amsterdam, has organised international protests against shipments leaving France for Japan and Germany on the grounds of safety and security. There is an

inherent tension within the movement between the French view that the wastes should be returned, the German emphasis on preventing storage at Gorleben, and the international movement's outright opposition to the shipments.[13]

Consensus or Conflict?

The problem of radioactive waste management in Germany has both national and international dimensions. A brittle consensus appears to be emerging over some areas of nuclear policy. Opposition to nuclear power and unfavourable economics have gone hand in hand to undermine reprocessing as an integral part of the German nuclear fuel cycle. The construction of new nuclear power stations is unlikely in the immediate future. But so long as the possibility of further expansion remains, the underlying conflict over nuclear energy will persist. With indigenous reprocessing off the agenda, the focus of conflict has become radioactive waste facilities and the transport of nuclear materials within, to and from Germany. An apparent plutonium smuggling scandal involving Russia has further served to focus attention on nuclear trade, legal and illegal.

Opposition to the nuclear industry's radioactive waste projects has had some success in Germany. It has held up the licensing of the Konrad mine and delayed the opening of the interim store at Gorleben, while the future of the HLW repository at Gorleben remains highly uncertain. The outcome of these various conflicts depends, ultimately, on the economic social and political context in which they are fought.

The economic context has undoubtedly played a significant part. The retreat of the nuclear industry from nuclear power and latterly from reprocessing reflects both high costs and cheaper alternatives. In both these areas economics and opponents have combined to defeat the expansion of the nuclear industry. Costs have also been a factor in the deferral of radioactive waste projects. But economics are likely to play a less determining role here

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13 Interviews with Heinz Lang, Greenpeace Germany in Brunswick, September 1993; RWMAC meeting with Greenpeace, Germany, October 1994. Interview with Jean-Luc Thierry, Greenpeace, France, May 1996.

since nuclear wastes in substantial volumes are accumulating and must be managed somehow.

Social factors, too, are significant. In Germany, as elsewhere in the world, the nuclear industry has found it increasingly difficult to find acceptable locations for radioactive wastes. Nuclear projects, particularly radioactive waste facilities, evoke profound fears about hazards to present and future generations which provokes hitherto latent values to be expressed. Such projects are usually located in 'peripheral' communities, geographically remote and dependent on a narrow economic base. Thus the social conditions are created for outright opposition (Hager, 1992; Parkin, 1994). This opposition is able to draw strength from its appeal to values of community and local culture (as in the Wendland). A diversity of interests, conservative and radical, are brought together united in the effort to defend territorial integrity. These interests are mobilised into cross-cutting coalitions operating at local, regional, national and international levels (Blowers and Leroy, 1994 and 1996). They are often opposed by other cross-cutting interests which are mobilised in defence of jobs and profits.

The success or failure of these coalitions depends on the political context. It has been suggested that democratic political contexts are more likely to be favourable to environmental movements than other political contexts (Potter and Taylor, 1996, p.5). Furthermore, it has been argued that environmental movements are able to deploy *confrontational* methods in those societies 'where there is accountability through multi-party elections and internal plurality of power centres within civil society or particularly the state' (Thomas, 1996, p.46). Germany appears to meet these conditions more than most democratic states. It has a federal structure providing alternative power centres some of them in opposition to the federal state; it has a flourishing civil society; and it has a multi-party system which results in a variety of single-party and coalition governments at local, *lände* and federal level. The history of nuclear politics in Germany has been one of confrontation, often peaceful, sometimes violent, but ultimately contained within a structure in which protest is a legitimate element in the democratic process. It is a context in which

the stage is set at the local level and the alliances are forged that set the agenda and influence the course of policy making.

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