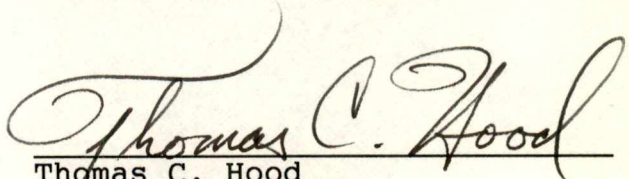
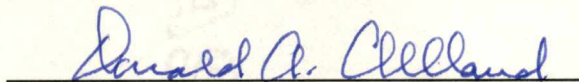


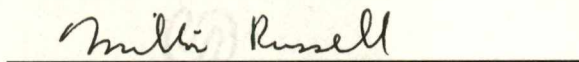
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I am submitting herewith a dissertation written by Mary R. English entitled "The Siting Dilemma: Low-Level Radioactive Waste Disposal in the United States." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Sociology.

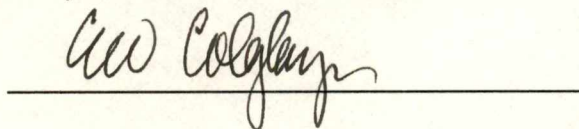

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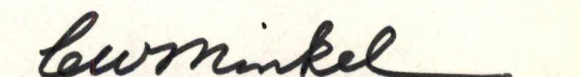








Accepted for the Council:


Associate Vice Chancellor and
Dean of The Graduate School

THE SITING DILEMMA:
LOW-LEVEL RADIOACTIVE WASTE DISPOSAL
IN THE UNITED STATES

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Mary R. English
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ABSTRACT

The 1980 Low-Level Radioactive Waste Policy Act ushered in a new era in low-level waste disposal; one with vastly increased state responsibilities. By a 1985 amendment, states were given until January 1993 to fulfill their mandate. In this dissertation, their progress is reviewed. The focus then turns to one particularly intractable problem: that of finding technically and socially acceptable sites for new disposal facilities. Many lament the difficulty of siting facilities that are intended to benefit the public at large but are often locally unwanted. Many label local opposition as purely self-interested; as simply a function of the NIMBY (Not In My Backyard) syndrome. Here, it is argued that epithets such as NIMBY are unhelpful. Instead, to comprehend the siting dilemma, differing values on issues concerning authority, trust, risk, and justice must be understood. Only then can the ground be laid for widely acceptable solutions to siting conflicts.

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INTRODUCTION

This dissertation was written as a book under a contract with Quorum Books. It has been accepted for publication and will appear in 1992 under the title, Siting Low-Level Radioactive Waste Disposal Facilities: The Public Policy Dilemma.

The book was born out of frustration . . . not mine so much as other peoples'. Over the past several years, I have sat at meetings, conferences, and public hearings, and I have heard the frustration voiced by those who are earnestly trying to do their jobs and ensure the responsible disposal of low-level radioactive waste (LLW). But I have also heard the frustration of those who earnestly believe that we as a society are being far too cavalier with dangerous stuff--waste that could poison not only us but generations to come. These frustrations have become vivid since the passage, in 1980, of a landmark act which made clear the need for a new system of LLW disposal.

In 1980, at the urging of South Carolina, Washington, and Nevada--the only states that contained active commercial LLW disposal facilities--Congress enacted the Low-Level Radioactive Waste Policy Act (LLWPA). According to the LLWPA, LLW disposal was no longer to be left wholly to the national marketplace. Instead, each state was to

ensure the availability of disposal capacity for LLW generated within the state. The act encouraged the formation of interstate compacts for regional disposal facilities, and it specified that, as of 1986, compacts could close their borders to outsiders' LLW. By 1985, however, it had become apparent that new disposal facilities would not be available for some time. The LLWPA was then amended to extend its deadline to 1993, but a sequence of milestones and penalties was established to help guarantee that the mandate for new disposal facilities would actually be met. This mandate has set the stage for strife in many compacts and states over how and where new disposal facilities should be sited.

Those who are responsible for developing new LLW disposal facilities--especially employees and officials of state agencies, interstate waste compacts, waste management companies, and their consulting firms--often see opposition to LLW disposal facilities as springing from the "not in my backyard" (NIMBY) syndrome. They dismiss those who adamantly refuse to host LLW facilities as petulant, irrational, and selfish; as failing both to understand the relative harmlessness of these facilities and to take on a share of society's burdens. Those who question whether LLW can be safely managed--especially members of environmental advocacy groups and citizens' groups opposing a prospective

LLW facility nearby--may respond with the battle cry, "not in anyone's backyard!" (NIABY). They dismiss those trying to site LLW disposal facilities as unthinking, uncaring, and short-sighted; as so determined to achieve their missions that they ignore both fairness and good science. And these confrontations are not limited to the grassroots level. Similar confrontations are taking place between states, as interstate agreements for waste disposal are being worked out.

On both sides, these dismissive reactions to one's opponents are simplistic. They reveal a lack of understanding of the true dilemma that faces us, as a society, on hard issues such as where to locate arguably harmful but arguably needed facilities. They also reveal an unfortunate, all-too-human tendency to assume that one's opponents are not only misguided but evil.

This does not mean that no dialogues are taking place between opposing factions on issues such as siting LLW disposal facilities. They are, and over the past decade, they have come a long way toward improving mutual understanding. Those in charge of siting processes have come to understand that they not only cannot but should not impose facilities without taking into consideration the interests of the host community, as expressed by its residents. And those who are wary of these facilities have

learned that perhaps, just perhaps, they can be built and managed safely. But the fall-back position of both sides is still the accusing finger.

This situation is not unique to LLW disposal. Although that is the topic of this book, it could be, and in a sense is, about siting other potentially harmful facilities, especially those for the disposal of solid waste (garbage) and chemically hazardous waste. The parallels are not complete. Whereas the LLWPA made the assurance of LLW disposal capacity a state responsibility, the disposal of hazardous and solid waste is by and large still a free-market enterprise and a private or local responsibility. But the legislated and court-made law governing hazardous and solid waste disposal is in transition and appears to be headed toward approaches akin to those being used for LLW. Low-level waste disposal is in some respects a harbinger of things to come for hazardous and solid waste disposal, which have already posed their own intractable difficulties.

The purpose of this book is not to solve the siting dilemma. That will take many years, and many people. Instead, I seek to lay out the central issues underlying this dilemma--issues that are sociological, political, and philosophical in nature. I focus on authority, trust,

risk, and justice, and the roles they play in determining whether siting processes are widely regarded as legitimate.

This book is premised on the thesis that the passage of a law such as the 1980 LLWPA is only the beginning of a long and complicated endeavor. For enactment does not mean that the law is either wholly fleshed out or widely accepted: it often simply means that there was sufficient impetus to get a mandate for change. Following enactment, a law must be specified, both formally--e.g., through budgetary appropriations and administrative regulations; and informally--e.g., through the meetings, phone conversations, newsletters, and press releases of those charged with or interested in the law's implementation. And following enactment, the law as implemented must, if it is to be effective, be widely recognized as legitimate. In other words, it must be supported by a normative consensus: it must be regarded, not simply as the law, but as a law that is rightful and that should be followed, whether or not the threat of sanctions is immediately apparent. And, while the courts may help to both specify and legitimate a law, many others are involved as well. Everyone does not have to recognize as legitimate all parts of the law as implemented; in fact, some people, if they thought about it, might disagree with the law's basic premise and yet be willing to accept it. But those involved in an aspect or

phase of the law's implementation must accept as legitimate how that aspect or phase touches their lives.

In Chapter 1, I review the 1980 LLWPA as it has been implemented to date. I concentrate on the most daunting problem that those trying to implement the LLWPA and its 1985 amendments have encountered: the problem of finding host states and host communities for new LLW disposal facilities, especially in the face of a concurrent debate on the viability of nuclear power, which is the largest generator of LLW. In addition, I briefly discuss other, related problems: of defining what LLW is and who should regulate it; of setting exposure standards; of selecting disposal technologies; of the effects of volume and source reduction on fee structures and vice versa; of liability, especially the question of who should pay for damages to health and property; and of the prospective need for substantial LLW storage capacity, in the event that new disposal facilities are not available when access to the three existing sites is closed off in 1993. Although this book concentrates on the siting problem, all of these other problems affect and are affected by the siting dilemma. In the remaining chapters, I turn to the focus of the book: issues concerning authority, trust, risk, and justice that underlie that dilemma.

In Chapter 2, I argue that issues concerning authority--particularly, of when hierarchies of authority are accepted and when they are not--are central to any siting process. If a hierarchy of authority is accepted because it is regarded as right and appropriate, not merely because there is no other recourse, then it is probable that those holding positions in the hierarchy and their policies and actions will also be seen as legitimate. (Whether they are legitimate in the sense of being morally right is another question, to which I return.) If such normatively-based acceptance of authority is widespread, then it is likely that those in authority will be trusted; that their assessments of what is best for society, including what risks should be taken, will be accepted; and that their actions will be seen as just. But trust and a consensus on risk and on justice will also be less crucial, since unconditional and unquestioning acceptance of authority is itself sufficient to ensure acceptance of the policies and actions of those in authority.

Unconditional and unquestioning acceptance of authority . . . this sounds quite implausible. And it is, especially in the public life of a modern, pluralistic, predominantly urban society such as that of the United States. Instead, in the United States today, particularly on contentious public policy issues such as siting LLW

disposal facilities, authority is questioned. Granted, assertions of authority may be accepted, especially when those on the receiving end either happen to agree with those in authority or temporarily have no alternative except acquiescence. But this is not true acceptance of authority, for it may be withdrawn at any moment, with changing conditions. Chapter 2 illustrates this point with the example of Michigan and its experience as the Midwest Compact's host state.

Michigan's acceptance of the authority and the policies embodied in the LLWPA and its amendments, as well as in the Midwest Compact, grew increasingly tenuous as the consequences of those policies were felt. Many of Michigan's arguments in opposition to the LLWPA and the Midwest Compact Commission were framed in terms of whether the authority of the federal government and the compact commission was being properly exercised or not. Particularly at issue was the extent to which that authority could override the self-determination of a sovereign state. But, precisely because Michigan's state leadership did not fundamentally accept that authority, other issues--especially issues concerning risk, equity, and societal efficiency--figured importantly in its assessment of the legitimacy of the Midwest Compact Commission's actions and the LLWPA itself. Concerns about

trust were raised as well: Michigan felt that it deserved more trust than was forthcoming from the compact commission. But trust was a relatively minor theme in the Michigan case, which did not progress to the point of identifying a candidate site. Instead, issues concerning trust tend to loom largest when the parties involved in a siting process must confront where a facility is actually going to be located.

Increasingly, trust is recognized as a highly desirable element in siting potentially risky facilities, as well as in the successful implementation of other public policies. But trust is also highly elusive: as acceptance of authority becomes conditional, trust becomes conditional. Those in authority cannot assume that they will be trusted simply by virtue of their office, experience, or academic degree; instead, they must demonstrate their trustworthiness. As Chapter 3 argues, however, demonstrating trustworthiness is a virtually impossible task. First, those seeking to be trusted must prove their technical competence. On this score, they may convince many people, but, having the burden of proof, they will always be vulnerable to challenge, especially if values about what counts as technical competence differ. And second, they must demonstrate their willingness to support and further the interests and world views of their

"clients"--i.e., those whose trust they are seeking. For public officials in particular, this second requisite for trust presents enormous difficulties, because their clients are numerous and often have conflicting interests and world views. Chapter 3 uses the Illinois Department of Nuclear Safety's attempts to site a LLW disposal facility to illustrate both that trust can easily be eroded by unfortunate and avoidable circumstances and that, even under the best of circumstances, only guarded and partial trust may be forthcoming . . . or appropriate. More trust is not the answer to public policy dilemmas such as how to site LLW disposal facilities; instead, measures should be taken to minimize the need for trust. Inevitably, however, some degree of trust will be necessary, especially on issues such as how risks are assessed and managed.

Risk management and, especially, risk assessment are often portrayed as a science, especially by their practitioners. They tend to maintain that risks can be objectively identified, measured, and compared, and that risk management decisions can and should flow rationally from risk assessments. Chapter 4 argues, however, that while dangers can be objectively known and measured, risk is a culturally-imbued concept--one which, by its very nature, depends upon the eye of the beholder. There is no "rational" when it comes to risks.

Using as an illustration contrasting views in a South Carolina county that is sanguine about hosting a LLW disposal facility and in two New York counties that are vehemently opposed to it, Chapter 4 discusses the importance of culturally-acquired norms and values to concepts of risk. Depending upon the particular geographic or organizational culture of which a person is a part, a danger may or may not be seen as a significant risk. One important issue is what value should be placed on the cost, including the socioeconomic cost, of the risk. Another issue is what value should be placed on compensatory benefits, including the social benefit of the product resulting in the risk. (For example, because nuclear power is by far the most significant source of radioactive waste, questions about nuclear power often become entwined with questions about radioactive waste disposal.) In addition, there is the issue of what roles experts can and should play in risk assessment and management. Here, questions concerning trust and authority, especially the authority of expertise, again crop up: To what extent should laypeople defer to experts in risk assessment and risk management? To what extent can and should laypeople seek independent confirmation of the experts' judgments? As with trust, the aim on issues concerning risk should not be attain unquestioning deference to those in authority. Instead,

the aim should be to minimize the risks insofar as possible, by adopting risk management measures that are robust in the face of uncertainty. But nearly always, a residual degree of risk will remain which may continue to be a source of conflict. And nearly always, people will espouse different norms and values concerning, on the one hand, the rights of those on whom the risk is being imposed, and on the other, the responsibilities of those who are imposing it. This means that, virtually inevitably, evaluations of both the risk itself and the justice of its imposition will clash.

The LLWPA was intended to serve distributive justice: South Carolina, Washington, and Nevada should not have to be the "dumping grounds" for the rest of the nation. But the LLWPA also precipitated a crisis of justice. Because that act urged states to band together in interstate compacts to establish regional LLW disposal facilities, each compact had to decide which state would serve as the first host for its facility. (Although most compacts provide that their members will take turns hosting the regional facilities, going first is not generally regarded as a privilege.) And each host state was faced with an even more difficult problem of distributive justice--deciding where the disposal facility should be located. Using the Southeast Compact and its newly

designated host state, North Carolina, as an example, Chapter 5 discusses the three approaches that compacts and states have used in their attempts to choose host states and host communities: the "best site" approach, which stresses technical superiority; the "fair play" approach, which stresses adhering to previously agreed-upon procedures; and the "volunteerism/incentives" approach, which stresses finding a host that is willing, partly because it is to be lavishly compensated. These three approaches make appeals to different and in some ways conflicting principles of justice and consent, and none is altogether persuasive. Inevitably, conflicts arise over basic questions of justice: If a fair set of procedures is used to distribute societal goods or societal "bads" (such as the risk of having a LLW disposal facility nearby), is the distributive process fair by definition, or must its outcomes be fair according to criteria independent of the process? What criteria should be used to judge the fairness of a distributive process and its outcomes? When is the welfare of society as a whole more important than justice to individuals? Who should speak for future generations?

As this introductory discussion suggests, issues concerning public policy dilemmas such as siting LLW disposal facilities are permeated with questions of values.

But talking about values makes us feel uncomfortable . . . partly because they are matters of passionate concern on all sides; partly because we have no well-defined methodology for dealing with them. It is tempting to try to minimize the value dimensions of our discussions and decisions by keeping value assumptions out of sight and framing problems solely in terms of technology and efficiency. We ignore values at our peril, however. For if we are (or appear to be) blind to our own values and those of our opponents, we throw gasoline on a smoldering fire. We infuriate those who oppose us, adding insult to injury. Thus, the role played by values in issues concerning authority, trust, risk, and justice must be understood if discussions about siting are to achieve a higher plane of understanding. Only then will the Gordian Knot of siting begin to be loosened.

In this book, I attempt to illustrate the role that values play in the implementation of laws such as the LLWPA by referring to statements made by various people as spoken in meetings, quoted in newspaper articles, and printed in various documents and newsletters. Since 1985, I have attended a number of national or state conferences, public hearings, and meetings on LLW disposal, and I have heard or read the formal statements presented in these settings by compact commissioners, state officials, employees of LLW

generators, employees of waste management companies, representatives of citizens' groups, etc. Over the past six years, I also have had the opportunity to talk informally with these people, to better understand their viewpoints. In addition, I have amassed stacks of written material produced by compact commissions, state siting agencies, LLW generator groups, waste management companies, and environmental advocacy groups, as well as numerous clippings from local and state newspapers. Some of this material was gathered for my prior research on LLW management, in my professional capacity as a researcher at the University of Tennessee's Energy, Environment, and Resources Center; some has been gathered specifically for this book.

In this book, I thus have been able to draw upon a large body of material and several years of familiarity concerning the topic of LLW disposal in the United States. But I still have had to grapple with a difficult methodological question. Values are internal instigators of behavior. This means first, that values can only be inferred, they cannot be observed; and second, that they can only be inferred from behavior, which may have other, possibly contradictory determinants. I can only infer values, and then only from the behavioral evidence available to me. I thus run the risk of misconstruing the

evidence. Processes for siting LLW disposal facilities are taking place in more than a dozen states, however, and I am familiar with a number of these processes. Consequently, the possibility of my gravely misconstruing the evidence is not great, especially since I seek to give a general, not a person-specific, understanding of how values on issues concerning authority, trust, risk, and justice have affected the implementation of the LLWPA.

One may reasonably ask, "Why these issues? Why not others?" A very different book on siting LLW disposal facilities might be written on such themes as competing claims for limited public resources, the prevalent desire in the United States for a life free of all but voluntary risks, and the effects of our adversarial system of justice on the implementation of public policies. And yet another very different book might be written on such themes as the existing distribution of societal benefits and burdens, layperson versus expert knowledge, and the effects of political and economic power structures on public policies and their implementation. Both sets of themes are worth pursuing. To some extent, I touch on them in this book, but I do not give them the play that others might. Instead, I have chosen the themes of authority, trust, risk, and justice because I have heard them referred to frequently, directly or indirectly, by those trying to site

LLW facilities as well as those opposing their siting. While these themes do not necessarily encompass all the important concerns that might arise in siting such facilities, they permit a relatively unbiased examination of most of these concerns. They thus get at much of what the siting dilemma is fundamentally about.

But just as I cannot resolve the siting dilemma, I cannot fully resolve the issues surrounding authority, trust, risk, and justice addressed in this book. Each is worth a book, or many books, in itself. While I can and do make some suggestions about how they should be addressed, my primary goal is simply to put them more clearly on the map by explaining how they inevitably figure into any siting decision. My primary aim is to help raise them from a tacit to an explicit part of the dialogue on siting decisions, not to suggest what the precise conclusion of that dialogue should be.

For there is no panacea . . . nor should there be. On public policy dilemmas such as siting LLW disposal facilities and their like, intensive public scrutiny and extended discussion are important, even though they can seem terribly frustrating and inefficient. They are the stuff of which an open, just society is made. They are the only basis on which public policies such as those governing

LLW disposal can, in the end, come to be regarded as legitimate.

In the concluding chapter to this book, I give my opinions on how siting processes should be shaped, but throughout I have sought to remain neutral on whether and where LLW facilities should be sited. I have concentrated instead on trying to illuminate what others think, and why they think what they think. I should, however, make my own opinions clear.

I believe that, since we have LLW, we also must have LLW disposal facilities--dedicated facilities, not long-term storage at nuclear power plants. I am less convinced of the wisdom of pursuing nuclear power, at least as it has been pursued to date, but that is another story. And our country desperately needs a sensible, farsighted energy policy that manages demand and not merely supply, but that too is another story. I do not think that this nation, at present, needs a dozen or more LLW disposal facilities, although that number may seem more attractive in two decades, when facilities begin to be inundated with the waste from decommissioned nuclear power plants. But I do think that deciding by fiat how many facilities we should have and where they should go is not a good idea. It may have technical appeal, but it makes no sense politically or socially. Efficiency is one measure of society's success,

but the legitimacy of its public policies is a far more important measure.

In the concluding chapter, I argue that favorable physical factors (aridity, sparse population, etc.) can make a siting process easier, but they cannot ensure its success. Neither can strong leadership. Instead, the legitimacy which results from a normative consensus is necessary before the LLWPA can be successfully implemented. I argue that in a multicultural society such as ours, legitimacy cannot be attained through authority, because acceptance of authority will be conditional at best. Nor can it be attained through trust or through seeking a consensus on risk. While attempts to be trustworthy and to enter into dialogues about risk are laudable and should be pursued, absolute trust and widespread agreement on risk are not likely to be forthcoming. They thus cannot serve as the main underpinnings of legitimacy. The best hope in the long run is to ensure that public policy processes are fair--but fair in the fullest sense of the term.

Public policy processes must be made legitimate by virtue of their justness. This means that they must not mask grave imbalances of access to power, including the power of knowledge and money, with a thin veneer of procedures that follow the letter of the law. Instead, their procedures must correct for those imbalances. Even

if they do so, conflict will still occur; in fact, it may be heightened since those who previously might have acquiesced out of ignorance or powerlessness will now have the means to object and make their objections heard. But if the processes spawned by laws such as the LLWPA are to be stable and durable, legitimacy is necessary. And legitimacy can only be attained if those processes are played out in an open and equitable fashion.

CHAPTER 1

GETTING TO 1993

It is the policy of the Federal Government that--(A) each State is responsible for providing for the availability of capacity either within or outside the State for the disposal of low-level radioactive waste generated within its borders . . . ; and (B) low-level radioactive waste can be most safely and efficiently managed on a regional basis. To carry out [this] policy . . . , the States may enter into such compacts as may be necessary to provide for the establishment and operation of regional disposal facilities for low-level radioactive waste.

--The 1980 Low-Level Radioactive Waste Policy Act¹

This simple, straightforward directive has precipitated one of the most complicated tasks undertaken by state government. The 1980 Low-Level Radioactive Waste Policy Act (LLWPA) was passed in response to a problem of equity: the three states with active commercial disposal

¹Public Law 96-573, Sec. 4(a). Public Law 96-573 is codified as 42 USC 2021b et seq.

facilities--South Carolina, Washington, and Nevada--had vigorously objected to taking all of the nation's low-level radioactive waste. The act proposes a simple solution: each state is responsible for its own waste. But the act recognizes that this solution is inefficient, so it tempers equity with efficiency. It encourages the states to enter into regional compacts, and as an incentive, it gives compacts the power to exclude out-of-region waste.

As a result, the states have been compelled to concoct more complex formulas for equity as they form compacts and select states to host disposal facilities, and as those states in turn select sites. Because of the newness and difficulty of this kind of enterprise, together with the human and institutional inclination to procrastinate and to hope for reprieves, the 1986 deadline set by the LLWPA was not met. Instead, Congress enacted the Low-Level Radioactive Waste Policy Amendments Act (LLWPAA) in 1985, extending the deadline seven more years and setting up intervening milestones and sanctions to ensure compliance.² But the LLWPAA did not change fundamentally the 1980 directive. As of January 1, 1993, the nation can no longer rely on South Carolina, Washington, and Nevada to take its low-level waste.

²Public Law 99-240.

RADIOACTIVE WASTE: A NEW SOCIETAL PROBLEM

Fifty years ago, no one worried about radioactive waste . . . partly because there was very little. With the advent of the "Atomic Age," however, radioactive waste became an increasing problem. Initially, most of this waste resulted from nuclear weapons production by the federal government. Then, in the 1950s and 1960s, the use of radioactive materials became more and more prevalent in the private sector for the production of electricity, for industrial uses, in academic research, and in medicine.

According to the 1980 LLWPA, only low-level radioactive waste (LLW) is the states' responsibility. By definition in that act, LLW excludes high-level waste--spent fuel from commercial or government nuclear power reactors, and waste from reprocessing spent fuel. These wastes generally have intense, long-lived levels of radioactivity and heat, requiring special shielding and isolation for thousands of years. They are the federal government's responsibility. Also excluded by definition from LLW are transuranic wastes such as uranium mining or milling waste.

Apart from these exclusions, all radioactive wastes regulated by the US Nuclear Regulatory Commission (NRC) under the Atomic Energy Act are considered to be LLW and

are thus the responsibility of the states, with one exception. The LLWPA specifies that the federal government, not the states, is responsible for LLW generated by the research and defense activities of the US Department of Energy (DOE). By 1990, DOE's research facilities and nuclear weapons plants were producing an estimated 4.6 million cubic feet of LLW per year--more than four times that produced by the private sector. Since October 1979, this waste has been directed to sites owned and operated by DOE.

To date, LLW typically includes such materials as spent resins and filters, solidified sludge and liquids, and contaminated trash, tools, hardware, and plant components (mainly from nuclear power reactors); depleted uranium slag; contaminated laboratory equipment and animal carcasses; and sealed radioactive sources. A small percentage of LLW is "mixed waste"--waste that is classified as both radioactive and chemically hazardous. (Hazardous waste is defined as waste that, using EPA criteria, is ignitable, corrosive, reactive, or toxic.) Whereas LLW is regulated by the NRC or by states having regulatory agreements (Agreement State status) with the NRC, hazardous waste is regulated by the US Environmental Protection Agency (EPA) and the states under the 1976 Resource Conservation and Recovery Act and the 1984

Hazardous and Solid Waste Amendments to that act. Mixed waste is subject to regulation as both LLW and hazardous waste.

Most LLW is not highly radioactive, but some is. And, typically, most of it is contaminated with radionuclides whose half-lives range from a few hours to a few decades. Depending upon the type of LLW, isolation for anywhere from days to centuries may be necessary. In late 1982, the NRC somewhat belatedly issued its licensing requirements for land disposal of LLW, formalizing practices that were already being followed. These regulations, which went into effect January 26, 1983, are codified as Title 10 Code of Federal Regulations, Part 61 (10 CFR 61).

10 CFR 61 identifies three classes of LLW--Classes A, B, and C--based upon their concentrations of short-lived and/or long-lived radionuclides. Class B waste has more stringent waste form and packaging requirements than does Class A, but both Class A and Class B wastes must decay within 100 years to levels that the NRC considers do not present a substantial hazard to an inadvertent intruder. In contrast, Class C waste, which is made up mainly of irradiated reactor components, is defined by the NRC as remaining hazardous for up to 500 years. Because no one knows what society will be like centuries from now, 10 CFR 61 forbids reliance on "institutional controls" (guards,

fences, monitoring, facility maintenance, etc.) for more than 100 years after the facility has closed. Thus, Class C waste must either be buried at greater depths or have intruder barriers--e.g., concrete covers--that will remain effective for at least 500 years.

At the other end of the spectrum from Class C waste is waste with very low levels of radioactivity that, according to the NRC, can be disposed on-site, where it is generated. Such waste may be incinerated, diluted and disposed as sewage, or simply stored until its radioactivity has decayed sufficiently for it to be discarded as regular trash. The LLW of medical institutions, in particular, is often so slightly contaminated that it can be disposed using these on-site methods. Most LLW, however, requires disposal in a specially designed facility.

THE ELEPHANT IN THE STEW

Commercial nuclear power plants produce the majority of LLW disposed at non-federal sites. In 1990, 1.1 million cubic feet of LLW was sent to commercial disposal sites, with a total radioactivity of about 550,000 curies. Of this waste, nuclear power plants accounted for 56 percent by volume and 79 percent by radioactivity. In contrast, the industrial sector (including, e.g.,

radiopharmaceuticals manufacturers and nuclear fabrication plants) accounted for 31 percent by volume and 19 percent by activity; the government (including, e.g., naval vessels and military hospitals), accounted for 6 percent by volume and 2 percent by activity; and academic and medical institutions (including, e.g., research facilities and diagnostic and treatment centers) accounted for 6 percent by volume and 0.2 percent by activity.³

Vigorously promoted by the federal government in the 1950s and 1960s, nuclear power plants were widespread in the United States by the mid-1970s, especially east of the Mississippi River. Due to growing problems with costs, licensing, and public acceptance, no new nuclear power reactors have been ordered in the United States since 1978 and all orders since 1973 have been canceled. However, a number have reached completion since then, and as of the end of 1990 there were approximately 120 units. (Several of these have officially closed, and others have been temporarily shut down.) Commercial nuclear power plants also produce most of the radiation content of the nation's high-level waste: although the federal government weapons program produces the vast majority of high-level waste by volume, its waste is usually less concentrated.

³Low-Level Waste Management Program, US Department of Energy, 1990 preliminary data.

Because nuclear power plants currently are licensed by the NRC to operate for 40 years, many reactors will be shut down between 2010 and 2030 unless they are relicensed. As they are decommissioned, large quantities of LLW will be produced. Precisely how much is uncertain. It depends partly on the timing and method of decommissioning; partly on the size of the reactor.

The Shippingport reactor, located near Pittsburgh, Pennsylvania, was the first to be decommissioned. A joint venture between a private utility and the US Atomic Energy Commission (the predecessor to DOE and NRC), the reactor went on-line in 1957 and was the world's first commercial nuclear power plant. It was understood from the outset that Shippingport's decommissioning would be handled by the federal government. In 1989, shortly after it was shut down, the Shippingport reactor vessel was sent whole by barge down the Ohio and Mississippi rivers, into the Gulf of Mexico, through the Panama Canal, and up the Pacific coast to DOE's Hanford Reservation where it was buried, at a total decommissioning cost of about \$100 million. (The reactor vessel is both the most cumbersome and the most radioactive part of the nuclear power plant to decommission. All of it is treated as LLW except its spent fuel rods, which must be stored until they can be permanently disposed by DOE as high-level waste.) But

Shippingport's approach isn't as viable for other nuclear power reactors. First, the decommissioning of other nuclear power reactors is a private responsibility, regulated by the NRC. And second, the Shippingport reactor, which produced 72 megawatts, is much smaller than more recent reactors, many of which generate more than 1000 megawatts.

A reactor conceivably could be permanently entombed on-site, but this would turn the closed nuclear power plant into a de facto LLW disposal facility. Alternatively, it could be decommissioned by being broken into chunks and then shipped for disposal, rather than being shipped whole. Dismantlement could be done soon after the nuclear power reactor had been shut down, or the reactor could be left to sit, guarded but inactive, for 30 to 50 years before being dismantled. Delayed as opposed to immediate decommissioning has the advantage of reducing the radioactivity to less than 5 percent of what it otherwise would be, making the dismantling process much safer for workers. After 50 years, the initial volume of LLW from the reactor, which might be as much as 600,000 or 700,000 cubic feet, also could be reduced by as much as a factor of 10. But if LLW disposal costs continue to rise steeply, the economic advantages of delayed decommissioning diminish. And if the reactor to be decommissioned is not

located on the same site with other units that are to remain active (approximately 40 reactors are single rather than collocated units), the problems of maintenance and control may outweigh the advantages of deferred decommissioning.

The NRC currently is considering what its license renewal policy for nuclear power reactors should be. As now contemplated, renewal would extend a reactor's life span for 20 years. However, it would also require extensive reactor refurbishing, which would generate large quantities of waste for a period of about five years . . . as much as about 50 percent more than the volume normally produced, with a much higher radioactivity content than normal. And a license renewal would simply postpone the time when a plant would have to be closed and decommissioned.

Despite recent efforts at volume reduction and waste minimization, nuclear power plants inevitably will produce large volumes of LLW for the foreseeable future. But until 1980, when disposal costs began to rise and the states containing operating disposal sites began to raise equity concerns, LLW disposal was not a major worry for most LLW generators or most states.

1960-1980: FREE-MARKET LLW DISPOSAL

The quantity of LLW generated by the private sector was not significant until the 1960s. The use of commercial nuclear power was just starting to grow, and what LLW there was, was handled either by the US Atomic Energy Commission at its sites or by ocean dumping. In 1960, the Commission announced that both practices would be phased out and that regional land disposal facilities, operated privately but licensed by the government, should be established to handle the growing volume of private-sector LLW. Disposal of LLW then became, for a time, a popular commercial venture. In less than a decade, six sites opened around the country.

The first commercial disposal site was opened in 1962 in Nevada, near the small desert town of Beatty. It was operated by California Nuclear, Inc., which within four years opened two other commercial sites: one near Sheffield, Illinois, and one on the federal government's Hanford Reservation, near Richland, Washington. In 1968, the company's assets were transferred to the Nuclear Engineering Company, or NECO (which changed its name to US Ecology, Inc. in 1981). NECO, a Louisville-based firm, had opened a disposal site near Maxey Flats, Kentucky in 1963. In addition, Nuclear Fuel Services had opened a site near West Valley, New York in 1963, and Chem-Nuclear opened one

near Barnwell, South Carolina, in 1971. All of the states except Illinois had Agreement State status with the Atomic Energy Commission, enabling them to handle the licensing of their sites. The Commission licensed the Sheffield site.

The relatively care-free days of LLW disposal were brief. All six sites adopted the disposal technique being used at government LLW disposal sites. This technique, called shallow land burial, involves trenches that are cut in the earth (typically about 30 feet deep), filled with waste packages, and then capped with several feet of dirt and other materials. Early waste management practices were informal at both the government and the commercial disposal sites. Drums of waste--often uncompacted and untreated--were dumped casually into the trenches (the ill-famed "kick and roll" technique), leaving voids that led to slumping of the protective caps. By mid-1978, the West Valley, Maxey Flats, and Sheffield sites had closed, largely because of environmental problems. All are located in humid climates, and all had problems with excessive water infiltration. As a result, low levels of radionuclides were detected in water outside some of the trenches.

The disposal sites near Beatty and Richland, with their more arid climates, fared better in terms of their burial trenches' performance, but both had other problems.

In 1976, at the Beatty site, employees were discovered to have removed tools, hardware, and other material that had been brought in as LLW. During the next three years, a series of events involving improperly packaged and handled LLW resulted in the temporary suspension of NECO's operating license by the NRC and Nevada, and the site was reopened only after a complex inspection system was instituted. In 1979, at the Richland site, violations of transportation and packaging regulations were discovered, and the site was shut down during October and November of that year by Washington's governor. This, together with the March 1979 accident at Three Mile Island, the nuclear power plant near Harrisburg, Pennsylvania, precipitated the waste disposal crisis of 1979 which led to the LLWPA.

By 1979, the volume of LLW sent to commercial disposal sites had grown to nearly 3 million cubic feet annually. The accident at Three Mile Island's Unit 2 reactor spurred growing concern in some parts of the nation about the perils of nuclear power. It also generated a lot of waste. And Richard Riley, the newly-elected governor of South Carolina, did not want this waste to be sent to the Barnwell facility. Although the facility, which had benefitted from the experiences of the other sites, was generally well-run and had not had major waste management problems, it was at risk of becoming the dumping ground for

the nation. (In 1978, it took 2.4 million cubic feet of waste, or approximately 80 percent of the national total.)

Commenting that "what was intended to be a regional facility . . . has, in fact, become a 'national' facility for virtually all the low-level commercial waste east of the Rocky Mountains,"⁴ Riley took steps to bar the TMI waste from the Barnwell site. Then, in October of that year, with both the Beatty and Richland sites temporarily closed, he moved to place volume restrictions on the site. Over the next two years, the amount of waste that would be accepted at Barnwell would be phased down by half, to 1.2 million cubic feet per year. Generators of LLW could no longer count on unlimited disposal capacity.

THE LLWPA

With the waste disposal crisis of 1979, there was a flurry of Congressional interest in having a federally-oriented LLW disposal program. However, before long this was discarded in favor of a state approach. While the states were not altogether enthusiastic about taking on the burden of responsibility for LLW disposal, many thought a federal approach was undesirable. The federal government

⁴Richard Riley, as quoted in the News and Courier (Charleston, South Carolina), April 21, 1979.

had a poor record of taking care of waste; it was wedded to shallow land burial, which had fallen into disfavor with the public and many state officials; it tended to neglect public participation in its decisions. In addition, a state approach would allow the states to develop their own site selection procedures and criteria, rather than having the federal government decide unilaterally where to locate LLW disposal sites; the state approach would allow them to be involved in the disposal sites' regulation; and it would enable them to establish fee structures that could produce revenue for the states and host communities. There was also widespread agreement that a regional system of facilities, achieved through interstate compacts, would be the most efficient way to fulfill the states' responsibility for LLW disposal.

The state approach was supported by a number of groups of state officials, including the President's State Planning Council on Radioactive Waste, chaired by Governor Riley; the National Conference of State Legislatures; and the National Governors' Association, which formed a task force to help formulate the bill that eventually passed. Initially, this legislation was included in a much larger bill addressing the disposal of high-level as well as low-level waste. However, by late in 1980 it was evident that conflicts about high-level waste disposal could not be

resolved in that Congressional session. (The Nuclear Waste Policy Act, which deals with high-level waste disposal, was not enacted until 1982, and has proved to be extremely difficult to implement.) The LLWPA was carved out of the larger bill and was passed by the House and the Senate late in December of 1980. National environmental groups such as the Sierra Club had focussed on high-level waste disposal, but they too supported the state approach to LLW disposal.

Although the states, through the National Governors' Association, had unanimously supported passage of the LLWPA, they were slow to carry out its mandate. The LLWPA had allowed five years for the new system of disposal facilities to get up and running. But as of 1985, it still had a long ways to go.

By 1985, seven compacts had formed: the Southeast Compact, with eight states; the Northwest Compact, with seven states; the Midwest Compact, also with seven states; the Central Compact, with five states; the Rocky Mountain Compact, with four states; the Northeast Compact, also with four states (two subsequently dropped out); and the Central Midwest Compact, with two states. The remaining thirteen states plus the District of Columbia and Puerto Rico, were unaffiliated, although some were negotiating compacts.

As of 1985, three of the compacts knew which state would host their regional facility. The state of

Washington, which was in the Northwest Compact, had agreed that the Richland site could remain open for compact waste. And in the Rocky Mountain and Central Midwest compacts, it was understood from the beginning that the host states would be Colorado and Illinois, respectively, since they produced most of their region's waste. But four of the compacts--the Southeast, Midwest, Central, and Northeast--had not yet determined who their host state would be. In addition, by 1985 some states, including some that were still unaffiliated, had enacted the legislation necessary to authorize finding a site for and then developing a new LLW disposal facility. But no state had successfully completed this process, and most were only beginning. Texas, the one state that had proceeded vigorously, was prepared to identify a preferred site in early 1985, but a storm of protest arose from the prospective host area, and the governor and legislature directed the siting agency to begin its site search anew using somewhat different criteria. The 1986 deadline was nearly upon the states and compacts, but none was ready to open a new facility.

The compacts, to be official, required the consent of the US Congress. But according to the LLWPA, any congressionally approved compact could exclude outsiders' waste after January 1, 1986. (The LLWPA was silent

regarding whether individual states would have similar exclusionary powers.) Washington intended to limit the Richland site to Northwest Compact waste. Nevada, which had joined the Rocky Mountain Compact, planned to close the Beatty site. South Carolina, which had joined the Southeast Compact, planned to close the Barnwell site. The seven compacts that had been formed by 1985 had already been ratified by their party states and had begun to take action, but none had been approved by Congress. Thus, none--including those with operating facilities--could legally exclude waste from outside their regions. But the threat was there. South Carolina, Washington, and Nevada remained adamant: the status quo could not continue, and if it did, they would seek to close altogether or to restrict access to the facilities in their states.

But the compacts needed the consent of Congress, and in Congress, the states that belonged to compacts with existing sites were outweighed by the "unsited" regions and unaffiliated states. On December 19, 1985, less than a day before Congress adjourned, a compromise bill was adopted by a voice vote in the Senate. (It had already been unanimously passed by those voting in the House.) The bill that eventually passed was hammered out largely through negotiations sponsored by the National Governors' Association that had taken place over the preceding year.

It was based on a bill first proposed by US Representative Morris Udall in October of 1984 . . . a bill which signalled the intent of Congress to address problems with the LLWPA. A year later, Representative Udall, chair of the House Committee on Interior and Insular Affairs, became instrumental in orchestrating passage of the compromise bill, as did South Carolina's Governor Riley. Both had strongly backed the 1980 LLWPA; five years later, both strongly backed the LLWPAA so that the former act's fundamental purpose could be achieved.

THE LLWPAA

As enacted, the LLWPAA provided that the three existing sites would stay open to all LLW generators until January 1993. The cost of access would escalate, but generators could continue to ship their waste to Barnwell, Beatty, or Richland for another seven years, providing certain conditions were met. Between 1986 and 1993, the compacts and states would have to meet four milestones, with increasingly severe penalties if they didn't:

- By July 1986, each state had to either join a compact or indicate its intent to site a facility for itself. After July 1, 1986, all generators other than

those in regions with existing sites had to pay a surcharge of \$10 per cubic foot, on top of the regular disposal fees. Seventy-five percent of the surcharge was to be retained by the "sited" state where the waste was being shipped for disposal (South Carolina, Nevada, or Washington); 25 percent was to be rebated to the originating state or compact, for use in developing a new disposal site. If a state missed this milestone, however, the surcharge would be doubled. Furthermore, no rebates would be made on surcharges or penalties paid during periods when the state was out of compliance with the LLWPAA.

• By January 1988, each compact had to select a host state, and each compact or host state, including each unaffiliated state, had to adopt a siting plan giving procedures and a schedule for selecting a site and preparing a facility license application. On January 1, 1988, the regular surcharge was to be raised from \$10 to \$20. If a compact or unaffiliated state missed this milestone, its generators would have a one-year grace period, during which time they instead would have to pay a \$40 per cubic foot surcharge for the first six months and an \$80 per cubic

foot surcharge for the remaining six months. After the grace period was up, the sited states could deny access. (In this and other situations, NRC could override a state or compact's denial and grant emergency access, but only for up to 360 days.)

- By January 1990, the host states had to file disposal facility license applications. If they failed to do so, the governor of each noncomplying state, including each state in a noncomplying region, had to certify to the NRC that the state would provide storage or disposal capacity for LLW generated within the state after the 1993 deadline. No grace period was allowed for failure to meet this milestone . . . access could be denied immediately. In addition, on January 1, 1990, the regular surcharge was to be raised from \$20 to \$40 per cubic foot.

- By January 1992, a disposal facility license application had to be filed. Otherwise, the governors of the sited states could require that for continued access to their disposal sites, generators from noncomplying regions or states would have to pay a

surcharge of up to \$120 per cubic foot, rather than the \$40 per cubic foot surcharge otherwise applicable.

There were a few exceptions to these milestones.

Party states to compacts with existing sites (the Southeast, Northwest, and Rocky Mountain compacts) did not have to meet the milestones or pay the surcharges. States that arranged for waste disposal by contract with a sited compact and its host state, while they had to pay the surcharges, would automatically be considered in compliance with the LLWPAA's milestones, even if the contract was only good until 1993. All other states and compacts had to prove that they had met the milestones and were subject to the penalty surcharges and possible access denial if they hadn't. And all states and compacts, sited and unsited, faced the LLWPAA's 1993 deadline.

Between 1986 and the 1993 deadline, restrictions were also placed on the volume of waste that the existing sites would be called upon to receive. The formula adopted by the LLWPAA was based largely on the amounts of LLW sent to each site in 1983. According to this formula, Washington could limit its total volume of waste accepted for disposal during the seven-year transition period to 9.4 million cubic feet; South Carolina, to 8.4 million cubic feet; Nevada, to 1.4 million cubic feet. A complex formula was

spelled out for determining how much disposal capacity each nuclear power reactor could expect. Non-utility generators were simply guaranteed access, subject to the overall volume restrictions and to their state's compliance with the milestones.

The volume of waste shipped for disposal at the three commercial sites had peaked in 1980 at 3.8 million cubic feet. But the cost of disposal had risen sharply, due in part to more exacting requirements on waste disposal practices. For example, in 1975, disposal charges for Class A waste were about \$1 per cubic foot; by 1985, they were approaching \$20 per cubic foot. Disposal costs were due to go much higher with the surcharges. Generators increasingly were motivated to cut back on the LLW that they shipped for disposal. By 1985, the amount of shipped waste had already decreased to about 2.7 million cubic feet--the average annual amount allowable under the LLWPAA's formula. (In the ensuing five years, volumes of shipped waste decreased about 50 percent more.) Keeping within the volume limits of the LLWPA was doable. Now, the main concern of the generators was whether the milestones and penalties imposed by the LLWPAA would ensure that the 1993 deadline for new disposal facilities was met.

By design in the LLWPAA, the 1993 deadline was also meant to be of concern to the states. The LLWPAA specified

that if a state or compact failed to meet it, LLW generators could go to the state where their waste was generated and request it to take title to and assume liability for the waste. If the state declined the request, then, over the next three years, the generators would be repaid--with interest--25 percent of the \$40 per cubic foot surcharge paid by them between January 1990 and January 1993. And according to the LLWPAA, as of January 1, 1996, the state would have to comply with a generator's request to take title to and assume liability for its waste. No ifs, ands, or buts.

The LLWPA was two pages long. It made clear the states' responsibility for LLW disposal, and it assumed that the prospect of compacts' excluding out-of-region waste would ensure that the January 1, 1986 deadline would be met. In hindsight, it became clear that more time and more impetus was needed for the LLWPA's goal to be realized. The 18-page LLWPAA was meant to correct for it.

ONE DECADE AFTER THE LLWPA . . .

In the three years following the LLWPAA, two more compacts were formed and approved by Congress. (See Figure 1.) Pennsylvania had gotten together with West Virginia to form the Appalachian Compact; Delaware and



Figure 1. Compact Regions and Unaffiliated States

Figure 1. Compact Regions and Unaffiliated States

Maryland, which had dropped out of the Northeast Compact, then joined the Appalachian Compact. It was clear from the compact's host state selection criteria that Pennsylvania, a large LLW-generating state (see Table 1), would be host. California had joined with Arizona and then with North and South Dakota to form the Southwestern Compact. It was understood that California--like Pennsylvania, a large LLW-generating state--would be host.

Altogether, nine compacts had been formed and approved by Congress by the end of 1988. The four that had not yet chosen their host states at the time of the LLWPAA had, with difficulty, done so in time to meet the 1988 milestone. The Southeast Compact selected North Carolina; the Midwest Compact, Michigan; the Central Compact, Nebraska. (Each plans to rotate the responsibility for providing a regional facility among the party states at 20- or 30-year intervals.) The Northeast Compact, reduced to Connecticut and New Jersey, decided on a "dual state" approach. Each would have a facility that would handle only its own state's waste.

Washington state still plans to allow the Richland site to remain open for another 10 or 20 years, and as of the end of 1990, it--with the Northwest Compact--was considering taking the Rocky Mountain Compact's rather minimal amounts of waste after 1993, in exchange for a

TABLE 1

LLW SHIPPED FOR DISPOSAL AT BARNWELL, BEATY,
AND RICHLAND--1990
(Volume in Cubic Feet*)

<u>Appalachian</u>		<u>Rocky Mountain</u>	
Delaware	844	Colorado	2,309
Maryland	17,038	Nevada	313
Pennsylvania	101,604	New Mexico	1,844
West Virginia	95	Wyoming	15
	<u>119,581</u>		<u>4,481</u>
<u>Central Midwest</u>		<u>Southeast</u>	
Illinois	98,360	Alabama	14,238
Kentucky	4,616	Florida	24,587
	<u>102,976</u>	Georgia	55,287
<u>Central</u>		Mississippi	5,981
Arkansas	6,239	North Carolina	48,098
Kansas	3,233	South Carolina	46,927
Louisiana	11,329	Tennessee	83,402
Nebraska	15,559	Virginia	57,766
Oklahoma	21,968		<u>336,286</u>
	<u>58,328</u>	<u>Southwest</u>	
<u>Midwest</u>		Arizona	27,751
Indiana	1,956	California	55,957
Iowa	5,558	North Dakota	33
Michigan	36,039	South Dakota	1,170
Minnesota	26,823		<u>84,911</u>
Missouri	19,610	<u>Unaligned</u>	
Ohio	24,147	D.C.	539
Wisconsin	9,217	Maine	7,857
	<u>123,350</u>	Massachusetts	40,613
<u>Northeast</u>		New Hampshire	206
Connecticut	34,138	New York	71,284
New Jersey	52,879	Rhode Island	160
	<u>87,017</u>	Texas	9,202
<u>Northwest</u>		Vermont	**
Alaska	34		<u>129,861</u>
Hawaii	4,739	<u>Total</u>	
Idaho	40		1,142,810
Montana	195		
Oregon	59,456		
Utah	5,338		
Washington	26,141		
	<u>95,943</u>		

*Numbers may not total due to rounding.

**No waste shipped because out of compliance.

Data Source: Low-Level Waste Management Program, US Department of Energy, 1990 preliminary data.

disposal surcharge. The other seven compacts must establish new sites. By the end of 1990, five unaligned states had passed siting legislation with the expressed intent of "going it alone" if no other state was willing to take their waste. Texas passed "go-it-alone" siting legislation in 1981. (However, it amended that legislation in 1991 to allow for the possibility of forming a compact.) New York passed siting legislation in 1986; Massachusetts and Maine, in 1987; and Vermont, in early 1990.

Thus, by the end of 1990, ten years after the LLWPA was passed, thirteen states had enacted siting legislation and were actively--or semi-actively--engaged in trying to find sites for new LLW disposal facilities.⁵ The progress has been erratic.

California, whose site selection process got underway in 1985, has been relatively successful. US Ecology, which was chosen by the state to develop and operate the facility, selected a site in Ward Valley, in the desert lands of southwestern California, and filed an application to construct the facility in late 1989. Assuming the licensing and concurrent environmental impact review process go smoothly, the facility is expected to open in

⁵For a description of each state's siting program, see Mary R. English with Dudley J. Delffs, Jr., 1990 Update: Summary of Low-Level Radioactive Waste Disposal Facility Siting Laws (Knoxville, TN: Energy, Environment, and Resources Center, University of Tennessee, 1991).

1992. US Ecology was also chosen by the Central Compact to site, develop, and operate the region's facility. After Nebraska was selected as the host state, US Ecology undertook a site selection process that led to the identification of a site in Boyd County, on the border of South Dakota. Local and statewide opposition to hosting a LLW disposal facility has been greater in Nebraska than in California, but US Ecology submitted a license application in 1989 and hopes to have the facility open by 1993. In Illinois, the Department of Nuclear Safety--the agency in charge of the state's LLW disposal facility siting process--was anxiously awaiting the outcome of hearings on a site in Martinsville, in rural east-central Illinois, to be held by a newly constituted oversight commission in 1991. The status of the other states' siting programs is even more tenuous.

Texas, which had the earliest and perhaps the most earnest response to the LLWPA, has had great difficulty in finding a site that is politically acceptable as well as technically suitable. After having its efforts rebuffed in 1985, the Texas LLW Authority retrenched, looked for another site, found one in an arid and sparsely populated area in west Texas, but has since reached a virtual impasse because of lawsuits brought by neighboring El Paso County, about 40 miles to the west of the Hudspeth County site.

(In early 1991, Governor Ann Richards directed the Authority to renew its site search while continuing to press for resolution of the remaining suit concerning the Hudspeth County site; in mid 1991, the Texas legislature enacted a bill which would redirect the site search of the Authority, extend its powers, and help to secure siting success.) New York, Michigan, and North Carolina have also encountered formidable difficulties in finding sites that are both technically suitable and politically palatable. It is likely that Pennsylvania will, too, but as of the end of 1990 it had not yet gotten to the point of identifying candidate sites. Chem-Nuclear, which was selected as the contractor to operate Pennsylvania's facility (it is also the facility contractor for Connecticut, Illinois, and North Carolina), submitted a siting plan to the Pennsylvania Department of Environmental Resources in December 1990, but following public comment, was directed by the department to revise the plan.

Maine and Vermont, while pursuing siting programs, both hope to align by compact or contract with another state or region that will take their waste. If Texas can solve its siting problems, it may come to the rescue . . . for a price. Maine and Vermont, led by representatives of their respective nuclear power plants, Maine Yankee and Vermont Yankee, have been negotiating with Texas but have

been finding it difficult to come up with a persuasive offer. An up-front \$20 million apiece has been discussed, but it may not be enough. Connecticut and New Jersey also hope to find an external solution, but as of the end of 1990, none had presented itself. Massachusetts, whose 1987 siting legislation was a complex, 58-page document laying out four phases before a facility would be operational, was still in its first, pre-site-selection phase more than three years after passage of the act. It has had bureaucratic complications and problems with appropriations, and opposition within the state to nuclear power and radioactive waste disposal is strong and widespread. But because it has two nuclear power reactors and an industrial sector that generates a lot of LLW, the amount of waste shipped annually from Massachusetts is not trivial. Persuading another state to take it would be difficult.

The others that were unaligned as of the end of 1990--New Hampshire, Rhode Island, the District of Columbia, and Puerto Rico--produce negligible amounts of waste. (With the start-up of the Seabrook nuclear power plant, considerably more LLW will be generated in New Hampshire.) Puerto Rico has made no arrangements for waste disposal and is out of compliance with the LLWPAA. The other three have contracted with the Rocky Mountain Compact

to have their waste sent to the Beatty site until the end of 1992. (New Hampshire's contract excludes Seabrook waste.) According to DOE, they are in compliance with the LLWPAA, but what will happen to their waste beginning in 1993 is uncertain. All compacts have provisions for compacting and contracting, but--apart from the probable Northwest/Rocky Mountain arrangement--it is unclear whether any will agree to permanently take on outsiders.

THE ROAD AHEAD

Of the states and compacts that are trying to develop new LLW disposal facilities, only California and Nebraska anticipate having facilities open and operational by the beginning of 1993. The others expect that it will take two years or more beyond the 1993 deadline to have a viable facility. They are working with generators to plan how waste will be stored after the deadline has passed. But storage is a temporary, not a permanent solution. And in 1996, storage or disposal becomes the states' problem, not the generators'.

Some states still hope that a knight in shining armor will appear: for example, that South Carolina will agree to let the Barnwell site remain active, or that Washington or California and their compacts will open their doors and

let the rest of the nation send its waste there. Those who hope this argue that the prospective system of 14 sites is clearly inefficient and that a few well-run sites, located in arid climates, would be both much less costly and much more safe. But the states with existing or prospective sites have given no overt indication that they wish to return to the open-door days of the 60s and 70s. (In fact, in 1991, the Southwest Compact Commission, pressed by California's environmental community, voted to reject all applications for disposal access from non-member states.) And Congress has given no indication that it wishes to revisit the LLWPA and its amendments and decide by fiat where disposal sites should be located.

Some states may be able to work out arrangements to have others take their waste. It does not appear, however, that this option will be available to all states without disposal capacity. States and compacts that generate significant amounts of waste are especially unlikely to find willing recipients for their waste. And even those that may eventually come up with alternative arrangements must for now make good-faith efforts to site their own facilities--to ensure their continued access to the existing sites until the 1993 deadline; to improve their chances that an alternative arrangement can be found; and to have a back-up in case one isn't. But "getting to 1993"

is no longer the main concern. The big problem looming on the horizon is 1996.

ISSUES FACING THE COMPACTS AND STATES

Finding sites for new LLW disposal facilities is by no means the only problem the states and compacts have faced. There are a number of other issues they must contend with, many of which are related to siting. Some of these were recognized by the time of the LLWPAA and dealt with in those amendments; others were not. Key issues include:

LLW Definitions, Regulatory Responsibilities, and Disposal Responsibilities

In the LLWPA, LLW was defined by what it was not. This gave the NRC considerable latitude to change the definition of LLW as it saw fit, thus expanding or contracting the states' responsibilities. And there were areas where regulatory and/or disposal responsibilities for particular types of waste were not fully clear. The states were concerned, and pressed for clarification. These problems were addressed in the LLWPAA.

One problem was NARM--"naturally-occurring and accelerator-produced radioactive material." NARM includes

both discrete material (e.g., radium needles used in medicine, or radioactive material produced in linear accelerators and used for making instruments) and diffuse material (e.g., radium-contaminated soil at plants that manufactured luminous paint and dials). The latter is an especial problem, since there may be millions of cubic feet of soil that is slightly contaminated with radium. The LLWPAA made it clear that because NARM is not regulated by the NRC, states are not required to take responsibility for its disposal. They may do so, but as LLW, NARM is "orphan waste"--waste that is neither the states' nor the federal government's designated responsibility.

Another problem was GTCC waste--"greater than Class C" waste. The states were concerned that, if no upper limit was set on the definition of Class C waste, they would not know what type of facility to design for these wastes. The NRC could redefine Class C, and they would still be responsible. In the LLWPAA, it was made clear that the states would be responsible for LLW only as defined by the NRC in 10 CFR 61 as issued in January 1983. Any waste that exceeded the curie content limits set at that time for Class C would be considered GTCC waste and, according to the LLWPAA, would be a federal responsibility.

Prior to passage of the LLWPAA, Representative Peter Kostmayer of the House Interior Committee proposed an

amendment to make Class C waste a federal responsibility as well. LLW disposal facilities would then be easier to site, because the curie content of the wastes accepted would be much lower. They would also be safer, because the wastes accepted would decay to reasonably safe levels within the 100-year institutional control period. But the Kostmayer amendment had a mixed reception. Other members of the House Interior Committee, including its chair, Representative Udall, were opposed to altering the basic principles of the 1980 LLWPA. And the states, which had been citing those principles as a reason for not subsequently expanding their disposal responsibilities, felt they could not turn around and advocate changing one of the principles. The Kostmayer amendment was dropped, but the issue of whether it is reasonable to expect states to handle Class C waste has continued to crop up.

At the other end of the spectrum from GTCC and Class C waste is BRC waste--waste that is "below regulatory concern." The LLWPAA directed the NRC to establish standards and procedures for exempting from NRC regulation (and disposal under LLW regulations) wastes that have such low concentrations of radionuclides as to be below regulatory concern. The NRC already had the authority to do this, but, because of a desire to extend the life of LLW disposal facilities, they now had a mandate. In July of

1990, they issued a BRC policy which proved to be highly controversial. The policy was widely criticized by public interest groups for being too lax and for sacrificing public health and safety to economics, and by state officials for heightening concerns about radioactive waste disposal and thereby destabilizing their efforts to meet the LLWPA's mandate. Several states enacted legislation that would bar BRC waste from disposal as solid waste; bills were introduced before Congress to change the BRC policy; a lawsuit challenging the policy was brought by the national public interest group, Public Citizen, with 29 co-petitioners and with 16 states filing an amicus curiae brief in their support. In February of 1991, the NRC tabled its policy and initiated a consensus-building process to resolve differences about how BRC wastes should be defined.

Mixed waste--waste that is both radioactive and chemically hazardous--was yet another problem facing the states when the LLWPAA was passed. With mixed waste, the issue was not whether the states would be responsible for its disposal. It was clear that, if the waste's radioactive component fell within the definition of LLW, they would be. Instead, the issue was how regulations governing mixed waste disposal would be reconciled. Because mixed waste is regulated by both NRC and EPA, its

disposal is governed by two different and in some ways conflicting philosophies. Whereas EPA regulations require that a hazardous waste disposal facility include a dual liner with a leachate collection system, NRC regulations discourage the use of liners because they retain water and can create a "bathtub" effect. And whereas EPA regulations are geared to active monitoring and short time horizons, NRC regulations are geared to minimizing human contact and to ensuring safe disposal over the long term, through reliance on how the waste is treated and packaged and where and how the disposal facility is constructed. Other problems include EPA's waste analysis and sampling requirements, which could expose workers to unacceptable levels of radioactivity, and its limitations on waste storage, which preclude all but very brief periods of storage before disposal. These problems were recognized at the time of the LLWPAA, but no resolution was reached. Since then, NRC and EPA have been trying to come to a joint understanding on how mixed waste should be handled.

In terms of volume, mixed waste is not a huge burden: it currently constitutes about 5 percent of all commercial LLW. The burden can be made smaller either by having BRC standards that allow some wastes to be declared non-radioactive and treated simply as hazardous waste, or, conversely, by having de minimis criteria for the hazardous

component of the waste. But some waste inevitably will remain classified as mixed. And unlike LLW, the definition of hazardous waste is not fixed. As more substances are listed as hazardous, the volume of mixed waste may increase. Because of mixed waste's regulatory uncertainties, most states are taking a "wait and see" attitude. One possibility being explored is for DOE, which has a much larger quantity of mixed waste, to dispose of the states' relatively small quantities.

Exposure Standards

The NRC's 10 CFR 61 establishes a performance standard of 25 millirems as the maximum whole body dose that a member of the public may receive annually from a LLW disposal facility. Several host states, however--prompted by concerns expressed by environmentalists--are adopting much more stringent standards. These may be as low as one or two millirems, with zero release goals.

In addition, EPA is also considering promulgating more stringent standards. While regulation of LLW disposal is primarily an NRC concern, EPA can issue standards concerning releases of contaminants into environmental media such as air and groundwater. (It can also issue standards regarding the location of LLW facilities.)

Although, as of the end of 1990, EPA's LLW standards were not finalized, they promised to be somewhat more conservative than NRC's. The disagreement has contributed to a turf battle between the two agencies. At issue is whether NRC's standard provides an adequate level of protection, whether more stringent standards would be worth the additional costs that they would entail, and whether EPA should defer to NRC if EPA's proposed standard would provide no substantial health benefit over the NRC standard.

Disposal Technologies: Security, Retrievability, Cost, and Economies of Scale

10 CFR 61 was written with shallow land burial in mind, since that was the only technology that had been used at commercial LLW disposal sites as of 1982. Its methods had been refined and improved since the days of West Valley, Maxey Flats, and Sheffield. But because of the adverse experiences at those sites, shallow land burial came to be regarded with deep suspicion, especially by environmental groups, and was prohibited in a number of states' LLW disposal facility siting laws. To increase the acceptability of LLW disposal and to offer the promise of meeting stringent release standards, those in charge of

selecting the disposal technology--usually, the host state in conjunction with the prospective facility operator--have turned to elaborate, highly engineered facilities.

Modelled in part on disposal technologies that have been used in Europe, especially in France, these tend to feature multiple barriers and massive concrete structures that are located aboveground but have engineered earthen caps. The only new facility that will use shallow land burial is California's Ward Valley site. And there, "enhancements," including deeper burial and thicker caps, will be included.

At first it was unclear whether the new engineered technologies would fit the NRC regulations, or vice versa. However, by the time of the LLWPAA, it was evident that shallow land burial had fallen into disfavor, and the 1985 act directed the NRC to publish technical guidance regarding the licensing of alternative disposal methods. Licensability is no longer a major problem. A bigger problem with some of the engineered approaches is the question of retrievability. Many environmental groups, especially those who question the safety of LLW disposal, want the waste to be retrievable. If something goes wrong it can be remedied, and if a better solution to radioactive waste is found it can be retroactively applied. But retrievability does not fit well with the concept of permanent, earth-covered disposal dictated by 10 CFR 61.

Accommodations to this problem have been found, but the goal of easy retrievability remains at odds with the definition of disposal, spelled out in the LLWPAA, as "permanent isolation."

Another problem with complex engineered disposal technologies is their cost. Whereas disposal costs were, as of 1990, on average about \$40-\$50 per cubic foot at the three operating sites, they are projected to rise in the next decade to about \$100-\$500 per cubic foot at the new, engineered disposal facilities.⁶ It is expected that actual disposal costs will correlate inversely with the facility's annual volume. Very small, highly engineered facilities (e.g., those taking only 10,000 cubic feet annually) are likely to have disposal costs of \$500 or more per cubic foot; large, highly engineered facilities (e.g., those taking 300,000 cubic feet annually) are likely to have disposal costs of about \$100 per cubic foot.

The economies of scale afforded by a large facility is used as an argument for having fewer sites. So is the high cost of finding and developing new LLW disposal sites: fewer sites means fewer expensive screening processes, fewer community benefit packages, etc. But costs are

⁶Robert T. Anderson, Victor J. Barnhart, and Michael T. Ryan, "Advanced Disposal Technologies for New Low-Level Waste Disposal Compact Sites," in Roy G. Post, ed., Waste Management '90 Proceedings, vol. 2, p. 184.

mainly a concern to LLW generators, especially to those, such as medical and academic institutions, that cannot readily pass increased disposal costs on to their consumers. While utilities would also like to see LLW disposal costs kept to a modest level, theirs are spread over many ratepayers and do not add enough to utility bills to provoke ratepayer objections.

Volume Reduction, Source Reduction, and Fee Structures

Spurred by escalating disposal costs as well as limitations on disposal capacity, LLW generators adopted more and more waste reduction practices during the 1980s. Initially, these practices were limited primarily to compaction--cramming the same amount of waste into less space (thereby making it more intensely radioactive but with fewer voids). Compaction quickly evolved into supercompaction and shredding, and in addition, sophisticated decontamination-and-reuse techniques were developed for tools, hardware, etc. Incineration has also become an option for some LLW. For example, in 1989 a commercial LLW incinerator operated by a private firm in Oak Ridge, Tennessee, was started up which processes LLW from around the country and can achieve very high volume reduction ratios. However, radioactive ash still must be

shipped for disposal, with the ash identified by the originating generator and state, and certain types of LLW are not amenable to incineration.

Ironically, good waste management practices, together with stricter regulations governing waste disposal and with the LLWPAA's surcharges, have contributed to higher unit disposal costs. As the disposal sites receive less waste, they must charge more per cubic foot to keep making a profit. Rates charged at the Barnwell, Beatty, and Richland sites have not been subject to state formulas, but it is expected that all states with new LLW disposal facilities will regulate their disposal fees, and Washington is planning to begin regulating the Richland site's fees. Fee structures are likely to be complex formulas that take into consideration such factors as the size and weight of the waste container, the form of the waste, its radionuclide activity, and its surface dose rate. Fees will be set to allow for a profit margin, if the facility is privately operated, and to take into account its full costs, from development to post-closure, including the cost of liability insurance.

Liability

Liability is an issue both among states that have joined a compact and within states that seek host communities. In some compacts and states, it is being addressed only belatedly, through legislative amendments or regulations. At issue are such questions as who should pay for damages to health or property, who is eligible for damage restitution (including what proof of damages is needed), and how much should be paid. Of these questions, the first currently is receiving the most attention.

The division of liability within compacts raises the problem of control. How far should party states be held liable for what happens at a regional facility if only the host state has control over the selection of the facility's location, disposal technology, and operator? Several compacts have grappled with this issue. In addition, liability has been a potentially contentious issue between host states and their facility operators. What liability, if any, should the state assume while the facility is operating? Should the facility operator be subject to strict liability principles--i.e., be held responsible even if negligence cannot be proved? Should there be a rebuttable presumption that the facility has caused any radioactive contamination in its vicinity? (According to

Pennsylvania's siting law, for example, the facility operator will be liable for all damages and radioactive contamination within three miles, unless it can prove that it did not contribute to the damage or contamination.) Who assumes liability for the facility after it has closed is also an issue that must be worked out between the facility operator and the state, and between the state and its party states.

Because of their extensive financial assurance requirements, states now limit the pool of prospective facility operators to companies with "deep pockets." And because of liability provisions as well as other financial risks (including, in some cases, the need to provide a lot of up-front money) only a few well-financed companies are now interested in operating LLW disposal sites.

Storage

If a state is out of compliance with the LLWPAA, it may be denied access to the existing sites. Its generators then must store waste that they would otherwise ship for disposal. In addition, most compacts and unaligned states will not meet the 1993 deadline and must plan for waste storage until a disposal site is ready. Between 1993 and 1996, this could mean storage by many LLW generators. But

as of 1996, the states will be expected to take title to the waste upon the request of the generators. States then may need to provide storage capacity if they still don't have a disposal facility. Storage is becoming an increasingly critical issue, but it is not at all clear how it should be undertaken.

Between 1993 and 1996, different storage strategies may be adopted, each with its pros and cons. One option is to develop a centralized storage facility. This could be the safest, most secure storage method, but it would necessitate finding a host community for the facility--an enterprise that could be nearly as difficult as finding one for a disposal facility. In addition, as with a disposal facility, complicated procedural issues--e.g., siting criteria and compensation to the host community--would have to be worked out. In fact, it can be argued that given the trend toward retrievability in disposal facilities, there is little that would be different about a storage facility. (In a few states, in fact, retrievability has become such a byword that disposal is being called storage.)

As an alternative to centralized storage, each generator could store its own waste. This avoids problems of finding a storage site and getting local acceptance: the generator has an existing operation, and the surrounding community probably will be unaware of changes

in that operation (although perhaps they should be told). Larger generators such as nuclear power plants might have the room to store their waste for several years. However, they could encounter problems. Future waste form and packaging requirements would have to be anticipated, so that the generators could store waste in the appropriate manner, and these requirements would affect the amount of storage space effectively available. On-site storage also may be the least safe option, especially for small LLW generators. Small generators such as hospitals and universities are not professional radioactive waste managers; they have other missions. Without elaborate training programs and security measures, on-site storage runs the risk of radiological exposure to workers and "inadvertent intruders." It also requires that expensive, specially constructed or retrofitted space with monitoring systems, dedicated exhaust systems, etc. be provided, with refrigerated storage for biological wastes such as animal carcasses. Even then, it may be difficult to make the storage area secure against hazards such as fires.

With on-site storage, decisions would also need to be made about amending the LLW generator's license to allow storage of more material for longer periods of time. The NRC, which has sole authority to license and regulate nuclear power plants, currently limits at-reactor storage

to five years. It is considering relaxing this policy in light of the states' storage plight, but while doing so, it is consciously struggling to define its appropriate role: Should it seek to enforce the LLWPAA by using storage limitations as a "stick" to prod the states into developing disposal facilities, or is public health and safety its sole responsibility?

A third option is to use a blended approach--e.g., at-reactor storage of utility waste and storage of non-utility waste at a special state-run facility. This avoids some but not all of the problems with the first two options. A variation on this approach is have non-utility wastes stored at one or more of the nuclear power plants, rather than building a specially dedicated facility. This avoids the siting problems of a special storage facility, but utilities are disinclined to take on this responsibility, partly because of the liability problems involved, and such arrangements currently are not permitted by NRC. Another variation on this theme is to store non-utility waste at facilities provided by LLW brokers (companies that collect and ship waste for disposal). Brokers may be amenable to this idea, but under current regulations, they can only store wastes for a short period. In the long run, if wastes were accumulated at a broker facility for several

years, problems concerning space, safety, and public acceptance could also crop up.

With the compacts, all of these alternatives exist. But, in the event that they do not meet the 1993 deadline, compacts have the added problem of deciding how to allocate responsibility for storage among their member states. They face such questions as: Should the host state take responsibility for the region's waste, should some other regional solution be sought, or should each state determine how best to manage its waste until the regional disposal facility is up and running?

WHAT HAPPENS IN 1996?

One of the biggest concerns about storage is time. Storage is supposed to be interim, until a permanent disposal facility is open. But given the difficulties of establishing a disposal facility, it will be tempting to get the waste in storage and forget it. This is a reservation many people have about storage, especially on-site storage, and it is one of the reasons for the LLWPAA's 1996 take-title-and-possession provision, which reads:

If a State (or, where applicable, a compact region) in which low-level radioactive waste is

generated is unable to provide for the disposal of all such waste generated within such State or compact region by January 1, 1996, each State in which such waste is generated, upon the request of the generator or owner of the waste, shall take title to the waste, be obligated to take possession of the waste, and shall be liable for all damages directly or indirectly incurred by such generator or owner as a consequence of the failure of the State to take possession of the waste as soon after January 1, 1996, as the generator or owner notifies the State that the waste is available for shipment.⁷

The provision is fuzzy in some respects, however. First, it is not clear whether states can be asked by generators to assume responsibility for backlogs of LLW generated and stored between 1993 and 1996, and to pay for damages and other costs incurred by them during that time due to their LLW. And second, it is not clear whether the phrase "liable for all damages directly or indirectly incurred" is meant to be broadly construed, to include, e.g., costs resulting from a LLW generator being forced to go out of business, or narrowly construed, to include only

⁷Public Law 99-240, sec. 5(d)(2)(C).

costs obviously due to not being able to transfer possession of LLW to the state. Such issues were brought up in congressional debate of the proposed LLWPAA, but they remained points of contention when this act was passed.

Even more importantly, the take-title-and-possession provision has been questioned from a legal standpoint. Given the traditional principle of sovereign immunity (a state must consent to liability before it can be held liable), it is unclear how effective the threat of being sued will be in motivating states to develop the licensed storage facilities needed in order to take possession. There is also a question whether the provision runs afoul of the US Constitution's 10th amendment (the reserved powers clause), especially since the take-title-and-possession provision applies to all states, even to those that did not, by enacting and seeking congressional consent to interstate compacts, imply concurrence with the LLWPAA's provisions. These issues also were debated immediately before the LLWPAA's passage, but again, they were not resolved.

While the tiger at the end of the LLWPAA trail may turn out to be toothless, no one knows that for sure. The take-title-and-possession provision's constitutionality has been being challenged in court, but so far those challenges have been unsuccessful. And few states are prepared to sit

back and risk the consequences if it turns out this provision is enforceable. Virtually all feel compelled to act as if both the 1993 deadline, when free-market access to disposal facilities is terminated, and the 1996 deadline, when generators can demand that states take responsibility for their LLW, are real.

CONCLUSION: A WEB OF ISSUES

The LLWPA was an unprecedented exercise of authority by the federal government over the states in an area that previously was largely a private matter. The federal government, and by extension the state governments, had regulated LLW disposal, but their concern had been limited to how LLW was disposed. Now, through the LLWPA, the federal government was directing the states to take an active responsibility for the disposal of this waste. If they did not, they would face the take-title-and-possession provision of the LLWPA amendments. Customarily, contentious federal-state issues arise over the constitutional power of the federal government to preempt a field of governance. They also arise over stipulations attached to federal revenue for state programs. But only rarely do they arise over direct federal orders to states,

for only rarely does the federal government directly mandate a state action.

The problems of authority raised by the LLWPA are compounded because LLW disposal, like the disposal of other wastes, involves private property: i.e., waste that in most instances has been privately generated. The implications of this concept--that waste is property owned by someone, with concomitant rights and responsibilities--will not be dealt with extensively here. But the fact that LLW usually starts as private property has affected state and local attitudes toward the task imposed by the LLWPA. In many cases, the original owners of LLW--i.e., its generators--are nuclear power plants. They may also be industries, hospitals, research facilities, etc. But the original owners are not the states that are being called upon to take responsibility for ensuring waste disposal capacity, and they are not the communities that are being called upon to host disposal facilities.

Property ownership is accompanied by certain privileges and obligations, or "incidents of ownership": the right to possess, use, manage, derive income from, and sell the property; and the obligation not to use or manage

the property in a manner harmful to others.⁸ But, unlike other wastes such as some solid wastes, virtually no beneficial use has yet been found for LLW. Thus, to date the only important incident of LLW ownership has been the negative one of ensuring that it does not harm others. It is this incident which has been made partly a public responsibility, while LLW generators continue to enjoy the positive incidents that accompany the products and activities of which LLW is a byproduct.

Under the old, pre-LLWPA system, the waste management company assumed primary responsibility for LLW at the time of its disposal, and the host state assumed primary responsibility for the disposal facility and its contents after the facility's closure. The generator was not the only one ever to have responsibility for the waste. The LLWPA and its amendments did not fundamentally alter this arrangement, but they did introduce a new element: the states were to take an earlier and more active role in waste disposal. Correspondingly, the generators would have less responsibility. Granted, they would still have to finance the disposal of their LLW, including paying out millions of dollars for the development of new disposal

⁸For an analysis of the various incidents of ownership, see A. M. Honoré, "Ownership," in A. G. Guest, ed., Oxford Essays in Jurisprudence (Oxford: Oxford University Press, 1961), pp. 107-147.

facilities. But they would not have to rely on the market to provide them with disposal capacity. Instead, that capacity was to be ensured by the states.

These two conditions--first, the federal government's giving direct orders to the states; and second, the shift of part of the burden of responsibility for LLW from the generators to the states and by extension their citizens--have shaped objections to the LLWPA. With respect to the first objection, against the federal government's telling the states what to do, it can be countered that the states themselves promoted and endorsed the approach adopted in the 1980 LLWPA. And with respect to the second objection, that states and their citizens should not have to take responsibility for the byproducts of private and quasi-private enterprise, it can be countered that the states and their citizens have benefited from LLW-generating activities. Both counterarguments have not been altogether accepted, however.

First, with any public policy decision or legislation, there is the problem of time and of different stakeholders. An initial public policy decision--a decision about how responsibility for LLW disposal should be allocated, about whether nuclear power should be promoted, etc.--may be assessed differently over time, especially as the consequences of the initial decision (and other subsequent

decisions) begin to be felt and as they affect citizens who were not directly involved in making the initial policy choice. Over time, a public policy may be more or less widely endorsed by key constituencies, if only because different players and groups of stakeholders are affected at different stages in the process spawned by the initial policy decision. The communities being asked to host LLW facilities in 1990 had little interest in the 1980 LLWPA, because they had no way of knowing that a 2-page act being passed in Washington would affect them so dramatically. Furthermore, the governors who supported passage of the LLWPA were by and large long out of office a decade later, and so did not have to deal with the perhaps unanticipated consequences of their support. For example, as discussed in Chapter 2, Michigan's Governor Blanchard and Governor Engler inherited but did not necessarily accept Governor Milliken's stance in support of the LLWPA. But even if stakeholders remain largely the same--for example, even if, in the years following passage of the LLWPA, a state retained the same political leadership, as it did to some extent in the Illinois case to be discussed in Chapter 3--some people's attitudes may change as the initial policy decision leads to other decisions and as the ramifications of these decisions loom large. What looks good (or bad) on

the far horizon can seem unattractive (or attractive) up close.

Second, some people do not think that the largest LLW generators--nuclear power plants--have been a net public benefit. Instead, they regard nuclear power (at least as it has been developed to date) as undesirable: as an expensive, potentially harmful enterprise that has deflected attention from crucial energy issues, including the need to develop energy conservation and alternative energy sources. And to the extent that people do see nuclear power this way, the new public responsibility for LLW disposal may stick in their craws.

Some see public responsibility for LLW as a necessary evil, even if they do not endorse the activities that have produced it. They think that since we have the waste it should be managed in the best manner possible, and that this entails a measure of public responsibility. Others argue, however, that the burdens of LLW disposal being placed on states and communities are justified only if the waste-generating products and activities have substantial public worth, and that public involvement in LLW disposal is helping to perpetuate an ill-conceived enterprise. Because of their concern about the safety of nuclear power generation as well as radioactive waste disposal, this is the position taken by some state groups, such as Don't

Waste Michigan and Don't Waste New York, as well as some national groups, such as Public Citizen's Critical Mass Energy Project.

The upshot is that although the LLWPA was widely accepted in 1980 by those involved in its enactment, within a decade its legitimacy was being questioned by a number of people--both private citizens and public officials. Legitimacy problems have not been restricted to the LLWPA and its amendments, however. All those responsible for the processes initiated by that legislation have been confronted with problems of establishing their legitimacy. While the federal government has had to establish the legitimacy of its policies regarding LLW disposal, as embodied in the LLWPA and its amendments, the LLW compact commissions have had to establish the legitimacy of their relationships with their party states, and state governments have had to establish the legitimacy of their processes for siting and developing new LLW disposal facilities.

In the chapters that follow, this book will concentrate on one overwhelming problem facing the compacts and states: figuring out where LLW disposal sites should be located. Problems such as how LLW should be defined, what types of facilities should be used, how liability should be allocated, and whether storage is a viable option

will be mentioned only in passing, as they relate to the question of siting. But these other problems are not trivial . . . they are part of the "nuts and bolts" of what states and compacts, LLW generators, waste management companies, local officials, and citizens groups grapple with, when a LLW disposal facility is being sited and developed. While they will not be dealt with here, they should be kept in mind. They are part of the complex web of issues within which the LLWPA process as a whole, and the siting processes of each compact and state, are taking place.

CHAPTER 2

AUTHORITY

It is not enough to draw up even the most detailed and comprehensive proposals, projects, plans, and programs. By themselves, these are merely promises. What is required to give them substance is an authority that can mediate the present and the future, can tailor ideal forms to actual conditions, and can arouse the enthusiasm and allegiance of the people it seeks to lead. It is the lack of such authority that is at the bottom of most of our troubles.¹

The question of authority is central to the siting dilemma. If the LLWPA and its amendments, the subsequent state legislation and hierarchies of authority spawned by those acts, and the actions of those within the hierarchies were universally accepted because they were regarded as legitimate and appropriate, then there would be no dilemma. A state that was selected to host its compact's LLW

¹Iredell Jenkins, "Authority: Its Nature and Locus," in R. Baine Harris, ed., Authority: A Philosophical Analysis (University, AL: University of Alabama Press, 1976), p. 26.

disposal facility would accept its designation without demurring; a community in which a facility was to be located would raise few objections. Although they might have reservations, they would, out of respect for authority, voluntarily acquiesce to these decisions. They would see them as right simply because they flowed from authority.

Rarely, however, is such unquestioning acceptance of authority to be found today. Instead, in societies such as that of the United States, acceptance of authority is often conditional at best, especially on issues such as LLW disposal where new policies--policies that diverge profoundly from past practice--are being shaped. Then, authority, including the authority of the policymakers, will be questioned. The degree to which it is questioned will vary, however, as will the degree to which it is actually rebelled against. This chapter illustrates how, in one state, rebellion grew against the basic precepts of the LLWPA and its amendments.

THE MICHIGAN EXPERIENCE

In June of 1987, to its chagrin, Michigan was selected host state for the Midwest Compact. By 1984, the compact potentially had eight members: Michigan,

Minnesota, Wisconsin, Iowa, Missouri, Indiana, Ohio, and (provisionally) Illinois. Illinois, with eight nuclear power reactors and several more coming on line, produced by far the most LLW. Suspecting that it would be called upon to be the compact's host, it backed away, acceding to pressure from Illinois environmentalists. Among the remaining seven states, the choice of a host state was not yet altogether clear, but, based on waste volumes, Michigan was likely.

The Midwest Compact Commission, with one representative from each state, initially sought a volunteer . . . partly at Michigan's urging. In the early 1980s, Michigan, under Governor William Milliken, had taken the lead in organizing the compact. It had always assumed, however, that Illinois would be the first host state. In 1983, Governor Milliken was succeeded in office by James Blanchard. Under Governor Blanchard, Michigan, faced with the probability of being tagged "it," wanted to explore whether another state would volunteer.

The incentives package to entice a volunteer included about \$500,000 to the host state and \$800,000 to the host community annually in unrestricted funds. While some communities expressed interest, none of the states tumbled to the idea. The commission then adopted a selection process that compared the projected volumes and

radioactivity of each state's LLW, and also the ease and safety of transporting waste into and around each state. They assumed that each state could come up with at least one site that would be technically suitable, so they decided that technical suitability would not be a selection criterion. (They based this decision partly on a recent NRC study which had found that 10 CFR 61 requirements could be met in a number of different types of environmental regimes.) Although Michigan was not adamantly opposed to the host state selection approach at the time it was adopted, the question of technical suitability would come to haunt both that state and the compact commission.

Four finalist states were selected based solely on their LLW volumes and radioactivity. These volume and radioactivity criteria, together with the transportation criteria, were then weighted by each of the compact commissioners, with full knowledge of the scores to which the weightings would be applied. The weighted scores were used as a basis for voting on the host state. Michigan, with 33 percent of the region's projected LLW volume and 42 percent of its radioactivity,² was chosen by a vote of 6

²The data and projections given in the compact's regional management plan were used as a basis for the scores. See Midwest Interstate Low-Level Radioactive Waste Commission, Regional Management Plan (August 1, 1986). However, a 1990 report, "Projection of Low-Level Radioactive Waste Characteristics for the Midwest Compact LLW Disposal Facility," prepared for the commission by

to 1 on June 30, 1987. It was to serve as the host state for 20 years, at which time another compact member would take over.

Michigan Balks; Objects to Site Proliferation

David Hales, Michigan's representative to the compact commission, reacted to the host state selection vote by saying that the state would wait until after the commission's August meeting to make a decision about accepting the designation. (That spring, while the finalists were being considered, the states had three months during which they could withdraw from the compact. That time had come and gone.) On June 18th, prior to the commission's vote, Hales had written to the other compact commissioners, expressing concern about whether Michigan, if it became the compact's host state, would be saddled with an unfair share of liability and costs. He had also urged the other commissioners to lobby for a Congressional reexamination of the LLWPA and its 1985 amendments, which, he contended, was leading to an unanticipated, inefficient, and possibly unsafe proliferation of sites.

Rogers and Associates Engineering Corporation, projects that in terms of curie content Ohio will be a close second to Michigan over the 20-year operating life of the facility. Midwest Interstate Low-Level Radioactive Waste Commission, Update, vol. 6, no. 4 (1990).

Shortly thereafter, David Hales attempted to have the National Governors' Association consider whether the LLWPA and its amendments should be revisited. His initiative was not warmly received. Then, on January 30, 1989, Governor Blanchard announced that he would introduce legislation withdrawing Michigan from the compact unless his fellow compact governors, first, joined him in pressing Congress for a reduction in the number of planned disposal sites, and second, supported amendments to the compact legislation to satisfy Michigan's concerns about shared liability and fiscal responsibility. He said that he was halting Michigan's siting activities until these conditions were met.

The reaction of South Carolina, Nevada, and Washington was swift. They said that Michigan LLW generators would immediately be denied access to the existing disposal sites; the other Midwest Compact states would have time in which to either address Michigan's concerns or take other steps to get back in compliance with the LLWPAA. The compact's other governors, who had already agreed in principle to amend the compact legislation as Michigan had requested, formally stated their agreement and also agreed to consider proposals for reducing the number of planned sites. Governor Blanchard then directed the Authority to resume its siting activity.

In August 1989, the Michigan Congressional delegation, led by Representative John Dingell, wrote to DOE Secretary James Watkins that they shared their governor's concerns about site proliferation and asked DOE to take the lead in assisting states to resolve this problem. DOE ducked, responding that "States and compacts retain sufficient flexibility to negotiate mutually agreeable conditions for management and disposal of low-level waste without revision at this time of the fundamental framework embodied in the Federal law"³

In December 1989, Governor Blanchard wrote to President George Bush, asking him to instruct the appropriate federal agencies regarding site proliferation: they should ensure that the nation would have only the number of facilities needed for safe LLW disposal. He called the current federal legislation "both economically and environmentally irresponsible" and said that "states are unable to resolve these serious flaws alone."⁴ He also commented that until these matters were resolved, no

³US Department of Energy, Report to Congress in Response to Public Law 99-240: 1988 Annual Report on Low-Level Radioactive Waste Management Progress, DOE/NE-0098 (1989), p. xii.

⁴December 13, 1989 letter from James Blanchard, as quoted in Michigan Low-Level Radioactive Authority, Update, vol. 1, no. 5 (1990), p. 3.

state should be barred from disposing its LLW in existing facilities.

Michigan was not the only state with objections to the federal legislation. On February 12, 1990, New York's Governor Mario Cuomo filed a suit which challenged the constitutionality of the LLWPAA. The New York suit contended that the statute, especially its requirement that states take title to LLW after 1996, unconstitutionally infringes on the states' sovereignty. The suit also objected to the requirement that states be responsible for Class C waste. The Friday before, on February 9, Governor Blanchard--perhaps anticipating the New York initiative--announced that Michigan would file suit against the federal government to challenge the constitutionality of the 1985 Amendments Act. In his announcement, he stated that "it is clearly unconstitutional to require Michigan citizens to accept, against their will, the responsibility and liability--in perpetuity--for radioactive waste produced by private industry."⁵

As of the end of 1990, the Michigan suit, which was filed in May of 1990, was being considered, and Nevada, South Carolina, and Washington had been granted a motion to intervene on the federal government's behalf. New York's

⁵February 9, 1990 press release of James Blanchard, as quoted in Michigan Low-Level Radioactive Waste Authority, Update, vol. 1, no. 6 (1990), p. 6.

suit was rejected by the Federal District Court of New York State on December 7, 1990, but was appealed. Another suit challenging the LLWPAA's constitutionality, brought by the Concerned Citizens of Nebraska against the Central Interstate Compact Commission, the Nebraska Department of Environmental Control, and the facility developer, US Ecology, was dismissed by the Federal District Court of Nebraska on October 18, 1990.

Michigan and a few other states or citizens groups have continued to raise site proliferation objections to the LLWPA and its amendments, arguing that it would be better for the nation to have a small number of sites in technically optimum areas. However, it has become increasingly evident that in most states--especially in those that are likely to comply with the act as it now stands--there is little inclination to renegotiate the act's terms.

Michigan's Siting Process and the Midwest Compact

Through the fall of 1987, Michigan and the Midwest Compact worked on the details of their interactions. The compact commission proposed a "host state agreement" that provided for shared costs for site development and operation, penalties if a party state withdrew, and shared

liability (including a region-wide standard for sovereign immunity concerning liability for accidents at the facility). These proposals formed the substance of amendments to the compact legislation that were to be enacted by Michigan, and then by the other compact states. (As of the end of 1990, however, Michigan had not yet enacted them.)

During the same period in 1987, Michigan was trying to work out its siting legislation. After considerable debate, a bill was passed on December 10, 1987, three weeks before the LLWPAA's 1988 milestone, and was signed into law by Governor Blanchard the following week. The act established the Michigan Low-Level Radioactive Waste Authority, which was to select a site, subject only to the veto of the state legislature, and was to operate or contract out the facility. In addition, the act specified stringent criteria that the disposal site would have to meet.

Michigan's siting process was slow getting off the ground. Michigan was looking to the compact commission for funding of its siting activities (although the compact is silent on the issue of upfront funding), and financial arrangements were not worked out until late spring of 1988. In addition, the Authority had an early change of leadership: its commissioner, briefly David Hales, was

replaced by James Cleary in June of 1988. The siting process was further delayed when, as previously indicated, Governor Blanchard terminated it in January of 1989 and resumed it only when the sited states threatened that Michigan generators would be denied access to their disposal sites. According to the siting act, the Authority was to designate a site by September 1, 1989. This goal was nowhere in sight more than a year after its deadline had passed; instead, the siting process was in turmoil.

The Authority began its search for a site by using the criteria laid out in its siting law, as well as the implementing criteria developed by a technical advisory committee (representing the fields of geology, environmental engineering, and environmental health). After eliminating areas of the state that did not meet the criteria, 81 areas remained that might contain suitable sites. From these, the Authority chose the three largest. In October of 1989, it identified candidate areas in three counties: in Lenawee County, on the Ohio border; in St. Clair County, about 50 miles northeast of Detroit; and in Ontonagon County, in the western Upper Peninsula. On February 16, 1990, the latter two were dropped because a suitable parcel of land could not be found. (Although the actual disposal area was to be only 35 to 90 acres, the site was to be 1200 acres, with most of the land used as an

"isolation zone." Furthermore, the Authority had decided that, for flexibility in the site's placement, a 2500- to 4000-acre parcel was needed.) There was no adequately-sized parcel in those two candidate areas that did not involve wetlands and that met the other siting criteria.

That left Lenawee County. Ohio officials expressed concern that a creek just south of the border had not been considered. The candidate area was redrawn, raising its southern boundary to one kilometer north of Ohio. Then, on May 23, 1990, the whole candidate area was dropped. It had failed to meet state siting criteria regarding wetlands, flooding, and groundwater discharge. Also contributing to its exclusion were several manmade features, such as gas pipelines. The Authority planned to go back and resurvey the 78 other areas that had not been excluded. Six months before, it had projected that a facility would be opened by May 1, 1995. That date was pushed back nearly two years, to March of 1997.

In making the announcement about Lenawee County, Cleary commented, "In a broader perspective, I doubt that any location in Michigan can meet the strict siting criteria for a low-level waste facility under State law. . . . Our siting criteria go beyond the Federal requirements, and they may be prohibitive. This will

likely be an issue in the future."⁶ His comment turned out to be a prophetic understatement.

Conflict Erupts

Less than two months after Lenawee County was dropped, Washington, Nevada, and South Carolina warned Michigan that they intended to cut off the access of Michigan's LLW generators to their disposal facilities unless Michigan either designated candidate sites for characterization or made its siting criteria less stringent. Although states may adopt standards more stringent than those set out in 10 CFR 61, the sited states contended that Michigan's standards were intentionally obstructive. They referred to statements (initially made by the Authority's technical advisory committee) that some of Michigan's statutory siting criteria had "no technical foundation" and "no defensible scientific basis" and by Governor Blanchard that "our goal is to keep a low-level radioactive waste dump out of Michigan."⁷

⁶James Cleary, as quoted in Michigan Low-Level Radioactive Waste Authority, Update, vol. 1, no. 9 (1990), p. 1.

⁷June 28, 1990 letter from Christine Gregoire, Director, WA Department of Ecology, to Governor James Blanchard, as quoted in Michigan Low-Level Radioactive Waste Authority, Update, vol. 1, no. 10 (1990), p. 2.

The Midwest Compact Commission was also upset. At its March 1990 meeting, it had adopted a resolution expressing concern about the Michigan siting process and directing that any finding that no feasible site exists within a host state must be based primarily on 10 CFR 61. The vote adopting the resolution was 6 to 1, with Michigan opposed. Then, at its August 1990 meeting, the commission approved a \$9 million budget for the Michigan Authority for fiscal year 1991, but with contingencies attached. (Under its 1988 Preoperational Funding Agreement with Michigan, the commission must approve the Authority's budget. It then assesses the region's nuclear power plant utilities to come up with the approved amount.) Citing Michigan's unduly stringent siting requirements, the delay in its siting process, and the resulting increases in disposal costs and prolonged storage requirements that would be imposed on the region's generators, the commission stipulated that funds for a number of line items would be delayed pending legislative change of Michigan's siting criteria and designation of three sites for characterization. It also stipulated that if the three candidate sites were not identified by April 1, 1991, amounts to be disbursed would be reduced for each month of further delay.

Michigan's relationship with the rest of the compact, shaky to begin with, deteriorated rapidly. After the commission's budget resolution, Cleary warned that the Authority saw the commission's action as being beyond the scope of its powers under the Preoperational Funding Agreement and suggested that they negotiate the matter--a suggestion that the commission's chair turned down. And in response to criticisms of Michigan's siting criteria, Cleary said that the Authority was "not about to start talking about changing our criteria."⁸ Although the compact commission had argued in its budget resolution that it was pointless to spend more money on a siting process that was doomed to failure because of its criteria, Cleary countered that the siting process would lose credibility if it were changed in mid-stream.

In October of 1990, Cleary announced that the Authority would proceed with its 78-area review using funds from the Michigan Public Service Commission, which would assess a fee to the state's public utilities. But he also commented in an October address to the Michigan Coalition of Radioactive Users, Inc. (MICHRAD) that the compact commission's actions since June of 1990 had resulted in delays in Michigan's site selection process and had

⁸James Cleary, as quoted in Michigan Low-Level Radioactive Waste Authority, Update, vol. 1, no. 12 (1990), p. 2.

jeopardized the viability of the compact. "It is not known if any of this activity will force Michigan's withdrawal from the Midwest Compact. This could happen, but that is not our desire."⁹

On November 6, 1990, Governor Blanchard lost his bid for reelection in a close race against John Engler, a Republican leader in the state senate. (Engler, like Blanchard, was opposed to having a disposal facility in Michigan.) On November 10, Washington, Nevada, and South Carolina denied Michigan LLW generators access to their disposal sites. On November 13, MICHRAD filed suit against officials in these states, challenging their denial of access. On November 19, Michigan's attorney general filed suit on behalf of the Authority against the Midwest Compact Commission, requesting that the commission be ordered to engage in good faith negotiations, transfer the budget money, assume liability for the consequences of delays in the siting process relating to its denial and delay of funding, and take no further actions beyond the scope of its authority.

⁹James Cleary, October 9, 1990 address to MICHRAD conference, as quoted in Michigan Low-Level Radioactive Waste Authority, Update, vol. 2, no. 1 (1990), p. 7.

DISPUTES ABOUT AUTHORITY: REAL, OR STALKING-HORSES?

Disagreements about authority--about who should have what power to shape the outcomes of which issues--are certainly not the only sources of contention in the Michigan case. In fact, antinuclear--and, specifically, antiradioactive waste disposal--attitudes voiced in the state, combined with the responsiveness of state political leaders to those attitudes, undoubtedly lay at the heart of much of the contention in the Michigan case. Certainly, arguments about authority were used in the debate about whether Michigan should host a LLW disposal facility. But these arguments may have been raised, especially by Michigan, because they could be used as tactical weapons, not because they were the real bones of contention.

And yet, saying that arguments about authority were merely stalking-horses for the real sources of contention in the Michigan case ignores a fundamental truth. If authority is truly accepted, then the person or group subject to the assertion of authority will acquiesce to it . . . regardless of whether they might have reasons to disagree with a particular course of action, and regardless of what those reasons are. Acknowledgement of and acquiescence to authority is not something that one can turn on and off at one's convenience, like a faucet. If

assertions of authority are treated that way, then they are not recognized as inherently valid. Instead, authority itself is at issue. And once authority becomes an issue, it opens the door for other issues to arise . . . such as whether a LLW disposal facility can be safely sited in Michigan, and whether fewer disposal sites across the nation would be better than more.

Objections to assertions to authority thus cannot and should not be dismissed as merely a smokescreen for other issues, or as merely the cavilling of sore losers. While other issues may be (and usually are) at stake, questions about the appropriate and inappropriate exercise of authority are worthy of attention, in and of themselves. For this reason, the discussion that follows concentrates mainly on matters concerning authority and how they have affected Michigan's relationships with the sited states, the rest of the nation, and the rest of the Midwest compact. It does not deal extensively with issues such as trust, risk, or justice. These issues, which are discussed in other contexts in subsequent chapters, have also figured in the Michigan case. But the point here is to get a better understanding of how the door to such issues can become opened . . . or, as will be discussed toward the end of Chapter 4, how it can remain closed if authority is acknowledged.

This chapter, then, attempts to illuminate the role that authority plays in public policy issues such as those confronted by Michigan and the Midwest Compact. The purpose is not to delve deeply into an analysis of what authority is and is not. That is an enormous undertaking. Instead, the main purpose is to make evident why, in dialogues about public policy, issues concerning authority are themselves worthy of attention . . . whether or not there are also other bones of contention.

Discussions of authority cannot escape a fundamental conundrum: Can authority be said to exist if those on the receiving end either refuse to obey directives made by those wearing the mantle of authority or, even if they comply, refuse to recognize the legitimacy of that authority? In other words, does it take two to tango? It will be assumed here that in a weak sense, there can be one-way authority--i.e., authority that is not accepted by those on the receiving end, or (much more rarely) authority that is conferred on a reluctant leader. But for authority in its fullest sense, it is necessary to have acceptance of the relationship of authority by both sides.

I will also argue, however, that mere obedience to authority does not signify that the relationship of authority is thereby recognized as legitimate. Instead, what counts is the internal view that motivates obedience.

Only when both sides have fully accepted a relationship of authority in public life can that relationship--and the public policies it is meant to serve--be said to be stable and durable. "Going along with" authority temporarily because there is no other recourse is just that: a temporary solution. Force backed by law can sometimes accomplish a lot, but at a cost. Those complying because of the threat of force will resent having to comply, and in the long run, the authority of those in control will be undermined, on the policy issue at hand and on other issues.

MICHIGAN, LLW, AND AUTHORITY

Michigan's suit against the compact commission argued that the compact commission's changes in Michigan's proposed budget represented an ultra vires political effort to micromanage Michigan's site selection process. Michigan regarded itself as a sovereign state that had authority over its site selection process. Having agreed to become the Midwest Compact's host state, it maintained that complete control over the process should accompany that responsibility. The compact commission, however, saw Michigan's authority as tempered by the compact that it voluntarily joined. To the commission, the constraints

placed on the Michigan LLW Authority--exercised through its budget--were appropriate oversight measures, for at least two reasons. First, Michigan should not expect funding without accountability. And second--apart from the question of funding--all of the compact states would be affected if Michigan's siting process failed; thus, all should have a say in it, especially if it appeared to be self-sabotaged.

On a separate front, Michigan contended that Congress exceeded its authority in enacting the LLWPAA. Michigan argued that the LLWPAA violates constitutional provisions for state sovereignty in requiring the states, against their will, to be responsible for disposing of privately-generated LLW. Somewhat contradictorily, Michigan also informally supported MICHRAD's contention that South Carolina, Nevada, and Washington, in denying Michigan LLW generators access to disposal facilities within their states, were exceeding their authority. MICHRAD argued that Michigan had met the LLWPAA milestones to date; it had complied with the letter of the law. But the sited states saw themselves as enforcers of the LLWPAA; they were concerned that Michigan was violating the spirit of the law.

Within Michigan, the state's authority to name a host community for the disposal facility did not gone

unquestioned. Michigan's siting law gives the LLW Authority the power of eminent domain and does not provide for local veto of the site selection. The only body that may veto that selection is the legislature. In 1987, when Michigan was being chosen as the Midwest Compact's host state, a coalition of environmental groups in the state argued that Michigan was inappropriate because of its abundant water resources, and that, rather than picking a host state and searching for a disposal site, the state and the Compact Commission should press for a reconsideration of the LLWPA and its amendments. Then, two years later, when the three candidate areas were named, the antinuclear group, Don't Waste Michigan, joined forces with local groups that had sprung up in opposition to the prospect of hosting a LLW disposal site. In addition to arguments about site suitability and potential health risks, it was objected that the candidate areas' selection was politically motivated and that the big cities were yet again dumping on rural areas. Before the Authority had withdrawn the candidate areas from consideration, several lawsuits had been filed to block it from studying them.

But in Michigan, the key question was not the authority of the state over its prospective host communities. There, that question had not really been broached yet. In other states that have accepted the need

to host a LLW disposal facility, the authority of the state over its political subdivisions is one of the critical issues. But in Michigan, disputes about authority were still centered on earlier phases of the LLWPA's implementation. At issue were such questions as: What is Congress's authority over Michigan and other states? What authority have South Carolina, Nevada, and Washington, through Congress, acquired over the states without disposal sites? And what authority does a compact have over its member states, especially the host state? Thus, whereas state government normally is thought of in terms of its own authority, here it is cast as a rebel.

THE PROBLEM OF AUTHORITY

Laws such as the LLWPA and its amendments carry legal weight. But, as T. S. Eliot wrote, "between the idea and the reality . . . falls the Shadow."¹⁰ Legal authority--the authority embodied in and conferred by a law--is sometimes (although not always) necessary in the making and implementation of public policy. But legal authority is rarely enough.

¹⁰T. S. Eliot, "The Hollow Men," in T. S. Eliot: The Complete Poems and Plays (New York: Harcourt, Brace & World, 1952), p. 58.

In a democracy, all laws when enacted have a measure of acceptance . . . otherwise they would not be enacted. At a minimum, a law when passed presumably has the support of those who voted for it. But the endorsement of a law by elected representatives and their constituents may wax or wane as the law is implemented. This is especially the case if, as with the LLWPA and the compact laws it precipitated, the days of implementation seemed far off at the time of enactment, and the problems of implementation (actually having to site new LLW disposal facilities) were not fully anticipated. But eventually, the piper must be paid . . . and at this point, particularly, a refusal to accept a relationship of authority is likely. Governor Milliken fully supported Michigan's membership in the Midwest Compact; Governor Blanchard was on uneasy terms with the compact commission and the other compact states; Governor Engler did virtually nothing to prevent the compact commission's termination of Michigan's membership in the compact.

Usually, then, if a law is to be implemented successive stakeholders must defer to the authority of the law and subsequent laws and regulations precipitated by the original law. They must also defer to those charged with carrying out the resulting mandates. This sequence can be seen with the LLWPA and its amendments. First the

states must accept the authority of Congress to enact such laws; then they must accept the authority of the sited states and DOE to enforce the LLWPAA's sanctions; then party states to a compact must accept the authority of the compact commission to make decisions affecting individual members of the compact; then constituents within a state must accept the authority of the state legislature to respond to the LLWPA's mandate by enacting a siting law; then certain constituents must accept the authority conferred by the siting law on state agencies to take actions which can affect their lives. Everyone doesn't have to accept every aspect of the law as implemented, but, at a minimum, a nucleus of key players at each stage must do so. At each stage in a law's implementation, legal authority must be accompanied with political authority for the implementation to be effective and durable.

Political authority is an elusive concept, on which much has been written. Put succinctly, it can be described as voluntary submission to a codified or institutionalized form of power. In other words, the governed--those subject to the law and the authority it embodies--willingly go along with directives issued in its name. But this definition raises more questions than it answers. Perhaps the biggest question is what counts as willingness.

The idea of willingness raises a paradox inherent in authority. For authority to be true authority, it cannot depend upon the whims of the governed. If they accede to authority only when they feel like it--i.e., only when it suits their pleasure--then authority is not present. If Michigan had wanted to be host state, then a cooperative attitude toward the sited states and the Midwest Compact Commission would not necessarily indicate respect for their authority. Similarly, if it had accepted the compact commission's contingencies on its budget because it agreed with those contingencies, this would not necessarily be a mark of respect for the commission's authority. Instead, the true test of authority is the hard case, where deferral to authority does not suit the pleasure of the governed. If they still willingly defer, then authority can be said to be present. But in what sense would such deferral be "willing"?

The jurisprudentialist H. L. A. Hart, in The Concept of Law, discussed the difference between obedience to law which derives mainly from a fear of sanctions (the Austinean "gunman" theory of law) and obedience to law which derives instead from an inner sense of obligation to obey. He commented that:

At any given moment the life of any society which lives by rules, legal or not, is likely to consist in a tension between those who, on the one hand, accept and voluntarily co-operate in maintaining the rules, and so see their own and other persons' behaviour in terms of the rules, and those who, on the other hand, reject the rules and attend to them only from the external point of view as a sign of possible punishment.¹¹

In a similar sense, authority, to be truly authority, must be deferred to neither because it happens to accord with one's own desires nor because of the immediate threat of sanctions. Instead, it must be driven by an internal sense of the rightness and legitimacy of the laws and the actions of those charged with the laws' implementation.

The philosopher Hannah Arendt, in "What is Authority?," made a similar point. There, she argued that authority is neither force nor persuasion, although it can be mistaken for both:

¹¹H. L. A. Hart, The Concept of Law (Oxford: Oxford University Press, 1961), p. 88.

Since authority always demands obedience, it is commonly mistaken for some form of power or violence. Yet authority precludes the use of external means of coercion; where force is used, authority itself has failed. Authority, on the other hand, is incompatible with persuasion, which presupposes equality and works through a process of argumentation. Where arguments are used, authority is left in abeyance.¹²

Food for thought. For clearly, authority involves some use of force, especially if force is construed broadly to include legally authorized coercive measures. The LLWPA's mandate was not enough; the LLWPAA and its sanctions (penalty surcharges, the denial of access to existing disposal facilities) were necessary to bring most of the states in line. And the Midwest Compact also was not enough; the commission eventually felt compelled to invoke its budgetary powers to try to bring Michigan in line. Clearly, also, authority involves some use of persuasion, especially persuasion as argument. The Midwest Compact Commission did not expect to make decisions affecting Michigan without supplying a rationale for those

¹²Hannah Arendt, "What is Authority?" in Between Past and Future: Six Exercises in Political Thought (Cleveland, OH: World Publishing Co., 1963), pp. 92-93.

decisions; both the commission and Michigan assumed that some explanation, some argument, was necessary.

Instead, the question with both force and persuasion is how much force or persuasion is necessary to ensure cooperation. And in terms of authority, an even more important question is: What happens if both the arguments and the mildly coercive measures do not convince the subjects that cooperation is the right--not merely the prudent--thing to do?

For authority is not really authority if it is obeyed solely because of prudential concerns . . . out of a sense of "we'd better, or else." It may appear to be authority, but the result is unstable. It lacks the durability of compliance that is motivated by an internal sense of the rightness of compliance. If the Michigan LLW Authority had decided to comply with the Midwest Compact Commission's budget resolution, not because it believed that it should do so but because it felt that it had no other recourse, then, seemingly, the Michigan Authority would have accepted the commission's right to control aspects of the siting process. But only seemingly. For, even if the only alternatives available were stopgap measures (e.g., funding from the Michigan Public Service Commission), the Michigan Authority might decide (as it did) not to comply with the budget resolution. Instead, it might decide (as it did) to

tell the commission that it was acting ultra vires--outside the powers conferred on it by law. This issue of what motivates compliance will be returned to later, in Chapter 5's discussion of justice and consent.

WHAT HAPPENS WHEN CONFLICTS OVER AUTHORITY OCCUR?

Normally, those on both ends of the "stick" of authority start from some common ground. Virtually everyone in the United States accepts the Constitution as a source of authority. Most people accept the US Supreme Court's interpretations of the Constitution, although they may see those interpretations as politically or ideologically motivated and may seek their revision, either by enacting new laws or (in the long run) by changing the composition of the Court. Fewer people accept all of the laws passed by Congress, but most recognize Congress's constitutionally conferred right to enact laws. Similarly, within each state, most people recognize the state legislature's right to enact laws, although they may disagree with their content and may seek to evade or change them.

Thus, when states such as Michigan challenge the constitutionality of the LLWPAA's take-title-and-possession provision, they are using the Constitution and its 10th

amendment as the basis for their challenge. They are appealing to the authority of the ultimate law of the land to override the lesser authority of Congress. When MICHRAD (with the tacit support of the Michigan attorney general) challenges the authority of the sited states to deny access, it is invoking the LLWPAA as the basis for its lawsuit. And when Michigan challenges the authority of the Midwest Compact Commission to "interfere in" Michigan's siting process, it is invoking the interstate compact which set up the commission. In each case, the basis for the appeal is to a higher authority.

In the United States, even radicals, both left and right, are likely to use the Constitution as their ultimate basis for appeal. But radicals are also likely to make strong appeals to natural law--i.e., to what (they think) is moral, right, and just, whether or not it is legal. To the extent that they see the formal legal structure as illegitimate, they become free to use illegal tactics--e.g., sabotage or violent resistance--in their attempts to thwart "the system."

In contrast, governors and heads of LLW agencies are part of the system and as such are not free to adopt flagrantly illegal tactics. They normally do not act like eco-guerilla rebels. It thus would seem that, as part of the structure of authority, they must submit to the higher

authorities. But this is not the case. Instead, they have other tools of resistance. They, more than most people, have at their disposal the tools of law and politics--amendments to laws, lawsuits, budget confrontations, etc. They thus are likely to voice their objections mainly in terms of the formal legal structure, and to use their power within that structure in their confrontations with those whose decisions they do not accept.

In addition, whereas private citizens and protest groups may be concerned with permanently preventing an action that they regard as harmful, elected and appointed officials may be concerned more with forestalling it from taking place "on their watch." (Governor Blanchard's resistance to having a LLW disposal site in Michigan may have been especially great in 1990, because he was up for reelection that year.) But the reverse may also be true: the leaders of a radical group may be mainly concerned with the security of their own positions, while officials in a government bureaucracy may be willing to sacrifice their careers if they think an issue is morally important enough. Furthermore, natural law is not the exclusive domain of those outside the system. Governors and heads of LLW agencies--influenced, perhaps, by the prevailing sentiments in their states--can also make covert or not-so-covert appeals to what they think is moral, right, and just, not

what is legal. Michigan believes that, given its wet environment and the availability of more technically suitable sites elsewhere in the United States, requiring it to host a LLW disposal facility is both inefficient and unfair. This position cannot, however, be reconciled with the basic precept of the LLWPA: that each state should be responsible for its own LLW.

Despite tacit appeals to natural over manmade law, however, disputes between government officials over authority are usually expressed in narrow and technical terms. For the question being debated is usually not whether those in charge have any authority, but whether they are exceeding their authority. And when a disjuncture exists between authority as exercised and authority as accepted, conflict will occur. Both sides begin by agreeing that some authority is appropriate. Problems arise only if one party exercises its authority and another party chafes under it. Then, the latter is likely to try to circumscribe the authority being exercised, while the former is likely to see its actions as appropriate, legitimate, and justified without further explanation or defense.

AUTHORITY AS HIERARCHY

Hannah Arendt went on to argue that authority relies on a shared sense of the rightness and legitimacy of a hierarchy in which both the subjects and the ones with authority have their own predetermined and stable places. In a similar vein, Max Weber, in his classic treatise on authority,¹³ identified three types of political authority: bureaucratic authority, which is characterized by written rules; traditional authority, where past practice justifies current practice; and charismatic authority, which is achieved by a compelling personal quality of the leader. The three types make different claims to legitimacy, yet all can come into play simultaneously.

In western industrial cultures such as that of the United States, political authority is, seemingly, of the bureaucratic type. Its claim to legitimacy is based on its "rationality"--on rules that are universalistic and logically consistent, and on office holders who attain their authority through these rules and their ability to implement them. But Weber's types were "ideal types." In

¹³Max Weber, Economy and Society--An Outline of Interpretive Sociology, vols. 1 and 2, Guenther Roth and Claus Wittich, eds. (Berkeley, CA: University of California Press, 1978).

other words, they were theoretical constructs, and as such are rarely found in pure form. Appeals to authority in US political life are usually framed in terms of bureaucratic authority. Nevertheless, the two other types of authority, broadly interpreted, may be at work as well . . . at either end of the authority stick.

Either those in authority or those subject to it may use past practice as a basis for judging the legitimacy of authority. Thus, for example, when those in government attempt to do something different (e.g., restricting access to LLW disposal sites that previously were open to all), tradition acts as an impediment. They cannot invoke past practice as a justification for their actions; in fact, others may invoke past practice as a reason why their actions are not justified. Although the MICHRAD suit against the sited states was expressed in terms of the limits of those states' authority under the LLWPAA, Michigan generators may have felt that the sited states had exceeded their authority simply because generators previously had open access to the disposal sites.

Similarly, charismatic authority can work as either a companion or a counterweight to bureaucratic or traditional authority. For example, a popular governor may be able to "rally the troops" behind an otherwise unpopular measure, such as accepting a LLW disposal facility. But charismatic

authority is inherently unstable: it relies on the specific, personal qualities of a particular leader. It thus can't be extended to the system as a whole. And, as will be seen in Chapter 3, it is fragile and easily eroded, if issues of trust arise.

Whether authority is bureaucratic, traditional, or charismatic, it is hierarchical: leaders lead, and followers follow. On first impression, this order would seem to apply only within groups--for example, within a state or federal government. Or perhaps it could apply to a state government's relationship to its political subdivisions. But it is not immediately evident how it would apply between groups such as sovereign states. Yet states are only "sovereign" to the extent that their powers have not been circumscribed either by the Constitution and federal laws or voluntarily, by entering into compacts. The concept of "group" thus can be thought of in a looser sense, to include a union of states headed by a federal government, or an association of states headed by a compact commission. Within these "groups," hierarchies are also present--again, in a looser sense. But the delineation of these looser, multilayered groups and their hierarchies is not sharp. And because of this, disputes over authority are likely to take place at a fundamental level.

Within a well-defined group (e.g., within the Michigan LLW Authority), the person in charge may have disputes about authority with the staff, but those disputes are likely to concern the manner in which authority is exercised; the hierarchy itself is usually not questioned. In contrast, with loosely defined groups (e.g., the Midwest Compact), substantive questions concerning the hierarchy--to what extent does one exist, and on what issues--become sources of conflict. Because the "group" is loosely structured and its members see themselves as largely autonomous, the notion of a hierarchy, which is fundamental to authority, is often not altogether accepted.

AUTHORITY, NORMS, AND VALUES

Returning to Arendt's point about the importance to authority of a shared sense of the rightness and legitimacy of the hierarchy If values and norms concerning the hierarchy are shared, then widespread agreement about how those within the hierarchy exercise authority is likely. But if these values and norms conflict, then dissent about an exercise of authority can easily occur. The ensuing chapters will return to the subject of values and norms as they relate to the domains of authority--e.g., to the task of ensuring that our society is a just one

which does not impose undue risks on any of its members. Here, the focus is on the hierarchy itself, and on values and norms that are brought to bear in evaluating its rightness and legitimacy.

"Value" is heard frequently these days, especially in its plural form. ("That just doesn't fit with my values.") "Norm" is more arcane. The precise meanings of these terms, including how they differ from each other, have been the subjects of extensive academic debate. However, working definitions of them are intuitively available. "Values" are views about what is desirable; they thus include prudential concerns but have a moral component as well. "Norms" are rules about what should or shouldn't be done; usually, they also have a moral component. Values are internal conceptions that serve to motivate behavior; norms are external statements that explicitly prescribe or proscribe certain behaviors or actions. Values may or may not be shared but are likely to reflect the cultural group of which one is a part; norms become more norm-like (less conditional and more absolute) as they are shared and put into practice.

Do values lead to norms, or vice versa? The causal relationship between norms and values is muddy. It appears, however, that values and norms have a dynamic, two-way relationship. Values, to the extent that they are

shared, can promote norms, by providing the raison d'etre for the norm. But norms can in turn promote shared values, by providing behavioral guidelines to which members of a group are expected to adhere. And as this relationship between norms and shared values is strengthened, conditional norms become more absolute.

Reactions in Michigan to the proposed LLW disposal facility by prospective host communities and groups such as Don't Waste Michigan demonstrated that avoiding technological risks is an important value for a number of people in that state. (The ways in which they do or don't act on that value is another matter.) Also important is the value of autonomy: of not being told what to do. Thus, for many people in Michigan--especially those who became concerned about the potential risks of the LLW disposal facility as it became imminent--the norms codified in the LLWPA, the LLWPAA, the Midwest Compact's agreements, and, to a lesser extent, Michigan's siting law became anathema. If for no other reason than the sensitivity of the state's political leadership to these values and attitudes, the norm that came to prevail in Michigan was one of resistance to the idea of hosting a LLW disposal facility.

Because of the resistance of Michigan and, to a lesser extent, a few other states, the norms set forth in the

LLWPA and its amendments could be called conditional norms--norms that are disputed rather than accepted. Most fundamentally, there is the key precept of the LLWPA, that each state should be responsible for LLW generated within its borders. This was not accepted by Michigan, as evidenced by Blanchard's comment that it is unconstitutional to require Michigan citizens to accept responsibility for private industry's radioactive waste. Here the content of the norm itself was rejected. Then there is the norm, specified in the 1985 amendments to the LLWPA, that the sited states should oversee the progress of the unsited sites. Here Michigan's objection was, not to the content of the norm, but to its interpretation: Michigan argued that the sited states were exceeding their delegated powers. In addition, there is the Preoperational Agreement between the Midwest Compact Commission and Michigan. Here also there were threshold disagreements about who should have what control. And finally, there is Michigan's siting law. Here again, some Michigan citizens objected to the content of some of the norms embodied in that law--not to its stringent siting criteria, but to the idea that the LLW Authority could impose a facility on a community.

Michigan does not, of course, speak with one voice. Opinions differ in the state about whether or not the norms embodied in the LLWPA, its amendments, the Midwest Compact,

and the siting law should be honored. But the sentiment that has been most vocal and that has prevailed politically is one of dissent. Michigan is not alone in this sentiment: while Michigan's objections to the LLWPA and its amendments have been unusually fervent, similar objections have been raised by officials in other states; while Michigan's interactions with its compact have been more fractious than most, virtually all of the compacts have encountered some disagreements as they work out their respective roles; and while the Michigan LLW Authority encountered strident objections from prospective host communities, so have virtually all other states trying to site LLW facilities.

Nevertheless, resistance to hosting LLW facilities has varied, at the state as well as the local level. Several states have exhibited the political will to pursue doggedly a siting program, even in the face of local obstacles that are at least as great as those in Michigan. Why is this? In the following chapters, it will be argued that values concerning trust, risk, and justice all help to determine whether a normative consensus can be formed on a public policy issue such as LLW management. Here, the point is that normative consensus (or the lack thereof) concerning the hierarchy itself will do much to determine whether

there is a relationship of authority. And the Michigan case suggests that this determination will be complex.

Initial norms--e.g., those set out in the LLWPA--lead to other norms--e.g., those in the Midwest Compact and its subsequent agreements and in the Michigan siting law. But the interaction is not one-way: disagreements about the subsequent, implementing norms can cause the initial norms to be called into question retrospectively. (Virtually no one objected to the LLWPA when it was passed. It was several years later, when the realities of its implementation had become clearer, that constitutional objections were loudly voiced.) Because the people who must accept initial norms are not necessarily the same as those who must accept the subsequent implementing norms, the attitudes of the latter may or may not coincide with those of the former.

Norms thus are layered and dynamic, not monolithic and static, and relationships of authority are similarly interwoven. Cases such as the Michigan experience help to reveal the complex ways in which these relationships are played out.

CONCLUSION: AUTHORITY AND LEGITIMACY

This discussion has concerned what authority is and how it comes to be accepted or rejected. A different issue, not addressed here, is when authority is legitimate and when it is not. Yet this issue cannot be ignored.

An exercise of authority may be either justified or unjustified. But according to whose lights? Philosophers have debated whether an objective standard for legitimate authority can be articulated, and if so, what it would look like. Meanwhile, people bring their own, sometimes quite different values and norms to bear in evaluating whether authority is justified. This does not mean that disagreement runs rampant. On many issues, a common understanding exists of appropriate exercises of authority. (For example, most people recognize that the disposal of LLW should be subject to governmental regulation, although who should regulate and what the regulations should say is sometimes debated.) At the margins, when an exercise of authority is either patently needed or patently excessive, consensus about its legitimacy or illegitimacy is likely. But, when it is less clear whether authority is being abused, consensus is less likely.

When questions arise concerning the legitimacy of authority in a particular domain, some people---especially

those being criticized--may be tempted to ignore or trivialize the criticisms. It becomes tempting to dismiss objections as mere "sour grapes" from the losing side. (For example, it becomes tempting to say that Michigan is simply being a poor sport, because it lost in the compact game.) But this dismissive reaction ignores that there is at least a possibility of well-founded reasons for the objections. Nor should it be assumed that, if everyone complies with an exercise of authority, the authority is ipso facto legitimate.

Both hierarchies of authority and the actions of those in authority can be legitimate, even if virtually everyone resists them (especially if they resist solely for self-interested reasons). But in addition, both hierarchies of authority and actions taken from positions of authority can be illegitimate, even if everyone goes along with them (especially if they go along solely for self-interested reasons). The question of legitimacy, while perhaps not fundamentally answerable, cannot be ignored. It needs to be part of the debate about where public policies such as those precipitated by the LLWPA are heading and should be headed.

The last chapter of this book returns to the question of legitimacy and how it can be attained. For the LLWPA and the process it precipitated, issues of trust, risk, and

justice are fundamental to the question of legitimacy . . .
in part because (whether for good or for wrong-headed
reasons) legitimacy is not readily accorded the systems of
authority spawned by that act.

CHAPTER 3

TRUST

The formation and consolidation of trust is . . . concerned with the future prospects of what is at any given time the present. It is an attempt to envisage the future . . .¹

Trust is the glue that holds society together. Without trust, little coordinated action could take place, and the implementation of complex public policies such as those spawned by the LLWPA would be impossible. The problem with the implementation of such policies is not that there is no trust; it is that there is a paucity of trust. But, in such situations, there may be good reason for withholding trust--especially unquestioning trust. Those trying to implement complex public processes thus are faced with a difficult paradox: more trust is needed for them to carry out their missions, but less trust can rationally be expected.

Using the Illinois Department of Nuclear Safety's attempts to site a LLW disposal facility as an

¹Niklas Luhmann, Trust and Power (New York: John Wiley & Sons, Ltd., 1979), p. 13.

illustration, this chapter discusses how the actions of those in positions of authority can help to either create or destroy trust. But it also discusses how, under even the best of circumstances, the level of trust that is sought may be neither forthcoming nor appropriate.

THE ILLINOIS EXPERIENCE

In 1983, the Illinois Department of Nuclear Safety was given the power to select a site for a LLW disposal facility. Seven years later, it was stripped of this power and directed to obtain the approval of a special, newly created commission. In 1988, two communities were vying for the opportunity to host the facility. Two years later, one had dropped out and opposition had increased in the other. Growing distrust was not the sole reason for these reversals of fortune, but it was an important reason.

Illinois' Response to the LLWPA

The amount of LLW generated in Illinois is not trivial. In the early 1980s, Illinois had eight commercial nuclear power reactors and five more coming on-line. With about 98,000 cubic feet shipped to disposal facilities in

1990, Illinois is one of the top LLW-generating states in the nation.

After flirting with the idea of joining the Midwest Compact, Illinois instead formed a mini-compact (the Central Midwest Compact) with Kentucky in September of 1984. Kentucky has no nuclear power reactors and generates virtually no LLW. Illinois was certain to be the compact's host state, but it would be sure to have the exclusionary powers granted to compacts by the LLWPA while limiting the amount of nonIllinois waste it would have to take.

Illinois and Kentucky were not unfamiliar with LLW disposal. In 1968, California Nuclear had opened a commercial disposal facility in Sheffield, a town in northern Illinois. The facility was later operated by the Nuclear Engineering Company, Inc. (now US Ecology), but was closed in 1978, because of long delays in its license renewal process. Tritium had migrated from one of the burial trenches, and there were concerns about the extent of contamination and the adequacy of prior site assessments. Nuclear Engineering had also operated the Maxey Flats disposal site in Kentucky from 1963 to 1977, when it was closed because of radionuclide migration.

The Sheffield site and its perceived mismanagement became an anathema to Sheffield citizens and Illinois environmental groups, and the Maxey Flats site in Kentucky

contributed to skepticism about LLW disposal. However, when confronted with the LLWPA, Illinois's environmental groups generally recognized the need for the state to have a LLW disposal facility; in fact, key Illinois environmental representatives had led the legislative effort to establish the Central Midwest Compact in lieu of membership in the Midwest Compact.

In late 1983, while still considering which compact route to take, Illinois adopted a comprehensive Low-Level Radioactive Waste Management Act. The act specified a process by which Illinois LLW is to be treated, stored, transported, and disposed of. It also specified a detailed process for siting a LLW disposal facility. This included developing site evaluation criteria; promulgating rules on contractor selection, waste facility standards, and loss compensation; choosing a disposal technology (shallow land burial--the disposal method used at Sheffield and Maxey Flats--was prohibited); choosing a contractor to build and operate the facility; choosing a site; and carrying out the facility's licensing proceedings. The state was to seek Agreement State status from the NRC, enabling it to license and regulate the facility.

The 1983 act was unusual in that it gave the Illinois Department of Nuclear Safety (IDNS) full responsibility and authority for the LLW management process. This department

had been created in 1980 in the wake of the accident at the Three Mile Island nuclear power plant in Pennsylvania. According to the 1983 act, IDNS would actively seek to develop a facility which it would then turn around and regulate. There was precedent for such combined activity: the US Atomic Energy Commission was charged with both encouraging and regulating commercial uses of nuclear power. In the 1970s, however, the Commission was reorganized into two distinct agencies, largely because of perceived conflicts of interest. And unlike IDNS, agencies concerned with radioactive wastes in other states had either siting or regulatory authority, but not both. Furthermore, in most other states the siting authority was provisional, subject to review by the legislature or a state board. In Illinois, according to the 1983 act, IDNS would act autonomously. Only local approval of the site selection was required.

The Siting Process Advances

By 1988, IDNS's siting process was underway. A citizens' advisory group and a technical advisory panel had been formed; siting criteria had been established; the necessary rules had been promulgated; Agreement State status had been obtained. Terry Lash, who had been

appointed the director of IDNS in November 1984 and had been orchestrating the siting process, was appointed to a second term in 1987. A preliminary screening of the state to eliminate hydrologically or geologically unsuitable areas from consideration had been done in 1986, and in 1987, further screening of the state was carried out. Concurrently, the department asked counties to indicate if they did not want to be considered.

As of late 1987, 17 counties had not said they were unwilling to host the facility. Of the 17, eight were found to contain areas that might be technically suitable. Eventually, all of these withdrew from consideration. IDNS still had one possibility, however. Early in 1988, Martinsville, a small city (1990 pop., 1,161) in Clark County (1990 pop., 15,921) in rural east central Illinois, indicated that it would like to be considered.

In the summer of 1987, IDNS had begun exploring with Clark County the idea of hosting a site. On January 21, 1988, the Martinsville city council unanimously adopted a resolution in favor of hosting a facility, but on January 22, faced with a crowd of protestors, Clark County's board voted 4-3 against it. IDNS's director, Terry Lash, reacted by commenting, "The minority has imposed its rule on the

majority,"² and subsequently indicated that he would consider inquiries to host the facility from municipalities as well as counties. (In the 1983 act, municipalities were given veto power over LLW disposal facilities sited within 1-1/2 miles of their boundaries. In 1987, counties were given similar veto power over a siting outside municipal jurisdiction.) Soon after Martinsville indicated its interest, Wayne County (1990 pop., 17,241), about 75 miles to the south, said that it was also interested. On March 8, Wayne County's board of supervisors unanimously passed a resolution requesting IDNS to consider locating the facility there

In the spring of 1988, after consulting with local officials, Lash selected Westinghouse, Inc., as the contractor to develop and operate the facility. A partnership of Chem-Nuclear Systems, Inc., Dames & Moore, and Numatec, Inc., had also submitted a bid, but Westinghouse was chosen for its modular disposal technology and for the economic benefits it offered the state and the area.

Through 1988, IDNS and Westinghouse carried the favor of Martinsville and Wayne County. Martinsville received \$150,000 in grant money from IDNS and the Central Midwest

²Terry Lash, as quoted by Greg Gravemier, "Progress in Martinsville," The Illinois Approach, vol. 1, no. 1 (September 1988), pp. 4-5.

Compact Commission to conduct its own technical and socioeconomic impact studies of the site, and a \$200,000 "no strings attached" grant from IDNS for each year that the site was under consideration. (The unrestricted grant was increased to \$400,000 per site in 1989.) Wayne County received similar funds for the site being considered there. Alternative sites were added in each county, doubling the amounts received. Although the 1983 act gave IDNS the power of eminent domain, the alternative site in Wayne County was soon abandoned out of respect for landowner opposition. Shortly thereafter, the alternative site in Clark County also was dropped, allowing IDNS to concentrate its attention and funds on characterizing the initial two sites.

The 1983 act had directed IDNS to characterize at least three possible sites. In July 1988, an amendment was passed at the request of IDNS requiring it to characterize only two sites. Included in the amendment was a provision, requested by local officials in the candidate communities, that the governing body of the community hosting the facility would be able to shut it down if nonpermissible wastes such as high-level radioactive waste were sent to it. (Although this is precluded by federal law, local officials wanted additional legal protection.)

Also during 1988, IDNS began a scholarship program for selected high school students from Martinsville and Wayne County, and both Westinghouse and IDNS established information and outreach programs in the two locales. Scores of public meetings were held. Many local fairs and workshops were attended. The department produced a series of videotapes: "Illinois Low-Level Radioactive Waste Management," "Low-Level Waste - Managing Responsibly," "Selecting a Site," "Visit to a Host Community (in Barnwell, South Carolina)," "The Illinois Approach: Working in Martinsville," "Wayne County: Speaking Out," "And the People Will Decide" . . . all intended both to educate and to persuade local citizens. But not all the people were convinced.

The 1988 Referenda; Problems in Wayne County

In Clark County, an opposition group, Concerned Citizens of Clark County, had launched a drive to get a nonbinding advisory referendum on the LLW facility on the November 1988 general election ballot. In Wayne County, a similar group, Individuals for a Clean Environment, was formed with a similar agenda. Both succeeded. The referenda were advisory, not binding. (In some states with local vetoes over LLW facilities, a local referendum must

be held, but in Illinois, the majority vote of the local governing body is sufficient.) However, the referenda were universally recognized as important expressions of political sentiment. During the fall of 1988, IDNS intensified its efforts to educate and persuade, taking out many large ads in local papers with such leads as "Illinois Low Level Radioactive Waste Facility Will Be Good for the Local Economy--Already Benefits Gained Include . . ."³

The results of IDNS's efforts were mixed. In Martinsville, 68 percent of the voters favored the facility, whereas in Clark County as a whole, 41 percent favored it. In Wayne County, only 32 percent favored it. As one Wayne County citizen commented shortly before the election, "The people should . . . not allow themselves to be swayed by the rosy promises. Vote your true feelings, as to whether you want to allow yourselves and all future generations to become Guards over an untested, maybe dangerous facility"⁴

The discrepancy between Martinsville and Clark County can be readily explained: Martinsville stood to benefit much more substantially from the facility. Terry Lash had

³Illinois Department of Nuclear Safety (IDNS), advertisement, Wayne County Press, November 7, 1988.

⁴Charles Smith, letter to the editor, Wayne County Press, November 3, 1988.

announced that the host community would get approximately \$1 million annually in benefits. This money would go to Martinsville, not the county. Making matters worse, the "Martinsville site" was not within the city limits; it simply was within the 1-1/2 mile limit of municipal jurisdiction prescribed by the 1983 act. The discrepancy between Martinsville and Wayne County is less easy to explain, since they were to get roughly the same benefits from the facility.

IDNS accounted for Wayne County's predominantly negative vote by noting that the department and contractor had done more spadework in Martinsville. But the problems ran deeper. First, Wayne County saw itself (and was) a second-choice site in the eyes of IDNS. Early in 1988, Martinsville officials, concerned about the flurry of interest in Wayne County, had sought a commitment from the department that it would choose Martinsville if its site was technically satisfactory. IDNS had informally made that commitment. This was a reason for the department's greater attention to Martinsville; it was also one reason why proponents of the facility in Wayne County had a harder time generating support in the county. A second reason was that Wayne County had just been through two protracted environmental fights--one over a river channelization; the other over a landfill--and was battle-weary. A third

reason was the discreet (some said secretive) way in which county officials undertook their initial contacts with IDNS. The county board wanted the unrestricted funds that they would receive as a candidate host community, especially since they had a budget deficit, but people in the county saw them as ignoring community sentiment. Yet another reason was the strong, organized local opposition. People became afraid to come out in favor of the facility, especially when opponents launched informal boycotts of local businesses that had voiced support for it. And finally, there was the citizens' review committee . . .

Both the Martinsville city council and the Wayne County board of supervisors had appointed citizens' review committees to assess the LLW disposal project. The Martinsville committee was hand-picked to represent the pro-facility sentiments of the city council; it was docile and had a relatively smooth process. The Wayne County committee was a different story.

The Wayne County citizens' review committee had two co-chairs--one, a facility proponent; the other, a facility opponent--who quickly developed an acrimonious relationship. Within a half year after its organization, the committee was at a virtual stalemate. In February of 1989, the committee hired an outside moderator to conduct meetings, and two months later it hired a social impact

assessor and process facilitator. But arguments about how to proceed continued. The committee's problems were more than internal, however. After IDNS would not or could not meet its informal requests for information, the committee--spearheaded by its opposition faction--made a formal request to the department in May of 1989 for seven items: the site characterization study, the facility licensing application, the final determination of the site contractor and operator, the final fee structure, the final waste form rules, the final liability determinations, and transportation volumes, routing, and safety criteria. The committee added, "The committee expects to be candidly informed and consulted in a timely manner on all these items."⁵

In the summer of 1989, the Wayne County citizens' review committee--again, led by the opposition faction--released an interim report listing difficulties with establishing a working relationship with IDNS and with getting information from it. The committee also recommended that the Wayne County board take no positive action on the facility until a majority of the county's citizens were more favorable to the project. The facility proponents on the committee passively went along with the

⁵Wayne County Citizens Review Committee, May 11, 1989.

report, although they later tried to change it.⁶ Several committee members--especially those with a technical bent--dropped out as the process became politicized. In late 1989 the county board disbanded the committee, fed up with its opposition faction.

In May of 1989, the Wayne County committee indicated that it hoped Westinghouse would continue as the facility operator, because of the economic benefits offered by the company. In addition, both proponents and opponents had come to trust Westinghouse to some degree, partly because Westinghouse had opened an information office in Wayne County as well as in Martinsville. (IDNS had appointed a full-time local coordinator to Martinsville but not to Wayne County.) Two months later, the committee was lamenting Westinghouse's departure.

Westinghouse Is Replaced

In early 1989, Westinghouse and IDNS had become embroiled in increasingly hostile disagreements. IDNS

⁶For a discussion of this report and the Wayne County citizens review committee, see Elizabeth Peelle, "Two Citizen Task Forces and the Challenge of the Evolving Nuclear Waste Siting Process," US Department of Energy, Oak Ridge National Laboratory, presentation to the First Annual International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, April 8-12, 1990. Peelle was the paid process facilitator and social impact assessor for the committee from April to October 1989.

maintained that the contractor should own and assume unspecified liability for the facility while it was in operation; Westinghouse maintained that this was not in its contract. By May, relationships between the two had deteriorated into mutual accusations of bad-faith bargaining. The contract was terminated, and in July of 1989, the department selected Chem-Nuclear to replace Westinghouse--somewhat to the chagrin of Illinois environmental groups, who had come to dislike Chem-Nuclear because of an incident in Channahon, Illinois.

In the early 1980s, Chem-Nuclear had built a LLW transit facility in Channahon, located in Will County in the northern part of the state. In 1986, the company petitioned the NRC to expand its operation to include a supercompactor, in order to provide LLW volume reduction services (but not LLW disposal). Illinois was not yet an Agreement State, but Agreement State status was expected shortly. The NRC informally advised IDNS of the proposed supercompactor, but nobody--including Chem-Nuclear--told the officials or citizens of Channahon. Chem-Nuclear was seen as having been high-handed and duplicitous. The Channahon mayor commented, "Even if it is a safe and properly operated business, the way that [Chem-Nuclear] did

this puts a question on their credibility and honesty."⁷ IDNS was also implicated, partly because of a misunderstanding. A staff member of State Senator Jerome Joyce, whose district includes Will County, had called Terry Lash to ask whether a LLW site was being put in that county. Not realizing that the inquiry referred to the Channahon supercompactor, Lash said no. Senator Joyce subsequently blasted Lash: "After his mismanagement of this matter and his attempts to mislead, I am contemplating calling for Lash's resignation."⁸ But Joyce did not succeed in ousting him . . . yet.

The Siting Process Flounders, then Regroups

The change of contractor in the summer of 1989 increased suspicions that IDNS, in its eagerness to find a site in a willing community, was ignoring technical niceties. In a May 19, 1989 letter to IDNS, Westinghouse project director James Holland had documented the Westinghouse team's concerns about the Martinsville site, including groundwater and soil problems and the proximity of local water supplies. He went on to comment that

⁷Mayor Chesson, as quoted in NEIS News (Nuclear Energy Information Service, Evanston, IL), February 1987, p. 3.

⁸Jerome Joyce, as quoted in NEIS News (Nuclear Energy Information Service, Evanston, IL), February 1987, p. 3.

following its review of site characterization plans, Westinghouse had forwarded comments to IDNS. While IDNS integrated some of the comments, "many were ignored."⁹ On June 5, IDNS issued a statement that "although there is currently not enough information on the [Martinsville] site to reach a definitive conclusion on licensability . . . [the] site warrants the further detailed analysis that is being conducted."¹⁰ The department was joined in this statement by the Illinois State Geological Survey and State Water Survey, which had participated in the preliminary state screening studies and in some of the site-specific investigations. Battelle Memorial Institute, which had contracted with IDNS to do site characterization work, also responded to Westinghouse's charges. In the meantime, however, the Chicago Sun-Times had carried several stories which alleged that Westinghouse was not interested in continuing as the site operator-developer because of concerns over the suitability of the primary candidate site. Westinghouse subsequently issued a statement that they were negotiating termination of the contract because of disagreements about ownership, financing, and

⁹James Holland, as quoted in The Radioactive Exchange, vol. 8, no. 11 (1989), p. 3.

¹⁰"Joint Statement of the Illinois Department of Nuclear Safety, the Illinois State Geological Survey, and the Illinois State Water Survey," June 5, 1989, p. 2.

liability--not because of siting issues. Nevertheless, questions had been raised about the site and about IDNS's technical scrupulousness--questions that were to come up again only a few months later.

In October of 1989, just before Terry Lash was to announce whether the Martinsville site or the Wayne County site had been selected, Geological Survey and Water Survey staff indicated that changes had been made in their hydrology report on the Martinsville site, including alterations in their use of the term "aquifer." They added that "conclusions in the [IDNS] report were overstated."¹¹ In response, Terry Lash indicated that the IDNS report would be pulled. The department then held intensive discussions about the discrepancies with the State Surveys, Battelle, and other technical report contractors. On October 17, they reached an agreement. The revised IDNS report was to make clear that additional data would be collected and that final conclusions on the site selection would not be reached until the results of these data were known. A revised report was released with this caveat.

But the damage was done. As an editorial in the Chicago Tribune commented:

¹¹The Radioactive Exchange, vol. 8, no. 18 (1989), p. 2.

It's been hard enough convincing them [people in the candidate host communities] that the site should be near one of their towns when most of the radioactive waste . . . would come from the Chicago area. Instead, they're convinced that the department [IDNS] bungled the process, accusing it among other things of double-talk, misrepresenting the risks and trying to ram the project through before all the safety tests were complete.

Some of these complaints--fair or not--are to be expected on issue as volatile as this . . . But the department blew its credibility in producing a doctored environmental report on the site near Martinsville . . . "¹²

On October 19, James Thompson, in his final term as governor, announced that two changes would be made in the siting process. First, license applications would be prepared on both the Martinsville site and the Wayne County site. And second, a former Illinois Supreme Court justice, Seymour Simon, would hold a multiday public hearing in each of the candidate host communities to determine whether the site met the siting criteria specified in the 1983 act.

¹²Chicago Tribune, October 24, 1989.

Thompson had supported IDNS and Terry Lash; in fact, he had created IDNS and appointed Lash. In making his announcement, he stressed that this support continued and that the changes were being instituted "to better satisfy the public's need for more safety assurance."¹³ But he also expressed concern over IDNS's dual role, adding that the changes would help to make the siting decision "open, fair and to the extent that it needs to be, adversarial, rather than concentrating all of the power in the hands of the Department of Nuclear Safety and making it advocate, judge and jury."¹⁴

Not everyone was satisfied with Governor Thompson's proposed changes. The Illinois Senate president, Philip Rock, asked Thompson to fire Lash, and Senator Joyce introduced a resolution calling for "a prompt and thorough inquiry into [the] conduct of the Department of Nuclear Safety during the site selection process to ensure that no site will be selected unless and until it can be determined that the repository poses no threat to the public health and safety." At the same time, he commented that "I, for one, am tired of the double-talk and outright misrepresentations coming from Director Lash and his agency

¹³James Thompson, as quoted in The Radioactive Exchange, vol. 8, no. 18 (1989), p. 2.

¹⁴Ibid.

. . . "¹⁵ Lash, who was not fired, said that he would cooperate fully with the inquiry but would have to determine whether he legally could stop the siting activities.

Meanwhile, the Martinsville mayor wrote a letter to Senator Joyce on October 25, saying that he and the city's geological consultant continued to support the project, that the changes in the State Surveys' report were not significant, and that "we've never had reason to doubt their [Lash and his staff's] honesty."¹⁶ Professionals in nuclear-related fields also gave their support: for example, the president-elect of the American College of Nuclear Physicians, in an open "letter to the editor" of the Chicago Tribune, referred to the upcoming inquiry as a "lynching."¹⁷ Subsequently, a technical advisory committee to IDNS released a report on the department's site selection process. (The committee had been appointed by Terry Lash in June of 1988, and consisted mainly of representatives of LLW generators.) The report stated that "the site characterization process currently underway at

¹⁵Jerome Joyce, as quoted in The Radioactive Exchange, vol. 8, no. 18 (1989), p. 3.

¹⁶Truman Dean, as quoted in The Radioactive Exchange, vol. 8, no. 19 (1989), p. 2.

¹⁷Robert Henkin, letter to the editor, Chicago Tribune, November 19, 1989.

the Martinsville and [Wayne County] sites is being conducted in an objective, technically sound manner"18

State officials from Nevada, South Carolina, and Washington also got into the act. In a November 29, 1989 letter to Governor Thompson and Senate President Rock, they warned that stopping siting activities would put Illinois out of compliance with the LLWPAA and that access to the current disposal sites would be denied. The point was reinforced by a Nevada official at a December 12 conference of Illinois's LLW generators: "If we believe that there are any delays to the siting process that are the result of political intervention, the intent is to impose the denial of access to your state."<19

Nevertheless, the Illinois Senate's Executive Committee, chaired by Senator Joyce, held public hearings on the IDNS siting program. At these meetings, several people testified to the inherent conflict of having IDNS act as both promoter and regulator of the siting process. (The NRC staff, when it had reviewed Illinois' Agreement State application several years before, had cautioned about

¹⁸Technical Advisory Committee to the Illinois Department of Safety, Review and Evaluation of the Site Selection Process for the Low-Level Radioactive Waste Disposal Facility, January 1990, p. 4.

¹⁹Jerry Griepentrog, as quoted in The Radioactive Exchange, vol. 8, no. 22 (1989), p. 3.

having IDNS in this dual role, but Agreement State status had been granted.) Joyce decided to go beyond the hearings to be held by Judge Simon. In the spring of 1990, he introduced legislation to create an independent, three-member commission that would assess whether the site proposed by IDNS met the siting criteria in the 1983 act--an idea which Judge Simon endorsed. The legislation was passed by the legislature and signed by Governor Thompson in June of 1990. He then appointed the siting commission members, who were confirmed by the Senate.

Joyce's push to retool the siting program was somewhat ironic. With the help of Joanna Hoelscher, a representative of the Chicago-based Citizens for a Better Environment, Joyce's office had played a large role in drafting the 1983 act which resulted in the concentration of siting authority in IDNS. But animosities had grown up between Joyce and Lash, and Joyce, along with seeking to remove some of IDNS's authority, had continued to press for Lash's removal.

Then, in mid-March of 1990, a report surfaced that IDNS had an agreement with Chem-Nuclear that its Channahon supercompactor, which provides volume reduction services for waste from around the nation, would be moved to the new LLW disposal site. Critics objected to both the secrecy of the arrangement and the fact that it would open up the

disposal site to waste from outside the Central Midwest Compact. As a leading Wayne County opponent commented: "We were concerned that once the dump was in, they'd bring in other facilities and we'd end up the nuclear waste mecca of the Midwest. Now it turns out the IDNS was lying to us all the time, just like they've lied to us on so many other things."²⁰ IDNS and Chem-Nuclear protested that the arrangement was not a secret and that it was subject to the host community's approval, but again, the damage was done. Effective April 6, 1990, Lash resigned. Shortly thereafter, his deputy director and his LLW program manager also left.

Reactions to Lash's departure were mixed. Hoelscher, a member of IDNS's citizens' advisory group since it was formed in 1985 and one of Lash's most vocal critics, commented that "Terry's resignation may bring some more credibility to the process, but it really depends on who his replacement is. Unless it is someone completely from the outside, who has not been associated with the department, he is going to be painted with the same brush that Terry is."²¹ The comments of Kathy Tharp, a member

²⁰Michael Podolsky, former co-chair of the Wayne County Citizens Review Committee, as quoted in the Martinsville Planet, March 21, 1990.

²¹Joanna Hoelscher, as quoted in the Chicago Tribune, April 5, 1990.

of the antifacility group, Concerned Citizens of Clark County (CCCC), were less critical of Lash but more critical of the process: "Director Lash is going but the process is continuing. As far as I'm concerned the process is a fiasco. No more money should be spent on sites that are politically and geologically unacceptable."²² But Dale Huffington, executive director of the Clark County Economic Development Corporation and an early supporter of having the disposal facility in the county, expressed hope that the process would continue and said, "I think it's unfortunate because Terry has a lot to offer. He's a brilliant person and the program's going to miss him."²³

The process did continue, with some changes. Thompson named Thomas Ortziger, who had been in Illinois state government since 1977, to replace Lash. While many of the IDNS staff remained the same, a number of those in the LLW waste management program had left and been replaced. Over the years, the LLW program had experienced fairly high turnover. Some left for personal reasons unrelated to IDNS; others, because they did not get along with Terry Lash. And one IDNS senior policy analyst--a social scientist who had worked for the department for more than

²²Kathy Tharp, as quoted in the Herald & Review (Decatur, IL), April 5, 1990.

²³Dale Huffington, as quoted in the Herald & Review (Decatur, IL), April 5, 1990.

four years but had resigned in September 1989--made a point of publicly criticizing both IDNS's siting process and the laws on which it is premised.²⁴ The citizens' advisory group, which apparently had grown increasingly disaffected, had diminished influence with IDNS, especially after Ortziger took over.

Wayne County Bows Out; Technical Concerns and Opposition Mount in Martinsville

In March of 1990, another referendum on the facility was held in Wayne County, and 70 percent voted against it. On April 10, 1990, the county board of supervisors formally rejected hosting the facility by a vote of 12 to 1 but said that site characterization studies could be completed. However, the Illinois Senate, in an action on IDNS's budget, then prohibited the department from further studying the Wayne County site. That left only the Martinsville site.

Meanwhile, questions continued to crop up concerning the Martinsville site's suitability. In 1989, the state's

²⁴See, e.g., Richard Walker, "Glimpses Behind a Green Tunic Threadbare," a speech given at Cortland County Office Building, Cortland, NY, April 14, 1990; and, also by Walker, "The Dark Side of Low-Level Radioactive Waste Disposal Siting in Illinois," a speech at Argonne National Laboratory, Argonne, Illinois, February 23, 1990.

test data on the site were analyzed independently by geologist Charles Norris, working with the Central States Resource Center (an environmental advocacy organization located in Champaign, Illinois) and with the CCCC. Norris contended that groundwater under the site could migrate to the pool of groundwater tapped for Martinsville's wells--in other words, that there was a hydrological connection between the site and the public water supply, and that the latter could become contaminated with migrating radionuclides. At the time, Terry Lash dismissed the possibility, saying that Norris's finding was "irresponsible and unsupported by scientific data."²⁵ In the following year, however, the work of IDNS's site characterization contractor, Battelle, was harshly criticized by the State Surveys, and Norris continued to press his case. In mid-1990, IDNS admitted that there was a hydrological connection between the site and the water supply, but it contended that it was a weak connection, that any migration of radionuclides from the site to the water supply would take centuries rather than the decades that Norris predicted, and that contaminants would in the meantime become diluted. The changes in IDNS's position on the site had significant implications. From assurances

²⁵Terry Lash, as quoted in the Chicago Tribune, October 5, 1989.

that the department would accept only a "technically excellent" site, it now appeared to many that IDNS would settle for a merely adequate site.

The impression of corner-cutting was reinforced when, in the fall of 1990, Chem-Nuclear announced that it planned to make changes in the original Westinghouse design for the facility. Westinghouse had been chosen as the contractor partly because of its conceptual design for the facility (earth-covered concrete vaults and modular concrete canisters). When Chem-Nuclear took over in the summer of 1989, it was understood that the new contractor would use Westinghouse's concept. During the subsequent year, Chem-Nuclear decided that some of Westinghouse's design specifications were infeasible. In particular, they decided to reduce the thickness of the facility's walls from 40 inches to 24 inches and to co-locate Class C waste with less radioactive waste, rather than isolating it in specially constructed cells. They contended that thinner walls would make the facility more earthquake-proof and that it was not feasible to pour walls 40 inches thick. They also contended that collocating the waste would allow less contaminated waste to act as a shield for the more highly radioactive waste. When asked whether the changes would weaken the original design concept, Chem-Nuclear's project manager said, "That's unanswerable. I don't want

to get into comparisons. Our design will meet all contractual requirements."²⁶ However, when two Westinghouse aides were asked a similar question, they replied that the thinner walls "would be all right for our lifetime" but added that "we planned--and could have built--much thicker walls, because that's what's needed for a facility that's got to last hundreds of years without leaking . . . which no concrete structure has ever done before."²⁷

Pressed by environmentalists, IDNS had decided in late 1987 to adopt release standards that were far more stringent than those required by NRC regulations. Whereas 10 CFR 61 says that releases of radioactivity from a LLW disposal facility cannot exceed 25 millirems per year of whole-body dose to people outside the facility boundary, IDNS adopted a "zero release" concept. The facility would have a one-millirem, not a 25-millirem, performance requirement, and it would have a zero-millirem performance objective. Two to three years later, the criticism was

²⁶Paul Corpstein, as quoted in the Chicago Sun-Times, November 4, 1990.

²⁷Anonymous sources, as quoted in the Chicago Sun-Times, November 4, 1990.

being made that IDNS was backing away from its zero-release objective and was prepared to settle for licensability.²⁸

In August of 1990, CCCC mounted a petition drive to have another nonbinding referendum on the proposed facility. The referendum was to appear on the ballot of the county's November 1990 general election. And in the fall of 1990, a new opposition group to the facility formed within Martinsville. The new group, "Martinsville Against the Dump" (MAD), said it would use civil disobedience to stop the project if the site was approved by the newly created siting commission.

Between August and November, the Martinsville City Council voted to abolish property taxes if the facility was located there; another \$400,000 unrestricted grant came from IDNS, bringing the total unrestricted funds received so far to \$1.2 million; and as a result of the new grant, the city gave utility customers one month of free service up to \$100. Nevertheless, the referendum vote was even less favorable than it had been two years before. In Martinsville, 56 percent of the voters supported the facility; in Clark County, only 26 percent.

In December of 1990, IDNS proposed a siting resolution to the Martinsville City Council. The council rejected it

²⁸See Charles Nicodemus's article, "Nuke site shaky," Chicago Sun-Times, June 10, 1990.

because it lacked adequate language concerning local control. On January 9, 1991, after Thomas Ortciger, the new IDNS director, had met privately with each of the council members to hear their concerns, a revised resolution was unanimously approved. The revised resolution called for city involvement "in all aspects of the process, including the selection of the [facility] contractor . . . , negotiating regarding compensation and incentive measures, local oversight procedures, and other matters of local concern"²⁹ In approximately six months, the siting commission would hold its hearing on the site.

ILLINOIS AND TRUST

Trust--or in some cases, distrust--underlies the Illinois experience. The department made strong bids for trust, but they did not ask for blind trust. Instead, they grounded those bids in what they referred to as "The Illinois Approach: Technical Excellence--Political Acceptability--Public Participation."³⁰

²⁹Resolution of the Martinsville City Council, January 9, 1991, as quoted in The Reporter (Martinsville, IL), January 10, 1991.

³⁰Illinois Department of Nuclear Safety, The Illinois Approach, vol. 1, no. 1, September 1988.

Terry Lash's education included a Ph.D. in biophysics and biochemistry from Yale University. Prior to joining IDNS in 1983 he had worked as Director of Science for the Scientists' Institute for Public Information; Director of Science and Public Policy for the Keystone Center, an institute for consensus-building on environmental and policy disputes; and, for eight years, as a staff scientist for the Natural Resources Defense Council. He thus came to IDNS with a pedigree both in science and science policy and in environmental advocacy. His initial appointment as director was widely supported.

Although some of their work was criticized, the IDNS staff and its contractors were seemingly well-qualified to judge the technical suitability of a prospective low-level waste disposal site. For example, in 1987, the department issued a series of draft technical reports on such topics as "Risks from Low-Level Radioactive Disposal," "Alternative Design Approaches for a Low-Level Radioactive Waste Disposal Facility," "Safety Features to Prevent Releases from Low-Level Radioactive Waste Disposal Facilities," "Objectives and Evaluations of Alternative Designs for Low-Level Radioactive Waste Disposal Facilities," "Assessment of Mixed Waste Disposal," "Reinforced Concrete and Other Manufactured Materials for Use in Low-Level Radioactive Waste Disposal," "Regulations

Concerning Low-Level Radioactive Waste Disposal in Illinois" . . . Altogether, the reports made a stack three inches thick. They--as well as the site characterization process--were reviewed by the department's seven-member technical advisory panel, which included scientists, political scientists, and engineers.

The department also sought--and sometimes listened to--the opinions and advice both of concerned citizens statewide and of those who would have to live with the low-level waste facility. When sites were being considered in Martinsville and Wayne County, IDNS listened to the local officials' advice regarding the initial selection of Westinghouse; it supported the legislative amendment that gave local officials the authority to close the disposal facility if nonpermissible waste was accepted; and it also supported an amendment that eliminated a matching funds requirement for technical assistance grants.

But these efforts did not pan out as expected. Members of the citizens' advisory group included approximately 15 to 20 representatives of the Illinois Farm Bureau, LLW generators, and environmental and other organizations. Despite their differences, they developed a degree of trust in each other and IDNS, but the group's relationships were not altogether smooth. Following the addition of an especially ardent environmentalist who was

executive director of the Central States Resource Center, the industry representatives became wary. Meanwhile, representatives of environmental groups did not always see eye to eye with each other. And the advisory group--especially some of the environmentalists--had an increasingly contentious relationship with the department and with Terry Lash. Lash retained his critics on the advisory group, although all members served at his pleasure. He did start to downplay the group's role, however, especially as IDNS began to work intensively with Martinsville and Wayne County. Despite the special attention directed to the potential host communities, some members of the Wayne County citizens' review committee became increasingly distrustful of IDNS, as did many others in Wayne County and in Clark County. And the state legislature, led by Senator Joyce and Senate president Rock, increasingly questioned the integrity and ability of the department in general and of Terry Lash in particular.

Many people (including some of IDNS's staff) saw Lash's style as high-handed and autocratic; they were not inclined to give him the benefit of the doubt when questionable issues arose. The Channahon supercompactor incident in early 1987, while exacerbated by misunderstanding, contributed to the image of a director and a department that were not to be trusted. In Wayne

County, IDNS's failure to meet all of the review committee's information requests was seen by many--especially those who were inclined to be opposed to the facility--as a reason to distrust the department. The department responded that several of the requests could not be met until later in the siting process, but some members of the review committee felt that they were being asked to buy a pig in a poke, since IDNS expected them to give their assessment of the facility without this information. And trust in the department was eroded by allegations that IDNS and its site characterization contractor were ignoring or glossing over technical questions. The incident in 1989 concerning IDNS's alterations of the State Surveys' hydrology report dealt a nearly mortal blow to the department's--and Terry Lash's--already slipping reputation for integrity and technical excellence. The final blow for Terry Lash was dealt by the second incident involving the Channahon supercompactor and allegedly secret plans to move it to the new LLW disposal site.

Nevertheless, reactions to Terry Lash and the department were mixed. Many people thought that, while IDNS might have committed some peccadillos, it was still trustworthy. Others thought it had clearly demonstrated that it was not worthy of trust. Within Martinsville and Wayne County, continued support perhaps could be explained

by the windfalls these communities had received and stood to receive. But this does not adequately explain differences in levels of trust. Although some people in the potential host communities saw IDNS's unrestricted grants as persuasive reasons to give the department the benefit of the doubt, others saw them as bribes and as a further reason to distrust IDNS. Furthermore, people outside the potential host communities--people who did not have obvious vested interests in the facility--also had different degrees of trust in IDNS. Some of these differences can be explained by differences in how people evaluate risk. This is discussed in the next chapter. But in the potential host communities, as well as elsewhere, there were also important differences in values concerning trust.

DECIPHERING TRUST

Trust is the sine qua non of social interactions. Without it, society as we know it could not operate. Yet it is not at all clear what trust is. What follows is an attempt to decipher trust. Many of the ideas are drawn from Niklas Luhmann's insightful monograph on trust.³¹

³¹Luhmann, op. cit.

Trust is inextricably tied with time. To trust is to behave as if the future were not altogether uncertain. Without trust, only the most simple and immediate transactions between people would be possible. With it, transactions that are complex and far-reaching (through both space and time) are enabled.³² Trust thus permits differentiation of the social system: the Martinsville farmer grows food; Commonwealth Edison generates electricity, with LLW as a byproduct; Chem-Nuclear disposes of LLW. Each trusts that the other will do a good job. Yet differentiation also presents problems for trust.

The basis for trust is a sense of duration. It is a sense of the present, continuing into the future in an unbroken continuum despite changing events. For the future contains many possibilities--far more than could be contemplated in the present. And the more society is differentiated and the more complex its undertakings are, the greater the range of possibilities is. The future is always uncertain (and thus always poses risk). The problem of trust, then, becomes planning for the future while knowing that it is not necessarily going to be like the present.

³²Clark Bullard has developed a typology of technologies using two characteristics: their complexity, and their spatial and temporal reach. See Clark W. Bullard, "Management and Control of Modern Technologies," Technology in Society, vol. 10 (1988), pp. 205-232.

Trust is a gamble; it's a risky investment. For trust is only involved when it makes a difference in how one acts and what one decides to do. Yet trust cannot be encompassed by decision-making theories, for the grounds for trust are not wholly rational. Trust is, instead, inevitably a blend of knowledge and ignorance. Decisions based on trust involve a process of symbolically, internally resolving outcomes: there are a whole series of "what ifs" that one doesn't worry about, and if what happens is not as expected, one doesn't blame the trusted person or institution. Despite attempts to systematically analyze the costs and benefits of prospective actions, the future always includes an element of uncertainty (especially when the action being contemplated involves a relatively complex technology such as LLW disposal). Trust enables acceptance of this element of uncertainty.

Trust thus brings a kind of freedom. It increases one's tolerance for an indeterminate future; it makes it possible to live and act in relation to complex events and social structures. But so does trust's counterpart, distrust. Distrust is not simply a lack of trust; it is a decision not to trust. It also reduces complexity, but it does so through negation. The shift from trust or lack of trust to distrust (or, rarely, vice versa) is not usually triggered by one event, and it (like trust) is not a wholly

objective, cognitive process. Rather, it is a matter of a threshold having been crossed, and of an "unstable, incalculable moment"³³ when the "reasons" or "proofs" that distrust or trust is justified become especially intense and apparent. For example, in the Illinois case the State Surveys' allegations in the summer of 1989 served to crystallize some people's distrust of IDNS or Terry Lash. This suggests that there are boundaries--but not boundaries that can be objectively drawn--between two poles: instances where distrust or trust is patently "required." This does not mean, however, that trust and distrust cannot be rationally intermingled: in Wayne County even opponents of the disposal facility trusted Westinghouse as a "good company," but they did not necessarily trust that Westinghouse, IDNS, or anyone else had adequate knowledge to dispose of LLW safely for 500 years.

One begins to trust--or distrust--another by extrapolating from the available clues, but the process is not purely cognitive. It is also not one-way. The person or group seeking to be trusted can help create trust through various means (many of which can be seen in IDNS's actions toward Martinsville but not toward Wayne County). For example, performance beyond the call of duty--supererogatory performance--helps to inculcate trust.

³³Luhmann, p. 74.

So does having but foregoing opportunities for betrayal. And so does reciprocal dependence, for being able to demonstrate trust helps to win trust. Yet mere cooperation for tactical reasons (for example, the cooperation of Wayne County's board of supervisors with IDNS to secure grant funds) does not mean that trust is present. And pretending to be trustworthy--or to trust--may backfire, if the charade is recognized.

For both the truster and the person seeking to be trusted, there is seemingly a fundamental problem. How should one judge the communications of other people, especially people whom one doesn't know and who come from different cultural backgrounds? This problem sometimes comes up in relationships between individuals. It comes up more frequently when institutions are involved.

Interpersonal Trust and System Trust

There are two basic types of trust: trust in other individuals (interpersonal trust), and trust in society's institutional structures (system trust). Interpersonal trust can prepare the way for system trust. For example, the trust that developed between Terry Lash of IDNS and Dale Huffington of the Clark County Economic Development Corporation helped prepare the way for the trust that some

Martinsville citizens developed in IDNS as an agency. But interpersonal trust and system trust are quite different in several respects. Interpersonal trust is based on familiarity; it is concerned with motives and with the possibility of deception. System trust can't be based on familiarity; instead, it is concerned with how others in the social world perform their roles. Those seeking to be trusted as part of the social structure do so by their readiness to adapt to the demands of that structure and by how they present themselves publicly.

With both interpersonal trust and system trust, one trusts that the basic conditions one has "bought into" will continue despite change, and one renounces impossible demands for complete information and complete control. A relationship of trust thus gives the one being trusted some flexibility of action . . . but how much flexibility is another question. (For example, how far could IDNS and Terry Lash back off from the demanding technical standards they had espoused and still retain trust?) Interpersonal trust and system trust thus share the quality of bounded flexibility. But whereas interpersonal trust is particular and affective, system trust is concerned with how the system functions. And it is that functioning--not the individuals themselves--that is trusted with system trust.

Yet the two types of trust cannot be neatly separated. One's interpersonal relationships may have a system aspect to them (e.g., friends and business associates who end up serving on the Martinsville city council together), and one's system relationships may have an interpersonal aspect to them (e.g., the personal animosity between Jerome Joyce and Terry Lash). Thus, role performance will figure in interpersonal trust, and familiarity and motives will figure in system trust.

In addition, with both types of trust (especially system trust), people have different values based on different orientations to time and the world around them. On the one hand, those with an experiential orientation think in terms of the here and now. For them, the present is the basis, or touchstone, for changing events. They value stability and harmony. On the other hand, those with an instrumental orientation think less in terms of the present, more in terms of future-bound goals. They value achievement, and to attain it, they seek to control events and people through the tools of social organization (e.g., distinguishing people's roles and managing the flow of information). While a person can have both orientations, most people have a predilection for one or the other. This sets up the possibility of suspicion between people with different orientations, since each will have difficulty

making sense of where the other "is coming from" . . . the other's worldview will simply not be intelligible. (Could Kathy Tharp of CCCC and Terry Lash of IDNS understand what motivates the other?)

An instrumental orientation is necessary for substantial societal change (like building nuclear power plants or developing fusion energy systems), but those with an instrumental orientation are likely to be regarded with suspicion, even by other instrumentalists. The instrumentalist's control of information, events, and people is often seen as manipulation, and when it is seen that way, others will continue to trust only if they can tolerate the suspicion of being manipulated. But many people can't tolerate this suspicion--especially those with an experiential orientation, who are likely to share neither the instrumentalist's specific goals nor her general preference for "getting things done."

Finally, with both types of trust, the truster and the trustee may be out of sync. The person or group seeking trust may expect (and think they merit) a strong form of trust, but they may get only a weak form of trust. With system trust, particular problems arise in the case of authority.

Authority and Trust

Trust means giving up demands for full information and complete control, but it does not necessarily mean giving up demands for any information and any control.

Hierarchies of authority, especially in differentiated social systems, often presume that those subject to authority will for the most part relinquish their demands for information and control. They thus presume a trust that, while not altogether blind, is blinder than usual. But this degree of trust many not be forthcoming. Instead, especially in a pluralistic, highly differentiated system, assertions of authority are often met with only a weak form of trust. This trust may simply mean tolerating the other person's views, and, if the other person is demonstrably competent in a particular area, acknowledging the superiority of that competence. Thus, those in authority, including those who claim the authority of expertise, can't rely on their positions to ensure that they will have the degree of trust needed to ensure that their authority is respected. They must earn this trust, and even then, they can't be sure that it will be forthcoming.

TECHNICAL COMPETENCE AND FIDUCIARY RESPONSIBILITY

In The Logic and Limits of Trust, Bernard Barber identifies two kinds of expectations involved with trust: the expectation of technical competence, and the expectation that fiduciary responsibilities will be fulfilled.³⁴ These are important ingredients of trust, especially system trust: they largely define what it means to perform one's role well. However, what counts as "technical competence" or "fulfilling fiduciary responsibilities" is often not clear.

Technical Competence

What is technical competence? The answer seems simple: it's being able to do what one says one can do. But technical competence, especially in a complex society, is often a matter of knowledge, not of physical performance. In the Illinois case, for example, it's a matter of knowing whether the public water supply will be affected by the LLW disposal facility. So the claim then becomes slightly different: it's knowing what one says one knows.

³⁴Bernard Barber, The Logic and Limits of Trust (New Brunswick, NJ: Rutgers University Press, 1983).

Today, however, knowledge is not usually--and perhaps not often--something that one can claim as one's own. Instead, even experts must depend upon what they learn from others in developing their "own" expertise. They must trust that what they learn from books, articles, and colleagues is reliable: that it reflects state-of-the-art knowledge.³⁵ Granted, the learner has strategies for checking on what she learns from others (e.g., she can check pedigrees and get second opinions), and the professional community has strategies for preventing sloppy or fraudulent work from being disseminated (e.g., it can use peer review and research replication, and can penalize those who are caught committing "scientific misconduct"). However, these strategies are not fail-safe.³⁶ The alternative is to undertake autonomously the investigations needed to confirm the truth of what one learns from others. But this alternative is neither rational nor practical--even if one had the aptitude and training, one wouldn't have the time. Inevitably, then, one must to some extent trust that these building blocks to one's own

³⁵Truth is another matter--sought after but not recognizable even if it is attained.

³⁶See John Hardwig, "The Role of Trust in Knowledge," forthcoming in The Journal of Philosophy. I am indebted to Hardwig for many of the points made here about expert knowledge. See also John Hardwig, "Epistemic Dependence," The Journal of Philosophy, vol. 82, no. 7 (July 1985), pp. 335-349.

knowledge are provided by people who are competent and conscientious and are not deceiving themselves or others about the extent of their expertise.

So even an expert's knowledge is built on the knowledge of other experts, on trust in their ability, scrupulousness, and honesty, and on trust in the community of experts to police its members. This has two implications. First, it means that there are many types of knowledge that can be "known" only by a group of experts, not by any one expert. (For example, geologists and hydrologists were both involved in putting together the data to determine the likelihood of migration of radionuclides from the potential LLW disposal sites.) And second, it means that if trust is an ineluctable part of knowledge for experts, it must certainly be that for laypeople.

In public policy issues such as LLW disposal, measures can and should be taken to give laypeople firsthand experiences (e.g., by including them on advisory boards). But even so, the layperson must to a large extent trust that claims to expertise by both individual experts and groups of experts are valid: that they represent the collective state-of-the-art knowledge. Granted, they can check on what they are told. For example, Martinsville and Wayne County were given technical assistance grants so that

they could hire their own experts to independently evaluate the site investigation studies. But if the experts disagreed--as some did in the Illinois case--laypeople would have no way of knowing on their own whose claims to knowledge were valid.

Trust is what the expert hopes to earn, through her technical competence and specialized knowledge. And yet there is no way to prove technical competence and specialized knowledge, especially when (as with LLW disposal) a complex technology is involved that involves predictions far into the future of how water will move, how well concrete will hold up, etc. Then especially, technical competence and specialized knowledge, which is built partly on trust, must be taken partly on trust.

Fiduciary Responsibility

Other problems arise with fiduciary responsibility. The biggest problem is whom one is responsible to. If it's a number of people, conflicts of interest are likely.

People conferring trust relinquish a degree of control over their lives; they put themselves in the hands of their trustees. With the traditional "fiduciary" professions (law, medicine), the responsibility of the trustee seemingly is clear: her paramount duty is to act on her

client's behalf. In fact, the trustee's responsibility isn't altogether evident: Should a lawyer follow her client's instructions even if she feels they are not in the client's best interests? Should a doctor take into account the family's strained budget or society's scarce medical resources in deciding how to treat her patient? But traditionally, a fiduciary relationship has been conceived as a single professional or group of professionals concerned with protecting and furthering a single set of interests.

With social systems, where a number of different professionals are supposed to act on behalf of a number of different groups, or "clients," the situation becomes much more complex. Who are the clients? In the Illinois case, for example, are IDNS's clients the Central Midwest Compact's LLW generators? . . . the citizens of Illinois and Kentucky? . . . the elected representatives of those citizens? . . . the citizens or the elected representatives of Wayne County and Martinsville (or Clark County)? . . . the people that will live, for generations in the future, near the LLW facility? . . . the present and future people of South Carolina, Washington, and Nevada, where Illinois's and Kentucky's waste has been disposed? Perhaps all of the above.

The interests of multiple clients do not necessarily coincide; in fact, they often conflict. Illinois LLW generators, for example, have been paying a lot to get a disposal facility in place. (The utilities--or rather, their ratepayers--paid a fee of about \$1.8 million per nuclear power reactor for fiscal year 1991.) The generators want to expedite development of a regional disposal facility and do not want to be forced to store their waste come 1993, when disposal capacity outside the region is no longer available. In contrast, the Concerned Citizens of Clark County and the Martinsville Against the Dump groups are adamantly opposed to having a LLW disposal facility in their vicinity; they think the risks outweigh the benefits, as do most of the people in Wayne County.

The Illinois case illustrates other, related problems with fiduciary responsibility. First, when there are multiple clients, a trustee may be inclined to see those who hold the purse or the power as the "real" clients. The others, in the trustee's eyes, are merely stakeholders--people who purport to have an interest. For example, IDNS dedicated much more attention to the LLW generators (it held an annual generators' conference, and its technical advisory committee was mainly composed of generator representatives) and to Martinsville than it did to its other clients.

This suggests an additional problem: a multiplicity of clients may necessitate a multiplicity of trustees. In the Illinois case, the primary trustee at the state level was IDNS. The Central Midwest Compact Commission largely took a backseat to IDNS; the individuals or groups who established, appointed, or sanctioned the actions of IDNS and its leaders--including the Illinois governor and legislature and the NRC--gave IDNS fairly free rein. Until late 1989, the State Surveys were in a subordinate position to IDNS. But, when the conflicts between IDNS-as-advocate and IDNS-as-judge became apparent, the State Surveys' role was elevated, and another trustee, the siting commission, was added. (There were also problems with trustees and clients at the local level. As a leader of the CCCC commented, "Does a little town of 1,300 have the moral and ethical right to bring a radioactive waste dump into the middle of the county?"³⁷)

Another problem with fiduciary responsibility is how much technical expertise the trustee must have. If she must trust the testimony of experts--or worse, if she must decide between experts who disagree--can she be sure that she has fulfilled her fiduciary responsibilities to those who are trusting her? In other words, is technical competence a prerequisite for fiduciary responsibility?

³⁷ Steve Cloud, Chicago Tribune, July 23, 1989.

The Illinois experience suggests that it is not . . . that in fact, it sometimes is preferable to separate technical competence and fiduciary responsibility.

The Illinois siting commission members were appointed to act as judges in the adversarial hearings on the Martinsville site selection. Like most judges, they do not have extensive scientific or technological expertise. (Although one is a civil engineering professor, the other two are a retired judge and a Sierra Club representative.) And like judges, they won't do their own investigations of the facility. Instead, they will take testimony from experts and will try to evaluate that testimony. But this expert testimony will conflict: for example, opponents of the facility have claimed that the radionuclides migrating from the proposed facility could affect Martinsville's water supply, and they have experts to make this case; IDNS and other proponents have experts who dispute this claim. This illustrates that those who have technical competence may also have vested interests. (It also illustrates the potential inequities of expert testimony. IDNS has spent millions of dollars on its site characterization studies; the opponents have been given grants totalling \$150,000 by the Central Midwest Compact Commission to prepare for the hearings.) And, as discussed in Chapter 4, even scientists without vested interests have biases about how science

should be done and applied--about, for example, analytic methods and what counts as adequate evidence.

Thus, especially in cases that are charged with values issues and that are full of scientific uncertainty, those given fiduciary responsibility are usually not the technical experts. Instead, they are those who are thought to be able to evaluate the experts' testimony and act in their "clients'" best interests. But how expert testimony should be evaluated remains a troubling question. So does the question of whether the trustees are equipped to judge who the clients are, what their best interests are, and how competing interests should be reconciled.

This suggests yet another problem with fiduciary responsibility: how closely the trustee should share the viewpoints of their clients. It could be argued that the siting commission was not necessary; that the Martinsville and Wayne County citizens review committees should have been able to fill the role of judge. Like the siting commission, they were not experts themselves. But they had several hundred thousand dollars in grants from IDNS and the Compact Commission to hire their own experts to evaluate IDNS's studies of the proposed facility and its possible impacts, and they could advise their local governing bodies to accept or reject it. The difference between the siting commission and the local committees is

not primarily one of expertise; it is one of vantage point. Apparently, the Illinois legislators who voted to establish the siting commission saw the local committees and local governments as "too close to the problem": the local government and its appointed committee could decide whether or not accepting the facility was in their locality's best interests, but--perhaps because of those interests--they couldn't be trusted to objectively evaluate evidence and testimony concerning the site's technical suitability.

A final problem with fiduciary responsibility is the scope of people's expectations. People often use their ideals about the physical and social world as criteria in judging whether their trust--especially their system trust--has been justified.³⁸ Part of fiduciary responsibility, as seen in the eyes of clients, is to help ensure that these expectations about the natural and social world are met or at least not contravened. And yet, the trustee has no way of guaranteeing that they will be. Even if those acting as trustees can reconcile differences in the expectations of those to whom they have a fiduciary responsibility, they still cannot wholly control the system. For example, IDNS cannot change the LLWPA's mandate. This returns to the problem, not just of a pluralism of clients, but of a pluralism of trustees.

³⁸On this point, see Barber, op. cit., p. 9ff.

There is no one "she" or "he" in charge of the system. There are many actors, especially on complex public policy issues such as LLW disposal, and these actors often do not act in concert. Consequently, trust may be lost or frayed, not because of the trustee's actions but because of her inability to act; her inability to realize the natural and social orders desired by those whose trust she holds.

CONCLUSION: THE ELUSIVENESS OF TRUST

There were many factual reasons to trust IDNS. IDNS was empowered by a detailed law that was widely supported when it was enacted. The department and its director, Terry Lash, had the backing of the governor, its technical advisory panel, and others. It had a large, technically well-versed cadre of staff and contractors, and it had a thorough site screening process. It encouraged and financed the prospective host communities' independent evaluation of the potential sites and their impacts, and it made concessions to the potential host communities' demands for local control. All of this should have promoted trust.

However, there were also many reasons to distrust IDNS. IDNS gave the impression of being ready to overlook technical flaws in its eagerness to find a willing site--an impression that was reinforced first by Westinghouse's and

the State Surveys' allegations, and later by a partial reversal of IDNS's position on the hydrological connection between the proposed Martinsville site and the local water supply. The department, and especially Terry Lash, developed a reputation for secretiveness and high-handedness--a reputation that was reinforced by the incidents involving the supercompactor. The department, and especially Lash, also incurred the wrath and distrust of two important state politicians, Jerome Joyce and Philip Rock. IDNS's largess to the potential host communities appeared to some as bribes, especially when coupled with intensive promotional campaigns in those communities. And while the department sought the approval of the local populace, it was especially attentive to the local governing body, which might or might not represent local sentiments. Finally, IDNS pressed the communities for an early decision and was unable to fill all of the Wayne County review committee's requests for information.

IDNS also had to live with some things that were not altogether within its control but that contributed to the climate of distrust in the department. It had to live with the reputations of the failed Sheffield and Maxey Flats sites and with responsibility for Sheffield. (Although the Sheffield site had closed before IDNS was created, some people have been displeased about the department's 1988

settlement with US Ecology to make the site environmentally secure.) And it had to live with the fact that most of the nuclear power plants are located in northern Illinois but most of the areas suitable for LLW disposal are in central and southern Illinois, thereby fueling a long-standing charge by downstaters that the more populous and prosperous north was taking advantage of them.

But if everyone had reacted in the same way to these facts, there would have been little disagreement about how much IDNS should be trusted. And yet there was. Granted, some of the disagreement was due to what different people knew about the siting process. Some had first-hand knowledge of the process; others had only hearsay. And some of the disagreement was due to the different stakes and different positions that people had in the siting process. Apart from whether they stood to win or lose, politically or monetarily, there were also differences in whether, because of position, a person's trust or distrust was largely interpersonal or largely systemic, and whether they were in a reciprocally dependent relationship with IDNS. For example, Martinsville officials became well-acquainted with Terry Lash and IDNS staff, and they also knew that IDNS had become dependent on their favorable vote (as their budget had become dependent on IDNS's money). Other people, such as some members of the citizens'

advisory group to IDNS, came to know Lash personally and to distrust him as a result. They also were aware that their advice was not necessarily going to be listened to. This explains some of the differences in how people regarded IDNS and its siting process. But not all.

Obviously, much more work needs to be done on the role of trust. However, this analysis suggests that there are other, fundamental differences in how people approach the issue of trust--regardless of what their stakes and positions are or what the "facts" are. Some people are made uneasy by uncertainty, especially uncertainty that extends far into the future; others have a much higher tolerance for it. Some people have an experiential orientation and want to "live and let live"; others have an instrumental orientation and want to get things done. (The former are more likely to be wary of technological change; the latter, to promote it.) Some have high expectations that those in whom they put their trust will be technically competent and will ensure that their interests--including their visions of the natural and social world--are served; others can have lower expectations and still trust. Some are not willing to relinquish their desire for a high degree of information and control; others are.

These are all values that people bring to situations such as the siting of a LLW disposal facility. How

determinative are they? Undoubtedly some people would have felt distrust for IDNS, regardless of what it did or didn't do. But how many people, and who? To answer this question, a much more in-depth study would be needed of the key players in this case. Nevertheless, it is evident both that people brought different values to bear in the Illinois case and that a number of things done by IDNS and Terry Lash promoted distrust rather than trust.

The problems do not lie wholly with IDNS, however. While IDNS has been the focus of this discussion, trust or distrust in the department and its director was not the only issue. As will be seen in the next chapter, there are also differences among people in the degree to which they are prepared to trust, not just particular individuals and institutions, but our collective societal ability to assess and manage risks. And the problem is not simply one of trust. A whole other issue, unexplored here, is when the destruction of trust is a positive good rather than an unfortunate outcome. Not all trust is merited, and not all social situations that rely on trust should be supported.³⁹ Another issue, dealt with only cursorily, is what counts as trustworthiness. One may be worthy of trust

³⁹For a discussion of this point, see Annette Baier, "Trust and Antitrust," Ethics, vol. 96 (January 1986), pp. 231-260.

and still not receive it, and vice versa. These are important issues, worth thinking about.

The point here, however, is that trust cannot be relied upon as the primary means for realizing the goals of public policy processes such as a LLW disposal facility siting process. Certainly, those seeking trust should do everything possible to be trustworthy. And those whose trust is being sought should consider whether there are good reasons for conferring trust. Dialogues should also be encouraged between those seeking trust and those deciding whether to grant it, to improve the possibility of respect and mutual understanding which may lay the grounds for trust. But trust--especially full-blown, unquestioning trust--may be neither forthcoming nor appropriate, especially on complex public policy issues which involve questions of risk.

CHAPTER 4

RISK

"Task Force Forming Plan to Keep Chem-Nuclear
Here"

The People-Sentinel, Barnwell, SC

January 9, 1991

"Towns Plan N-Dump Bans"

The Cortland Standard, Cortland, NY

January 28, 1989

Risk is often thought of as something that can be scientifically, objectively assessed. But, while dangers can, within the limitations of society's knowledge, be objectively evaluated, risk is a different and much more personal concept. Based upon individual values, including values that have been acquired through cultural contexts, a person may or may not regard a danger as a grave risk. People also will differ on how the costs and benefits that come with a risk-producing activity should be evaluated, and on what the responsibilities of those imposing a risk are, to ensure that others' rights to freedom from harm are protected.

In this chapter, these differences in views on risk--and, by extension, on how risk should be managed--are illustrated through the contrasting examples of, on the one hand, Barnwell County in South Carolina, and, on the other, Allegany and Cortland counties in New York. Their two very different attitudes toward LLW disposal suggest that "risk" is a complex concept; one whose interpretation will be affected by, among other things, past history as well as current economics.

In 1971, Chem-Nuclear's commercial low-level radioactive waste disposal facility in Barnwell County, South Carolina, was one of six in the nation. By 1979, there were only three sites: the Barnwell site and the sites in Nevada and Washington. At the urging of the governors of South Carolina, Nevada, and Washington, Congress passed the 1980 LLWPA. By state law, the Barnwell site was to close in 1986, but, with the 1985 amendments to the LLWPA, closure of the site was postponed until the end of 1992. Although statewide sentiment has continued to favor holding to this deadline, many people in Barnwell County would like the Chem-Nuclear facility to stay open--mainly because it has been an economic boon to the county.

New York, in response to the LLWPA, decided to "go it alone" and handle only its own waste. In 1986, it

established procedures and a new commission to site a disposal facility. In 1989, the siting commission identified five potential sites--three in Allegany County; two in Cortland County. Local officials and private citizens protested vehemently, and some groups used threats and civil disobedience to oppose the facility. In 1990, the siting process was revamped, and in 1991, the siting commission urged the governor and the legislature to adopt a benefits package to promote acceptance of the facility. But the reaction of one town board member may be indicative: "No way. It could be a million dollars and we'd say no. What's a million dollars worth compared to your health?"¹

BARNWELL COUNTY, SOUTH CAROLINA

Barnwell County (1988 pop., 21,000) is in southwestern South Carolina on the Georgia border. It is predominantly rural, about 55 percent white and 45 percent black, and has three principal municipalities: Barnwell, the county seat, about 5 miles from Chem-Nuclear, and Williston and Blackville, about 10 miles further away. (Chem-Nuclear is in Snelling--1988 pop., 110.) The political offices in the

¹John Smith, town board member, Taylor, NY, as quoted in The New York Times, January 18, 1991.

county and its municipalities have tended to draw upon the same pool of native white males, but changes are taking place: by 1990, Blackville had a black woman mayor, and the county council had been revamped from five members elected at-large to seven members elected by district. (Blackville is predominantly black, as is Williston. Barnwell is predominantly white.)

Farming has been important to the county but is on the decline, as in the rest of South Carolina. With much of the former farmland now in timber or lying fallow, the county has plenty of room for economic development. Progress is slow, but some companies are gradually being attracted, partly because of nonunion employees and relatively low wage scales. However, the "industry" that continues to economically dominate Barnwell County and its neighboring counties is the Savannah River Site.

In the early 1950s, the federal government moved into the Lower Savannah region and built the Savannah River Plant--now called the Savannah River Site, or SRS--to produce nuclear weapons materials. It took farmlands and river frontage and displaced homes and small towns (altogether, it absorbed about 40 percent of Barnwell County's land area, as well as portions of Aiken and Allendale counties), but it generally was welcomed for the economic prosperity it brought. Large from the start, it

employs many people in the region. Today, more than 20,000 people work there, of whom more than 1000 live in Barnwell County--about 10 percent of the county's total work force. And although the site has had well-publicized problems with its reactors and with environmental contamination, there are no local "anti-SRS" groups. (There are, however, some elsewhere in the state.)

SRS is under the jurisdiction of the US Department of Energy (DOE), and the current contractor is Westinghouse, which took over from DuPont in the late 1980s. More than 60 percent of the SRS site is in Barnwell County, but the focus of its operations is in Aiken County. In 1989, DOE paid about \$200,000 in lieu of taxes to Barnwell County. On August 31, 1990, after negotiations with SRS's three host counties, DOE agreed to raise its payments to better reflect current land values. Barnwell County got an immediate \$2.6 million, of which \$1.7 million was for fiscal year 1989 and \$0.9 million was to make up for 1988. The 1990 payment was also to be about \$1.7 million.

About a decade after SRS came to Barnwell County, the Allied General Nuclear Services (AGNS) plant was conceived--a large-scale project to reprocess spent fuel from light-water nuclear power reactors. The plant was built in the early 1970s in Barnwell County, next-door to SRS and to the nascent Chem-Nuclear site. It was received

with great fanfare: to construct it, many local people were hired, and to service it, a special four-lane highway from Barnwell to Snelling was built. But, to local and corporate consternation, it never opened: a 1976 executive order from the federal government had barred reprocessing. Although the order was rescinded a few years later, the facility, while still standing, was no longer equipped and has remained unused. Local and regional officials would like it to be considered for DOE's proposed monitored retrievable storage facility for high-level radioactive waste, but the state has been opposed to the idea.

In the late 1960s, when Chem-Nuclear arrived in Barnwell County, its facility was insignificant by comparison with its neighbors, SRS and AGNS.

Chem-Nuclear Comes to Barnwell County

In 1969, Chem-Nuclear Systems, Inc. was licensed by the South Carolina Department of Health and Environmental Control to begin a limited, nondisposal LLW operation in Barnwell County. In 1971, after a public hearing, the license was amended to allow disposal. The Barnwell County Council and the South Carolina State Development Board were instrumental in recruiting Chem-Nuclear, and it was received without objection. A short article on the front

page of March 4, 1971 issue of the local People-Sentinel was headed "Hearing Set at Courthouse This Morning." The following week another article appeared: "No Opposition Voiced to Chem-Nuclear Plant."

Chem-Nuclear is a wholly-owned subsidiary of Chemical Waste Management, which operates, among other things, a large hazardous waste landfill in Emelle, Alabama. Chem Waste in turn is approximately 80-percent owned by Waste Management Inc., one of the largest waste management companies in the world. Chem-Nuclear's Barnwell operation has two nondisposal divisions--transportation services and nuclear services. It also has a new sister company next door--Chem-Nuclear Environmental Systems, Inc., which consolidates defense waste. In addition to its Barnwell operation, Chem-Nuclear has contracted to construct and operate the upcoming LLW disposal facilities in Illinois, North Carolina, and Pennsylvania. It is headquartered in Columbia, South Carolina, and has offices elsewhere in the United States which provide various services to the nuclear industry (waste treatment, transportation, decommissioning, etc.).

Chem-Nuclear's Barnwell disposal site is 237 acres, including a 100-foot buffer zone, and uses shallow land burial. (In contrast, most of the new disposal sites will be 500 to 1000 acres, with the majority of the land as

buffer zone, and most will use elaborate engineered technologies rather than shallow land burial.) The Barnwell site has operated continuously since 1971, with approximately 23 million cubic feet of LLW buried in the ensuing 20 years. Of this, about 95 percent was Class A waste; 4 percent, Class B; and 1 percent, Class C. The state has prohibited the acceptance of mixed waste. The Class C waste, most of which comes from nuclear power plants, comprises 60 percent of the total radioactivity at the site. (Most of this is cobalt 60, which decays to background levels in 60 years but leaves a residue that is toxic for about 500 years.)

The majority of the nation's LLW disposed off-site is sent to Barnwell County. (During the last half of the 1980s, it took an average of about 55 percent by volume and nearly 75 percent by curie content.) By a 1979 state restriction, the site can accept no more than 1.2 million cubic feet per year. However, by the late 1980s it was being sent only about 1 million cubic feet annually, due to the volume reduction practices of LLW generators in the face of disposal restrictions and escalating charges at all sites.

The South Carolina Department of Health and Environmental Control regulates and monitors the Barnwell site. According to a 1990 report prepared for DOE, the

site has had waste packaging and transportation violations, especially in the 1970s, but no significant problems related to either site operations or on-site waste management.² After a phased closure by Chem-Nuclear, the state, through the department, will take responsibility for the site over the next century. (According to NRC regulations, LLW disposal sites cannot rely on institutional controls for more than 100 years after their closure.) The state will use a "perpetual maintenance fund" from special disposal charges that, as of 1990, had accrued approximately \$40 million.

Since 1980, Chem-Nuclear's disposal operation has been headed by John Zawacki, who has a background in health physics and worked for AGNS during the 1970s. Zawacki lives in Barnwell County, as do about 110 of his employees--more than two-thirds of the disposal facility's professional and support staff. (Chem-Nuclear's Barnwell operation has had a policy of having management live in the

²Idaho National Engineering Laboratory, National Low-Level Waste Management Program, Directions in Low-Level Radioactive Waste Management: A Brief History of Commercial Low-Level Radioactive Waste Disposal, report for the US Department of Energy (DOE/LLW-103), October 1990, p. 57. However, a small amount of tritium has migrated from some of the older burial trenches. North Carolina Low-Level Radioactive Waste Management Authority, Chem-Nuclear Systems, Inc., and Ebasco Services, Inc., Responses to Public Comments Related to Precharacterization Assessments of Richmond County, Wake/Chatham County, Rowan County and Union County Favorable Site Areas, April 1990, p. 11.

community and of hiring and purchasing locally to the extent possible.) According to estimates in a 1990 study of Chem-Nuclear's economic and social impacts on Barnwell County,³ an additional 78 jobs for Barnwell County residents have resulted indirectly from having the LLW disposal operation in Barnwell County. Employment due directly or indirectly to the disposal operation thus has accounted for about two percent of the county's total work force.

The socioeconomic impact study also concluded that Chem-Nuclear has been a net plus for the county's public finances, mainly because of special payments paid by the company or its customers. Otherwise, revenues and costs to the county from Chem-Nuclear largely would have balanced out. The special payments include first, a special business license tax on LLW disposal operations that, by county ordinance, Chem-Nuclear has paid annually to the county since 1979; and second, funds derived from the portion of the LLWPAA surcharge that South Carolina returns

³Mary English with Matthew Murray, The Economic and Social Impacts of Chem-Nuclear's LLW Disposal Facility on Barnwell County, South Carolina, report to the US Department of Energy (Knoxville, TN: Energy, Environment, and Resources Center, University of Tennessee, January 1991).

to Barnwell County.⁴ The business license tax is used as general revenue and helps to keep local property taxes down. (In 1989, revenue from Chem-Nuclear's special tax covered nearly 10 percent of the county's \$4.5 million budget.) The "surcharge fund" is earmarked for economic development, to help Barnwell County prepare for the time when the LLW disposal operation has departed. (In 1989, nearly \$1 million was added to the fund.)

Chem-Nuclear's Barnwell operation gave about \$17,500 in charitable donations in 1989, mainly to Barnwell County organizations--public schools, the county hospital, and local clubs and other groups. These charitable donations are not significant as a percentage of Chem-Nuclear's corporate profit. (According to its 1989 Annual Report, Chemical Waste Management, Inc., and its subsidiaries had a net income--after taxes and operating and administrative expenses--of \$144 million.) However, donations to local causes have contributed to the company's reputation as a good corporate citizen in Barnwell County, as has staff involvement, either privately or through the company, in various local events and civic organizations.

⁴By a 1986 South Carolina statute, Barnwell County receives 10 percent of South Carolina's share of the waste disposal surcharge imposed by the LLWPAA. (See Chapter 1 for an explanation of this surcharge.)

A Love Affair with Chem-Nuclear?

Based on opinions surveyed for the 1990 social and economic impact report, it appears that most (although not all) Barnwell County residents regard Chem-Nuclear as a definite economic plus for the county and as a good community-oriented company. "Chem-Nuclear provides a strong tax base for the county. The business tax and licensing tax and surcharge are major contributors to the economic health of our county."⁵ "I am all for Chem-Nuclear being in business in Barnwell County. They furnish numerous jobs with good pay to the local citizens. Their being located here and paying the taxes that they do takes a lot of burdens off of the taxpayers. As long as they follow the safety guidelines and NRC rules and regulations for their type of business, I consider them a benefit." "Chem-Nuclear is a caring firm; they're really concerned about the county. That really impresses me to see care and concern given over and beyond monetary benefits." "They underwrite so many different projects, from scouting, to church activities, to sports."

⁵This quote is drawn from the 1990 report on The Economic and Social Impacts of Chem-Nuclear's Low-Level Radioactive Waste Disposal Facility on Barnwell County, South Carolina, as are all of the following quoted opinions of Barnwell County citizens. See pp. 40-60, op. cit.

To the extent that there are concerns about Chem-Nuclear, many appear to focus on the stigma of having a LLW "dump." "I believe Chem-Nuclear has been good for Barnwell County, but negative media cause people in other parts of the state and the country to misunderstand." "The benefits far outweigh the drawbacks. The only real drawback is the irrational fear generated by those outside the area who are not fully informed or are misinformed about Chem-Nuclear and its operations here."

About one-quarter of those surveyed are concerned about the long-term risks of the site. "Who will maintain the [Chem-Nuclear site], preventing plants from growing down into the earthen caps and extracting radionuclides?" "I believe that we need a guarantee and funds to back it up that the site will be perpetually monitored for any possible leaks into the groundwater and air for radiation or other types of leaks." "The possibility of risks becomes a question for posterity. What will the long-term effects be?" "The only benefit to Barnwell County has been employment and the money involved. The danger, in my opinion, far outweighs the benefits." A substantial majority, however, think differently: they see the site's risks as negligible, and as outweighed by its benefits.

The County and the State Disagree

In 1979, during an antinuclear demonstration at SRS, AGNS, and Chem-Nuclear that drew people from out of state and elsewhere in South Carolina, local people staunchly backed their nuclear industries. The headline of the October 4, 1979 People-Sentinel read: "Nuclear Protest Effort Was 'Numerical Flop.'" In the following week's paper, a letter from Chem-Nuclear's site manager thanked residents and police for their support and cooperation during the demonstrations.⁶

More than a decade later, the pro-Chem-Nuclear sentiment has remained unchanged in Barnwell County. In January 1991, a committee of 21 local officials and business leaders--the "Save Chem-Nuclear Task Force"--took steps to persuade the state to allow the disposal operation to remain open beyond 1992. In addition, the Barnwell County Council and the municipal councils of Barnwell, Blackville, and Williston all unanimously adopted resolutions supporting keeping the site open. As the local state representative commented, "We may be the only county in the world that wants to keep a waste site open. Some

⁶Lee Hebbard, Jr., open letter, The People-Sentinel (Barnwell, SC), October 11, 1979.

people are shocked by our attitude. They don't realize the good neighbor relationship we've had with Chem-Nuclear."⁷

But the state has been less keen on retaining Chem-Nuclear's LLW disposal operation. Although South Carolina had promoted establishing nuclear facilities during the 1960s and early 1970s, it changed its official stance in the late 1970s, especially with the election of Richard Riley as governor in 1978. During his campaign, he broke with the state's pro-nuclear tradition by saying that he was worried about its growing role as a national nuclear waste site--a theme he pursued once he took office. Following the March 1979 incident at Three Mile Island, he announced that the state would not take any of the voluminous LLW generated by the accident. He argued that while Chem-Nuclear's facility was well-run, it was not intended to handle virtually all of the nation's waste. (During much of the 1970s, it had been taking about 80 percent or more of the waste shipped for disposal in the United States.) Shortly thereafter, he then moved to place volume restrictions on the site.

In addition, in his capacity as chair of the President's State Planning Council on Radioactive Waste Management, Governor Riley pushed for passage of the LLWPA.

⁷Joe Wilder, as quoted in The People-Sentinel (Barnwell, SC), January 9, 1991.

Five years later, when it became clear that the LLWPA's deadline would not be met, the governor, then in his second term, helped to orchestrate the passage of the 1985 amendments to the LLWPA, using as a "stick" the threatened closure of the Barnwell site. He was supported in this position by South Carolina's congressional delegation and by a majority of the state representatives.

In 1983, South Carolina became a member of the Southeast Compact, whose legislation included a proviso that the Barnwell site would not remain open beyond the LLWPA's new January 1993 deadline. In 1987, the newly elected governor, Carroll Campbell, took office. Campbell was a Republican whereas Riley was a Democrat, but the new administration continued to support the former's nuclear waste policies. Governor Campbell, who was reelected in 1990, has also taken a strong stand against the importation of chemically hazardous waste from states that are delinquent in developing their own waste treatment and disposal facilities. Although Joe Wilder, the state representative from Barnwell County, proposed a bill to the South Carolina legislature in early 1991 to keep Chem-Nuclear open beyond 1992, the bill's prospects were dim.

ALLEGANY COUNTY AND CORTLAND COUNTY, NEW YORK

In the early 1980s, New York was one of 11 states in the Northeast that were considering forming a regional compact. But compact discussions broke down, partly because none of the states that generated large amounts of LLW (Pennsylvania, New York, Massachusetts) liked the idea of becoming the host for the rest of the region.

Antinuclear sentiment is strong in the Northeast, especially in New England. Although the region has a number of nuclear power plants, resistance to them had grown during the 1970s, even before the 1979 accident at Three Mile Island. Each state was going to take a lot of political heat just finding a site for its own waste.

In July 1986, after more than a year of debate and public hearings, New York enacted its Low-Level Radioactive Waste Management Act, directing the commission created by the act to find a site for a facility that would then be operated by the New York State Energy Research and Development Authority (NYSERDA) for New York LLW generators only. The site was to stay open for at least 30 years and would dispose of about 100,000 cubic feet of LLW per year. (In 1980, when the LLWPA was passed, New York LLW generators were disposing of nearly 250,000 cubic feet offsite, but by 1986, they were shipping less than half

that amount. This drop was due partly to volume reduction practices, but the amount of radioactivity in the shipped waste also decreased substantially--mainly because of a large drop in the waste produced by Cintichem, a radiopharmaceuticals manufacturer.)

In trying to find a site for its LLW, New York had a legacy of poor radioactive waste management practices to overcome. More than two decades before, the Western New York Nuclear Service Center had been established in Ashford, near the small town of West Valley. The center, located about 30 miles southeast of Buffalo in rural Cattaragus County, was intended to promote the development of nuclear technologies in the Northeast. It included a nuclear fuel reprocessing plant (the only one that ever operated in the United States), a storage facility for liquid high-level waste, a 7-acre disposal site for solid long-lived waste such as spent-fuel hardware, and a 22-acre disposal site for LLW. The LLW disposal site, which opened in 1963, was one of the nation's six commercial sites, and like the others, it used conventional shallow land burial. Until 1975, it was operated by Nuclear Fuel Services under a lease arrangement with the state. In 1975, the company halted disposal when water contaminated with radionuclides began to seep through the covers of two burial trenches, and it agreed not to reopen until the requirements of New

York's Department of Environmental Conservation (DEC) were met. It never reopened, and its lease expired in December of 1980. In 1983, NYSERDA took over monitoring and maintaining the closed LLW site. (DOE was handling West Valley's high-level waste.) In 1986, New York's LLW act prohibited locating the new disposal facility at the West Valley site. However, a citizens' watchdog group, the Coalition on West Valley Nuclear Wastes, continued to be concerned about the spread of contamination at West Valley and the quality of the site cleanup.

The 1986 act directed DEC to develop site selection and disposal technology criteria. (It prohibited the by now ill-famed shallow land burial technique.) Using DEC's criteria, a site and a disposal technology were to be recommended by the siting commission--a 5-member group appointed by Governor Mario Cuomo in May 1987 that included a geologist, a health physicist, an engineer, a doctor, and a private citizen as chair. The commission was to be advised by a 13-member committee made up of state officials and private citizens appointed by the governor. After the commission had made its recommendations, DEC would hold public hearings and decide whether or not to certify the site and technology. Municipalities and counties could not veto the facility and NYSERDA had the power of eminent domain, but the commission hoped that--mainly through the

persuasion of good science--it would find both willing communities and willing landowners. It found one willing landowner and no willing communities.

Science Confronts Skepticism . . . and Blockades

Using DEC's criteria and factors specified in the 1986 act, the commission and its contractors systematically screened the state to identify potential sites. In mid-1988, screening using exclusionary criteria eliminated nearly 30 percent of the state from the running. (Areas above primary water supply aquifers were eliminated, as were federal and state protected lands and municipalities with population densities of more than 1,000 people per square mile.) Then, in late 1988, screening using additional exclusionary criteria resulted in ten candidate areas, ranging in size from 49 to 162 square miles. Following further investigation of the candidate areas, field observations, and comparative evaluations, the commission named five potential sites in September 1989. The sites, which ranged from 473 acres to 1039 acres, were in two counties--three in Allegany County immediately to the east of Cattaraugus County; two in Cortland County to the south of Syracuse and east of Ithaca.

When the ten candidate areas were named, reactions were severe. In January 1989, the commission held public hearings in each of the ten areas and was met with huge crowds, often of more than 1000 people, often very hostile. Many of them said that they had never given much thought before to either nuclear power or political demonstrations.⁸ When the five potential sites were named, opposition was even more violent--especially in Taylor, a town of about 500 people where both of the Cortland County sites were located.

When the siting commission met in Cortland, the county seat, with about 70 security guards to maintain order, more than 4,500 angry people protested the selection process. But they also were dismayed with Arthur Allen, a 52-year-old dairy farmer, who had offered to "sell out" to the siting commission. The Allen family had been in Taylor since 1817, but Arthur Allen was making only \$10,000 after expenses on his 730-acre farm, and the only son who had been interested in keeping the farm had died in 1987. "It's hard, very hard. It's reached the point where it costs us more to make our milk than we get out of it . . . These people come out and say 'We want you to continue working 90 hours a week, making half or less than we do, so

⁸According to an article, "Quiet Towns In an Uproar Over Waste," by Sam Howe Verhovek in The New York Times, February 28, 1989.

you won't devalue our property.' That doesn't make sense to me. It's their affluence that has caused the nuclear problem to begin with."⁹ Allen apparently hoped to get \$800,000 to \$1 million from the state for his farm.

Allen's life was threatened, and letters appeared in the local newspaper, The Cortland Standard, calling him greedy and shortsighted. Opponents of the two Taylor sites organized into Citizens Against Radioactive Dumping and vowed to block state officials from inspecting the sites. "They have the perception that the county is backwards, rural, unsophisticated and uneducated," said Paul Yaman, co-chair of the group. "The fact of the matter is the dump is never going to happen here."¹⁰ In Allegany County, protest groups organized, and property owners whose land had been targeted for the potential sites fought the state's efforts by the state to conduct tests. In both counties, civil disobedience tactics--some violent--were used, and scores of people were arrested. The Taylor sites also were opposed by the Cortland County government, which, as of February of 1990, had spent more than \$100,000 on lawyers, consultants, and a three-member office to prevent the siting. While the Allegany County government was less

⁹Arthur Allen, as quoted in The New York Times, December 9, 1989.

¹⁰Paul Yaman, as quoted in The New York Times, February 26, 1990.

active in its opposition, it, with Cortland County, joined in the state's suit against the federal government.

A Lawsuit and a Revamped Siting Process

In reaction to the political heat of trying to site a LLW disposal facility, Governor Cuomo tried to walk a fine line. In a November 22, 1989 letter, he emphasized both his commitment to seek to get the federal mandate changed and his commitment to meet it while it was in force. He commented, "New York did not seek this responsibility. Congress foisted it onto the states. Having been given this legal responsibility, New York will implement the federal law in a manner which maximizes the protection of public health and safety. . . . I will under no circumstances ignore the rule of law here or permit any citizen to."¹¹ At the same time, however, he reiterated his intention, announced five days earlier, to pursue a legal challenge to the LLWPAA.

On February 12, 1990, Governor Cuomo filed suit, challenging the constitutionality of the LLWPAA's 1996 "take title" provision and objecting to the requirement that states be responsible for Class C waste. On December

¹¹Governor Mario Cuomo, letter dated November 22, 1989.

7, 1990, the suit was dismissed by the US District Court for the Northern District of New York, which relied on precedent established in the US Supreme Court's decision on Garcia v. San Antonio Metropolitan Transit Authority.¹²

This decision, according to the district court, called into question the judiciary's ability and authority to consider challenges to Congressional power over the states.

However, the district court left the door open for an appeal when it commented that the Garcia case was decided by a divided Supreme Court, that the make-up of the Court has since changed, and that "it may well be this case which results in Garcia being overturned."¹³ The state attorney general's office took the court's implicit invitation and appealed.

Meanwhile, in early 1990, following some injuries incurred during protests, Governor Cuomo directed the siting commission to refrain temporarily from further on-site testing. Some legislators had pressed Cuomo to altogether suspend the activities of the siting commission. Instead, the commission's course was modified.

¹²469 US 528 (1985).

¹³December 7, 1990 decision by the United States District Court for the Northern District of New York, as quoted by Dan M. Berkovitz, The Radioactive Exchange, vol. 9, no. 22, p. 5.

By a June 1990 act introduced at the governor's request, the commission was directed to prepare a report on previously excluded lands and to justify its prior selection of the ten candidate areas and five candidate sites. It was also directed to select a preferred disposal method before selecting a site. In addition, the governor was to add two new members to the commission--a social scientist and an environmentalist. And the commission's advisory committee was to be revamped by removing its six state officials and replacing them with four new, more populist members: two private citizens, one knowledgeable about farming and one knowledgeable about local public health services; and two local officials, one from Allegany County and one from Cortland County. The advisory committee would now be independent of the commission and would review and evaluate the commission's reports and decisions. In an earlier action, the New York Department of Health, which had been charged with providing public information on radiation, was directed by the governor to conduct background radiation studies of proposed sites, a risk assessment of the final site, and a health assessment of the proposed host community.

Can a Willing Community Be Found?

The commission had emphasized that it would conduct its search for a site on purely scientific grounds and would choose the technically best-suited site, even if the local community was opposed. In a January 1991 resolution, the commission changed its philosophical stance. It admitted that "imposing [a LLW site] on an unwilling community has little or no possibility of success,"¹⁴ and it called upon the Governor and the legislature to, in effect, stop stalling and adopt a benefits package. (Apparently, the legislature had ducked enacting the necessary legislation because doing so might look like an endorsement of the siting process.)

As proposed to the legislature in 1989, the benefits package was modest compared with benefits received by Barnwell County or by some of the prospective host communities elsewhere in the nation. New York's candidate counties would only get \$50,000 in technical assistance grants for each potential site--not the hundreds of thousands of dollars in unrestricted funds given to potential host communities in Illinois and Nebraska. After a community was selected as host, it was to get an annual

¹⁴Resolution of the New York State Siting Commission, January 16, 1991.

unrestricted payment, to be shared equally with the host county, that could not exceed the lesser of (1) \$1 per cubic foot and \$1 per curie, and (2) \$25,000 or 10 percent of its capital and operating budget. A higher or lower special payment could be negotiated, but otherwise it was likely to range between \$25,000 and about \$125,000--not the \$1.4 million that Barnwell County was receiving. By the spring of 1991, other benefits packages were being contemplated, but none had been enacted.

Reactions to the commission's new emphasis on wooing a willing community generally were unenthusiastic. Although few changes had been made in the proposed package between 1989 and 1991, it does not appear that lack of largesse was the problem. For example, one member of the Allegany County NonViolent Action Group said that the commission was "trying to take advantage of the economic problems that a lot of rural governments are facing. They're trying to find a sucker."¹⁵

By 1991, some people in Ashford, home of the West Valley Nuclear Fuel Services site, had quietly, cautiously indicated interest in having the site considered for the new facility . . . mainly for economic reasons. They had become concerned that a great deal of land was tied up in

¹⁵Sally Campbell, as quoted in The New York Times, January 18, 1991.

this defunct operation and wanted it to be put to economic use. The possibility of a benefits package sweetened the pot. But opposition continued in the West Valley area, and a legislative amendment would be needed before the site could be used for the new disposal facility.

NEW YORK: 700 MILES OR LIGHT-YEARS AWAY FROM BARNWELL COUNTY?

Why do many people in Allegany County, Cortland County, and other parts of New York vehemently object to having a LLW disposal facility? Why do many people in Barnwell County hate to see theirs go?

The likelihood of a LLW facility's acceptance is only minimally affected by the prospective host community's physical characteristics and population size. In these respects, Barnwell County and Allegany and Cortland counties are fairly similar. Both have clay soils and moderate to heavy rainfalls; both are lightly populated. (Barnwell County has a population density of about 63 people per square mile (excluding SRS); Allegany County, about 50 people per square mile; Cortland County, about 95 people per square mile.) In the New York counties, people have argued that their areas are unsuitable because of treacherous winter roads, the potential for groundwater

contamination, and, in Allegany County, the potential for seismic activity. However, these are by no means the major reasons for their objections to being chosen as potential sites.

The likelihood of acceptance is also only minimally affected by the type of facility and the amount and radioactivity of the waste it will receive. The Barnwell facility uses shallow land burial, a LLW disposal technology that has been prohibited in New York and many other states. And each year, the Barnwell facility is sent about 1 million cubic feet of LLW with, on average, about 350,000 curies--approximately 10 times as much waste and radioactivity as the New York facility would handle annually.

Acceptance is only partially determined by the local economy and proposed benefits to the community. Like Barnwell County, Allegany and Cortland counties are rural, with farming on the decline; all are struggling to remain economically viable. Barnwell County wants to retain Chem-Nuclear because it is a boon to the local economy, even though the county's finances have improved greatly with DOE's increased payments in lieu of taxes--an increase that would more than make up for lost revenue from Chem-Nuclear. But in New York, when the siting commission's January 1991 resolution called for benefit assurances for the host

community, people responded that they would not be bribed. Similarly, in Boyd County, Nebraska (as in Wayne County, Illinois, and to a lesser extent in Martinsville), reactions to a handsome benefits package have been mixed.

Elected officials can play a significant role in a facility's local acceptance or rejection. They can exert influence and make decisions that pave the way for a new facility by inviting its developers to consider their community, allocating special road construction funds, etc. . . . as Barnwell County officials did with Chem-Nuclear and Allied General Nuclear Services. Or they can use lawsuits, political influence, etc. to block the facility, whether or not they have actual veto power over it . . . as Cortland and Allegany counties did with New York's proposed LLW disposal facility. Elected officials, in turn, are influenced by others within the prevailing power structure, especially key business people. But, particularly when dealing with a potentially contentious issue such as a proposed LLW disposal facility, elected officials are more likely to be responsive to all their constituents, not just the inner circle. And while the views of the inner circle help shape the views of those on the outside, the opinions of those outside the prevailing power structure will reflect their own longstanding attitudes as well as immediate local influence.

Particularly important are people's evaluations of the proposed facility's risks. Regardless of how attractive the facility's benefits are to the host community, its risks must not be too great, and they must be well-managed. This leads to the elusive concepts of risk and risk management. What is risk? And what does "risk management" mean?

RISK AND ITS MANAGEMENT

Definitions

"Risk" is commonly defined to be a function of estimations of probability (how likely it is that the adverse event will occur) and consequence (how disastrous the event will be). The term covers anything from natural disasters over which people have virtually no control (e.g., tornadoes) to hazards that are heightened because of human activity (e.g., building on floodplains) to hazards that are wholly manmade (e.g., LLW disposal facilities).

When a risk is "assessed," the probability of the risk occurring and the severity of its consequences are estimated. A risk assessment--either formal or intuitive--has three components: (1) identifying the hazard and its potential adverse effects; (2) assessing how

severe the effects are at various levels, or doses, of the hazard; and (3) estimating the frequency, intensity, and duration of exposure to the hazard. (With a LLW disposal site, one would identify the various radionuclides that emit alpha, beta, or gamma radiation--each of which has different health effects--and would predict whether they were likely to migrate from the disposal site, including when, in what quantities, and using which pathways. One would then assess the dose-response effects of the various types of radiation and estimate the potential exposure to individuals and populations.) Each of these three components has associated uncertainties, however. After the uncertainties have been taken into account and the results of the steps have been combined, the risk can be said to have been assessed.¹⁶

"Risk management" can mean anything from removing the risk by preventing or eliminating its cause to reducing the risk by lowering its probability or consequences. It can be done by anyone from professional risk managers (e.g., NYSDERDA and the New York Department of Environmental Conservation, or Chem-Nuclear and the South Carolina

¹⁶See, e.g., National Research Council, Risk Assessment in the Federal Government: Managing the Process (Washington, DC: National Academy Press, 1983), a now-standard manual which divides risk assessment into four steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization.

Department of Health and Environmental Control) to laypeople in the course of their daily lives. While risk assessment and risk management are often thought of as separate and sequential enterprises, in many instances they are not. Instead, "risk" is a dynamic concept, and how a risk is managed, including the uncertainties associated with risk management, will help to determine how the risk is assessed--either formally or informally. More on that below.

A Field in Flux

During the past century, there have been a number of important changes that affect how people today think about and manage risks.¹⁷

First, the nature of the dominant risks has changed. There has been a shift from risks due to infectious diseases, industrial accidents, and natural hazards to risks due to, e.g., automobile accidents. There also has been an increase in new risks that are fundamentally

¹⁷I am indebted to Vincent Covello and Jeryl Mumpower for many of the points below on recent changes in the nature and management of risk. See Vincent Covello and Jeryl Mumpower, "Risk Analysis and Risk Management: An Historical Perspective," Risk Analysis, vol. 5, no. 2 (1985), pp. 103-120. On these issues, see also the National Research Council's Improving Risk Communication (Washington, DC: National Academy Press, 1989).

different from those encountered in the past--e.g., the risks of nuclear power plant accidents, of radioactive waste, of synthetic pesticides and other chemicals, of genetic engineering, etc.

Second, the ability of scientists, engineers, health care professionals, and others to identify, to measure, and, in some cases, to control for risks has improved. The number of people whose work is focused on health, safety, and environmental risks has increased, and there have been advances in risk assessment methodology--e.g., laboratory tests, epidemiological methods, and computer simulations--as well as risk management technology. Most of us, especially if we have the money to take advantage of these advances, are likely to live longer, healthier lives than we would have a century ago.

And third, who is managing risks has changed. Insurance was one of the earliest attempts to quantify and cope with the effects of risks to life and property. Common law, with its liability provisions, was another traditional method of managing the consequences of risk. While these methods continue, private sector self-regulation and government intervention to minimize or prevent risks have become increasingly important. Partly spurred by lawsuits and insurance claims, industries and professions have taken on more responsibility for

regulating themselves, through both their everyday decisions and their licensing or certification activities. And government now has more and more laws and agencies to manage more and more external and self-imposed risks, both natural and manmade.

Because of these changes, people now have heightened expectations about society's ability to manage risks. Simultaneously, however, they may have less confidence in the risk managers. On the one hand, there appears to be a greater faith in the ability of science and technology to control for most risks, but on the other hand, there appears to be less trust that business and government have both the competence and the integrity to act in ways that will minimize risks. Paradoxically, government is especially suspect. The panoply of government regulations and regulatory agencies has led to false hopes and disappointments, and it also has led to cynicism ("Who's watching the watchers?"). To some people, government's reputation as a protector has also been compromised by ambiguity: they regard it as having become a risk inducer by promoting activities (e.g., nuclear power) and carrying out missions (e.g., nuclear weapons production) that consider highly risky.

For all these reasons, activism on risk issues has soared. Risk--especially manmade risk--elicits public

interest, concern, and demands for protection. When combined with a better-informed, better-organized, and more vocal public, this means that risk assessment and risk management activities often become politicized.

Conflicting Values

What now poses risk is somewhat different from what posed risk in the past; people think about risk differently than they did in the past; and those charged with managing risk are struggling with both new risks and heightened expectations. All this contributes to conflict. But there are other, even more fundamental reasons for dissent. With many risks today, values differ on the following issues:

(1) How big the risk is. "Driving a car entails a high-probability risk with potentially severe consequences for those immediately involved." This statement is widely accepted, because automobiles are a familiar technology and there is a lot of common-sense knowledge of their risks. However, new technologies that are not well-understood (e.g., genetic engineering), that lack a large experience base (e.g., nuclear power plants), or that cannot be tested except through prediction models because their time spans are too long (e.g., radioactive waste disposal) present far greater uncertainties as to their risks.

Alvin Weinberg has suggested that while science can explain and predict regular, reproducible, and recurring events, the domain of "trans-science"--a domain which inevitably involves an intermingling of facts and values--is entered when the probability of an event occurring is highly uncertain.¹⁸ Contrary to what Weinberg implies, even "regular" science must involve values, if only in the methodological choices that are made (e.g., the data sampled and the analytic tools used). However, LLW disposal is certainly an area of trans-science, especially when the disposal facility's risks over centuries rather than decades are being assessed. Even in Barnwell County, among people who generally agree about the immediate safety of Chem-Nuclear's disposal operation, there is disagreement about the facility's post-closure risks. And uncertainties about long-term risks are one reason why New York's Governor Cuomo has maintained that Class C LLW should be the responsibility of the federal government, not the states.

(2) How the risk should be managed, and how reliable the risk managers are. Risks can be lessened by having an alert that a dangerous situation is about to occur. (Chem-Nuclear's LLW disposal operation in Barnwell County

¹⁸Alvin Weinberg, "Science and Its Limits: The Regulator's Dilemma," in Hazards: Technology and Fairness (Washington, DC: National Academy Press, 1986), pp. 9-23.

monitors the air and water around its trenches for radionuclide migration.) Alternatively or in addition, an "overbuilt" technology may be used. (Following the European practice, most new LLW disposal facilities in the United States will have elaborate engineered barriers such as concrete vaults and overpacks, in addition to natural barriers.) Finally, a "technological fix" may be available. (To answer doubts about the safety of nuclear power, some scientists and engineers are espousing "inherently safe" reactors, where, rather than having multiple barriers to prevent core melts, core melts are impossible because of the reactor's design.¹⁹) But all of these risk management techniques rely on humans to some degree, raising questions about the fallibility of even "fail-safe" technologies.

Some people, including some scientists, are suspicious of technological fixes. While they want the technology to be as fail-safe as possible, they also want scrupulous enforcement of safety regulations, to monitor and shut down the risk-creating technology in potentially dangerous situations. Others--including some scientists--go even further. They argue that the technology should be dispensed with in order to eliminate the risk. This is the

¹⁹See, e.g., Alvin Weinberg, "Engineering in an Age of Anxiety," Issues in Science and Technology, Winter 1989-90, pp. 37-43.

argument that is used against nuclear power reactors, including supposedly fail-safe reactors. Judgments about the human capacity to cause or to avert disaster vary greatly, but some people are deeply pessimistic. It has been contended, for example, that with systems that are interactively complex, as many technological systems are, accidents are virtually inevitable.²⁰

(3) Who should decide how the risk is managed.

Partly because of disputes about managerial reliability, there is often little consensus on who should decide how to manage a risk. In New York, for example, some opponents of the proposed LLW disposal facility have argued instead for at-reactor storage of LLW wastes produced by utilities.²¹ In other words, they think the waste could be most safely handled if the nuclear power plants, regulated by the NRC, remain responsible for it. But others contend that this is not a good solution, because they think that the utilities are less competent to manage LLW disposal than a waste management company and the state.

Even if people agree that LLW disposal should be a state responsibility, other issues arise. The state must

²⁰See, e.g., Charles Perrow, Normal Accidents: Living with High-Risk Technologies (New York: Basic Books, 1984).

²¹See, e.g., memorandum to New York State legislators from Cortland Citizens against Radioactive Dumping, Concerned Citizens of Western New York, and Don't Waste New York (no date).

work out how much say a prospective host community will have on a number of risk management issues--e.g., where the facility should be sited, who should operate it, what its disposal technology and monitoring techniques should be, and who should have the power to shut it down if it becomes unsafe. In Barnwell County, none of these are bones of contention, partly because the disposal facility is a fait accompli. However, all of these issues are being debated in New York, as the siting commission, the Department of Environmental Conservation, and NYSERDA attempt to develop a facility.

(4) Whose interests are dominant. This question is closely related to the preceding one and will affect how that question is answered. It is not the same, however, both because an interest may be strong but not overriding and because an interest-holder may not be able to speak on her own behalf. For example, the interests of current Barnwell County residents, who receive monetary benefits from Chem-Nuclear's facility, do not necessarily override the interests of future residents, who may inherit a leaky LLW disposal site without any direct monetary benefits. Nor do they necessarily override the interests of citizens elsewhere in South Carolina, who do not want the state to get a reputation as a "nuclear dumping ground." Thus, even though some people in Barnwell County favor keeping the

facility open, South Carolina, through the governor and the legislature, can maintain that they are acting on behalf of both future generations in the county and the state as a whole in deciding to close the facility. In contrast, the interests of people in New York's potential host communities, many of whom regard a LLW disposal facility as too risky to live with, are in tension with the interests of LLW generators, who need some place to dispose of their waste, and of state officials, who need to carry out their legal mandates. The interests of potential host communities are also in tension with the interests of people, present and future, who might suffer if at-reactor disposal was adopted.

(5) Who is at fault in the event of an accident. If a technology is complex, it may be difficult to tell what has gone wrong, and it can be more difficult to tell whose fault it was. For example, when the Unit 2 reactor at Three Mile Island suffered its "loss-of-cooling" accident, it was not immediately clear who or what had caused the potentially catastrophic situation. If a technology is not only complex but has a long reach, either geographically or over time, it is even harder to pin down who caused the accident or harm--especially if it is a low-level chronic insult rather than a big bang with high consequences. For example, if, 50 years from now, it is discovered that

radionuclides have migrated from the Barnwell County disposal site, it may not be clear to what extent the fault was Chem-Nuclear's (for failing to operate and close the site properly), and to what extent it was the state's (for failing to maintain the defunct site properly).

(6) Who should pay for damages. Even if fault can be determined, the question of who should and who can pay for damages remains. Weinberg has suggested that very low probability accidents might be considered acts of God, like natural disasters, and accordingly compensated by society as a whole.²² Others reach the same conclusion thorough a different argument: they maintain that if a technology benefits society as a whole, society should assume the costs of its accidents. Both positions contrast with the equally prevalent view that only those whose actions led to the harm should be responsible for it. A strong, strict-liability version of this view is that responsibility should be assumed by those contributing to a harm even if their negligence cannot be proven. Whether those responsible have adequate funds to assume the liability is another question, raising the further question of joint and several liability. There also remains the question, whenever liability is discussed, of whether some damages can ever be adequately compensated.

²²Alvin Weinberg, "Science and Its Limits," op. cit.

THE SOCIAL CONSTRUCTION OF RISK

How bad is the risk? Can it be managed, and who should do so? If an accident occurs, whose fault is it? Seemingly, these are questions that could be answered if we only knew enough. But they're not. Instead, the answers to these questions, like the answers to the ethical questions of whose interests are dominant and who should pay, are inevitably affected by who is doing the answering. Partly at issue, often, is what counts as a risk.

Many scientists and engineers treat risk as something that can be objectively measured and compared. But even science can never be completely "objective." Measurements of the probability and consequences of a danger are affected by choices about how the danger should be measured. For example, in measuring the dose-response effects of radiation, how many deaths and tumors are needed, in which populations and over what time span? Can responses to low doses be extrapolated from responses to high doses, and if so, using what dose-response curve? Questions such as these are one reason why scientific experts may disagree in their assessment of a danger. And even if there is a consensus among scientists, it can, as

Thomas Kuhn pointed out,²³ be the result of a prevailing paradigm--a collective mind-set that sees scientific problems in a certain way. If renegade thinkers successfully show the mind-set to be seriously flawed, the paradigm eventually will give way to other modes of thinking, which also may eventually be challenged and discarded. Furthermore, scientists (like everyone else) can be influenced by their own interests, including their interest in staying employed and having their research well-funded.

But all of these qualifications to scientific objectivity are attributable to human fallibility. They do not refute the idea that some dangers are worse than others. And science, while it may never be able to fully understand a danger (or anything else), can move closer to the objective reality. At some point, the danger will be understood for all practical purposes. As science starts to approach this point, crude evaluations of relative dangers become possible. For example, the US Environmental Protection Agency has evaluated the cancer, noncancer, ecological, and welfare risks posed by 31 environmental

²³Thomas Kuhn, The Structure of Scientific Revolutions, 2nd ed. (Chicago: The University of Chicago Press, 1970).

problems.²⁴ This analysis is a useful tool in understanding where policy choices need to be made. But, as the Environmental Protection Agency acknowledged, it is not in itself a ranking of risks.

Risk should not be equated with danger. Danger is objectively out there, although no one may fully understand it. Danger does not involve values; risk does. A consensus on values would be needed to convert the Environmental Protection Agency's analysis of dangers to a risk ranking. With risk, certain dangers are selected as important, and values are the selection mechanism. Thus, conflicts over risk do not occur simply because some people are "risk experts" while others are relatively uninformed. Granted, people may be relatively uninformed about various dangers. They may even admit that scientists know more than they do about a particular danger. (Although they may question whether scientists know enough.) But danger is only part of the story with risk.

²⁴US Environmental Protection Agency, Unfinished Business: A Comparative Assessment of Environmental Problems, February 1987. As was stressed in both this report and a subsequent analysis done by the Relative Risk Reduction Strategies Committee of EPA's Science Advisory Board (Reducing Risk: Setting Priorities and Strategies for Environmental Protection, September 1990), attempts to compare and rank environmental risks inevitably involve value judgments. Nevertheless, the emphasis of both reports was on finding a "rational," nonvalue-based method to prioritize risks.

Psychology has provided a useful counterweight to science and engineering by explaining how risks are seen through the eyes of the potential risk-bearer. Much work has been done on how people regard risk, especially risks that are involuntary and involve dreaded unknowns such as cancer.²⁵ But, while this work is important, it is not fully adequate. First, it still tacitly assumes that "risk" is an objective concept; what varies is merely how people perceive risk. And second, it treats risk perception as a phenomenon of individual cognitive processes. It fails to take into account adequately the cultural contexts that help to determine what counts as risk for different people. Cultural contexts affect the risk interpretations of all people--risk analysts and managers, such as the New York siting commission and NYSERDA, as well as potential risk-bearers, such as the people of Cortland and Allegany counties. "Risk," then, is a concept that is in part socially constructed.

"Risk" as a social construct is a relatively new idea; one that became popular in the 1970s and 1980s, especially in sociology and cultural anthropology.²⁶ It is grounded

²⁵See, e.g., Paul Slovic, "Perception of Risk." Science, vol. 236 (April 17, 1987), pp. 280-285.

²⁶For a review of how sociologists have amplified the work of psychologists on risk and individual choice, see Carol Heimer, "Social Structure, Psychology, and the Estimation of Risk," Annual Review of Sociology, vol. 14

in theory about how everyday reality--what we think about in our daily lives, and how we think about it--is itself socially constructed.

The Social Construction of Reality

Two widely recognized proponents of the social construction theory are Peter Berger and Thomas Luckmann in their 1966 book, The Social Construction of Reality.²⁷ Their work was, in turn, built on work during the first half of the 20th century in the sociology of knowledge--a subfield of sociology and philosophy that is concerned with the relationship between human thought and its social context. But whereas early 20th-century sociologists and social philosophers had been concerned with the sources of intellectual ideas, Berger and Luckmann concentrated on everyday knowledge.

According to Berger and Luckmann, the knowledge that guides the conduct of daily life is drawn from everyday reality, as interpreted by people to make that reality coherent and personally meaningful. "Different objects present themselves to consciousness as constituents of

(1988), pp. 491-519.

²⁷Peter L. Berger and Thomas Luckmann, The Social Construction of Reality (New York: Doubleday, 1966).

different spheres of reality. . . . Among the multiple realities there is one that presents itself as the reality par excellence. This is the reality of everyday life."²⁸ One's social interactions (both face-to-face and more distant and anonymous interactions) are important selection mechanisms for the "reality par excellence." In this process, language is vital: it is the main means by which these interactions are conducted and by which the social stock of knowledge is transmitted and augmented. The social stock of knowledge, in turn, differentiates reality for the individual by providing detailed information about those sectors of life with which she must deal.

Society does not merely transmit information to the individual, however. It shapes the individual and in turn is shaped by the individual. The individual experiences society as an objective, external, sometimes coercive reality, but society exists only because people become socialized as they grow from infants to adults. Thus, according to Berger and Luckmann, the society and the individual are engaged in a dialectic: society exists as a product of human activity, but that activity is shaped by the society of which it is a part. This dialectic is crucial to the formation of socially constructed realities, with their own institutions and stocks of knowledge.

²⁸Ibid., p. 21.

As with other factors (e.g., genetically inherited traits) that may be determinants of thought and action, the problem arises of how much the social factor is a determinant. This, and the epistemological question of validity, raise doubts about "socially constructed realities." But if this theory is restated with qualifiers--that (what we think of as) reality is (to some extent) socially constructed--it is convincing. The theory also has been fertile, setting the stage for more specialized theory such as that of risk as a social construct.

Risk as a Social Construct

Building on work such as that of Berger and Luckmann, the idea of risk as a social construct has taken shape. The most well-known exposition of this theory is Mary Douglas and Aaron Wildavsky's 1982 work, Risk and Culture.²⁹

²⁹Mary Douglas and Aaron Wildavsky, Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers (Los Angeles: University of California Press, 1982). Mary Douglas's Purity and Danger: An Analysis of Concepts of Pollution and Taboo (London: Routledge & Kegan Paul, 1966) was an important theoretical source for this later work. In my discussion of Risk and Culture, I give my interpretation of Douglas and Wildavsky's starting thesis. I do not, however, discuss the main thrust of this work: their application of grid/group theory. For a somewhat different slant on the idea of risk as a socially

Douglas and Wildavsky began by pointing out that some dangers come to be thought of as risks while others do not. There is, however, far from universal agreement on which dangers merit attention. For example, among groups involved in public policy (political parties, government officials, interest groups, etc.), those that are most worried about economic prosperity tend to be less worried about environmental pollution, and vice versa.

Why is this? The reason lies partly with science. While science has increased human understanding of the natural world, it also has increased the gap between what is known and what people would like to know. To understand fully the dangers that face us would take total knowledge--an impossibility. Furthermore, to decide which dangers to address and in what order would take ranking criteria, but there is no mechanical (nonvalue-based) way to arrive at such criteria. Thus, we, collectively as well as individually, can know no more than a fraction of the dangers that exist or might exist, and even if we could, we cannot reach an agreement on how to rank the risks we do know. Faced with endless possibilities for dangers, how, then, does one decide which to be concerned about, and what

constructed problem, see Joel Best, ed., Images of Issues: Typifying Contemporary Social Problems (New York: Aldine de Gruyter, 1989).

to do about them? In other words, how do particular dangers come to be selected for attention by some people, ignored by others?

This question can be answered only by first recognizing that "risk" is a function of two variables: the extent of individual and collective knowledge about the future, and of shared vision about what the future should be like. If knowledge is fairly complete and the vision is fairly universal, the problem of risk becomes relatively simple. One merely needs to do a cost/benefit calculation of whether the risk is worth it. If knowledge is incomplete, the problem becomes one of gathering more information. If there is little agreement about what the future should be like, the problem becomes one of trying to reach a unified view. If both knowledge and a shared vision are lacking, then the appropriate course of action is unclear, and there is likely to be the greatest dissent about the nature and relative importance of the risk.

Risk, understood as a function of the degree of knowledge of and consensus about the future, is neither an objective reality nor something that is seen solely through an individual prism. Instead, according to Douglas and Wildavsky, it is a product of a particular social context: "The different social principles that guide behavior affect the judgment of what dangers should be most feared, what

risks are worth taking, and who should be allowed to take them."³⁰ People select their awareness of certain dangers to conform to a specific way of life. If a person is part of a particular geographic or organizational culture, she will be predisposed to take certain kinds of risks while avoiding others.

TECHNOLOGICAL RISKS

All risks are socially constructed, but technological risks--manmade risks posed by relatively new, relatively unproven technologies--are especially likely to have conflicting constructions. Technological risks are a prime example of risks where there is relatively little knowledge of and consensus about the future. People are likely to disagree on whether the new technology actually poses a risk, how grave that risk is, and whether the risk is worth taking. One reason is that different people evaluate the benefits and costs of the new technology differently. Another is that people may also have different evaluations of the rights of those bearing the risk and the responsibilities of those causing or contributing to it.

³⁰Mary Douglas and Aaron Wildavsky, *op. cit.*, p. 6.

Costs and Benefits

Even natural risks may be counterbalanced by benefits: one may choose to live on the San Andreas fault, enjoying life in California until or unless a major earthquake comes. Human enterprises that create risks always have benefits as their rationale . . . otherwise, they would not be undertaken. Often, however, people disagree on what the value of the benefits is.

First, disagreement arises because of differences in who benefits how much. For example, it is argued (especially by LLW generators) that although radioactive materials generate radioactive waste, they benefit the public by providing abundant, nonpolluting electricity and by enabling advanced medical procedures and research techniques. But people living near to a proposed LLW disposal facility may feel that they do not share equally in these benefits; that people in urban areas with high electricity demands and sophisticated health care centers benefit more than they do. As two people in New York protested, "It is our hope that the less populated counties of the state . . . will be protected in the future from

being abused by richer counties and their communities in New York State."³¹

Second, disagreement over the benefits of a risk arise because of differences in people's visions of what the world is and should be. It has been proposed that, with respect to technological risk, people can be categorized into three types: "sponsors," "guardians," and "preservationists."³² Sponsors wholeheartedly favor new technology; they are convinced of its benefits and are optimistic about society's ability to manage its risks. They want the world that new technology makes possible. Guardians are less enthusiastic about technological change and are considerably more skeptical about whether its risks will be well-managed; they think that it should be undertaken cautiously and with many safeguards. Preservationists go further: they are deeply suspicious of both new technology and those who profess to manage its risks. For them, the benefits count for little against the hazards of the technology and the changes in life it will bring.

³¹Catherine McKenzie and Kevin Rose, letter to the editor, The Cortland Standard, January 20, 1989.

³²Michael Elliott, "Coping with Conflicting Perceptions of Risk in Hazardous Waste Facility Siting Disputes" (Ph.D. dissertation, Massachusetts Institute of Technology, Department of Urban and Regional Planning, Cambridge, MA, 1984).

Granted, it is difficult to separate how people evaluate benefits from how they evaluate costs. With risk, the two are closely related. But they are not inextricable.

A person living near a proposed LLW disposal site might acknowledge that she enjoys having plentiful electricity and technically advanced medical care and that she shares these advantages equally with other members of society. But she still might contend that these advantages are--for her, at least--outweighed by the drawbacks of having the LLW disposal facility nearby. She would reach this conclusion because of her evaluation of the cost side of her cost/benefit analysis. Her conclusion might change if the benefit side were increased (e.g., through new roads, new schools, lower property taxes enabled by the facility). But it might not. She still might see the facility as a net negative for her. Those trying to site the facility then might seek to lower her estimated costs (e.g., through property value guarantees, local monitoring committees, waste type and volume restrictions). But, if she had grave doubts about whether those in charge understand the risk and whether they can and will manage it well, she still might think that the costs were too high.

Alternatively, a person living near a proposed LLW disposal site might think that its potential costs were

insignificant and were outweighed by the benefits it brought. However, someone living further away--especially if they did not reap the special benefits provided the host community--might disagree. (For example, in 1985 Chem-Nuclear investigated privately siting a LLW disposal facility in Fall River County, South Dakota. When a referendum was held on the facility, it was approved by a majority of the county's voters--partly because of longstanding uranium mining there; partly because of the benefits they would receive--but was rejected by 83 percent of those voting in the state as a whole.)

Thus, a person's judgment about whether a risk is worth taking is likely to be affected by her geographic and economic position relative to the risk's source. But it also will be affected by, on the one hand, how much she values the benefits that come with the risk, and on the other, what she estimates the potential costs of the risk to be. Manmade change, especially if it involves a new technology, often provokes dissent about whether the change is needed or desirable. If the technology is not only new but unproven, disagreement is likely to arise over how to calculate the potential costs of the new technology . . . in hazards created, as well as capital spent.

Nuclear Power

Nuclear power exemplifies the tension between different evaluations of the benefits and costs of a relatively new, relatively unproven technology. Passions about nuclear power run high, in some regions, especially. For example, during the 1980s in Maine, several statewide elections included referenda to shut down Maine Yankee, the state's sole nuclear power plant. In 1982 in Massachusetts, an act was passed by statewide referendum that requires new nuclear power plants to be approved by popular vote.³³ And in New York, Governor Cuomo announced that he intended to allow no more nuclear power plants in the state. Because nuclear power is by far the biggest source of radioactive waste, arguments about the costs and benefits of radioactive waste disposal sometimes are difficult to separate from arguments about nuclear power's costs and benefits.

In terms of benefits, proponents of nuclear power are armed with a new argument: nuclear power is clean, and it's needed. They argue that with growing demand for electricity in the United States and with the threat of

³³However, the constitutionality of this act (Nuclear Power and Waste Disposal Voter Approval and Legislative Certification Act, 1982 Mass. Acts 503) was questioned in a June 1986 opinion by the Massachusetts Supreme Judicial Court.

global warming from fossil fuel emissions, nuclear power must step in and fill the bill. But opponents of nuclear power counter by arguing that the development of solar and other renewable technologies should be supported instead, and that energy conservation measures can reduce the need for more electricity.

In terms of costs to health, proponents of nuclear power maintain that the technology is not unproven--that in three decades of nuclear power plants in the United States, there have been no catastrophic accidents. They also maintain that the very low releases of radiation from nuclear power plants do not affect people's health. But opponents contend that the number of safety violations and "close calls" indicate that the technology is unsafe. They also contend that not enough is known about the dose-response effects of radiation. (On the last point, they can refer to the National Research Council's December 1989 "BEIR V" report, which indicates that the risk of getting cancer from low doses of radiation appears to be four times as high as previously estimated.³⁴) Opponents of nuclear power also contend that nuclear power plants are exorbitantly expensive to build and maintain properly.

³⁴National Academy of Science, National Research Council, The Committee on the Biological Effects of Ionizing Radiation (BEIR V), Health Effects of Exposure to Low Levels of Ionizing Radiation (Washington, DC: National Academy Press, 1990).

(For example, the cost of the Seabrook plant, in southeastern New Hampshire, was about \$6.5 billion--more than 10 times the original estimate.) But proponents of nuclear power counter by arguing that the expense is partly due to the long delays in construction and licensing caused by the opposition. (Seabrook was more than 10 years behind schedule, partly because Massachusetts refused to provide an emergency evacuation plan.)

Disagreements about nuclear power also arise over the back end of the fuel cycle--in other words, what to do with nuclear power's high-level radioactive waste (mostly spent fuel rods) and low-level radioactive waste (mostly spent resins and filters, solidified sludge, activated plant components, and contaminated trash). Nuclear power plants contribute about three-quarters of the curie content of the LLW to be disposed by states and compacts; in addition, they contribute most of the curie content of the high-level waste to be disposed by the US Department of Energy. Without nuclear power, radioactive waste disposal would be a relatively minor problem, although still troublesome and expensive. Opponents of nuclear power contend that the waste problem is yet another reason why nuclear power should be abandoned. Proponents of nuclear power contend that the opponents are intentionally obstructing waste

disposal solutions, because they object to nuclear power on other grounds.

Rights and Responsibilities

Some risks exist because of another person or group, not because of nature or fate; they threaten one's life or health, not one's property; they have been imposed, not agreed to. Under these conditions--conditions which are likely with technological risk--dissent is virtually inevitable. This dissent will be due to different assessments of whether something is a risk and what its costs and benefits are. But it will also be due to different assessments of the moral rights of those bearing the risk (the "victims") and the moral responsibilities of those causing or contributing to the risk (the "agents").³⁵

Sometimes the victims of a risk are scattered and numerous (e.g., the victims of ozone depletion who may develop skin cancer or cataracts); sometimes they are unknown or belong to future generations (e.g., the victims of flooding caused by global warming). When the victims

³⁵See Mary English, "Victims, Agents, and Outrage," in B. John Garrick and Willard C. Gekler, eds., The Analysis, Communication, and Perception of Risk, (New York: Plenum Press, 1991), pp. 199-205.

are diffuse and unknown, they usually are not regarded as having strong moral rights to freedom from the risk being imposed. (Whether they do have these rights is another matter.) But when victims are geographically concentrated and identifiable, they are more likely to be regarded--especially by themselves--as having the right to freedom from harm. This is partly due to a feeling that the risk has been unfairly imposed: they have been selected to assume a risk so that society as a whole may benefit. As an Allegany County farmer commented, "People in the county feel they've been singled out and picked on. We feel like we're the Third World of New York state."³⁶ The feeling is heightened if they are not convinced either that the risk is necessary or that they have been selected fairly and appropriately.

All of us who use refrigerators or air conditioners with chlorofluorocarbons contribute to ozone depletion. All of us who drive cars or otherwise burn fossil fuels contribute to global warming. Although our choices about refrigerators, air conditioners, and cars are limited by those products' manufacturers, we--as well as the manufacturers--are the agents of ozone depletion and global warming. Diffuse agency, however, usually does not result

³⁶Rich Kelley, as quoted in the Democrat and Chronicle, Rochester, NY, January 22, 1989.

in a strong sense of moral responsibility, in either the agents or their victims. (Whether it should is another matter.) But when the agents are identifiable organizations or individuals, they are likely to be seen as morally responsible . . . although they may not see themselves this way.

With an organization, it is difficult to distinguish collective from individual moral responsibility. For example, is each member of the New York siting commission personally responsible for the commission's actions? With an individual, it is seemingly easier to assign moral responsibility. However, if the person is acting on behalf of the organization or a larger group (e.g., Governor Cuomo acting on behalf of the state of New York), the extent of personal responsibility is still questionable. But, regardless of how responsibility is divided up, people often have a strong sense that someone is responsible for the risk and should be held morally accountable. The risk doesn't simply exist; it is being imposed by someone. Indignation at this imposition inflames their sense of the risk itself. It would not be there if it weren't for the agent.

If a person sees risk situations in terms of the moral rights of victims and the corresponding moral responsibilities of agents to honor and protect those

rights, she will be predisposed to be particularly concerned about technological risks. For in many cases, new technologies seemingly have one or a few identifiable agents. It's the siting commission that is deciding to put this here; it's NYSERDA that will build it; and it will serve mainly the nuclear power plants. (The people who use electricity might also be considered agents, but that possibility often goes unrecognized.) If, along with identifiable agents, the potential victims are clustered and identifiable--it's the people of Taylor who will have to live with this--the sense of risk and of indignation at that risk may be heightened, especially in the potential victims. If those in charge flatly refuse to consider dropping the risky technology--we must have a LLW facility, because we need to comply with the LLWPA, and because the NRC forbids long-term at-reactor storage--fuel is added to the fire. Everyone accepts that many natural hazards are impossible to eliminate; their consequences can only be made less severe. People often are not so accepting when it comes to technological risks. The option of simply not having the technology does exist with technological risks.

"Moral rights" and "moral responsibilities" are subject to interpretation. Some rights and responsibilities are nearly universally espoused (e.g., the right not to be murdered and the responsibility not to

murder). But even these "universal" moral principles are evaluated differently by different people when applied to specific situations (e.g., abortion, capital punishment). Other rights and their corresponding responsibilities are widely debated--especially claim rights (e.g., the right to food and shelter), but also liberties such as the right to freedom from harm. For example, the US Environmental Protection Agency uses "one in a million" as its rule-of-thumb guideline for reasonable freedom from harm: more than one cancer, death, etc. in a million and it generally takes action; fewer than one in a million and it generally doesn't.³⁷ It does not guarantee absolute freedom from harm due to environmental hazards.

Similarly, those responsible for LLW disposal facilities do not promise that no one will ever be harmed by the facility; they simply promise to make the odds of harm as low as possible. (The NY Department of Health, in its brochures about radiation, indicates that there may be a risk from any exposure to radiation, but that the disposal site operator will be required to meet the Department of Environmental Conservation's regulations

³⁷When only small populations are at risk, it informally uses the more lenient standard of one in ten thousand as its action level with cancer risk management. See Curtis Travis, Samantha Richter, Edmund Crouch, Richard Wilson, and Ernest Klema, "Cancer Risk Management: A Review of 132 Federal Regulatory Decisions," Environmental Science & Technology, vol. 21, no. 5 (1987), pp. 415-420.

concerning maximum allowable doses and also keep the total exposure from the site "as low as reasonably achievable."³⁸) However, only zero-probability odds may be good enough for people living near the facility, especially if it is put there without their consent. They see it as their moral right not to be harmed by a situation they have not consented to. But it may not be their legal right: for example, in New York, a candidate host community does not have veto power over the prospective LLW disposal facility, and NYSERDA has the power of eminent domain to acquire land for it.

For moral rights and responsibilities don't always coincide with the law. That does not mean that they are less valid: they may not fall within the law's purview, or the law may not have caught up with the prevailing moral norms. But it does mean that moral rights and responsibilities may not be legally enforceable. Furthermore, a "prevailing" moral norm implies a fairly high degree of consensus. The debate about whether Roe v. Wade should be reversed is partly a debate about whether

³⁸In 10 CFR 20.1, the US Nuclear Regulatory Commission defines "as low as reasonably achievable" (ALARA) as "as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest."

there is a prevailing moral norm--i.e., about how many Americans are morally opposed to abortion. But even if an overwhelming majority supports a particular moral view, others may contend that it's the wrong view. This leads to the question of whether moral norms can only be subjectively judged, or whether their validity can be assessed against some rational standard. It's a question philosophers have wrestled with, and it suggests how complex the debate about rights and responsibilities is.

Increasingly, the rights of victims and the corresponding responsibilities of agents are an overriding concern for many people . . . but by no means all. In contrast, some people believe that victims do not always have a right to be free from the risk of harm, especially if the probability of the risk is low or the consequences minor. Instead, they believe that those in charge owe their first responsibility, not to protecting victims' "rights," but to doing what is best for society as a whole. This viewpoint is more likely to be taken by people who don't see themselves as victims. It is also more likely to be taken by people who trust authority--sometimes (but not always) because they are themselves in positions of authority. This is a key reason for dissent about technological risk in the United States today.

The Role of Authority

Those in positions of authority, especially the regulators and the experts (scientists, engineers, risk analysts, etc.), share moral responsibility with other agents for the risk being created. If nothing else, they sanction the risk. They may also help to manage it.

People who are predisposed to trust those in positions of authority take for granted that they are doing their jobs competently and with integrity. When conflicts of interests or rights occur, they are likely to assume that those in charge are in the best position to reconcile those conflicts. In contrast, people who are not predisposed to trust those in positions of authority critically scrutinize whether they are fulfilling their moral responsibilities. These people take little (except, perhaps, the rights of the victims) for granted. They want proof of competence and integrity, and they are skeptical of whether those in charge will balance competing rights and interests fairly. Instead, they see this balancing as a matter for public debate and resolution.

Thus, what counts as risk will be shaped partly by individually and culturally determined attitudes toward authority. If a person trusts those in charge to be competent and to carry out their fiduciary

responsibilities, her sense of risk will be lowered. If she does not trust those in charge, her sense of risk will be heightened. For those in charge this raises the problem, discussed in Chapter 3, of how competence can be proven and of what constitutes "fiduciary responsibilities," especially if the rights and interests of society or of different factions within it conflict with the victims' rights and interests. Then, it is not enough for those in charge to have integrity. The conflict remains.

The concept of risk thus cannot normally be extricated from concepts about the roles of those who are creating, sanctioning, or managing the risk. The probability of an adverse event occurring and the severity of its consequences often will be determined in important ways by human actions. But either these actions have not yet been taken or their ramifications are not yet known--that is inherent in the futurity of risk. Predictions must be made about the adequacy and appropriateness of the actions. And these predictions will, inevitably, be colored by values about the appropriate roles of those in charge, as well as evaluations of how reliably they are doing and will do their jobs.

CONCLUSION: TWO WORLDS; TWO VISIONS OF RISK

The majority of people in Barnwell County think that Chem-Nuclear's LLW disposal facility is an economic asset for the county, and most think that it poses virtually no threat to health. Many Allegany and Cortland County residents, in contrast, are fearful about what a LLW facility would do to their health and their agricultural economy. But Barnwell has a different culture from that of Allegany and Cortland.

In the early 1950s (when people were extolling the Atomic Age, and few were worried about the adverse effects of radioactive materials), the Savannah River Plant was built in the Lower Savannah region. Despite a growing awareness of serious environmental problems caused by the US weapons complex, the level of concern is generally not high in Barnwell County or in many other communities near weapons facilities.³⁹ There are different explanations for this. One is that "you don't bite the hand that feeds you." Another, related explanation is that you tend to

³⁹While this appears to be true of many of the communities near DOE's nuclear weapons facilities, a counterexample is provided by the high citizen concern surrounding the plant in Fernald, Ohio. In 1989, in response to a suit by local citizens, the US Department of Energy agreed to pay \$78 million to Fernald residents for damages resulting from years of radioactive dust emissions and groundwater contamination.

rationalize if you want the benefits of something that may harm you. A third is that familiarity dispels fears. These are all psychological explanations, they are all plausible, and they are not necessarily incompatible. The Barnwell County experience, as well as the budding interest of the West Valley community in hosting New York's new LLW disposal facility, suggests that they all may apply. But (as noted in the Epilogue), the West Valley community is deeply divided in its endorsement of the proposed facility. One must look to sociological explanations in order to better understand why Barnwell County, more than any of the New York communities mentioned here, is receptive to LLW disposal.

There is a culture, now deeply rooted in Barnwell County, of trust in and deference to those in positions of authority, especially when that authority includes recognized technical expertise. As various respondents in the 1990 Barnwell County socioeconomic study commented: "I have confidence in the management of the local site and trust local management decisions to keep the site as safe as possible." "I think [Chem-Nuclear] has been good for Barnwell County and [has] some super nice people in high positions." "If all other wastes were handled with the regulations on LLW the whole world would be in much better

condition." And as a 73-year-old Barnwell County resident commented when interviewed in 1986:

I don't worry. What's going to happen will happen. Ain't nothing happened so far. It [the LLW site] suits me all right out there. I got a son-in-law working out there. It suits him all right, so it suits me all right. I don't think people even talk about it anymore. . . . From what they say, all this stuff is dangerous. But they got everything under control, I reckon.⁴⁰

The mass protests to the New York siting commission's site selection efforts suggest that a similar culture does not prevail in Allegany and Cortland counties or in the other candidate areas that the commission was considering in 1989. As a retired structural engineer in a candidate area commented, "How do we know they could keep this thing from leaking? How can they be sure it won't crack? There's nothing they could do to make us feel really safe if they went ahead and built it."⁴¹ And as a one candidate area resident noted, "This is the same government

⁴⁰Woodrow Creech, as quoted in the Star-News (Wilmington, NC), September 21, 1986.

⁴¹Joseph Frank, Charleston, NY, as quoted in The New York Times, February 28, 1989.

that gave us a collapsing Thruway bridge."⁴² Because of cultural differences, what counts as a risk for many Barnwell County residents is quite different from what counts as a risk for many New York residents, especially if the risk is related to the nuclear industry.

The contrast between Barnwell County and Allegany and Cortland counties suggests how, within a particular social context, values and norms can reinforce each other. What is valued as particularly desirable in Barnwell County (for example, patriotism in support of the nation's defense effort) becomes a norm (for example, not participating in demonstrations against the Savannah River Site, Allied General Nuclear Services, or Chem-Nuclear). What is valued as particularly desirable in Allegany and Cortland counties (for example, maintaining a clean environment) becomes a norm (supporting demonstrations and legal activity to fight the proposed LLW facility). The norm in turn helps to strengthen and further inculcate the value, by giving it a behavioral standard against which it can be measured. The contrast between Barnwell County and the Allegany and Cortland counties also suggests how norms can prevail within a particular geographic locale or a particular group culture but diverge within a larger context.

⁴²Jean Veeder, Fultonville, NY, as quoted in The New York Times, February 28, 1989.

The Barnwell/New York contrast raises other questions about risk, however. Seemingly, the risk of a LLW facility would be defined largely by the physical characteristics of the site, the track records of those who will operate and regulate the facility, the radioactivity of the LLW, and the disposal technology used. The Barnwell site meets 10 CFR 61 requirements but is not exceptional. While Chem-Nuclear and the South Carolina Department of Health and Environmental Control have a good record, there are no grave reasons to doubt the competence of NYSERDA and the New York Department of Environmental Conservation. And in terms of the magnitude of the disposal facility and the sophistication of its technology, the people of Barnwell County seemingly have more reason to worry than a county in New York would. They have a lot more waste with a lot more radioactivity, and a lot fewer engineered barriers to contain it. Have the people of Barnwell County been lulled into a false sense of security about Chem-Nuclear's LLW disposal operation? Or have they come to realize that the real dangers of the operation are insignificant? What are the real dangers?

Although this question is important in an abstract sense, it is moot for two reasons. First, the science of LLW disposal and its effects is still not altogether worked out. For example, the durability of concrete over hundreds

of years is still uncertain,⁴³ and the dose-response effects of radiation are still not fully understood. But second and more importantly, the major shaping force for action is how people define risk. In a practical sense, those definitions are what count. To understand how people--risk analysts and managers as well as laypeople--define risk, their cultural contexts must be understood.

Cultural contexts, with the values they inculcate, help to shape answers to such fundamental questions as "Is this a risk?" "How bad is it?" "Can and will it be managed?" And because these answers inevitably will differ, especially across cultures (including organizational cultures), efforts at risk communication which strive to "educate" or to attain a consensus on risk are doomed to be at best of limited success. This does not mean that dialogues on risk should not be undertaken, for, at a minimum, they can improve mutual understanding of differences in risk interpretation. They may also help to bring these interpretations closer together. But inevitably, important differences will remain.

⁴³See Wallace Chang and Nausherwan Hasan, Concrete Longevity Overview, prepared for the US Department of Energy's National Low-Level Waste Management Program, DOE/LLW-105, September 1990.

CHAPTER 5

JUSTICE

. . . the primary subject of [social] justice is the basic structure of society, or more exactly, the way in which the major social institutions distribute fundamental rights and duties and determine the division of advantages from social cooperation.¹

When attempts to establish legitimate, accepted authority, to develop a climate of trust, and to reach common understandings on risk fail, justice becomes the obvious recourse. But what is justice? Using the experience of the Southeast Compact's host state selection process and North Carolina's site selection process as examples, this chapter discusses how, in different situations, different conceptions of justice have been tacitly invoked. The "best site" approach has invoked a utilitarian conception of justice; the "fair play" approach, a contractarian conception; the "volunteerism/incentives" approach, a libertarian

¹John Rawls, A Theory of Justice (Cambridge, MA: The Belknap Press of Harvard University Press, 1971), p. 7.

conception. Each has pros and cons, but none can escape some fundamental questions that continue to plague theories of justice.

NORTH CAROLINA AND THE SOUTHEAST COMPACT

In 1983, eight states in the Southeast--Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia--agreed to form a regional LLW disposal compact. That year, they each passed essentially identical compact legislation, and in December of 1985, concurrent with the passage of the LLWPAA, congressional consent was granted.

The Southeast Compact states generate more LLW than any other region in the United States--in 1989, a total of about 500,000 cubic feet, or nearly one-third of the nation's waste. The compact is fortunate in having an existing facility in Barnwell County, South Carolina. This exempts its states from the disposal surcharges and milestone requirements of the LLWPAA during the 1986-92 transitional period. However, the compact provides that Barnwell will remain open only until January 1993, and that by then another regional facility must be licensed and ready to operate. Thus, the Southeast has the same

ultimate deadline for siting a new facility as the other compacts.

Directives to the Compact's Commission

The Southeast Compact legislation established a regional commission composed of two voting members from each of the eight states. The legislation instructed the commission (i) to determine the type and number of regional LLW disposal facilities needed; (ii) to provide the region's states with guidelines on evaluating alternative locations for LLW disposal facilities; (iii) to adopt procedures for identifying a state to host the next regional facility; and (iv) if no state volunteered, to designate the host state by a two-thirds vote. In developing criteria for the host state selection, the commission was to consider "the health, safety, and welfare of the citizens of the party states; the existence of regional facilities within each party state; the minimization of waste transportation; the volumes and types of wastes generated within each party state; and the environmental, economic, and ecological impacts on the air land, and water resources of the party states."² South

²Southeast Interstate Low-Level Radioactive Waste Management Compact, Article 4(E).

Carolina is exempted until all the other states have fulfilled their obligations, as established by the commission, to host a facility.

Shortly after the regional commission was set up in 1983, it took steps toward establishing a new disposal facility for the region. First, the commission contracted with Dames & Moore to study the region's LLW management, which released a three-volume technical report on the region in July 1985. Second, a regional plan was prepared and, in October 1985, adopted by the commission. This four-page document states the need for a regional facility, calls for a succeeding host state to be named at least seven years before the new facility was to close, and lists the requirements that a regional facility must meet. (It must satisfy federal design requirements, must be capable of receiving Class A, B, and C waste, and must be able to operate for at least 20 years with an annual volume of up to 1.6 million cubic feet. Otherwise, the design is left up to the host state.) And third, the commission initiated a process to select a new host state.

The Commission Adopts a Host State Selection Process

In April 1985, the commission, upon the recommendation of its technical advisory committee, adopted criteria to be

used by Dames & Moore in evaluating each state's technical appropriateness as the next host state. As revised by the commission in its December 1985 meeting, the ten criteria include the aggregate amount of potentially suitable area (PSA) in the state, with the PSAs identified by taking into consideration geology, hydrology, population, protected areas, and coastal flood plains (criterion 1); the volume of LLW generated and shipped for disposal, by classes A, B, and C (criteria 2, 3, and 4); transportation distances of the LLW, by classes A, B, and C (criteria 5, 6, and 7); and the transportation systems, population densities, and meteorological patterns of the PSAs (criteria 8, 9, and 10). Dames & Moore was asked to arrive at proportional scores for the states for each of these criteria but was instructed not to reveal these numbers until the commission had weighted the criteria.

To weight the criteria, the commission adopted a three-round process. In each round, the 16 commissioners were to mail in their individual decisions on how they would distribute 100 points among the ten criteria. The outcomes of the prior round (including the weightings suggested by their fellow commissioners) were available to them during the second and third rounds. The weighting process began in December 1985 and was completed on February 21, 1986. At that time, Dames & Moore released

its draft Host State Identification Study, which gave the proportional scores for each state. North Carolina, with 796, scored highest. Alabama, with a score of 768, was second.

On April 3, 1986, the commission met to determine the technical ranking. The commission first decided to adopt Dames & Moore's report for use in the host state identification process. (The vote was 14-2, with the North Carolina commissioners opposing.) The commission's staff then formally presented the results of the criteria weighting exercise, and the commission, by a unanimous vote, accepted the results. It then unanimously approved use of the resultant technical ranking in the host state designation process. North Carolina ranked first, with a weighted score of 126,974. Alabama was a close second, with 122,635. Virginia and Georgia were third and fourth, with 109,955 and 108,313, respectively. Tennessee, Florida, and Mississippi, ranked fifth, sixth, and seventh, were clearly out of the running.

Prior to arriving at this ranking, the commission had attempted to facilitate the host state selection process by asking each state to outline the conditions, such as fee surcharges and other compensation, that it would seek if it were selected as the host state. The states were also asked to consider whether and with what stipulations it

would volunteer to become the host. The commission decided that, although the states would not be committed to their stated conditions, submission would be mandatory, to induce them to think about their bargaining positions. Each state submitted its list of conditions in January 1986, but none volunteered.

But the ranking was still just a technical one. The commission had agreed that other considerations raised in public hearings could affect the final choice of a state. At the April 3rd meeting, when one of the North Carolina commissioners asked if the Dames & Moore scores could be changed by input at the hearings, the chairman of the commission had replied that the purpose of the hearings was to collect additional technical and other data to factor into the decision-making process. According to the chairman: "This ranking is merely a preliminary step. The final decision about which state will host the next disposal facility will not be made until we have held hearings and received input from citizens about technical, economic, political and other factors to consider."³

³Richard Hodes, commissioner from Florida and chairman of the commission, as quoted in the Raleigh News and Observer, April 4, 1986.

Consternation Among the Top Runners

In May of 1986, the commission held a public hearing in each of the top four states. The commission's May 27 hearing in Raleigh, North Carolina, and its May 29 hearing in Montgomery, Alabama, drew by far the greatest attention--the other two were relatively short, and objections were muted.

The Raleigh hearing lasted approximately six hours and was attended by over 150 people. Governor James Martin's remarks established the official stance of the state in the coming struggle: "We insist that North Carolina be treated fairly by its neighbors. That means the host state must be selected only on the basis of accurate and up-to-date information."⁴ He and his staff maintained that North Carolina was ranked first only because Dames & Moore used 1983 waste volume data; that since then, the state's waste volumes had dropped, partly because it had made an effort to reduce its waste volumes; and that if more current data were used, Georgia would also be a front runner. In addition, state officials criticized the Dames & Moore report for ignoring several geological faults and unpredictable weather patterns and for considering North

⁴James Martin, as quoted in the Charlotte Observer, May 28, 1986.

Carolina's sandy coastal plain as potentially suitable. But the remarks of one commissioner from Alabama also portended that state's stance: "If you're going to use different numbers, then which ones? At what date are you going to say, 'These are the numbers.' Because three days later, you can have new numbers. Or an hour later. We knew this was coming. It's no surprise that North Carolina would question the numbers."⁵

Environmental and citizens activists groups in North Carolina had already coalesced in opposition to the US Department of Energy's consideration of two sites in North Carolina for its second high-level nuclear waste repository, and to US Ecology's proposal to build a commercial LLW incinerator in southeastern North Carolina. (Plans for both were subsequently dropped.) These groups, including the Conservation Council of North Carolina, the Sierra Club, Conservatives for Good Government, Radioactive Opposition Council, Clergy and Laity Concerned, Coalition for Alternatives to Shearon Harris (a North Carolina nuclear power plant), the NC Radioaction Waste Watch, and the Coalition Against the Radioactive Incinerator, rose in opposition to the idea of having North Carolina host the compact's LLW disposal facility. They went further than

⁵Fred Braswell, as quoted in the Charlotte Observer, May 28, 1986.

their state officials, however. They argued that North Carolina should withdraw from the compact and develop its own facility for nonutility waste, with waste from nuclear power plants to remain at the reactors. But the governor rejected this idea: "If it's clear that the evidence justifies [North Carolina's] selection, then I think we've got to get ready to meet our responsibility. We joined the compact in good faith."⁶ He was joined in this position by North Carolina's LLW generators, who were concerned that disposal costs would skyrocket if the state withdrew and developed its own facility.

The hearing in Montgomery also was long and well-attended, and it was even more emotionally charged than the Raleigh hearing, with vehement opposition expressed to the prospect of hosting a LLW facility. Both Alabama officials and environmental and community groups contended that since hazardous waste from throughout the United States, including the Southeast, was sent to a commercial landfill in Emelle, in western Alabama, the state should not have to host a LLW facility. This argument was made by the Alabama compact commissioners throughout the host state selection process. However, it was consistently rejected by the other commissioners,

⁶James Martin, as quoted in the Charlotte Observer, May 28, 1986.

partly because if Emelle were factored in, existing or proposed large-scale waste facilities in the other compact states would need to be considered as well. But Alabama remained adamant. Early in May of 1986, a member of the governor's cabinet had commented: "We are not going to accept another waste facility under any circumstance--even if we have to pull out of the compact."⁷

The Selection Process is Hotly Debated

On June 13, 1986, the commission met to discuss comments received at the public hearings. By a close vote, it reaffirmed that 1983 data would be used as a basis for LLW volume projections, rather than using revised data. It also reaffirmed the positions it had taken previously on having a regional disposal facility rather than a number of individual state facilities, and on accepting waste from all generators rather than requiring utilities to store their waste for decay on site. It directed its technical advisory committee to review public comments and provide recommendations pertaining to the data and assessment techniques used for PSAs and for the meteorological criterion. On July 2, the technical advisory committee

⁷Bill Rushton, director of the Alabama Department of Economic and Community Affairs, as quoted in The Daily Beacon (Knoxville, TN), May 7, 1986.

developed a set of recommendations to be discussed by the commission at its July 14 meeting--the meeting which had been targeted for a vote to designate the next host state.

The legislation passed by each state in the Southeast Compact required host state designation within three years after the commission was constituted. This meant the commission had a July 22, 1986 deadline. The commissioners had checked with legal counsel for their states to determine whether this deadline had to be met. Several (including those for Alabama and Georgia) gave the opinion that it did; others suggested that designation could be postponed if the commission had been making good-faith efforts to reach a decision. Thus, the July 14 meeting was conducted in a climate of urgency tempered by a sense of the ethical and political need not to summarily dismiss potentially important considerations.

The meeting opened with three comments from the public: one from a South Carolina environmentalist urging that both the immediate and the succeeding host state be designated that day; one from a North Carolina attorney reiterating the position of the Conservation Council of North Carolina; and one from a representative of Governor Martin, reiterating the state's position that North Carolina was willing to become the host if it was designated through a fair and objective process that used

accurate data. The remainder of the morning session centered on a discussion of the technical advisory committee's recommendations. Most of the recommendations were in response to objections raised by North Carolina state officials, and most (but not all) were intended to satisfy those objections.

The committee had developed ten substantive recommendations. After three hours of discussion, all were accepted by the commission (two in amended form), but some of the recommendations--especially one concerning wetlands--provoked heated debate. In identifying the PSAs, should consideration have been given to wetlands, and if so, should wetlands now be treated as an additional subcriterion of the PSA criterion? The commission finally decided that yes, wetlands should be treated as a subcriterion of PSA . . . over the objections of the two Alabama commissioners, who maintained that PSA should not be redefined after the ranking results were known, and that if PSA was open for redefinition, then other factors such as proximity to hazardous waste sites should be included.

When the afternoon session opened, the North Carolina commissioners requested that revised waste volume data be used in Dames & Moore's calculations. Information was circulated on the LLW volumes generated by each of the Southeast Compact states between 1979 and 1984, and the

North Carolina commissioners made a motion that the 1983 data be replaced with either 1984 or 1985 data. The commission chairman held that, according to parliamentary rule, the motion was out of order since the commission had already voted on that issue at its June 13 meeting. To reopen the issue someone who had voted on the prevailing side would have to move to reconsider. Extensive informal debate ensued, focusing on the need to agree upon and stick to fixed data points versus the need to base the selection process on up-to-date information, and on the need to subject this issue to the same scrutiny as others had received versus the need for closure. Upon a formal call by the chairman for a motion to reconsider, no one from the prevailing side spoke up. The floor was then closed to further debate on the issue.

With the meeting still in session, the North Carolina commissioners got up and left. The remaining commissioners recessed without adjourning, with the understanding that the meeting would reconvene in about two months, as soon as Dames & Moore had developed new data and adjusted its findings in accord with the recommendations passed earlier in the day.

North Carolina Balks; Then Bites the Bullet

After the July 14 meeting, the chairman was asked if the compact commission was on the verge of disintegrating. He replied, "I think it's certainly at risk of doing that."⁸ He had good reason to worry. Two days later, a bill before the North Carolina legislature to withdraw from the Southeast Compact was being pushed forward, this time with Governor Martin's support . . . and Alabama was threatening to withdraw if North Carolina did.

On August 11, Governor Martin held a closed breakfast meeting in Charlotte, North Carolina, with the governors of South Carolina, Tennessee, Virginia, and Georgia. He convinced them that the commission should look at the most recent available data on LLW volumes, rather than relying on the 1983 data. As the governor of South Carolina commented afterward: "We all want all of the data considered. It was the feeling today that what North Carolina wants the commission to look at, they'll look at."⁹ And as the Virginia governor noted: "We all agreed that it's important that this compact not become unraveled. It's simply in the best interest of all our states to

⁸Richard Hodes, as quoted in The Charlotte Observer, July 15, 1986.

⁹Richard Riley, as quoted in the Winston-Salem Journal, August 12, 1986.

participate in the compact and to get the decision made."¹⁰ But Governor Martin also conceded that North Carolina could still be chosen, depending upon how the new information was used. (Alabama and Georgia produced more LLW than North Carolina in 1984 and 1985, but North Carolina had the highest average for 1980-1985.) And he reiterated his position to stick with the compact if the process was fair: "I've said all along that if North Carolina is chosen after fair consideration of all of the available information, we will accept our responsibility."¹¹

North Carolina was chosen. On September 10, the commissioners reconvened in Atlanta. At the meeting, Dames & Moore presented its revised technical ranking. North Carolina continued to rank first, by a score of 123,637 compared with Alabama's 121,881. North Carolina staff then presented alternative scenarios for projecting waste volumes. (In several of those scenarios, North Carolina continued to rank first; in others, Alabama or Georgia did.) The commissioners also discussed data for the first six months of 1986, which showed North Carolina to be first in LLW volume again. After intensive discussion, Dames &

¹⁰Gerald Baliles, as quoted in the Winston-Salem Journal, August 12, 1986.

¹¹James Martin, as quoted in the Winston-Salem Journal, August 12, 1986.

Moore's revised technical ranking was adopted by a vote of 14-2 (all in favor except the North Carolina commissioners). The next morning, again by a vote of 14-2, North Carolina was designated as the new host state.

Governor Martin's reaction was mild and equivocal. He indicated that he wasn't sure whether he would recommend to the General Assembly that North Carolina stay in or drop out of the compact, but that he would not call a special session. "I'm sure it will be fully discussed in the 1987 session. This is not something that is going to happen tomorrow and we have time to calmly assess our options."¹² But Martin's control over what would happen was weaker than in most states: in North Carolina, bills ratified by the General Assembly cannot be vetoed by the governor.

During the next year, arguments for and against dropping out of the compact raged in North Carolina. Proponents of staying in argued that North Carolina had an obligation to live up to the compact, that waste disposal would be far less costly with a regional facility than with a state facility, and that "going it alone" was risky since only compacts were assured of being able to exclude outsiders' waste. They also argued that by staying in the compact, they would only host an operating waste facility

¹²James Martin, as quoted in the Durham Morning Herald, September 13, 1986.

for 20 years, rather than "forever." And they argued that this was a good time to take their turn as host state, since during the next 20 years few if any nuclear power plants would be decommissioned--but during the succeeding 20 years, decommissioning waste, some of which is highly radioactive, could be expected.

Opponents argued that the selection process had been unfair, that less waste was safer than more, and that the state had tacit exclusionary powers that would protect it from outsiders' waste. They continued to argue that at-reactor disposal of the LLW from nuclear power plants would be the best approach. And they argued that the state was losing its sovereignty by remaining in the compact. As state representative Josephus Mavretic, a key opponent, said: "I tell people we need to get out of this thing because what we are doing is giving up the sovereignty of the state. Our freedom to act unilaterally and independently has been infringed."¹³ But in the end, the proponents--mainly the power companies and other LLW generators, supported by the governor and a number of key legislators--won out.

On July 8, 1987, the House Air and Water Resources Committee approved a bill sponsored by Mavretic that would

¹³Josephus Mavretic, as quoted in the State (Columbia, SC), June 28, 1987.

have withdrawn North Carolina from the compact and established a statewide disposal facility in one of the three counties with nuclear power plants--Wake, Mecklenburg, or Brunswick. The latter provision was subjected to a vote and was at first retained by a vote of 12-13, with some people arguing that the choice of a site should be made on the basis of scientific considerations while others argued that it would be logical to put the site near a nuclear power plant because the plants themselves would become waste sites when they were decommissioned. Three weeks later, the provision was eliminated in order to obtain the support of the three counties' legislators. But the bill still did not make it through the General Assembly. On August 14, in the last week of the legislative session, a bill strongly backed by state representative George Miller, one of North Carolina's compact commissioners, was enacted. The state would stay in the compact and would develop a facility for the region.

North Carolina Selects a Site (or Tries to)

The 1987 act created an independent 15-member Low-Level Radioactive Waste Management Authority. Five members were appointed by the speaker of the House; five by the president of the Senate; five by the governor. The

authority was to be responsible for siting, designing, constructing, and operating the compact's new LLW disposal facility but could contract out all of these activities. It was directed to seek a volunteer community (more than two years later, no one had volunteered), but it was also given the power of eminent domain and could appeal local ordinances prohibiting the facility to a standing state board, the Governor's Waste Management Board.

By May 1988, the authority had developed siting procedures and criteria. The criteria took federal regulations into consideration, and they addressed factors listed in the 1987 act concerning hydrology and geology, environmental and public health, natural and cultural resources, local land uses, transportation, and aesthetics. The authority selected a contractor, Ebasco Services, to screen the state for candidate areas, with the understanding that a different contractor would complete the siting and operate the facility. In 1989, Chem-Nuclear, which operates the existing facility in Barnwell County, South Carolina, was selected as North Carolina's site operator.

The site screening was done in phases. The first phase, completed in the fall of 1988, identified 38 percent of the state as potentially suitable. These areas were studied and smaller areas, called candidate areas, were

identified in March of 1989. The candidate areas, which were clustered in the central (Piedmont) region of North Carolina, constituted about 10 percent of the state. To allay premature public consternation, the authority noted that the areas might or might not actually contain viable sites. The authority also embarked on an extensive public outreach effort. In December 1988, after completing the first phase, it held public information meetings in six major cities. Then, during February, March, and April of 1989, it held 26 "community forums"--presentations followed by question-and-answer sessions--around the state. Midway during this exhausting process, the candidate areas were announced. Attendance and interest surged. The meetings began at 7 p.m. and lasted as long as 5-1/2 hours; some were attended by as many as 900 people. Questions were asked about the authority, the compact, the way the site was going to be picked, the qualifications of the site operators being considered, measures for ensuring the safety of the facility and of waste transportation . . . and so on. But for the communities within the candidate areas, hosting a facility was still only a theoretical possibility. Less than a year later, it became much more real for a few.

On November 8, 1989, Chem-Nuclear, which had taken over the screening process from Ebasco, made a presentation

to the authority. During it, they identified four "favorable site areas": two in the central part of the state (one in Rowan County; one straddling Wake and Chatham counties), and two close by the South Carolina border (one in Union County; one in Richmond County). On February 21, 1990, Chem-Nuclear recommended to the authority that the sites in Richmond and Wake/Chatham counties undergo detailed site characterization, in preparation for final selection of a site. Public meetings had been planned in the four targeted areas for late February and early March. The meeting in Rowan County was brief; the meeting in Union County was canceled at the county officials' request. The meetings in the remaining two areas were much more heated.

At the meetings, many of the comments were highly critical of the process. Among other things, people argued that site areas should be selected based on those best suited to host the facility, not by disqualifying other sites; that the site selection process was being driven by politics and had not followed the site selection criteria set forth in applicable laws; that other LLW disposal facilities have leaked; that waste volumes should be reduced; and that nuclear power plant wastes should be stored at the reactors. Some at the Richmond County meeting also argued that the Richmond site is too near the South Carolina border and that wetlands, shallow

groundwater, potential earthquakes, and a relatively high number of people living within the site boundaries make it unsuitable. In Wake and Chatham counties, it was argued that their site could be adversely affected by the Shearon Harris nuclear power plant, in that radiological monitoring could be impaired and an accident at the plant could disrupt the LLW facility's operation. (The Wake/Chatham site is near to Shearon Harris, and part of the site is owned by Carolina Power & Light, which operates the nuclear power plant.) As at the Richmond County meeting, people also argued that the Wake/Chatham site is not technically suitable.

Although the authority, with Chem-Nuclear and Ebasco, responded to these and other objections, most people were not persuaded. Some in Wake County, which includes Raleigh, the state capital, were relatively sanguine about the prospective site. But many people, including many county officials, were adamantly opposed. All three of the counties' boards of commissioners voted in opposition to the facility, and Richmond and Chatham counties each filed suit against the Authority, claiming that an environmental impact statement must be submitted before site characterization can begin, and also claiming that improper procedures were used in the site selection process.

As set forth in the 1987 act, at least two sites were to have been characterized by August 1, 1990; the authority was to have selected the preferred site by November 15, 1990; and a license application was to have been submitted by December 31, 1990. But pending the outcome of the counties' lawsuits, Chem-Nuclear can do only preliminary, noninvasive testing of the sites. It cannot begin the full site characterization necessary to determine the preferred, licensable site. Because of these and other delays, a site will not be selected until late 1992 at the earliest, and the facility is not likely to open until 1995.

COMPACTS, HOST STATES, AND DISTRIBUTIVE JUSTICE

The 1980 LLWPA was a simple act of distributive justice. According to the act, South Carolina, Washington, and Nevada should not have to dispose of the nation's LLW; instead, each state should be responsible for its own waste. But the LLWPA allows for--in fact, encourages--the formation of regional compacts. And with the compacts (especially as they were originally envisaged), simple distributive justice was no longer possible. One state would have to dispose of several states' waste.

Some states--Maine, Massachusetts, New York, Texas, and Vermont--ducked the distributive justice problem by

staying out of a compact. They would have to dispose of their own waste, but they wouldn't have to take anyone else's. Those in North Carolina who wanted the state to drop out of the Southeast Compact adopted a similar philosophy. As one North Carolina environmentalist wrote to her state representative: "I urge you to consider withdrawal from the Southeast Compact. North Carolina can host its own facility and not the entire southeast region's."¹⁴

Granted, "going it alone" does not solve all of a state's distributive justice problems. In North Carolina, as in other states, there have been arguments that, as a matter of distributive justice, reactor waste should be the sole responsibility of the nuclear power plants, not the state as a whole. (But, as people in the Wake/Chatham area objected, why should there be a bias toward LLW disposal "in an area which has already suffered the adverse impacts of an operating nuclear power plant"¹⁵?) And in New York, as in other states, questions have been raised about whether all of the LLW generated within the state is properly its responsibility, since some waste-producing

¹⁴Lisa Finaldi, Raleigh, NC, letter to state representative Dan Blue, May 23, 1986.

¹⁵Henry Dunlap, chair, Chatham County Commission, letter to the North Carolina Low-Level Radioactive Waste Management Authority, as quoted in the Durham Morning Herald, April 29, 1990.

products, such as radiopharmaceuticals, are used by people across the nation. (But, as Governor Cuomo told a crowd of protestors in Allegany County, "OK, you want to put it in somebody else's state. And they'd say, 'Thank you, New York, that's a typical New York thing to do.'"¹⁶)

Nevertheless, "going it alone" does minimize the immediate problem of distributive justice. Then, the state won't have to take any other state's waste . . . maybe. For there's a catch: unaligned states do not have the assurance of being able to exclude out-of-state waste. The LLWPA is explicit about a compact's exclusionary powers; it is silent about whether a go-it-alone state would have similar powers.

This prompted states such as Illinois, Pennsylvania, and California to form mini-compacts. In these alliances, one state is the obvious choice for host; the other party state(s) contribute only minimal amounts of waste. These "big brother/little brother" compacts are not truly regional. (Illinois's compact, for example, is only with Kentucky.) But they have two virtues. First, they ensure that the LLWPA's exclusionary powers can be invoked; and second, they minimize the amount of out-of-state waste that the host state must take. Although such alliances are not

¹⁶Mario Cuomo, as quoted in The New York Times, February 10, 1990.

in the spirit of the 1980 LLWPA's compact provision, with its vision of regional efficiency, they follow the letter of the law: the LLWPAA made explicit that two-state compacts are acceptable.

One compact--the Northeast Compact, with only Connecticut and New Jersey as members--went even further with the mini-compact concept. It ducked the "who should be host state" problem by agreeing that each state would have its own facility. These facilities will be small, with high disposal costs: Connecticut and New Jersey each dispose of about 40,000 cubic feet of waste annually, whereas the Southeast Compact states together dispose of about ten times that much. Depending upon the disposal method used, the average cost of disposal could be severalfold higher in the Northeast Compact. Despite inefficiencies, however, Connecticut and New Jersey avoided disputes about fairness with their "dual state" strategy. The host state became a foregone conclusion.

But in three of the compacts, the choice of a host state was not a foregone conclusion. In the Southeast, Midwest, and Central compacts, more complex formulas for distributive justice were necessary, to determine which state should take the others' waste. In theory, distributive justice eventually would be served in those compacts as well, since each intends to rotate

responsibility for providing a regional facility among its party states in 20- or 30-year intervals. But hosting a LLW facility is a political burden, and political time horizons are usually measured in years, not decades. If the problem of siting a LLW facility could be postponed for at least 20 or 30 years, then politically, it would become a nonproblem. No one wanted the honor of going first. Procedures for choosing who should go first had to be developed.

But the problem of distributive justice was not solved when the host state was selected. Inevitably, all host states, regardless of whether they were in a compact or unaligned, had to face the problem of finding a host community. Then, principles of distributive justice became much more complicated and difficult to apply convincingly.

THREE APPEALS TO JUSTICE IN SITING

To establish the justice of their actions, those charged with finding hosts for potentially risky or undesirable facilities generally have used one of three approaches: the "best site" approach, the "fair play" approach, or the "volunteerism/incentives" approach.

The "Best Site" Approach

This approach seeks to justify its selection by finding the technically most suitable site through a detailed, scientific screening process. While the "best site" approach is used primarily to minimize the facility's risks, it also tacitly appeals to a "from each according to his ability" principle of justice. According to this principle, those best-suited for a task should be given the task. Technical suitability was an important consideration in the host selection process of both the Southeast Compact and North Carolina--but especially the latter's.

The Southeast Compact Commission's host state selection process used technical suitability concerns such as the adequacy of transportation systems and the amount of "potentially suitable area" as part of its criteria to rank the qualifications of the seven eligible states. But the criteria also included the volumes of Class A, B, and C LLW generated by each state . . . a set of criteria that has more to do with whether a state should serve as host (from the standpoint of distributional equity) than whether it could serve (from the standpoint of technical suitability). Furthermore, the compact commission's selection process was designed to take into account and balance the expressed views and interests of each state. The technical

suitability criteria were weighted by the compact commissioners, without knowledge of how their respective states had scored on the criteria but with a reasonable ability to guess. And the resultant ranking was--in theory, at least--only a "technical" ranking: the first-ranked state was not automatically the host; the host state was chosen after a series of public hearings and a vote by the commissioners.

In contrast, North Carolina's selection process was intended to be scrupulously scientific and apolitical. It involved a phased screening process, applying both exclusionary and favorability criteria to identify technically suitable sites. Politics, including the politics of persuasion, did inevitably enter in. The site selection process included extensive efforts to meet with the interested public and keep them informed . . . partly in the hopes of defusing opposition. And the two "finalist" candidate sites have a suspiciously political cast: one is close by the South Carolina border; the other is close by a nuclear power plant. But the terms of the debate have been mainly technical: both those in charge of the siting process and those questioning it have mainly argued about whether or not the site selection criteria were applied correctly and whether the candidate sites were in fact suitable. Whereas the Southeast Compact was

selecting a political entity to serve as host, the North Carolina LLW Authority was selecting a site. The host community--i.e., the community where that site was located--was in large measure supposed to be incidental to the process.

The "Fair Play" Approach

This approach recognizes that finding a site universally acknowledged as "best" may be enormously difficult, and that there may be a number of technically acceptable sites. Rather than relying upon exact science, this approach relies upon the fairness of a selection procedure to justify its outcome. To make this appeal to fairness, the procedure must be previously agreed upon by those who could be affected by it (or their representatives), and each party to the agreed procedure must not be advantaged or disadvantaged in any known way. In other words, the procedure must be selected by the participating parties without bias. When choosing the rules of the game, no one knows the hand they have been dealt.

The Southeast Compact's host state selection process was intended to make this appeal to procedural fairness. Each state entered into the compact voluntarily, had two

representatives to the Compact Commission, and agreed that host state selection procedures would be adopted by majority vote of the Commission. When these procedures were decided upon, the commissioners were aware in a general way of their respective states' waste volumes and technical suitability, but none knew what their exact scores from Dames & Moore would be or how the criteria weighting process would come out. And the commissioners agreed that the technical ranking would not necessarily dictate the new host state; that only after further hearings and deliberation would the host be selected by at least a two-thirds vote of the Commission, as specified in the compact law ratified by each state.

The Midwest and Central States compacts also based the justice of their host state selection processes largely on appeals to procedural fairness. But because the "fair play" approach is only feasible when the participants have entered into it voluntarily and have an equal say, it is less feasible at the intrastate level, when the host state must find a site for the facility. Then, either the "best site" approach or the "volunteerism/incentives" approach (or a combination of the two) are likely to be adopted.

The "Volunteerism/Incentives" Approach

This approach tries to entice a prospective host state or community to willingly accept the potentially risky facility in exchange for substantial benefits. It relies upon consent and recompense to justify its outcome. The prospective host has consented to and been fairly recompensed for the burden it is assuming; therefore, justice has been served. The rights of the prospective host have been honored.

The Southeast Compact commission hoped to duck the problem of designating a host state by enlisting a volunteer (as did the Midwest and Central States compact commissions). Although the states were invited to name their terms, no one took up the offer. Similarly, North Carolina's siting legislation directed the Authority to seek a volunteer as a parallel to the host selection process. The terms were set forth in the siting law: the host community was to receive 2.5 percent of the facility's gross receipts; it could levy an annual "privilege license tax" on the facility operator; other benefits could be negotiated. But again, no one volunteered. (To sweeten the pot, the Authority recommended in 1991 that the gross receipts tax be increased to 6 percent, which would produce

about \$2.5 million annually in revenue for the host community.)

Blended Approaches

As the Southeast Compact and North Carolina Authority's selection processes illustrate, the "best site," "fair play," and "volunteerism/incentives" approaches are usually used in combination. Although the Southeast Compact used an elaborate, previously agreed-upon procedure to designate a host state, it took technical suitability into account, and it also sought a volunteer. Although the North Carolina Authority was directed to find the most suitable site and given the power to designate it by fiat, subject only to the approval of the Governor's Waste Management Board, it too was directed to seek a volunteer community. And both the Southeast Compact and the North Carolina Authority hoped that an incentives package--either negotiated or predetermined--would at least make the prospect of being designated more palatable, if it did not actually elicit a volunteer. Protracted court battles might then be avoided. (This did not turn out to be the case in North Carolina, but it was a motivation.)

Typically, however, one approach is dominant in a site selection process. The Southeast Compact emphasized fair

play; the Authority emphasized finding the best site. There is a good reason for this: these approaches make conflicting appeals to distributive justice.

THEORIES OF DISTRIBUTIVE JUSTICE

Formal theories of distributive justice have had much to say about the distribution of scarce goods (land and other natural resources, income, medical services, etc.) but little to say about the distribution of "bads"--undesirable byproducts of societal activities. They thus do not speak directly to issues such as the siting of LLW disposal facilities, garbage landfills, prisons, etc. However, these theories are relevant, if only because they both influence and are influenced by widely held views of justice. They can also help to illuminate those views. The concepts of justice implicit in the "best site," "fair play," and "volunteerism/incentives" approaches parallel, respectively, those made explicit in the three most significant contemporary theories of justice: utilitarianism, John Rawls' contractarianism, and Robert Nozick's libertarianism.

Utilitarianism

As formulated in the early 19th century by Jeremy Bentham and developed by John Stuart Mill and others, utilitarianism is grounded in a single credo: "the greatest good for the greatest number." Utilitarianism combines a single principle of utility ("the greatest good") with a single principle of distribution ("for the greatest number") to arrive at a formula that has societal efficiency as its principle aim. Utilitarianism has taken a number of forms as it has evolved, but in all its forms it is fundamentally teleological rather than deontological: it is concerned exclusively with a calculus of the real or theoretical effects of an act, rather than with the morality of the act per se. With utilitarianism, what is right is a dependent function of what is good, rather than an independent function. In addition, utilitarianism in all its forms concentrates on the aggregate good rather than the individual good. It is therefore distinguished from individualistic theories of distributive justice such as Rawls' or Nozick's.

Rawls' Contractarian Theory

John Rawls, in his now-classic A Theory of Justice,¹⁷ published in 1971, used social contract theory developed by Locke, Rousseau, and Kant to formulate a theory of justice that would correct what he saw as the deficiencies of utilitarianism. Rawls' theory, like other contractarian theories, has two parts: the original conditions under which the principles are chosen, and the principles themselves. Rawls notes that the two parts stand independently: "One may accept the first part of the theory (or some variant thereof), but not the other, and conversely."¹⁸

Rawls began by identifying three original conditions: that those forming the social contract are trying to constitute a just society; that each is acting entirely in his or her self-interest; and that they are choosing the principles behind a "veil of ignorance," in which each cannot predict what his or her natural abilities, fortunes in life, or conceptions of the good will be. From these, he went on in his book to derive principles of justice which, taken together are meant to "maximize the worth to

¹⁷Rawls, op. cit.

¹⁸Ibid., p. 15.

the least advantaged of the complete scheme of equal liberty shared by all."¹⁹

Whereas utilitarianism emphasizes the net good for members of society taken collectively, Rawls' theory emphasizes individual liberties and welfare. (He explained, for example, that the justice principles derived through his scheme are to have priority over principles of efficiency and maximizing the sum of advantages.²⁰) And whereas utilitarianism is concerned exclusively with outcomes--in other words, with the effects of an action--Rawls' theory is concerned with the procedures by which a just outcome is reached. Because he saw justice as flowing naturally from procedures developed under fair circumstances, Rawls called his theory "justice as fairness."

¹⁹Ibid., p. 205.

²⁰"Implicit in the contrasts between classical utilitarianism and justice as fairness is a difference in the underlying conceptions of society. In the one we think of a well-ordered society as a scheme of cooperation for reciprocal advantage regulated by principles which persons would choose in an initial situation that is fair, in the other as the efficient administration of social resources to maximize the satisfaction of the system of desire constructed by the impartial spectator from the many individual systems of desire accepted as given." (Ibid., p. 33.)

Nozick's Libertarian Theory

Robert Nozick, in his 1974 book, Anarchy, State, and Utopia,²¹ also adopted an individualistic and procedural view of justice. He objected, however, to the heavy-handed, interventionist state that he thought was implicit in Rawls' theory, arguing instead for a minimal state limited largely to providing protection for its citizens. "A minimal state, limited to the narrow functions of protection against force, theft, fraud, enforcement of contracts, and so on, is justified; . . . [and] any more extensive state will violate persons' rights not to be forced to do certain things . . . [T]he state may not use its coercive apparatus for the purpose of getting some citizens to aid others . . . "²²

Nozick's theory of justice has two main principles: a principle of justice in the acquisition of property, and a principle of justice in its transfer. To them, Nozick added a third principle, that of the rectification of injustice in holdings, to allow for the correction of past mistakes in how property is acquired or transferred. Nozick's theory of distributive justice thus has a

²¹Robert Nozick, Anarchy, State, and Utopia (New York: Basic Books, 1974).

²²Nozick, p. ix.

particular slant: it is concerned mainly with property rights, and it emphasizes that the things to be distributed are not free goods but come attached to other people.

Unlike most justice theorists, Nozick has devoted attention to the distribution of bads as well as goods. In a chapter on "Prohibition, Compensation, and Risk," he proposed that if one party's activity is productive but puts a second party at risk, then two fair recourses are available. The first party can proceed with the activity but must compensate the second, or the second can prohibit the activity but must compensate the first if the latter, because of the prohibition, is made worse off as compared with others. Nozick called this the "principle of compensation." He noted that its details were not fully worked out and that establishing boundaries between significant and insignificant risks would be difficult.²³ However, together with Nozick's main principles, the principle of compensation suggests a voluntary, free-market approach to justice . . . and to siting.

ETHICAL AND PRAGMATIC DRAWBACKS OF THE THREE APPROACHES

The "best site" approach appeals to a utilitarian principle of social efficiency--of maximizing the net good

²³Ibid., p. 74ff.

for society. In doing so, it ignores both individual rights and the individual good (except insofar as they are part of the calculus of the net effect). And the "best site" approach runs the risk of getting into deep evidential trouble. How can one prove that the most qualified candidate has been found? As the technical disputes in the Southeast Compact and North Carolina Authority's selection processes illustrate, disagreements are likely to arise about what technical criteria are relevant, how they should be measured, and what data should be used, taken at which points in time. To avoid such disputes, those in charge of the selection process would have to be trusted, and their authority respected. But with the Southeast Compact, no one was "in charge." Furthermore, each state was looking out for its own interests, so each pair of commissioners had reason not to trust the others. And with North Carolina, the Authority was respected and trusted in some but by no means all quarters of the state.

In contrast, the "fair play" approach appeals to a procedural notion of fairness. In doing so, it avoids some of the worst evidential difficulties of the "best site" approach. However, as the Southeast Compact experience suggests, the "fair play" approach has other problems when applied. Which factors are relevant and which extraneous?

(Was Alabama right in contending that the Emelle hazardous waste landfill should be taken consideration?) Are political boundaries real or artificial delineations of burdens and responsibilities? (Should Mississippi, which is within three miles of Emelle, be regarded as sharing Alabama's burden? Was South Carolina right in objecting to having the new regional LLW facility three miles from its border?) Under what conditions should predetermined criteria, procedures, and other "rules" be changed? (Should the definition of "potentially suitable area" have been revised, even if acknowledged as inadequate, once the states' technical ranking was announced? Should the compact's parliamentary procedures and preset deadlines have been meticulously observed, or was flexibility needed to incorporate all reasonable considerations?) The Southeast Compact example illustrates that "playing the game by the rules" leaves several questions unanswered: What are the boundaries of the game? How binding are the rules? And when is the game over?

With the "fair play" approach, there is also the question of whether the outcomes of a procedure must be seen as fair or desirable for the procedure itself to be seen as fair. Governor Martin said several times that North Carolina would accept host state status if and only if it was selected through a fair process. Since he ended

up supporting North Carolina's selection, he must have concluded that the process was fair. Or did he? It has been suggested that Martin, influenced by North Carolina's utilities, actually wanted the facility to be located in his state since it would give the utilities more control over LLW disposal. On this view, Martin's call for fair process was really a cover to make more politically palatable an outcome the governor sought anyway.

The "volunteerism/incentives" approach has the practical advantage of sidestepping both the evidential difficulties of finding a "best site" and the procedural difficulties of deciding what is "fair play." But when used to select host states and host communities for LLW disposal sites and other potentially risky facilities, the results of the "volunteerism/incentives" approach have been mixed. Few prospective hosts are stepping forward, even when handsome incentives packages are offered. One reason is that, like the free-market approach of Nozick's libertarianism, the "volunteerism/incentives" approach tends to minimize the importance of nonmaterialistic concerns, especially concerns about health, social well-being, and the desire for a sense of control. The incentives then may be rejected as bribes.

To address these nonmaterialistic concerns, the "volunteerism/incentives" approach has been modified to

allow local input on whether and how the facility will be built and operated. The community may be given grants to do its own evaluations of the prospective facility and its local environmental and socioeconomic impacts, and if the facility is sited, it may be given a say over the facility's monitoring, emergency closure, and operation (including, e.g., the quantity and types of waste accepted). For example, in North Carolina when a candidate site is to be characterized, the host county may appoint an 11-member site designation review committee which can get a technical assistance grant of up to \$50,000 (or, where more than one county is involved, as with the Wake/Chatham site, a total of \$75,000). After the authority has designated the preferred site, the county commissioners may appoint an 11-member local advisory committee, which is given \$100,000 by the facility operator to review the license application, recommend conditions for licensing, and propose agreements between the authority, the operator, and the local government. Such measures enhance the feeling (and the reality) of local control, whether or not the community has veto power over the facility. They reduce the need for trust in the siting authority, the regulators, and the prospective facility operator, although, as explained in Chapter 3, they do not eradicate this need.

But even local control measures cannot address what may be the biggest ethical and practical problem with the "volunteerism/incentives" approach, and with siting in general: the problem of consent.

THE PROBLEM OF CONSENT

The three approaches and their corresponding theories of justice have distinct principles of consent²⁴--principles which, because they conflict, lead to profound disagreements over how potentially risky facilities should be sited.

Utilitarianism and the "best site" approach use a nonconsent principle: they assume that a rational calculus of costs and benefits for society as a whole is more important than the actual consent of those affected by a decision. Procedural justice and the "fair play" approach use hypothetical consent: the consent of those affected by the outcome is taken for granted, either because they voluntarily joined the society under which the procedures are being carried out or because they enjoy its benefits. The difference between nonconsent and hypothetical consent

²⁴The following distinctions about consent principles draw upon Douglas MacLean's "Risk and Consent: Philosophical Issues for Centralized Decisions," in Douglas MacLean, ed., Values at Risk (Totowa, NJ: Rowman & Allanheld, 1986), pp. 17-30.

is one of emphasis--either way, the fact that one has, in a sense, consented to be a member of society provides the justification for not seeking further consent. They are thus both principles of indirect consent. They contrast with the direct, actual consent used by libertarianism and the "volunteerism/incentives" approach.

The Southeast Compact's commissioners could (and did) invoke a hypothetical consent principle: they could argue that each state voluntarily joined the compact and had an equal say in devising its host state selection procedures. Even then, objections were raised in North Carolina about infringements on the state's sovereignty, but they were not persuasive. However, when the North Carolina LLW Management Authority sought a host community for the region's LLW disposal facility, a hypothetical consent principle could not be convincingly invoked.

For people living in a candidate host community, a decision to be part of the society imposing the facility may seem fairly remote. They are part of that state and that community because of their prior--sometimes long-ago--decisions to locate there, and, due to economics or family ties, they may not now be free to elect otherwise. Furthermore, the candidate host community is only one among many in determining how its state shall be run. And, since low population density is a site selection criterion, host

communities usually have even less political influence over the siting process than they might otherwise have. Finally, because these facilities tend to be located in economically depressed areas, the residents of the candidate host communities may feel estranged from the society that is imposing the facility on them. As one Richmond County resident commented about the North Carolina LLW Management Authority:

The [Authority] members of which I write, work in a world of ivory towers and research labs. They are taken care of by universities, government grants, hospitals, and powerful industries. They live with blinders on. They have tunnel vision. As long as they are personally satisfied that the waste facility is going to be safe, they can locate it anywhere with no other feelings.²⁵

Because of the deficiencies of the hypothetical consent approach in selecting a host community, states such as North Carolina must use either nonconsent or actual consent . . . or a blend of both. Most host states use a "two-track" system: the siting agency is to seek

²⁵Pridie Ariail, News from FORRCE (FOR Richmond County's Environment), Richmond Journal (Rockingham, NC), May 8, 1990.

volunteers while it also screens the state for technically suitable areas that may or may not have willing communities. A few states--Illinois, Maine, and Vermont--have formalized the actual consent principle in their LLW siting laws: they provide that the LLW disposal facility must be approved by the local governing body or by referendum. (In Maine, in fact, approval of a proposed site must be given by 60 percent of those voting in a referendum held in the host community, by the Maine Board of Environmental Protection, by the state legislature, and by a majority of those voting in a statewide referendum.) In most states, however, nonconsent has been reserved as a fallback: a site selection may by law go forward despite local opposition, on the grounds that the public welfare requires the facility and that the site has been picked by a thorough and scientific process.

Even in states that have retained the nonconsent principle, however, it is becoming increasingly clear that the "consent of the governed" is needed. To avoid having the siting delayed or blocked in court, the prospective host community must be willing if not eager. As discussed in Chapter 4, when a risk potentially affects a limited and known population rather than a diffuse and unknown one, the rights of the "victims," including the right not to have the risk imposed upon them, will seem heightened. Whereas

actual consent is usually infeasible when a risk affects a large, indeterminate population, it is feasible on a bounded issue such as siting. Whether it is appropriate is another question. But in any case, those affected by a siting process often think in terms of actual consent, even though those in charge of the process may still be adhering to a principle of nonconsent. This is one major source of conflict in siting.

But even if all agree that actual consent should be obtained, conflicts can still arise. What counts as "actual consent" raises a number of difficult questions.²⁶

There is the problem of representation: of who can consent to what on behalf of whom. (For example, in March of 1991, the Wake County site designation review committee's report recommending endorsement of a proposed disposal facility technology was rejected by the county's board of commissioners. The board, which had appointed the committee, continued to oppose having a LLW disposal facility in the county.) Representation is a problem inherent in all groups except those that are both democratic and fully participatory. But for all groups, representative and nonrepresentative, there are several other potential problems.

²⁶For a discussion of these questions, see Mary English, "Risk and Consent," in Risk Analysis: Prospects and Opportunities (New York: Plenum Press, forthcoming).

First, there is the problem of who's consent is being sought. With a LLW facility siting, this raises the question of how the "host community" should be defined. Should it be only the municipality where the site is located? Or should it include nearby municipalities and possibly the whole county? What about neighboring counties and states? In a letter to Governor Martin, the South Carolina congressional delegation objected that "if North Carolina now selects the Richmond site next to our border, all we will gain is the removal of the effects of this site from one end of our state to another. The purpose of the [LLWPA] will not be served."²⁷

Second, there is the related problem of weighting--of whether each person's opinion on an issue should count equally if the issue affects some much more than others. Should the person whose property borders on a LLW disposal site have a greater say in its operation than the person who lives three miles away? What if the first is an absentee corporate landowner and the second a longstanding local farmer?

Third, there is the problem of divided opinion--of what counts as consent when there is a lack of unanimity. At their June 13, 1986 meeting, the Southeast Compact

²⁷March 6, 1990 letter to Governor James Martin, as quoted in the State (Columbia, SC), March 12, 1990.

commission voted to use 1983 LLW volume data by only a slim majority, overriding the preference of others (the North Carolina commissioners, joined by three other commissioners) to use more current data. North Carolina had already agreed to be part of a process where most decisions would need only a simple majority vote, but--as their continuing objections showed--they by no means consented to the June 13 decision.

Fourth, there is the problem of whether consent must be informed to be true consent. In North Carolina, those in charge of the siting process hoped that the host community's willingness--if not their consent--would be attained partly by having a local site designation review committee and a local advisory committee. Are measures such as these, together with public outreach efforts by the Authority and Chem-Nuclear, sufficient to enable informed consent? How should people who do not sit on local committees or attend local meetings be reached?

All of these problems raise important procedural and ethical questions. But in addition, there is the purely ethical question of what has motivated the consent. If consent is motivated by an altruistic sense of obligation or patriotism, people may feel uncomfortable with taking advantage of it. They will feel more comfortable if the decision to consent is grounded in self-interest. But,

when a community's acceptance is motivated by hardship, the ethical question of what counts as "willingness" and "fair compensation" still remains.

If a community is well-off, a proffered incentives package--new jobs, lower property taxes, money for schools, etc.--usually will not be sufficient to overcome its members' aversion to hosting the facility. But if the community is in dire economic straits, its members may agree to, or even seek, the facility for its attendant benefits. The community's consent to the facility may be proffered out of ignorance, blind faith, or resigned acquiescence to power. But this is not always the case. Instead, the community's consent may be actual in the fullest sense: it may be unanimous, informed, and motivated by a self-interested calculation of costs and benefits. Nevertheless, even then there remains the possibility that the community members and their poverty are being "used." They would not have consented if they were not disadvantaged relative to the rest of society. This does not mean that they should be denied the opportunity to host the facility. But--if utilitarianism and libertarianism are rejected in favor of a Rawlsian "justice as fairness"--it does mean that the incentives package should be raised to a level where even prosperous communities would consider bidding for it.

CONCLUSION: CAN JUSTICE BE THE ANSWER?

When a new facility is sited, justice may or may not matter. If those involved in or affected by the siting fully trust those in charge and accept their authority, then the question of a just site selection process may not come up. It will be tacitly assumed that those in charge have good reason for doing what they're doing. Alternatively, if those involved in or affected by a siting see the risks of the new facility as small, then the question of whether the site selection process is just will also be of little consequence. It may not be just, but the effects of the injustice are too trivial to worry about. But if even a few people don't trust and respect the authority of those in charge and don't see the risks of the prospective facility as small, then questions about the justice of the site selection process are likely to arise.

Distributive justice is the fair distribution of benefits and burdens. But, as the Southeast Compact and North Carolina examples have shown, disagreements can arise over a number of questions. In particular: Distribution to whom? Fair to whom? And what counts as "fair"?

Distribution to Whom?--Moral Relevance

One definition of distributive justice is "fairness to those worthy of moral concern." This leaves open the question of who or what is worthy.²⁸ Answers may be bigoted, excluding whole categories of people (e.g., socioeconomic underclasses). They also may be cosmic, including not only all present and future generations of people but also all other living creatures (and even trees and mountains and rivers).²⁹ In selecting a host state or host community for a LLW disposal facility, all sides tend to focus on the people that now live in the state or the community, with the state and the community defined by political boundaries. But this definition of "who" falls short when the arbitrariness of political boundaries is recognized. In addition, facilities such as LLW disposal sites raise concerns about long-term risks to future generations living or working near the site, who may or may not be adequately represented by those currently affected.

²⁸Peter Wenz makes this point in Environmental Justice (Albany, NY: State University of New York Press, 1988), p. 272.

²⁹See, e.g., Christopher Stone, Earth and Other Ethics: The Case for Moral Pluralism (New York: Harper & Row, 1987).

Fair to Whom?--Individuals v. Society

The concerns of society as a whole, especially concerns about societal efficiency and stability, may or may not be regarded as one of the aims of justice. On the one hand, if justice is interpreted in a contractarian or libertarian manner, as what is just only to the individual, then the concerns of society as a whole are separate aims, acting as counterweights to justice. On the other hand, if justice is interpreted in a utilitarian manner, as what is just to society as a whole,³⁰ then individual rights and interests are subordinated to the common interest.

Today, the utilitarian view of justice and its corresponding diminution of individual rights seemingly is no longer in vogue. In theory, an exclusively individualistic interpretation of justice prevails; one which emphasizes protecting individuals from societal and private incursions (justice as preservation of rights), ensuring that the individual gets what she needs or merits (justice as desert), and promoting equality of treatment (justice as equality). But in practice, the

³⁰This begs the question of whether society has interests over and above the interests of the present and future members--i.e., of whether the whole can be greater than the sum of its parts. This issue cannot be resolved here, but the distinction between individualistic and collective definitions of justice still holds.

individualistic conception of justice is not universally accepted. Instead, the individualistic conception of justice remains in tension with the societal conception, particularly on issues such as siting a LLW disposal facility.

What is Fair?--Process v. Outcome

With either an individualistic or a societal conception of justice, process or outcomes may be emphasized. In justice as process, a set of procedures are designed with an outcome or set of outcomes in mind. But if, when the process is complete, the desired outcome is not fully realized, the process and its results will still be thought of as fair, precisely because the process was determined a priori to be fair. When the justice of the outcome is emphasized, however, failure to obtain the desired outcome would be a sufficient reason for deciding that the process and its results were not fair.

When a potentially risky facility is sited, those bearing the burden of hosting it may easily feel that the outcome as it affects them--including, e.g., the preservation of their rights and the sense that they are doing only their fair share for society--is far more important than the process by which that outcome was

reached. But for those responsible for the siting process, the process is valuable in and of itself, since the hallmark of process, consistency, is essential to their external and internal respect. Establishing and following rules is at the core of bureaucratic authority. This means that those responsible for the siting will have a proclivity for process, even if they do not adhere rigidly to it. Although they may use outcomes to assess how the process should be retooled, they place more faith in process than do those who are mainly concerned with outcomes. Furthermore, for those siting waste disposal facility that they see as needed, the justice of the outcome in a different sense, including the rights of all their constituents to health and safety, is at least as important as the rights of those immediately affected, as is the goal of societal efficiency and prosperity.

These questions--of who (and what) should be taken into consideration in weighing the costs and benefits of a public policy; of whether the concerns of society as a whole should prevail over individual concerns; and of how the fairness of a process's outcomes should be judged--plague the three commonly used siting approaches.

The "best site" approach, the "fair play" approach, the "volunteerism/incentives" approach . . . all, in different ways, have difficulty satisfactorily answering these questions, with their inherent conflicts.

Thus, regardless of the approach they use, those in charge of siting facilities such as LLW disposal sites are faced with seemingly unresolvable problems. Because it is virtually impossible to take everyone and everything into account, the boundaries of "moral relevance" must be drawn somewhere and will always be somewhat arbitrary. Because the claims of those most directly affected by a facility siting and the claims of society as a whole are often incompatible, sometimes one may be satisfied only at the expense of the other. And because processes that have the virtue of consistency do not always result in universally fair outcomes, justice of process and justice of outcome rarely can be fully reconciled.

Justice does not provide any simple solutions to public policy dilemmas such as how to site LLW disposal facilities. Because of the hard questions justice raises but does not answer, it becomes tempting to try to bypass niceties of justice and look instead for a quick means of achieving mission success. Nevertheless, as is argued in Chapter 6, justice may be the only viable route to the durable legitimacy of a public policy, and thus the only

viable means of achieving long-term success. And while justice will always be imperfect, it can be made more perfect.

CHAPTER 6

THE QUEST FOR LEGITIMACY

Advantageous geography (aridity, low population density, etc.) is not a sufficient condition for success in the current attempts to site a LLW disposal facility. It also may well prove not to be a necessary condition. Similarly, individual personalities are important but not crucial determinants of the process's success. Instead, each phase of the LLWPA's and LLWPAA's implementation must be widely regarded as legitimate for the implementation process as a whole to work. In other words, the law as implemented must be regarded, not simply as the law, but as a law that should be followed, whether or not specific conditions are ideal and whether or not the threat of sanctions is immediately apparent. And, while the courts may help to both flesh out and legitimate a law, people in many other aspects of civic life will be involved as well.

LEGITIMACY

Although "legitimacy" often is taken to mean a normative consensus of approval, there are two quite different ways in which the term can be used. Used

practically and sociologically, it suggests such a consensus; it implies acceptance of a law or practice by those affected. The question then becomes: Why do people accept the law or practice? But used abstractly and philosophically, it instead implies an objective standard of legitimacy, or what is morally right. The question then becomes: What is that standard, and does the law or practice in question meet it? While this discussion will focus on the former question, the latter is still relevant. For widespread acceptance--even for reasons from principle--does not necessarily signify that something is right or just; even oppressive systems (e.g., slavery) may be widely accepted and supported by a normative consensus. And objections to an oppressive system can be legitimate, even if they are not widely supported.

Within the first, sociological usage of legitimacy, the term can be interpreted in a strong, weak, or very weak sense. A law or action (for example, an exercise of authority or a response to that exercise of authority) would be considered legitimate if there was widespread agreement about the moral appropriateness of the law or action. But in a weaker sense, a law or action might be considered legitimate if it was accepted mainly for prudential reasons: for example, because compromise was necessary and this was the best arrangement that could be

worked out under the circumstances. And in a very weak sense, a law or action might be considered legitimate merely by virtue of its having been passively accepted, even if those affected by it had accepted it--or failed to change it--out of ignorance, apathy, or a sense of powerlessness.

These three interpretations of practical, sociological legitimacy all require widespread acceptance but vary as to what is a valid motive for acceptance: the first says that acceptance must be informed and from principle, not just (or necessarily) from interests; the second, that acceptance must be informed and must serve pragmatic, immediate interests; the third, that the mere fact of acceptance, regardless of motive, is adequate for legitimacy. These different interpretations have different consequences: legitimacy based upon acceptance from principle is more likely to be stable and durable than legitimacy based upon acceptance from interests or from ignorance, apathy, or powerlessness. Interests are more likely to change with changes in circumstances than are principles, and--even in oppressive systems--the cloud of ignorance, apathy, and powerlessness can begin to be lifted by a bit of knowledge and a glimmer of hope. Thus, in considering the processes spawned by the LLWPA, it is important to understand in what sense they are legitimate.

AUTHORITY, TRUST, RISK, AND JUSTICE

With laws such as the LLWPA--and with other public policy choices such as those concerning nuclear power--legitimacy in its practical but strong sense, as widely shared acceptance from principle, results if values in certain domains are widely shared. For a process to be stable and durable, at least one of the following conditions needs to be present at each stage in the process, among those involved in and affected by that stage: (1) widespread and full acceptance of the authority embodied in the process; (2) widespread and full trust in the competence and character of those in charge, especially in the face of scientific uncertainty; (3) widespread and fully congruent evaluations of risks--what they are, whether taking them is worth it, and what rights and responsibilities are entailed with the risks; and (4) widespread and fully congruent evaluations of what counts as justice.

(1) Acceptance of the authority embodied in the process.

Processes vary in the amount of authority being asserted. With a closed process, far more authority is asserted than with an open process. In a closed process, those officially in charge make virtually all the

decisions; outsiders are given little or no opportunity to review, advise, and concur or dissent. In an open process, they have a lot of opportunity to participate in decision-making. But no public policy process can be completely open and participatory; none can have everyone involved in all decisions. Thus, every process involves some measure of authority.

If the hierarchy embodied in authority is recognized as legitimate, then the actions of those in charge are more likely to be regarded as legitimate, simply because they flow from legitimate authority. Their actions are more likely to be seen as not requiring further justification; as right by virtue of coming from positions of authority. But if the legitimacy of the hierarchy is in doubt, or if those in charge are seen as overstepping the bounds of their legitimate authority, then they must prove that their decisions--or their qualifications to make decisions--are good. They are not given the benefit of the doubt.

In some European countries such as France, conflict over LLW disposal has been lessened somewhat because of a tradition of strong centralized government, closed public policy processes, and respect for authority, including the authority of expertise. (It has also been lessened because of major concessions to safety concerns through the use of highly engineered disposal facilities.) But even in such

countries, the development of new LLW facilities by those in authority has not gone unchallenged. And in the United States, which does not have that tradition to the same degree, the actions of those in charge are less likely to be seen as legitimate, especially on contentious, groundbreaking issues such as LLW disposal. Then, officials are rarely accorded unquestioning authority.

When the legitimacy of the hierarchy or its actions is in doubt, conflicts may be framed in terms of authority: the authority of the federal government to set policy for the states, the authority of compact commissions in relation to their party states, the authority of a state siting agency, etc. But, particularly when authority is questioned, values concerning trust, risk, and justice figure importantly.

(2) Trust in the competence and character of those in charge, especially in the face of scientific uncertainty.

If people regard a hierarchy of authority as legitimate, they will be predisposed to trust those in positions of authority, if only because it will be presumed that those in authority attained their positions because of their personal qualifications. With the bureaucratic type of authority prevalent today, evidence of qualification may include certification exams, peer evaluations, and other

indicators of competence and good character. But, especially when acceptance of authority is conditional, attainment of a position often is not regarded as sufficient evidence of trustworthiness. Then, it is more likely that those in authority will have to actively and continually demonstrate that they are trustworthy. Not all processes require the same degree of trust, however.

Open processes--processes that allow those outside the hierarchy of authority to intervene in the process--entail less authority and require less trust than closed processes. For example, less trust is needed if the existing hierarchy invites outsiders to independently assess the merits of its actions, or if it supports the efforts of outside groups to name their own assessors. Whether anyone--insiders or outsiders--can be fully objective is doubtful, since everyone brings to bear their own culturally-acquired values, even on issues that seemingly are purely scientific. Nevertheless, independent assessors, by applying their own experience and analytical approaches, may expose errors that seem obvious in retrospect but had hitherto gone unrecognized. And even if they do not uncover any obvious errors, analysis from a number of different vantage points helps to establish the validity of conclusions reached.

With technical issues involving risk, such as LLW disposal, scientific uncertainties attend both how the risk should be assessed and how it should be managed. The extent of these uncertainties affects the level of trust needed: the greater the uncertainty, the greater the need for trust. But if uncertainty can be minimized--for example, by building back-up safety features into the LLW facility--less trust may be needed. Safety features do not always diminish the problem of trust, however. If they are seen as cover-ups for an inherently flawed project rather than as real protections, then the project and its proponents will remain suspect.

There thus are ways--although not surefire ways--in which the problem of trust can be handled by reducing the need for trust. For example, an open process of analysis and decision-making can be used, and, when faced with uncertainties, extra safety features can be added to reduce the probability and consequences of accidents. Nevertheless, the need for trust cannot be altogether eliminated. Just as all processes entail some degree of authority, they also rely upon some degree of trust. And proving trustworthiness is a very difficult task.

To trust means to place a measure of control in another's hands. Proof of trustworthiness means proof of technical competence, integrity, and concern for the

interests and views of those for whom one is responsible. In its strongest sense, it means proof that one will try to uphold and further their visions of how the world should be. These proofs cannot easily be made, especially when those seeking to be trusted are asking for trust from many different segments of society. For example, it is difficult indeed for a LLW facility siting agency to win the trust of both nuclear power companies and antinuclear activists. But simply showing that one understands and respects other world views, even if one cannot fully support and further them, would improve trust. And too often, that understanding and respect is lacking . . . on all sides.

(3) Congruent evaluations of the risks in question: what they are, whether taking them is worth it, and what rights and responsibilities are entailed with the risks.

Projects such as LLW disposal facilities pose costs and offer benefits both to society as a whole and to members of the host community. Generally, however, such projects are seen as benefiting society while placing a burden on the host community (and, possibly, on nearby communities or on the region as a whole). Because of scientific uncertainty, the nature, magnitude, and probability of the costs--and to a lesser extent the

benefits--may be unclear. But scientific uncertainty is not the only reason for disagreements about risk.

There are culturally-determined differences in how people evaluate a risk and its costs and benefits: differences that arise from a person's group affiliations, as well as from geographic affiliations. These differences may not matter, if negotiations on eliminating, mitigating, or compensating for costs lead to mutually advantageous compromises--sometimes called "win-win" solutions. Each negotiating party is concerned with what they will get and give, not with their different evaluations of risk per se. But negotiated compromises are not always an option, especially if one or more parties is unwilling to compromise on certain principles . . . for example, on principles concerning the rights and responsibilities that accompany a risk imposition. Then, different evaluations of the costs and benefits of risk are much more likely to matter, as will different evaluations of these rights and responsibilities.

Individual rights, strongly interpreted, entail corresponding responsibilities in others not to violate those rights. Such rights can be highly controversial. The right to freedom from harm is an example of a controversial right, especially when the harm is an unavoidable consequence of pursuing what many think is a

societal good. Some people believe that the right to freedom from societal harm (e.g., the harm potentially imposed on a community by locating a LLW disposal facility nearby) is a fundamental right, and that other people, especially those in charge of making public policy decisions, have a strong obligation not to violate that right. Others believe that the right to freedom from harm is a relatively weak right; one that can and should be tempered by the need to look after the welfare of society as a whole.

Differences in how rights and responsibilities concerning harms are evaluated--and in how the harms themselves are evaluated--can be crucial. Both those in charge of and those affected by a risk imposition will assess its legitimacy partly in terms of their respective expectations concerning rights and responsibilities, as well as their respective evaluations of the degree of possible harm being imposed. If there is a reasonably congruent evaluation of risk, if expectations concerning rights and responsibilities are shared, and if everyone lives up to these expectations in both expressed views and actions, mutual trust is probable. In public life this type of trust is both rare and fragile, however, since it relies upon like-mindedness and validation. It is more probable that, on a particular risk issue, evaluations of

risk and of rights and responsibilities will not be congruent. It is also quite possible that both those in charge of and those affected by a risk imposition will suspect the other side of being two-faced: of tailoring their views to fit the circumstances. For example, those in charge of trying to site a LLW disposal facility may contend that the "NIMBY syndrome" is at work; that the reluctant host community would be happy to have the facility sited, but "not in my backyard." And the prospective host community may contend that those in charge can dish it out but can't take it; that they're eager to site the facility but wouldn't want to live near one themselves.

Thus, evaluations often conflict concerning both the costs and benefits and the rights and responsibilities that attend risk. And when they do, they are likely both to provoke antagonistic, over-simplifying charges and to deter a widespread sense of the legitimacy of the risk management process . . . unless all parties involved have an overriding commitment to justice.

(4) Congruent evaluations of what counts as justice.

The greater the diversity in evaluations of risk, including its costs and benefits and rights and responsibilities, the more important concepts of justice

become. The losing parties, whose principles and interests have not been served on a particular issue, must feel that at least justice has been served. For only then will they feel that the process is legitimate and that in a sense, even though they have lost, the right thing has been done.

With issues such as siting LLW disposal facilities, several different conceptions of justice may be explicitly or tacitly invoked by various parties to the siting process. One is the utilitarian conception: that what is best for society as a whole should override concerns about individual rights and individual welfare. The aim then is to select--by fiat, if necessary--the technically best site. Another is the libertarian conception: that individual rights must be honored and that consent must be obtained, but that societal goals can be realized through marketplace mechanisms. The aim then is to entice a volunteer through an extremely attractive incentives package. Finally, there is the contractarian conception of justice: that procedures developed under neutral and fair conditions should dictate how individual rights and societal welfare are balanced, and that the outcomes of these procedures are ipso facto fair, since they result from a fair process. The aim of this approach, which is often referred to as procedural justice, is to have all parties involved believe that the process actually is fair

and that the obligations entailed in its outcomes should be honored.

Besides giving short shrift to individual rights and welfare, utilitarianism requires an extremely problematic calculus of net costs and benefits in order to determine what is best for society as a whole. Especially in a society where there are profound differences in values, this calculus is not easy to perform. To do so, utilitarians either must disregard value differences and assume, implausibly, that there is a shared, single view of what is best for individuals and society, or they must accommodate disparate values, making their calculus impossibly complex. Libertarianism makes no such grand attempts, but it has other problems. First, it relies on the marketplace to realize social goals. And second, its procedural rules, which generally are limited to what counts as a fair transaction, often fail to adequately take into account both sacred values--values to which price tags cannot be attached--and the values of people who are not immediately involved in the transaction but who may be affected by it.

In the face of public policy issues such as LLW disposal, where there is a consensus that something needs to be done but there are deep conflicts over substantive issues, procedural justice has special appeal. With

procedural justice, people don't have to agree on what specific tack is best for society, on what the costs and benefits of a risk are, or on what particular shape individual rights and responsibilities should take. Instead, judgements about justice are based on evaluations of whether the process itself is fair, not on whether its particular outcomes are fair. A fair process is enough; its outcomes are accepted, simply because they flow from a fair process. And the process is, in theory at least, broad-scoped enough to take into account both societal welfare and individual rights and interests. In a pluralistic society, fair process seems like the most appropriate way to satisfy the demands of justice, especially on contentious issues such as LLW disposal.

ALTERNATE ROUTES TO LEGITIMACY

With public policy issues such as LLW disposal, there are four different, although not mutually exclusive, routes to legitimacy in its practical but strong sense. The first is widespread and full acceptance of authority; the second is widespread and unquestioning trust. These two tend to go together: more acceptance of authority tends to result in more unquestioning trust in those in charge, and vice versa; less acceptance of authority tends to result in less

unquestioning trust, and vice versa. The third route is agreement about what counts as risk and its benefits and burdens. This route is related to the first two. If authority and trust are present, agreement about risk may also be more likely, if only because the "greater wisdom" of those in charge is more likely to be accepted. The fourth route is agreement about what counts as justice. In societies such as that of the United States, only this route seems viable, and then only if just processes are emphasized.

If the authority of those in charge were fully accepted, then--in theory, at least--issues of trust, risk, and justice would be less likely to arise on public policy issues such as LLW disposal. People would be more likely to accept, as not only inevitable but appropriate, what was "coming down." But most people in the United States are too antiauthority to fully accept, especially in public life, the hierarchies of control inherent in authority, particularly when authority is being asserted in a new domain such as LLW disposal. And when authority is highly conditional, those in charge must prove that they can be trusted to act competently and in their constituents' behalves; they must prove that the risks of a LLW disposal facility are reasonable and manageable; they must prove

that their proposed distribution of the burdens and benefits of risk is just.

Steps can be taken to make attempts to site LLW disposal facilities (or to implement other public policies) more widely recognized as legitimate: assertions of authority can be made only when absolutely necessary; the ground for trust can be laid by seeking through dialogue to arrive at mutual respect and understanding; the need for trust can be minimized by making analytical and decision-making processes open and participatory; risk-minimizing measures such as extra safeguards and monitoring can be added to the proposed facility; compensation can be offered to those who will bear the potential burdens of the facility. But still, as the foregoing chapters have shown, proofs of trustworthiness, reasonable risk, and just distributions of costs and benefits are not easy to make. In fact, they may be virtually impossible, especially with the cultural diversity prevalent in the United States. Because of this diversity, it is extremely difficult to obtain congruent evaluations of trustworthy behavior, of risk, or of what counts as a just distribution of the benefits and burdens of risk. This leaves procedural justice as the only recourse. But it too can have problems, especially as it commonly is practiced.

PROCEDURAL JUSTICE: PROBLEMS AND POSSIBILITIES

Procedural justice is not an automatic solution to public policy dilemmas such as siting LLW disposal facilities. There are several catches.

First, all public policy processes, even open ones, entail some authority. To the extent that procedures are relied upon to adjudicate rights and responsibilities and to determine a fair allocation of costs and benefits, trust in those in charge of the procedures becomes important. And if the process does not include seeking explicit consent--both to the process as a whole and to decision points in the process--then authority and trust will figure all the more importantly. But even if explicit consent is sought, there remain the problems, discussed in Chapter 5, of representation, divided opinion, etc. In addition, as discussed in that chapter, there is also the problem of who, spatially and temporally, should be taken into consideration in the procedures. On many public policy issues, it is impossible to seek the consent of all those who might be affected. It is also impossible to seek the consent of future generations. Someone must be given the authority to act on their behalves.

Second, it is unlikely that outcomes will be totally disregarded in favor of abstract notions of procedural

justice; people will still care about who gets what, not just how they got it. With the implementation of any public policy, there are a number of factors that help to shape and reinforce values concerning the implementation process and its outcomes. Most immediately, these include the process itself--its procedures, incentives, sanctions, etc. But contextual factors are perhaps even more influential. With an issue such as LLW disposal, these include the cultural biases of the individuals and groups that execute the process, monitor it, oppose it, etc.; the social and political makeups of the regions, states, and affected communities; and attitudes toward science and technology in general and toward the nuclear industry in particular. These contextual factors are especially important, for they help to shape conceptions of the good--i.e., conceptions of what people want society and their own lives to be like, materially and ethically.

If, within a particular culture, there is a shared conception of the good, then a normative consensus on authority and justice is more likely, as is a consensus on risk, its costs and benefits, and its rights and responsibilities. As a result, mutual trust is more likely. Everyone has a tacit understanding of what society's goals should be and of what their respective roles are in attaining those goals. There still may be

disputes, particularly disputes about whether proposed actions will have their intended effects, but at least the intent--the telos--is agreed upon.

The debate in the United States over issues such as radioactive waste disposal and nuclear power illustrates that, in this country at least, there is no single, shared conception of the good. Some people are willing to sacrifice economic efficiency and development in order to have a pristine environment or in order to avoid what they see as grave risks. In fact, they do not see it as a sacrifice; they see it as the only prudent and morally acceptable course. Others think that such sacrifices are both painful and unnecessary; they see the risks as minimal and the natural environment as something to be used. For them, the only prudent and morally acceptable course is to pursue economic development, so that all people can prosper, including those now disadvantaged. Both might agree that disasters should be avoided and the natural environment should not be used up, but beyond that, fundamental disagreements arise.

This leads to the third point about procedural justice: that true procedural justice is very difficult to attain, since those involved in or affected by the procedures virtually always have unequal opportunities, abilities, or inclinations to participate in the process of

decision-making. No approach to justice--including procedural justice--can satisfy all conceptions of the good. Inevitably, there are winners and losers. But, especially in what often passes as procedural justice, the winners tend to be those with the greatest access to power, including the power of authority and of knowledge as well as the power of money.

Perhaps it must be accepted that justice will always be imperfect--that it will best serve those in power, whose conceptions of the good are dominant. But procedural justice offers another, more promising alternative: to try, by means of processes that are truly fair, to reach societal compromises on what the good is and how it will be attained. This possibility becomes all the more attractive as the need for it becomes more compelling.

Traditionally, those with power in society have had little reason to compromise their conception of the good. They have, in effect, been able to use it to their own advantage. By promoting it to other less successful, less powerful people, they have been able to protect it for themselves. In the past, for example, this has enabled them to locate undesirable facilities in depressed communities that aspire to a share of the "good life." Jobs, economic development, and acceptance of such facilities may result (as Chapter 4's discussion of

Barnwell County illustrates). But increasingly (as Chapter 4's discussion of Allegany and Cortland counties illustrates), there is doubt in a number of communities that such facilities will result in the good life. This doubt arises both from the risks the facilities are seen as posing and, possibly, from deep-rooted desires to avoid becoming dependent upon one employer's beneficence. Even benevolent paternalism is paternalism. Thus, problems for those in power--and reasons to negotiate--are coming from two very different sides: from those who do not share the dominant conception of the good, and from those who do share that conception but fear that what they will get might not be it.

Procedural justice, especially as attained through negotiation, does not guarantee the successful fulfillment of public policy missions. Some people simply may refuse to negotiate on certain issues, since to do so would compromise their principles. The opponents of a project such as a proposed LLW disposal facility may instead seek to and succeed in preventing the project from going forward. Procedural justice does not necessarily mean harmony, especially in the short run. Instead, it may mean conflict and public policy stalemates.

Furthermore, the fact that a negotiation has taken place does not mean that justice has been fully realized:

negotiation between parties of unequal power can simply mean that injustice has been covered over with a thin veneer of something that passes as procedural justice. Since those who control the procedures usually can influence their outcomes, procedural justice, if wrongly applied, can easily become a mockery of justice, and only legitimacy in its very weak sense--legitimacy based upon acceptance arising from ignorance, apathy, or powerlessness--will be attained.

Even true procedural justice does not escape all of the fundamental questions that plague conceptions of justice, including the questions (discussed in Chapter 5) of moral relevance, of individual versus societal concerns, and of how outcomes should be evaluated. Nor is procedural justice a prescription for automatic success in fulfilling missions such as trying to site LLW disposal facilities. But, if a process is truly just--if it incorporates measures to correct for imbalances in knowledge, money, and access to the process--then in the long run it offers the best possibility for social stability and the attainment of legitimate public policies. In the short run, however, it may appear to some to be disastrous, since it opens wider the door to opposition.

WHEN IS OPPOSITION LEGITIMATE?

Like the rest of this book, this discussion of legitimacy has focused mainly on the problems of those who are responsible for carrying out the processes spawned by the LLWPA and its amendments. But the legitimacy problems of others involved in these processes are at least as severe. All players must establish their legitimacy in the eyes of others. Radioactive waste generators must establish that they have rightful interests in having LLW disposal facilities. Waste management companies must establish that they are qualified to develop and manage these facilities. LLW regulators must establish the appropriateness of their regulations and the processes by which they promulgate those regulations. Local officials must establish that they can and do speak on behalf of their communities. And private citizens--either individuals or groups--who support or object to a proposed LLW disposal facility must establish that they have "standing" to enter fully into the public debate on the facility--i.e., that their interests and opinions should be listened to and taken into account. Otherwise, they (especially if they are not insiders to the system of economic and political power they seek to influence) may be

dismissed as "cranks" or as "vocal minorities" by those who disagree with their views.

"Cranks" are people who are regarded as holding an irrational position on an issue. The substance of their opinions is not regarded as legitimate, but they are seen as posing little threat because they are isolated individuals. "Vocal minorities" are somewhat different. The substance of their opinions usually is not regarded by others as totally irrational, although it may be vehemently disputed. But the fact that they speak only for a minority tends to indict them in others' eyes, giving others a rationale for not according them standing in a public policy debate. Vocal minorities, especially people who are not part of the hierarchy of authority, are not automatically labelled as illegitimate. However, many people--both within and outside the hierarchy of authority--deny them the presumption of legitimacy. Normally, the burden of proof is on them to convince others of their legitimacy. In this, they are unlike elected and appointed officials, who usually are accorded the presumption of legitimacy if they attained office through an accepted process. With an issue such as LLW disposal, where government is breaking new ground, the presumption of legitimacy conferred upon officials may be weaker and that conferred upon their opponents correspondingly stronger.

But even on such issues, there usually is an initial bias in favor of the legitimacy of the hierarchy over that of its opponents.

Even vocal majorities may have problems establishing the legitimacy of their positions in the eyes of others, if their positions do not accord with the views of those in power. But for vocal minorities, the task of establishing the legitimacy of their protests and their standing to protest is yet more difficult. It is especially hard if they lack clout in the particular political and economic system they are trying to influence, even if they have the sympathy of others outside that immediate system. For example, if a majority of a community, including its officials, opposes hosting a LLW disposal facility, the minority that is in favor of accepting the facility may feel estranged and shouted down, even though they have the support of state and regional officials, LLW generators, etc.

The task facing all vocal minorities--whether or not they are insiders to the system--is hard because their case for legitimacy can seldom be made in the sociological sense, as legitimacy based upon widespread acceptance. They may, perhaps, claim that they are speaking for a silent majority, but as long as the majority remains silent, that claim is merely an assertion. Instead, their

case for legitimacy usually must be made in the philosophical sense, as legitimacy based upon the fundamental rightness of their position, even though that position does not have many evident supporters. And whereas legitimacy in the sociological sense is relatively easy to demonstrate, especially if sufficient funds are available--it can be done with opinion polls--legitimacy in the philosophical sense is much harder to demonstrate. For how does one show that, measured against some objective standard, one is right, if no objective standards are available?

Eventually, after a vocal minority has convinced others of the rightness of its position, it may be accorded a retrospective as well as a contemporary legitimacy. Others may belatedly grant that it was right all along. But usually, by the time a vocal minority attains widespread acknowledgment of its legitimacy, it is no longer a voice crying in the wilderness. It has attained enough of a following to make a claim to legitimacy based upon popularity, not just wisdom. A claim to legitimacy based mainly upon wisdom, or rightness, is both the most valid and the most difficult case to make.

The task of opposing a political and economic system is in some respects easier than it used to be, however. Despite deep-rooted suspicion of government and

politicians, there is still a widespread presumption that those who have become part of the system through accepted procedures are legitimate whereas outside cavillers are not. But, because of a growing number of public policy issues that are surrounded by scientific uncertainty, political/economic systems, and especially the authority represented by hierarchies within such systems, have in some ways become more vulnerable.

Authority classically was the protector of tradition; of "the way we've always done things." It could ground its claims to legitimacy in precedent. Those attacking the way authority was exercised (or the hierarchy of authority itself) had a hard row to hoe, since they had to show why that precedent--the standard of rightness based on tradition--was misguided. Governments and other hierarchies of authority are still grounded to some extent in tradition. But today, they tend to concern themselves not so much with preserving the past as with attaining a new future, especially a future envisaged by some (particularly those in economic and political control) but not all. This leaves them vulnerable to criticism--criticism based on objections from both principle and prudence. They cannot use precedent to establish the rightness and workability of what they intend to do. They are tilling new ground.

The United States government's policies on nuclear power and radioactive waste disposal illustrate the modern vulnerability of the system to criticism, and the correspondingly greater presumption of legitimacy given by many people to opponents of these policies. Nuclear power had just begun to come into its own when, in the aftermath of major accidents such as those at Three Mile Island and Chernobyl, it was subjected to international scrutiny. The official responses varied. Sweden, for example, made its nuclear waste disposal program contingent on a phaseout of nuclear power in that country. In the United States, however, as in other countries, nuclear power continued to enjoy official endorsement. Both the US Department of Energy and the US Nuclear Regulatory Commission made clear their active support for the expansion of nuclear power, as long as it met their safety standards. But, despite this official endorsement, nuclear power did not automatically attain the status of an established, accepted practice in this country. Instead, entering the 1990s, the question still very much at issue was whether nuclear power--and by extension the continued large-scale disposal of radioactive waste--would become an established, accepted practice. To some people's chagrin and annoyance, nuclear power and radioactive waste disposal were still hot political issues.

CONCLUSION: POLITICS, LEGITIMACY, AND JUSTICE

Politics can be a check on authority, and authority a check on politics.¹ The two complement each other, if they are working properly. Authority, if it confers a presumption of legitimacy upon the system and its officials, keeps politics from running rampant. And politics, if it enables the system to be challenged, keeps authority from becoming encrusted and overbearing. It promotes a climate in which justice can prevail. But politics inevitably means conflict, and conflict can seem unappealing, especially when there is a mission to be accomplished.

A conflict-filled process is not pleasant, since it usually is not pleasant to confront people with whom one disagrees. It may also seem terribly frustrating and inefficient, especially to those in power. If one is trying to work for what one sees as the good of society--whether by building nuclear power plants, radioactive waste disposal facilities, or public policy--having one's efforts criticized or, worse, thwarted can be maddening. Laboriously trying to hash out

¹For a discussion of this notion, see William E. Connolly, "Modern Authority and Ambiguity," in J. Roland Pennock and John W. Chapman, eds., NOMOS XXIX: Authority Revisited (New York: New York University Press, 1987), pp. 9-27.

disagreements can also seem like an absurd waste of time and resources. And this inefficiency can seem like the grossest form of injustice to society as a whole. But the alternative is worse.

To wish for a society without conflict is both futile and misguided. For society, especially modern urban society, cannot be a group of like-minded folks. The public life is not like the private life; it is not made up of kindred souls. In fact, it's frightening to think of it that way, since a homogenous modern urban society would be possible only through manipulative persuasion, with oppressive coercion for those who dared to think differently. In the long run, if conflict is stifled, the system inevitably tends to become increasingly unjust and illegitimate. This sets the stage for total upheaval: for a major earthquake, since there has been no gradual slippage along the fault line.

Instead, conflict--especially the conflict that comes though politics in an open and participatory political system--is the antidote to an all-too-ready domination of a single political/economic system with a single conception of what a good society should be. The disenfranchisement of women and racial minorities, which virtually everyone now recognizes as wrong, used to be the prevailing norm. This norm was only changed because a few had the courage to

provoke conflict, and others had the courage to change their former views. Conflict thus can be a vehicle to legitimacy. It is not simply destructive.

To attain legitimacy, however, the terms of the conflict must be truly just. This means that the processes by which public policy decisions are made and implemented must be open and participatory, and that strong measures must be taken to raise those lacking power, including the power of knowledge, to positions of equivalency. And even then, it must be recognized that some people lack the appetite or aptitude for conflict and yet have interests that deserve protection. Those in charge thus need to reconceive of their mission as twofold: for example, not only as getting a LLW disposal facility sited, but also as providing a forum for public debate and negotiation on whether and how such facilities should be sited. And those affected by the process--whether potential supporters or potential opponents--need to examine their consciences to determine whether their positions are worth fighting for, in the sense of being best for society in the long run.

Conflict may lead to a compromise that fully satisfies no one. For example, compromise might mean that nuclear power would still be generated, but at substantially increased cost to pay for safety measures added to the power plants and to radioactive waste disposal sites. Some

people would object to these increased costs on the grounds that the United States should maintain or improve its standard of living and its international economic competitiveness. Other people would object to any continuation of nuclear power generation on the grounds that it is fundamentally unsafe. Not everyone is willing to compromise; compromises will not satisfy everyone; and there still will be winners and losers. But, if procedural justice is working right, at least the winning and losing positions are not foreordained. At least those engaged in the conflict--and others--know that the battle has been fair and that there will be another chance to fight.

Legitimacy is accretional; it is not a static, all-or-nothing proposition. There are degrees of legitimacy, and they can change over time. A piece of legislation, a policy decision, a process of implementing a decision, those in charge of that process, and those supporting or opposing it: all must, over time, establish their legitimacy in the eyes of others. Some will start with the presumption of legitimacy; others with the presumption of illegitimacy . . . but all must continually reaffirm for others the rightness of their positions. Through conflict, legitimacy may be diminished or increased. When presented with a conflict, those involved have yet another opportunity to make the case, not just (or necessarily) for

the widespread acceptance of their arguments, but for the inherent rightness of their arguments.

For in the end, assertions of authority and cries of "trust me" are not the answer. Certainly, those in charge (and those opposing them) should seek to be trustworthy and should seek through dialogue to establish the grounds for mutual trust. But they must also realize that, for good reasons, reactions may still be guarded, and full-blown trust may not be forthcoming. And in the end, attempts to educate people about the "real" risks are not the answer, either. Certainly, those in charge (and those opposing them) should seek to communicate with others as clearly as possible. But they must also realize that risk is a highly personal, value-imbued concept; one not readily susceptible to change. Finally, attempts to buy people's consent are not the answer. Certainly, those being asked to take on for society things or tasks that are generally regarded as burdens should be well-recompensed. But even so, offers of handsome compensation packages may, quite reasonably, be refused.

Instead, in the end the answer lies in ensuring that everyone has a fair shot: that a process is truly a fair process, not something that passes superficially as procedural justice. This does not mean that there will be no conflict. There will be. It does not mean that

facilities such as those for LLW disposal will be readily sited. They won't be. And it does not mean that all of the questions that plague conceptions of justice can be answered. They can't be. But even so, true procedural justice--procedural justice which promotes equality, debate, and participatory decision-making--is the only way in which processes such as those precipitated by the LLWPA can, over time, attain a durable legitimacy. And until they do, all solutions to public policy dilemmas such as how to site LLW disposal facilities will remain fragile and vulnerable.

In the short run, the conflict that comes with an open process may be risky, especially for those who have the presumption of legitimacy. They then become exposed to criticism. But in the long run, commitment to an open, just process will help to create legitimacy for all parties involved. A degree of trust based, not necessarily on agreement, but on understanding can then be developed. In time, a measure of authority based on trust can evolve. And, most importantly, a shared sense of the justice of the process can prevail. For while justice is not necessarily an end in itself, it is in the long run the best means to accommodate disparate views and desires and to achieve a mutually satisfactory society.

EPILOGUE

In the months since the core of this book was written, further developments occurred in the processes spawned by the LLWPA. For example:

One day before the Midwest Compact's annual meeting in June 1991, James Cleary, the commissioner of the Michigan LLW Authority, was replaced with Dennis Schornack, a policy advisor to Michigan Governor John Engler. Schornack, in his capacity as acting commissioner, spelled out to the compact Michigan's conditions for continuing its siting process. These included the compact commission's release of preoperational funds; rescindment of the conditions it had imposed on the Authority; adoption of a policy supporting Michigan's site selection approach; and agreement that if Michigan could not find a site that was suitable under Michigan law, the state would not be expected to serve as host to the compact's facility. On July 24, 1991, the Midwest Compact Commission voted to revoke Michigan's membership in the compact, and it then voted to designate Ohio, the second-runner state in the 1987 selection process, as the new host state. The first vote was 5-2, with Michigan and Ohio opposed. The second vote was 5-1, with Ohio opposed.

Also in June of 1991, Ashford, New York--the municipality which includes West Valley--openly confronted the question of whether it would seek to host the state's new LLW disposal facility. A handsome benefits package had been worked out between the West Valley Chamber of Commerce and a consortium of waste generators in New York. Ashford would double its current budget revenues by getting \$1.5 million annually in property tax payments and disposal fees; it would get trust funds for the fire department and library; it would get money to repair local roads and to build a new community center and town park. The Ashford Town Board was about to vote on the issue when, at a tumultuous town meeting on June 26, 1991, the board instead decided to hold a town referendum. The referendum took place on July 9, 1991. The vote was 702 in opposition to the facility and 533 in favor. The next night, however, the Town Board in effect voted a preliminary "yes" to the facility and the proposed benefits package by voting to support removing the provision, incorporated in New York's 1986 LLW law, that barred siting the new disposal facility in West Valley. The board argued that the referendum was not binding, its vote was close, and the board thus was free to decide what the town's best interests were. Ultimately, though, New York's state legislature and governor would have to decide whether to lift the West

Valley ban. And they certainly were getting mixed messages.

These and other developments illustrate the volatility of the processes spawned by the LLWPA's mandate. But they also illustrate that the central underlying issues--issues concerning authority, trust, risk, justice, and legitimacy--remain critical. And without recognizing and directly confronting these issues, volatility is not only probable; it is inevitable.

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