

THE LOW-LEVEL RADWASTE SITING SIMULATION GAME:
A CASE STUDY OF LEARNING ABOUT NEGOTIATION

by

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(1980)

Submitted to the Department of
Urban Studies and Planning
in Partial Fulfillment of the Requirements
of the Degree of

MASTER IN CITY PLANNING

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 1985

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Submitted to the Department of Urban Studies and Planning of the Massachusetts Institute of Technology on May 24, 1985 in partial fulfillment of the requirements for the degree of Master of City Planning.

ABSTRACT

Gaming simulations are popular pedagogical devices, in part, because of their ability to capture the dynamics of complex realities. In particular, scoreable games have been used to permit comparisons between teams of players and against minimum acceptable "scores." One of the most sophisticated scoreable games is the "Low-Level Radwaste Siting Game." Its creation was commissioned by the U.S. Department of Energy (DOE) to assist in the complicated task of siting low-level radioactive waste (LLW) disposal facilities. This multi-party, multi-issue process is very controversial. The game was designed to teach cooperative problem-solving as a technique for managing conflict in negotiating situations.

In December 1984, 34 people participated in the gaming simulation at a DOE-sponsored workshop. A post-game questionnaire was distributed to each participant. Its purpose was to discover if participants had left the workshop with a commitment to approach complex dispute situations, such as LLW facility siting, in a cooperative manner and if they had, what factors contributed to this. The findings indicate that more than half of the participants left the workshop expecting to behave in a cooperative manner when negotiating. Factors contributing to this involved the personal goals of individuals. The outcome of the game (e.g. whether or not a negotiated agreement was reached), was not a factor. Participants who responded that they expected to behave in a cooperative manner were designated "learners." Learners distinguished themselves from "non-learners" in many ways.

The thesis supervisor was Professor Lawrence E. Susskind.

Acknowledgements

My thesis is based on the experiences of the 34 participants in the U.S. Department of Energy-sponsored Low-Level Waste Facility Siting Workshop. Without them, this study would not have been possible. I thank them for their thoughtful responses to my questionnaire and for the time they spent with me in telephone interviews.

I extend my deepest appreciation to my advisor, Larry Susskind. I am grateful for the many opportunities he has offered during my two years at MIT. His guidance and encouragement have been invaluable.

Finally, heartfelt thanks go to Jon Mattleman. As always, his support, patience, and unfailing sense of humor (not to mention basketball trivia ...) helped me keep matters in perspective.

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INTRODUCTION

On December 14, 1984 about forty people met at the Massachusetts Institute of Technology in Cambridge, Massachusetts to take part in a workshop on low-level radioactive waste (LLW) facility siting. The purpose of the workshop, sponsored by the U.S. Department of Energy (DOE), was to introduce participants to theories and techniques of effective conflict management in hopes that such exposure would influence their approaches to LLW facility siting disputes. A negotiation simulation exercise or "game" was to be the vehicle for interested parties to learn about joint problem-solving techniques, experiment with these techniques, and develop new strategies and behaviors for productive interaction in complex dispute situations.

The DOE is the lead agency for national planning and coordination of LLW management. One role of DOE's LLW Management Program is to assist states in fulfilling their LLW disposal and facility siting responsibilities. Toward this end, in 1984, DOE approached the Program on Negotiation (1) at Harvard Law School to create a simulation exercise specifically to help identify "desireable patterns of interaction" between parties involved in the LLW management process. DOE recognized that,

development of effective communication between parties in conflict and the utilization of techniques to manage and resolve conflicts represent perhaps the most significant challenge for the people involved in LLW disposal in the next decade (DOE, 1984).

I wondered what impressions participants were left with at the conclusion of the workshop. Did participants in the gaming

simulation leave the session with a commitment to approach complex dispute situations, such as negotiating LLW facility siting, in a cooperative manner? For those that did, what factors contributed to this?

I designed and distributed a questionnaire to workshop participants in an effort to answer these questions. Responses showed that more than half of the participants left the session with a commitment to behave in a cooperative manner when negotiating. The study reports and elaborates on these findings. In conclusion, the study suggests three broad purposes that the LLW simulations serve in preparing people to address LLW facility siting issues.

Chapter 1

LOW-LEVEL RADIOACTIVE WASTE POLICY AND POLITICS

There are currently three facilities nationwide that accept low-level radioactive wastes (LLW) for disposal (2). These facilities, located in Beatty, Nevada, Barnwell, South Carolina, and Richland, Washington, must provide commercial LLW disposal capacity for the entire country. They have been doing so since 1978.

In 1980, Congress passed the Low-Level Radioactive Waste Policy Act (94 STAT. 3347, P.L. 96-573-Dec. 22, 1980) which was designed, in part, to relieve the unfair burden borne by these three states. The Act mandated that each state accept responsibility for the disposal of its own commercial LLW (3). The Act also stated that LLW can be "most safely and efficiently managed on a regional basis" and encouraged states to enter into regional compacts as necessary to provide for LLW disposal. The Act enables any Congressionally-ratified regional compact, as of January 1, 1986, to refuse to accept LLW from states outside the regional compact (4). The January 1986 deadline is now upon us and a number of states are without access to one of the three existing sites. Moreover, not one state or regional compact has been successful in siting a new facility.

In 1962, Beatty, Nevada became the site of the nation's first LLW facility. The site was licensed by the Atomic Energy Commission (AEC) and operated by a private firm. Two more

commercial sites opened in 1963; one at Maxey Flats, Kentucky and the other at West Valley, New York. Between 1965 and 1971, three more facilities opened: Richland, Washington in 1965; Sheffield, Illinois in 1967; and Barnwell, South Carolina in 1971. With six licensed regional facilities, the needs of LLW generators were being met and the responsibility for hosting sites was shared regionally. By 1979, however, three of the six sites had closed due to problems with the disposal method of shallow land burial.

Maintaining the integrity of LLW sites is essential, given the goal of restricting releases of radioactivity to levels that do not pose a threat to public health and safety. When the Nevada site was established in 1962, comprehensive criteria for siting and packaging LLW for disposal did not exist. Shallow land burial for LLW was basically an adaptation of sanitary landfill techniques. Unfortunately, what are now recognized as being questionable siting and operational practices were factors in the decisions to close the New York, Kentucky, and Illinois sites. All three sites had serious water management problems. In addition, by 1979, the Illinois site had exhausted its licensed capacity.

The three remaining sites were not without their own problems. During 1979, the governors of both Washington and Nevada ordered their sites temporarily closed for periods of time. For hospitals, research institutions, and some industries with limited on-site storage space, this raised the prospect of cutbacks on LLW-generating activities. (Nuclear power plants were not as directly affected as they have larger on-site storage

capabilities). Because the sites were only closed temporarily, a crisis was averted. However, the Nevada site is now operating under emergency regulations that require third-party inspections of all generators shipping wastes to the site. Consequently, costs of using the facility are high and its use is discouraged. In 1983, Beatty received only 2 percent of the LLW commercially disposed whereas Richland received 53 percent and Barnwell 45 percent (Spath, 1984).

In 1978, Governor Richard W. Riley ordered that the South Carolina site reduce the amount of LLW accepted for burial. So, South Carolina established a policy of limiting acceptance of wastes at Barnwell to 2.4 million cubic feet per year. This was followed in 1979 by an announcement that this limit would be further reduced to 1.2 million cubic feet. The limitation was to take place in phases and be completed over a two year period (National Conference of State Legislatures, 1981).

The message was clear. As hosts of the only operating disposal sites, the governors of these three states were not prepared to bear the LLW disposal burden for the entire nation. As they threatened to close their facilities to outsiders, state authorities and the industry began to recognize the crisis potential of disposal capacity shortages.

Representatives of the three states had additional concerns regarding the absence of regulations and/or the lack of enforcement of regulations to protect public health and safety. This prompted the U.S. Nuclear Regulatory Commission (NRC) to promulgate regulations in December 1982 entitled, "Licensing

Requirements for Land Disposal of Radioactive Waste." These are codified in Title 10 of the Code of Federal Regulations (Part 61). 10 CFR 61, as the regulations are referred to, represents the nation's first comprehensive set of criteria for regulating LLW disposal. 10 CFR 61 provides procedures, performance objectives, and technical requirements for licensing land disposal of LLW (5). With these regulations, requirements for establishing and operating commercial LLW facilities are much more stringent than they have been previously.

The U.S. Department Of Energy (DOE) and the NRC have produced numerous documents to guide states through the siting process. (The siting process is defined as the entire process from determination of need for a site through site start-up). The DOE is responsible for working with states to assist in the overall planning necessary to provide state and regional solutions for LLW disposal. The NRC is responsible for approving the license for and regulating the operation of LLW facilities in "non-agreement" states. "Agreement" states assume their own regulatory authority over LLW but must first have received approval by the NRC and passed state legislation enabling them to do so. Of course, both "agreement" and "non-agreement" states must abide by the NRC's baseline technical siting regulations as set forth in 10 CFR 61.

While technical, economic, and policy-related details must be tailored to the needs and situations of specific states and regions, there are six generic phases in the siting effort (DOE, 1982 and NRC 1982). These will typically be carried out by several entities including the state, a regional compact and

private contractors. Federal agencies are available to provide assistance and may be involved in regulatory activities if the state is a "non-agreement" state. The six phases are summarized below.

Assessment of Needs and Approach: The state or region evaluates the current and projected status of LLW generation; management practices; legal, political, and regulatory considerations; and future options. A decision is made to site a disposal facility and a planning effort is undertaken to achieve that objective.

Site Screening: Site suitability criteria (pertaining to demography, hydrology, geology, soils, land uses, cultural resources, and other factors) must be met for a site to be selected. If the state is an "agreement" state it may establish its own criteria or regulations to supplement those of the NRC. Criteria are used to screen for suitable areas within an identified region, these areas are screened for potential viable sites on a more detailed scale, and are screened once again to yield candidate sites.

Site Selection: Candidate sites are identified based on the screening criteria, preliminary data is collected, and technical and economic evaluations are performed. Based on these evaluations, a preferred site is chosen. Two or three viable alternatives are also chosen.

Site Characterization: Technical, economic, and environmental analyses are performed concerning the design, development,

operation, and eventual closure of the site. These are necessary to support a license application and verify that the site has potential to operate in a safe and sound manner. The site characterization phase will require a minimum of one year and will likely extend much longer. Site characterization also requires a significant expenditure of money.

Licensing Activities: The licensing agency, either federal or state, reviews the license application, safety and environmental reports, the general site design, and other information to ensure compliance with applicable federal, state, and local regulations.

Site Development and Operation: If a license is granted, final design and operating plans are developed, facility construction and personnel training are completed, and the site is prepared for operation.

These generic phases are expected to overlap in time. Public involvement and community relations activities should be an integral part of the process and indeed, are crucial to its success.

In an effort to comply with the 1980 Act, most states have participated in regional compact discussions. To date, five compacts (comprising 26 states) are awaiting Congressional approval; three of these (Northwest, Southeast, and Rocky Mountain) have one of the three operating LLW facilities within their region. The other two compacts, Central and Central Midwest states, have no facilities in their region. Texas is the only state so far that has definitely committed itself to

working outside of a compact. It has established a LLW Disposal Authority and is further along in the process than any other state or regional compact. In late 1984, it identified candidate sites as part of its site selection process.

Based on 1983 data, the member states in the three regions with operating sites generated about 41 percent of the volume and 25 percent of the radioactivity of the nation's commercial LLW. With the exception of South Carolina and Illinois, three of the largest waste-generating states are not included in any of the five compacts scheduled for Congressional ratification. These are Massachusetts, New York, and Pennsylvania. In addition, 24 states (generating about half of the volume and radioactivity of the nation's LLW) are not expected to be ready to assume their responsibilities under the 1980 Act on January 1, 1986 (Spath, 1984).

The reasons for failing to comply with the deadline are many and reflect the complexities of the LLW facility siting issue. First, governors and legislators are reluctant to deal with any nuclear facility-related issue because of tremendous public opposition. With the exception of the three states that want to stop incoming LLW shipments, few states are anxious to address the situation until it becomes absolutely necessary. For some, the strategy of delay may make the most sense. Second, the impetus for most states to participate in regional compacts has been primarily defensive. By taking part in such planning, they might possibly be able to encourage some other state in their

compact to accept the facility thereby avoiding the responsibility themselves.

Third, there are controversial issues yet unanswered which will be difficult to deal with, even given the cooperation of all concerned parties (which in reality is highly unlikely). In addition to the question of which state in a compact will host the facility, other problems include: a precise definition of LLW has not been resolved to the satisfaction of all parties; liability issues; and transportation issues (Spath, 1984). If these problems are not enough, there are intrastate problems of staggering proportion. These include: deciding the appropriate roles of various government agencies; determining the process of site selection; and making the choice of a specific technology. Most importantly, states must deal with the potential political impasse of public opposition to the siting of LLW facilities.

Chapter 2

LOCAL OPPOSITION TO LOW-LEVEL RADWASTE FACILITY SITING

If one aspect of the current LLW situation is predictable it is that there will be tremendous local, public opposition to the siting of facilities in communities. Such opposition is similar in most respects to that observed in the course of siting any large-scale facility perceived to be undesirable, including hazardous waste treatment facilities, power plants, airports, and prisons.

Opposition arises from the fact that these facilities are necessary and serve important regional functions but are typically undesirable and noxious to the "hosting" and abutting communities. Facility benefits are diffused across a wide region and, for the most part, beneficiaries perceive that their rewards are modest. Host and abutting communities, on the other hand, have been asked to bear a burden for the entire region. They acknowledge that such facilities are essential and should be sited but just "not in their backyards." They feel unfairly obligated to suffer the potential risks, costs, and lifestyle disruptions associated with a facility. Their losses may appear diminished when compared with overall regional gains; however, concentrated local opposition is born out of self-interest and concern for community. Because of modest rewards and decentralization, beneficiaries are much less likely to coalesce to support the facility.

Opponents of a proposed facility will tend to organize easily.

They are neighbors. They see one another on a day-to-day basis and are involved in community activities. Most importantly, they share a vision of community life that does not include the facility and thus, they share the objective of stopping it. They are determined and resourceful in acquiring the skills necessary to participate in public siting activities. After all, they will argue, the siting decision is the most significant control they may have over this unwanted, potential neighbor.

Location of a facility is permanent. It will undoubtedly be someone's neighbor and it does not appear to offer any significant rewards. In fact, it seems to offer only risks and problems (Elliott, 1984). It may increase public health and safety risks, it may threaten sensitive environments and the quality of natural resources, and it may alter lifestyles. While the host community may realize new tax revenues, this will not be the case for abutters who may also be impacted by the facility. Monetary compensation is not likely to dispell opposition for much that is threatened cannot be evaluated monetarily. It makes sense that communities will oppose the facility. It is expected to be an unwelcome neighbor and the potential gains do not outweigh what are perceived to be direct and severe losses.

Opposition will also arise because LLW facilities often evoke nuclear-specific images such as nuclear power plants, the Three Mile Island incident, nuclear weaponry, and other perceptually negative connotations. Because nuclear power plants produce LLW, for many, accepting the siting of a LLW facility is synonymous with condoning the use of nuclear power. This is in itself a topic of considerable public and political debate.

The traditional approach to facility siting serves only to aggravate local, public opposition (Bacow, 1983). It is characterized by rigidity, suspicion, hostility, and lack of communication by both proponents and opponents. The traditional siting process begins with the proponent, either a government agency or a private developer, determining a need for and deciding to build a facility. This is typically done in isolation, with only a small proportion of the public aware of what is occurring. There has likely been little or no interaction with potentially affected parties or local governments. After conferring with appropriate technical and political advisors, the proponent announces one of two things - either that he intends to build a particular facility on a specific spot or that the need for a facility necessitates some sort of process whereby a site will be chosen (Susskind, 1985).

If a site-specific proposal is announced, the proponent might also suggest that a few alternative sites be studied. To opponents, these will appear to be contrived given the proponent's likely strong support for the preferred site. Community groups will organize and take action, legal and otherwise, to stop the proposed facility (6). They will be motivated not only by a desire to keep the facility "out of their backyards" but also by what they perceive to be a disingenuous proponent who has "sprung" this project on them at the last minute. If a siting selection process is proposed, active opposition may take a bit longer to coalesce. However, once underway, the process will typically be managed by the proponent,

whom the potential host communities will perceive as being biased.

As technical studies are performed and institutional and regulatory affairs addressed, public information and participation programs are initiated. Such efforts are too often merely token or staged efforts at soliciting public input and can be characterized as "too little and too late". At this point, people who are concerned about the location of the proposed facility and suspicious of the proponent's motives, will behave defensively. They will reason that, at this stage in the process, the proponent is unlikely to change his mind and choose another site, alter his project, or become especially responsive to public concerns. The realization will occur that the opportunity to participate in formal public events is not the same as the opportunity to share in the power of decisionmaking (Suskind, 1985).

As the proponent has taken a strong position and is determined to build the facility, so has the opposition decided that they must be equally uncompromising in protecting their own interests. Neither group understands the other's values nor shares their expectations. Project proponents respond to what they perceive to be local fears, by conducting technical studies in an attempt to assure that health, safety, and other concerns will be met. They are not convinced that their role demands more than this. Residents feel that they have been misled in the past by the government and by technical studies. They do not trust any outside party to protect their community as well as they can.

The process is fraught with conflict and characterized by inflexibility. Both parties resort to "positional" behavior; that is, behavior that is uncooperative and uncompromising. Positional behavior is characterized by strict adherence to a particular set of narrowly framed, preconceived notions about how to accomplish specific goals. It is assumed that these are mutually exclusive of the opponent's goals. Ultimately, the dispute may end up in court, with long delays and high costs. No one is likely to emerge feeling like a "winner".

An alternative to the traditional approach is needed which will allow each party to achieve its goals while also meeting the needs of the other parties. For example, such an approach should enable a proponent to build a facility and meet its needs without spending exorbitant amounts of time and money in legal battles. It should also enable towns and local citizens to control their own destiny instead of feeling "duped" by developers and the government into hosting a facility. These "joint gains" cannot be accomplished with the traditional "Decide-Announce-Defend" approach (Ducsick, 1979). This approach, as described above, unnecessarily results in a zero-sum situation.

A more successful process would involve collaborative problem-solving, the focus of which is the definition and solution of joint problems. Typically, this can be accomplished in a negotiation situation whereby all interested and affected parties, called stakeholders, are involved in working together to discover solutions that are acceptable to all. (Since joint problems are defined in terms of the interests of all parties, it

is important that all key parties be represented in the negotiation. This lessens the chance of "surprises" later in the process.) Meeting this objective necessitates that parties look beyond their own narrowly conceived interests and consider the concerns of other, "opposing", parties (Susskind, 1984). In so doing, parties may discover that they have overlapping interests or that one cares strongly about a point that the other has no strong feelings about. This encourages trading between parties so that each can meet their own interests.

There is no guarantee that this type of negotiation will lead to solutions for all siting conflicts. But it will, at a minimum, encourage stakeholders to interact with each other in a productive rather than a confrontational manner, while simultaneously fostering an environment in which each might meet their own interests. A negotiated approach to joint problem-solving can address many of the concerns and sources of conflict that are either ignored or inadequately addressed by the traditional siting process. Some of these are discussed below.

Information: A complaint frequently voiced by local groups is that they do not have adequate information on certain topics. Another complaint is that the available information is not believable because it was compiled by the proponent. If original analyses have been performed, it was likely by the proponent. Some parties may feel that this results in biased information upon which important decisions must be made. If parties can negotiate an agreement regarding a joint fact-finding approach to generating analyses, it will be easier for them to make and

defend their decisions. Naturally, for the approach to be successful, stakeholders must negotiate an agreement on the scope and objectives of the studies, jointly select consultants to perform the studies, and agree that the finished product meets the desired objectives (Susskind, 1985).

Risk: Communities that host regional facilities perceive that they are expected to shoulder a disproportionate share of health and safety risks. They may also feel that the facility and its attendant risks have been forced upon them with little warning or sensitivity to community needs. Negotiations amongst stakeholders may help reveal community concerns and means of addressing them. For example, a potential host community for a LLW facility may be concerned that volumes of incoming radioactive materials will increase over time. It may be necessary to initiate a LLW source reduction plan to address and help assuage community concerns. A joint problem-solving process which fosters communication amongst parties is conducive to inventing options and discovering solutions such as these. This type of concern might have presented itself as an impasse in the traditional process.

Decisionmaking Responsibility: Too often communities feel that they have been given only a token opportunity to participate or that they have been altogether excluded from the decisionmaking process. A negotiation may alleviate the sense of alienation and illegitimacy that communities feel as a result of the traditional process. Joint problem-solving helps to open up the process from the outset.

The need to be involved in decisionmaking extends beyond the siting process and to the facility operations phase. A community may be concerned that, once operating, the facility may not be properly managed and maintained to protect against accidents and unacceptable conditions. Stakeholders may find that addressing this concern in a cooperative manner might result in a contract of shared control and monitoring of the facility. This would address a community need to exert control over its future.

Compensation: Few communities will allow themselves to be "bought" by a facility proponent and will staunchly resist if approached. Moreover, many impacts and losses cannot be measured monetarily. Rather than insult the integrity of a community by offering monetary compensation for some impacts, a negotiated compensation package might raise the possibility of compensatory action in the form of in-kind payments such as creation of parkland, relocation of sensitive habitats, and other specific actions. Creative solutions are not as easily discovered when parties are not communicating their needs to one another and when they feel "stuck" in an inflexible and adversarial process.

Chapter 3

GAMING SIMULATIONS

History and Rationale of Gaming Simulations as Teaching Aids

One of the best ways to learn is by doing. Hence, it was decided that a gaming simulation would be used to highlight the sources of conflict inherent in LLW facility siting. A gaming simulation could also serve the purpose of exposing participants to the use of negotiated problem-solving as an approach toward resolving these conflicts.

Without having been involved in a LLW facility siting dispute, it might be difficult to imagine the various parties, what their concerns might be, and how they might behave in an attempt to meet their self-interests. Even if one knew this information for some of the parties, it might be difficult to imagine how competing and conflicting interests might be reconciled in an attempt to reach a solution. And, even if one had been involved in negotiations concerning LLW facility siting, one could always learn more about reaching agreement efficiently and effectively. Short of actually participating in a siting process, simulating it in "game" form is beneficial. In fact, it may be preferable to participate in a simulation before becoming involved in the real thing.

Historically, games have been considered exercises for the purpose of amusement or diversion. However, games such as checkers and chess have their origins in war games developed

thousands of years ago. In the late-eighteenth century, military games were used to simulate real-world battle situations for analysis. Since World War II, gaming simulation techniques have become increasingly sophisticated and employed in military-policy-making areas such as strategic planning and weapons development. "Crisis" games have also been developed which require roleplaying in a scenario of a hypothetical crisis situation, usually in international relations.

In the mid-1950's, the American Management Association along with IBM explored the use of gaming simulation for training purposes in the business world. Since then, the popularity of gaming for educational purposes has grown. Today, most business schools use gaming simulations as teaching aids. In the 1960's, gaming for social science purposes emerged. These included games in the fields of hospital administration, community politics, ecology, and numerous others (Duke, 1966). Currently, gaming is employed in an increasingly large number of academic and professional contexts to simulate real world situations.

The popularity of gaming simulation is explained by the ability of games to provide a microcosm of a specific environment and process of interaction. In this way, games serve as a vehicle for providing a holistic image of processes that are not effectively communicated by other means. Gaming encourages a dynamic transmission of ideas and "emphasizes a heuristic understanding of some complex reality" (Duke, 1974).

Simulations are essentially operating models of systems or processes as opposed to static models (such as mathematical or graphic models). A simulation enables one to see how a system

exists in any given period of time and perhaps more importantly, how it changes over time. Of necessity, a simulation simplifies elements from a larger system to illustrate and represent views of reality, including interrelationships between those elements. Gaming is an experimental or training technique which may or may not make use of a simulated environment. Games are typically associated with the study of human behavior or the teaching of skills (Shubik, 1964). The gaming simulations referred to here are concerned with teaching individuals about negotiated problem-solving.

The elements in the gaming simulation are patterned from a real-world system. These elements include players' roles, goals, activities, and constraints. Linkages amongst and consequences of these elements are either wholly or partially dependent on the players' decisions (Greenblat, 1975a). Inasmuch, games require active participation on the part of players and players are encouraged to learn as a result of their participation.

Greenblat (1975b) discusses several educational viewpoints which support the use and value of simulation games as pedagogical tools or devices. These include the views that minds are to be developed rather than filled with information that may soon be obsolete; that people learn, not because learning is a goal in and of itself but, because they feel that their learning will facilitate effective goal achievement; and that people learn best by doing and hence, should interact with information in an active rather than passive manner. Simulation games relate directly to many of these notions.

Simulation games help people learn by provoking curiosity and inquiry rather than by "feeding" information. Games are appealing to people. They create engaging and innovative environments in which to learn. By so doing, they promote holistic ways of looking at events and processes, and provide an opportunity for vicariously experiencing some of the elements of those events and processes. Games require active participation. This frees players from dependence on a "teacher." Players must make decisions and face the consequences of those decisions on their own. As in real life, decisions must sometimes be made with less than adequate information and time constraints. The consequences of not making a decision have as much of an effect as any other decision. Experiencing this firsthand helps people learn and retain information much more effectively than having a teacher explain it in the abstract (Duke, 1964).

Another characteristic of a productive educational environment that can be captured in a game is the ability to permit and encourage exposure to various perspectives toward to the problem at hand (Moore, 1969). This experience encourages people to think about the viewpoints of others - their feasibility, desirability, and other considerations.

A learner is more receptive to information if it addresses a direct need and if it is communicated in a logical and coherently structured manner. It is crucial that the learner be capable of identifying or perceiving to identify with the context in which the information is presented (Duke, 1974). This will enable him or her to deduce or make inferences that seem appropriate, that will feel comfortable, and that might be extrapolated to real

life. It will also enable players to draw on their own goals and sources of motivation. Thus, an important feature in the success of games as teaching devices is their basis in and adherence to reality. If players feel they can relate their gaming activities to reality then the credibility of the game will be enhanced and the prospect that learning will occur is increased.

While offering an opportunity to interact with information in an active rather than passive manner, games also provide a "safe" environment for learning. They provide an opportunity to practice real-life situations without having to pay real-life consequences of actions. They also provide an opportunity to experiment with new behaviors in a relatively risk-free setting, safe from the worry that the outcome will affect life outside the game.

Scoreable Games and LLW Facility Siting

The opportunity for learning from a simulation game continues long after the gaming session is finished. It is hoped that participants will reflect on their experiences and try to integrate aspects of what they learned into their lives. Debriefing sessions immediately after the gaming simulation are a very important followup. They allow participants to discuss the process and outcome of their game and share their experiences with others. If a scoreable game is played, scores can be compared amongst teams. This enables players to evaluate the effectiveness of various tactics and strategies.

Simulation games can be either scoreable or non-scoreable.

Both types are suited for pedagogical purposes; however, scoreable games may offer many advantages over non-scoreable games. Unlike non-scoreable games, scoreable games allow for objective evaluations of outcomes. In debriefing sessions, participants in non-scoreable games discuss their feelings about the process and outcome of the games they played. Objective comparisons between games, and even evaluations of individual games, are difficult to achieve.

In a scoreable game, however, players are equipped with information to help them evaluate the value of the agreement they walked away with (or from). Along with their confidential instructions, players in a scoreable game are given a "scoresheet" designed specifically for their role. This explains their interests and concerns on the subjects at hand. It illustrates which issues are of greatest and least concern and serves as a guideline throughout the game. While players are forbidden from revealing the scores on their scoresheet to any other player, they must strive to communicate them in a manner that will be convincing to others.

Because parties will be guided by self-interest, whatever the topic of the game, parties are typically given the goal of reaching an outcome worth as many points as possible to them. A party cannot agree to be part of an outcome if it does not meet their individual minimum score or "reservation price." As explained by Raiffa (1982),

Your reservation price - which is based on the value you have placed on [no agreement] - is the absolute minimum value that you

(as the maximizer) would be willing to settle for. Any lesser value would be worse than the no-agreement state; you would walk away from the bargaining table rather than settle for a value less than this minimum.

Having a reservation price allows players to compare their results with the results of others. It also enables them to compare their result to the highest score possible. This information is important in helping players understand their outcomes and how to improve them.

The LLW facility siting game designed for DOE is an example of a scoreable game. In fact, it represents the most advanced scoreable game designed. In this game, which is described in detail in the following chapter, participants are given the task of negotiating a specific task related to LLW facility siting. The goal of each party is to reach a negotiated agreement that meets their self-interests. The game is designed and the scoring system is such that there are a limited number of agreements that will satisfy the reservation prices of the necessary parties required for an agreement to be considered acceptable. The players must work hard to discover the limited number of possible agreements. The purpose of designing the scoring system this way is to teach the lesson that players will do better for themselves if they work hard to help their opponents do better as well (Susskind, 1985b). This lesson emphasizes the importance of maximizing "joint gains", as will be necessary if LLW facilities are to be successfully sited.

Chapter 4

THE SIMULATION EXERCISES

The Game Design Process

The process of designing and pretesting the Radwaste Siting Game took about five months, from August to December 1984. Because the game is to be applicable for play in any state, all characters and settings are fictitious, and the scenario is hypothetical. The game was, however, designed to simulate what an actual siting process would be like and the issues of concern to those involved. The work was accomplished in several key steps.

The goal of the first step was to produce a matrix summarizing the interests and concerns of key stakeholders at various points in the LLW facility siting process. This task required identifying stakeholders and constructing the framework of a siting process to account for institutional, regulatory, technical, and public involvement activities. Matrix cells were then filled with lists of the concerns, needs, and responsibilities of the various stakeholders throughout the siting process. The matrix included 10 generic groups of stakeholders (e.g. environmentalists, state elected officials, abutters, and others) and 14 generic siting steps.

The matrix took about a month to produce. Background research involved personal and telephone interviews with individuals actively involved in LLW facility siting, and familiarization with DOE and NRC siting reports and regulations. Given that

states have different siting procedures, political situations, and physical characteristics, and that the game was to be suitable for play nationwide, the siting process outlined was actually a composite of existing and proposed processes. The objective was to ensure that all participants could realistically identify with at least some part of the process as presented.

Two potential games seemed especially obvious from the matrix. These were sketched into "stories" and expanded for further applicability to a scoreable negotiation game. Again, the stories were written to be hypothetical so as not to suggest that the scenarios were based on the experiences of any particular state. One game involved negotiation about site screening criteria and the other involved negotiation over which of three potential sites should be the actual LLW facility site. Our research and experience indicated that these two multi-party, multi-issue parts of the siting process would be most conducive to negotiated problem-solving and a scoreable game.

With two acceptable story lines, work began to develop two structured, scoreable games. This involved reducing the number of parties from 10 to a more manageable 6; consolidating the number and variety of issues that each party would be concerned about so as not to overwhelm players with the amount of information to be negotiated; player-specific points had to be assigned to each issue negotiated, thresholds had to be established to formalize each party's minimum requirements for agreement, and scoresheets had to be produced; and finally, the mechanics or formal rules for the negotiations had to be

developed.

Developing the games occurred in an iterative manner. Issues and components were incorporated at certain junctures while others were discarded where necessary. Numerous computer runs were conducted to identify the possible combinations of agreements that would be acceptable to various combinations of parties. Players' points and reservation prices were altered depending on the ease or difficulty with which an agreement could be reached.

The games were pre-tested twice in an effort to solicit comments on how realistic and useful they were. This was done once in October in Boston and again in November at DOE in Oak Ridge, Tennessee. People played the games whose "real life" interests and vocations resembled those of the parties depicted in the games. Their comments and impressions resulted in several changes to "fine tune" the games. Another stakeholder was added to represent interests that were thought to be missing, instructions were clarified, points were modified, and background information was added to explain the history of relationships between the parties. These practice runs were crucial in contributing to the internal consistency, realism, and overall success of the final versions of the games.

A Description of the Simulation Games

The negotiation simulation exercises or "games" are exercises in joint problem-solving. Teams of players, representing different stakeholders in the LLW facility siting process, are

assembled and left on their own with instructions to negotiate an agreement with regard to a specific LLW facility siting task. Depending on their interaction, some teams of players will be successful in negotiating an agreement acceptable to most involved parties, others will reach unanimous agreement, and still others will be unable to negotiate an agreement at all.

The Radwaste Siting Game is composed of two distinct parts (7). The first part, Game I, involves choosing site screening criteria; that is, those criteria that will be used to "screen" parts of a state or region to locate areas with characteristics appropriate for a LLW facility. The task set forth in Game II is to choose a site for a LLW facility from one of three previously designated towns. The three towns, which differ in several aspects, are presumably finalist towns that have satisfied the state's special site screening criteria as developed in Game I. Each game is designed to be played in a two to three hour period. Of course, the playing time can be increased if desired.

One need not have played Game I to appreciate or play Game II, or visa versa. The games are designed to be independent of each other. However, they do complement one another and, when played in order, allow players to simulate the site screening and selection process that is expected to occur in LLW facility siting.

Game I begins with a representative of a hypothetical State Regulatory Agency (SRA) in a hypothetical state convening a meeting of key stakeholders in the LLW site screening criteria selection process. The SRA is the state agency responsible for promulgating site selection criteria and enforcing compliance

with state and federal regulations. The SRA is anxious that siting criteria be decided as soon as possible.

Originally, the SRA planned to develop a set of 10 siting criteria that would supplement those already embodied in federal regulations (primarily 10 CFR 61). Given growing public concern and fears that widespread opposition might delay the siting process, the SRA now prefers not to decide these criteria unilaterally. In an attempt to maximize public support for the regulations it will ultimately promulgate, the SRA has agreed to host a special meeting for all parties interested in the regulations. The purpose of the meeting and the goal of Game I is to generate a joint proposal of the 10 criteria that will be used in evaluating potential LLW sites.

The SRA has promised the parties that if they can agree to a set of 10 criteria (out of 21 possibilities), it will adopt all 10 of them. If, however, the parties fail to reach an agreement, the SRA will take matters into its own hands. The SRA has not indicated which criteria it will promulgate if it is forced to act on its own. Each party would prefer to have the criteria it cares most about adopted by the SRA and therefore each has some incentive to negotiate.

The seven stakeholders with an interest in the siting criteria are:

- * Public Management Authority (PMA)
- * Federated Indian Tribal Council (Council)
- * Environmental Coalition (EC)
- * Green Wave (GW)

* State Association of Municipal and County Governments
(Munis)

* Association of Radwaste Generators (ARG)

* Governor's Blue-Ribbon Advisory Committee (Gov)

Each party is provided with confidential instructions and a scoresheet designed specifically for their role. These explain their interests and concerns on the subject of site screening criteria and serve as guidelines throughout the game. A party's confidential scoresheet illustrates which of the possible 21 criteria are of greatest and least concern to them. (Each of the 21 criteria are assigned a positive or negative numerical value). The criteria are explained in some detail for the sake of clarification and to explain technical details.

Each party's goal is to promote an agreement on a package of 10 criteria that is worth as many points as possible to them. No party can agree to a package unless it meets their reservation price. The parties have many conflicting as well as overlapping opinions about the possible criteria. It is up to them to decide how to proceed with the negotiation and how to organize the limited time they have been given. Only the seven abovementioned parties are present for the negotiation. The SRA has merely convened the meeting. There is no designated chairperson or meeting facilitator.

A proposal of ten criteria will be accepted only if at least 5 of the 7 parties support it. That is, it must meet or exceed the reservation prices of at least 5 of the parties. In addition, all proposals must specify only 10 of the 21 possible criteria - no more and no fewer. The game is designed and the scoring

system is such that there are a limited number of agreements (packages of 10 criteria) that will satisfy the reservation prices of at least 5 of the 7 parties. There are 51 solutions involving 5 players, only 4 solutions involving 6 of the 7 players, and no agreements are possible involving all 7 players. The players must work very hard to discover one of these 55 agreements out of thousands of possible, but unacceptable, combinations.

The Radwaste Siting Game II begins with a representative of a hypothetical state agency called the Public Management Authority (PMA) convening a meeting to determine which one of three sites will be selected to host the state's LLW facility. There are six key parties that have expressed concerns about the three candidate sites, including representatives of the three communities in which the proposed sites are located.

The PMA is a newly created state agency given the responsibility of managing the siting, construction, operation, and decommissioning of an in-state disposal facility. Its goal is to site a LLW facility within the time limit specified by law. But it recognizes that the viability of a site is dependent on appropriately addressing public and community concerns to diffuse outright opposition. The PMA has the power to select a facility site. It is concerned, however, that unilateral action will alienate the various parties and thus increase the likelihood of controversy and delays in the site development process. The PMA is therefore hopeful that the parties will be able to select a site through a consensual process.

If the parties reach agreement on one of the candidate sites, the PMA will approve that site for the State's LLW facility. But if the parties fail to reach agreement, the PMA will quickly act on its own and select a site.

The other parties concerned about the facility and included in this siting negotiation include:

- * Governor (Gov)
- * Environmental Coalition (EC)
- * Association of Radwaste Generators (ARG)
- * Town of Alford (Site A)
- * Town of Bellman (Site B)
- * Town of Crandon (Site C)

The goal of the parties is to reach an agreement on a LLW facility site. If an agreement cannot be reached, the Governor has empowered the PMA to select one of the three sites on its own. No one knows which site the PMA will choose; thus, there is no guarantee that the site will be chosen with complete sensitivity to the concerns of those potentially impacted. Therefore each party has some incentive to negotiate.

The discussions may proceed in any direction proposed by the parties. The PMA hopes that an agreement can be reached, thus preventing a situation in which it would have to choose on its own. But, the PMA will accept an agreement only if at least 5 of the 6 parties will support it and only if the host community agrees to accept the site. This local veto power is granted by state statute, but remains effective only as long as the negotiations continue. The PMA will not participate in the negotiations.

Because of the conflicting interests and concerns of the various parties and the predictable community aversion to hosting a LLW facility, the game is designed so that a limited number and combinations of agreements are acceptable. In fact, only 7 agreements are acceptable. Five of these are 5-way and only 2 are 6-way agreements. To arrive at an acceptable solution, players must be effective communicators and creative problemsolvers. As in Game I, each party is provided with confidential instructions, reservation price, and scoresheet to guide them through the negotiation. Unlike Game I, however, the parties are also given conflicting technical information in the form of two environmental assessments. It is explained that an environmental assessment comparing the three proposed sites was prepared by the state. It was subsequently criticized by the Environmental Coalition (EC) as being biased. The EC then proceeded to do an alternative analysis. Parties must grapple with the differences between the two documents in an effort to determine what they believe to be accurate assessments of impacts.

Another feature of Game II is that, 30 minutes into negotiations, the player in the role of Governor is called aside and instructed that specific compensation options (both economic and noneconomic) may be offered to the potential host town. Each party then receives supplemental confidential instructions, with revised scoresheets, regarding the new compensation options. These include: monetary compensation from the state and/or LLW generators; the opportunity to share in the control and monitoring of the facility (including the ability to close it);

and reduction of LLW at its source of generation (either with "caps" or with fees). Options and sub-options are valued differently by each party and negotiations revolve around the acceptability of various "packages" of options.

Results of the Games

About forty people took part in the DOE-sponsored LLW Facility Siting Simulation Workshop. The agenda for the participants in the day-long workshop was to play the games, reflect on the gaming experiences, and learn productive means of interacting in a negotiation situation. Participants included citizen activists, representatives of Federal and state agencies, private consultants, LLW generators, environmentalists, and others. They all shared a professional responsibility for and/or a personal and civic interest in seeing LLW disposed of safely and efficiently. Nearly all participants were from the Northeast United States.

Participants were assigned roles to play during the simulation and given general background information and role-specific confidential instructions to read before beginning. No one who played had previously played the game or read the associated materials. For a list of participants, their affiliations, and the roles they played, see Appendix A.

Four groups of 7 to 8 people were assembled to play Game I. (Although there were only 7 roles, some teams had two people sharing a role). More than two hours later, when the exercise was over, two of the four teams reported that they had been

successful in negotiating an agreement. The other two teams had been unable to create a package of criteria to which enough parties could agree. Table 1 summarizes the results of the Game I negotiations, including which groups reached agreement, parties to the agreement, and the final point totals for each party.

As explained above, each party had a reservation price (RP) that had to be met before it could vote "Yes" on an agreement. These reservation prices (expressed in points), are identified in the Table 1. For example, the person in the role of the Public Management Authority (PMA) had an RP of 38, reflecting the fact that only some screening criteria would be acceptable to the PMA. The agreement proposed in Group 1 resulted in a point total of 43 for the PMA representative; she could therefore vote in favor of this proposal if she so desired. (She could also have voted "No" in an effort to "hold out" for a higher score or block an agreement in which she perceived that others would receive unduly large gains). Many prior proposals may have been brought to a vote where she could not have voted "Yes". In the same group, only the representative from the Municipal and County Governments (Munis) and the Governor's Advisory Committee (Gov) had enough points to vote "Yes." With only three supporters out of the required five, the negotiated package could not be endorsed. Because there are a possible 55 solutions involving either 5 or 6 parties, there are many combinations of criteria that would have provided more than just these 3 parties with their minimum reservation price. Therefore, Group I's inability to reach an agreement indicates that they failed to discover opportunities for joint gain through their negotiation process.

Table 1

RADWASTE SITING GAME I: SUMMARY OF RESULTS

<u>Group No.</u>	Agreement on Package of 10 <u>Criteria</u>	<u>Final Vote and Point Total</u>						
		<u>PMA</u> (RP=38)*	<u>Council</u> (RP=26)	<u>EC</u> (RP=78)	<u>GW</u> (RP=180)	<u>Munis</u> (RP=67)	<u>ARG</u> (RP=8)	<u>Gov</u> (RP=63)
1	No	Yes 43	No 12	No 75	No 150	Yes 70	No 6	Yes 68
2	Yes 5 of 7 parties	Yes 39	Yes 40	No 70	No 150	Yes 68	Yes 9	Yes 65
3	No	No 31	Yes 42	Yes 80	No 160	Yes 68	No 2	Yes 70
4	Yes 5 of 7 parties	Yes 42	Yes 29	Yes 102	Yes 210	Yes 82	No -15	No 40

* RP (Reservation Price) is the minimum score any player must achieve before endorsing an agreement. The RP for one role cannot be measured against or related to that of another role. RP's are assigned in players' confidential instructions.

Had they negotiated more successfully, most of the parties could have achieved higher scores and met their reservation prices. Because this was not the case, the State Regulatory Agency (SRA) will choose 10 criteria unilaterally.

Group 2, on the other hand, was successful in getting 5 of the 7 parties to agree to a package of 10 criteria. The parties were able to exceed their reservation prices (although not by much) and voted "Yes". That a party's points are so close to their reservation price is an indication of the concessions that parties must make to accommodate others in the final agreement. That is, there are no big "winners" in the traditional sense. Everyone "wins" when an efficient and stable agreement is reached and the broader the consensus, the more secure the agreement. The agreement reached by Group 4 was also an acceptable one, even though it excluded the Association of Radwaste Generators (ARG) and the Governor's Advisory Committee (Gov). As promised, the SRA will adopt the 10 site screening criteria that were agreed to in this package.

Although many proposals were put forth during the two hour negotiation, Group 3 was unable to reach an agreement. Table 1 shows each player's points on the last proposal put forth before the negotiation ended. Four of the seven parties were able to vote "Yes" but this was one short of the five needed for an acceptable agreement. The SRA, therefore, will proceed to adopt its own package of 10 criteria.

For Game II, four teams of 6 to 8 people (some roles were doubled up) played for nearly three hours. The composition of teams was different from Game I. Again, two of the four teams

(not the same ones) reached agreement. Table 2 summarizes results of the Game II negotiation.

In Game II, the negotiation focused on choosing one of three sites (A, B, C) to host the LLW facility. The first two groups were successful in agreeing on a site. This was an especially difficult task given that the host town (A, B, C) had to grant its approval for an agreement to be acceptable. The points were structured so that this could not occur without significant compensatory measures being offered. Group 1 reached a unanimous agreement; all participants in the negotiation agreed that the LLW facility would be sited in Town A. All parties met their reservation price. (A reservation price was only applicable for a town if it had been proposed as the site for the facility. For example, for the facility to be sited in Town A, Town A had to meet a reservation price of 29. Neither Town B or C had to worry about meeting a minimum requirement because it was preferable for a site other than their own to be selected as the host site).

Group 2 also reached an agreement regarding location of the facility. Town B and the other parties (with the exception of ARG) agreed that the facility would be sited in Town B. Only five of the six parties had to agree for the decision to be acceptable. Groups 3 and 4 were unsuccessful in reaching an agreement. The points, as listed in the table, represent each party's points on the last package of options voted before the negotiations came to a close. Both groups had secured the agreement of the proposed host town but failed to produce a

Table 2

RADWASTE SITING GAME II: SUMMARY OF RESULTS

<u>Group No.</u>	<u>Agreement on Facility Site</u>	<u>Final Vote and Point Total</u>					
		<u>Gov</u> (RP=60)*	<u>EC</u> (RP=75)	<u>ARG</u> (RP=60)	<u>Site A</u> (RP=29)	<u>Site B</u> (RP=29)	<u>Site C</u> (RP=29)
1	Yes Unanimous	Yes 66	Yes 77	Yes 60	Yes 31	Yes **	Yes **
2	Yes only ARG excluded	Yes 61(62)***	Yes 76	No 49	Yes **	Yes 31	Yes **
3	No	No 51	Yes 77	No 36	Yes 40	Yes **	Yes **
4	No	No 50(51)***	Yes 76	No 20	Yes **	Yes 34	Yes **

* RP (Reservation Price) is the minimum score any player must achieve before endorsing an agreement. The RP for one role cannot be measured against or related to that of another role. RP's are assigned in players' confidential instructions.

** The RP is not applicable because this town has not been proposed to host the site.

*** The two different point totals indicate that two different environmental assessments were performed. The first number represents the point total based on the state's assessment, the second on the environmental coalition's assessment. See discussion on page 34.

package of options that could be agreed to by the Gov and the ARG. As shown by the first two groups, agreements were possible and more successful negotiations in Groups 3 and 4 would not have left acceptable packages of options "on the table".

Time was allotted after each gaming session for "debriefing" the participants. This allowed a sharing of experiences and impressions with others. There was also a more formal lecture designed to help participants relate information about cooperative negotiation to the negotiations in which they had just been involved. Scores of individual players and teams were also discussed and compared. The goal was to draw out comments from participants and translate them to lessons learned about negotiation.

Chapter 5

QUESTIONNAIRE: METHODOLOGY AND DESIGN

I wondered what impressions participants were left with after the Low-Level Waste Facility Siting Workshop. Had they learned a more cooperative approach to negotiation? Could they imagine using any of the techniques that had been discussed? Could they relate their gaming experiences to real-life situations? What aspects of the workshop, if any, had contributed to communicating the merits of collaborative problem-solving?

A large part of evaluating the utility of games involves identifying the extent to which the experience is perceived by participants to be useful. To this end, I designed and sent a questionnaire to the 34 participants in the December workshop. In an effort to ensure complete and decipherable responses, I called nearly all of these people and recorded their responses to both the open-ended and close-ended questions. This person-to-person discussion not only jogged their memories but helped to provide additional comments. (Five participants returned their completed questionnaires; the rest were completed by telephone interviews). A 100 percent response rate was achieved. A copy of the "Low-Level Radwaste Simulation Game" questionnaire is attached in Appendix B.

The questionnaire includes six different sets of questions designed to provide information about the respondents' approach to negotiation, their impressions of the dynamics between parties during the simulation, their motivations for participating, and

their perceptions regarding the effect that their gaming experiences might have on their real-life behavior. Respondents were also asked to indicate their prior exposure to collaborative problem-solving techniques and simulation exercises.

The first part of the questionnaire included seven statements about negotiation. Participants were asked to indicate whether they Strongly Agreed, Somewhat Agreed, Somewhat Disagreed, or Strongly Disagreed with the statements. Depending on the responses, I categorized respondents as either Cooperative Negotiators or not. The second part of the questionnaire offered six statements designed to elicit information on whether or not participants thought the games they had played (the negotiations in which they were involved) were conducted in a cooperative manner or not.

Participants were asked to identify which players had a specific impact on the negotiations and to comment on the consistency of behavior in the game with what they might have expected in real-life. The fourth section tried to establish why people had been interested in participating in the games and what they had hoped to accomplish by playing. Then, participants were asked for their overall impressions of the gaming sessions and specifically, if they thought that their negotiating behavior in LLW facility siting might change as a result of the experience. The questions in this section were the only open-ended ones in the questionnaire. In my telephone conversations, I asked respondents to elaborate on their initial responses to these questions. I asked if they had learned anything valuable

about negotiation, and if and why they thought the experience was worthwhile. The last section solicited personal information about the respondent.

Chapter 6

QUESTIONS AND HYPOTHESES

The questionnaire was designed to provide data for help in answering the following questions:

- a. Did participants in the gaming simulation leave the workshop with a commitment to approach complex dispute situations, such as negotiating LLW facility siting, in a cooperative manner?
- b. For participants that did leave with a commitment to approach dispute situations in a cooperative manner, what factors contributed to this?

I hypothesized that:

- a. Some participants would leave the sessions expecting to behave in a cooperative manner when negotiating.
- b. Participants likely to be cooperative when negotiating would be those who thought that their gaming behavior closely resembled the behavior they would exhibit in a real negotiation.
- c. Participants who said they would behave in a cooperative negotiating manner were likely to have participated in a group successful in reaching a negotiated agreement.

Of the 34 participants in the gaming sessions, 26 played both Games I and II and 8 others played only one of the two games. In Game I, 16 people comprised the two groups (out of four) that reached agreement. In Game II, 14 people were in the two groups that reached agreement.

Chapter 7

QUESTIONNAIRE FINDINGS

Participants as Learners

Of the 34 people who participated in the gaming sessions and responded to the questionnaire, twenty reported that they left the workshop feeling they had learned something about the value of cooperation in negotiating situations. These people expected that, in negotiations generally and LLW facility siting specifically, they would use some of the techniques that had been used in the game. These people were very enthusiastic and excited about the gaming sessions. They all mentioned that they had learned something about negotiations during the workshop. They were anxious to test some of the approaches. In fact, some already had. I call these people "learners" and discuss their reactions in more detail below.

Of the 34 participants, 20 (59%) were learners and 6 (18%) were non-learners. Eight (23%) were nondesignatable, mostly because their answers to my questions were incomplete or ambiguous. My learner/non-learner designation emerged after I analyzed the responses to my question - "After having played the game, do you think that your behavior in low-level radwaste facility siting will change? If so, how? If not, why?" This question was one of only a few which respondents were asked to discuss in depth, both in the written questionnaire and in my follow-up telephone conversations.

Those who responded positively and said they expected that their behavior would, or already had, change were designated learners. Also designated as learners were those who remarked that they would be more aware of others' concerns and generally talked about the importance of approaching negotiation situations in a cooperative manner. Non-learners were those participants who said that their behavior would not change as a result of the workshop and that the gaming sessions had not influenced their attitudes toward negotiation. Some respondents were vague and uncertain regarding what, if anything, they had gleaned from the workshop. Others made comments that were not applicable to the question. These last two were non-designatable.

Learners said that, as a result of the simulation exercises, they would be guided by a "different conceptual framework" (18). (To ensure the anonymity of the respondents, references are attributable by Player Number only. These are listed in Appendix A along with the players' affiliations and roles played). Learners commented that an important element of this new framework was acknowledging that other parties had legitimate needs and that it was necessary to understand those needs to achieve a positive negotiated outcome. As one learner exclaimed, "I don't want one of these [facilities] in my town; let's face it, no one does but I heard some very persuasive arguments for it. I realized that you have to listen to other people's opinions" (24). Learners appreciated the importance of discovering the underlying interests of others and of revealing their own. One learner commented that in future negotiations he would be "far more open to hearing and responding to the

perspectives of [people] with interests other than my own" (16). Another said that "talking more to explain the whys" (12) would be a valuable approach to negotiation. Learners recognized that honest and cooperative communication was key to understanding the needs of others.

Learners commented that they "learned to listen more than anything else" (30) and that "you really have to listen to understand what's going on" (21). Indeed, learners were aware that active listening was absolutely necessary to understanding and then addressing the interests of others in a negotiation.

Learners indicated that they would not feel threatened or at a disadvantage because they had attempted to accommodate other parties or explained the reasons behind their own views. Learners understood that doing so may be an effective way of satisfying all parties. One learner said that, "I think my behavior in negotiating in situations where a group consensus is needed would change...I would be more conscious of the possibility that meeting others' concerns may not always damage my position" (31). The same learner reported that his behavior had, in fact, changed in that he was "more aware of 'packaging' options" in a way that enabled him to satisfy his needs "while presenting an attractive settlement option" to his opponent.

In fact, having experienced firsthand the interdependencies of parties in the gaming simulations, several learners realized that the willingness and ability to pay attention to other parties may be key to their own success at reaching or improving an agreement. One learner remarked that, "You win more by listening

to other peoples' thoughts and opinions" and by recognizing that your opponents are "there for a reason" (30). Another concluded that, as a result of the game, he would be "more sensitive of the need to satisfy the 'other guy,'...because if something will not satisfy him, then I'm out of an agreement" (2).

Most learners indicated that they had learned a lot about collaborative problem-solving. For most, it was their first experience with a simulation exercise and their first opportunity to try out their ideas about negotiation. Many said that they thought their negotiation skills had improved since the workshop and that they were better negotiators as a result. One learner (who had to leave early) said the experience was "well worth the trip to Massachusetts for just a few hours" to learn about such a "logical, common sense approach to negotiation" (5). For those who were somewhat familiar with cooperative approaches to negotiation, the workshop helped to reinforce the use of such approaches. One learner said that the experience helped him to "not fall back into positional bargaining" (28).

I have categorized more than half of the workshop participants as learners. How is this group different from the other participants? What contributed to the fact that they had learned from the workshop experience and expected that their negotiating behavior might change as a result? Some special traits of learners emerged.

A. Learners, more than non-learners, saw themselves as cooperative negotiators rather than as "hard" or positional bargainers.

B. The goals of learners were different from the goals of non-learners. I found that most learners indicated that, in the gaming simulations, they tried to behave as they would in a real situation and to assess the results. In addition, learners said they wanted to negotiate an agreement in the games they could actually support in "real life."

C. Contrary to my hypothesis, there was no indication that being part of a group that reached agreement in the games influenced whether or not a player was a learner. Learners failed to negotiate agreements as often as did non-learners.

A. Learners as Cooperative Negotiators

Successful negotiation processes, those that result in stable efficient, and legitimate solutions, require cooperation (Fisher, 1983). The objective of negotiation is to discover solutions that will be acceptable to all involved. Meeting this objective requires participants to look beyond their own narrowly conceived interests and consider the concerns of other, "opposing" parties (Susskind, 1984).

The process of cooperative negotiation encourages that facts and feelings be shared and accepted. Maintaining cordial working relations with adversaries is paramount to the process of cooperative negotiation (Fisher, 1983). Collaborative approaches differ from "hard" or positional strategies characterized by posturing, bluffing, and obscuring the merits of the other side's arguments.

The first section of the questionnaire, entitled

"Negotiation," was designed to determine whether or not a respondent approached negotiation in a cooperative manner. Statements could be answered with "Strongly Agree," "Somewhat Agree," "Somewhat Disagree," "Strongly Disagree," or "Don't Know." "Don't Know" responses were not considered.

To be designated a cooperative negotiator, a respondent had to have at least 5 points. Responses to statements were assigned a point value of "1" or "0" as indicated below:

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Agree	Don't Know
When I enter a negotiation I try to take an opening position that is much greater than what I know I will settle for.		0		1	-
By acknowledging my adversary's concerns or problems, I can usually help us both do better.		1		0	-
I will agree to discuss any set of alternatives proposed by my adversary even if I am not willing to commit to them.		1		0	-
When I get my way it means that my adversary has lost.		0		1	-
I usually find it advantageous to complete one part of a negotiation before going on to the next.		0		1	-
Once I get what I want, I am not interested in helping my adversary further.		0		1	-
If I am opposed to a proposal suggested by my adversary, I almost always reveal the true reasons for my opposition.		1		0	-

In tabulating points, no distinction was made between the qualifications of "Strongly" and "Somewhat" in both the "Agree" and "Disagree" categories. A total of 7 points was possible. One of the 5 points had to be a result of disagreeing with Statement I - "When I enter a negotiation I try to take an opening position that is much greater than what I know I will settle for." In other words, a respondent who received 5 points but did not disagree with the first statement could not be designated a cooperative negotiator.

Statement I suggests one of the most traditional positional negotiation tactics - bid high with a "bottom line" in mind, concede reluctantly to let your opponent think that you are making important sacrifices, and ultimately, "settle" for your bottom line. This bargaining approach fosters adversarial relationships and does nothing to build trust. It is clearly not compatible with a cooperative negotiating style.

Of the 34 respondents, 11 were designated cooperative negotiators based on their responses to Section I of the questionnaire. Of these, eight (73%) were also designated learners. One learner who agreed with Statement I.A and could not be considered a cooperative negotiator, was quick to explain that she was "trying to change that [behavior] as a result of the game" (5). Table 3 summarizes the negotiating style of participants as indicated by their responses to Section I, "Negotiation."

Of the 20 learners, more than half (60%) were not cooperative negotiators. This is fewer than the 83% of non-learners and 75%

Table 3

SUMMARY: THE NEGOTIATING STYLE OF PARTICIPANTS

	<u>Cooperative Negotiator</u> (number of participants)	<u>Non-Cooperative Negotiator</u> (number of participants)	<u>Total</u>
Learner	8 (40%)*	12 (60%)	=20 (100%)
Non-Learner	1 (17%)	5 (83%)	=6 (100%)
Non- Designatable	2 (25%)	6 (75%)	=8 (100%)
	<hr/>	<hr/>	<hr/>
Total =	11	23	34

* 40% (8/20) of learners were cooperative negotiators.

of non-designated participants who were not cooperative negotiators. Moreover, the percentage of cooperative negotiators amongst learners (40%) is higher than amongst non-learners (17%) and those who were non-designated (25%).

While cooperative negotiators represent only about one-third of the 34 participants, it is significant that cooperative negotiators were mostly (73%) learners. Being a cooperative or non-cooperative negotiator does not necessarily predispose a participant toward being a learner or non-learner. The higher percentage of cooperative negotiators who were learners does, however, suggest that it is more difficult to be a cooperative negotiator and non-learner.

A recent large-scale study of the negotiating patterns of practicing attorneys identified two basic patterns describing how lawyers negotiate - cooperative and competitive (Williams, 1983). When correlated with effectiveness in negotiations, it was found that the highest proportion of lawyers with the cooperative style were effective negotiators. Fewer "cooperatives" were average negotiators and still fewer were ineffective. The smallest percentage of those with competitive styles were effective negotiators, the next highest were ineffective, and the highest percentage of "competitives" were average negotiators.

The study reported that elements of the cooperative strategy include moving psychologically toward the opponent and trying to seek common ground by communicating a sense of shared interests, values, and attitudes. Cooperatives tend to use rational and logical persuasion to achieve cooperation, the explicit goal being to reach fair resolution of the conflict based on an

objective analysis. Also important to the cooperative/effective type was maintaining or establishing good personal relationships with opponents. These elements reflect many of the characteristics of cooperative negotiators as discussed in the beginning of this section and measured by the questionnaire.

Williams reports that cooperative strategies may be more effective than competitive or "tough" strategies because they tend to produce more favorable outcomes and result in fewer ultimate breakdowns in negotiations. While it cannot now be known how "effective" workshop learners will be in future negotiations, it might be expected that those with cooperative negotiating styles will continue to adopt that approach with the result being favorable outcomes.

B. The Goals of Learners

The fourth section of the questionnaire, entitled "Participation," sought to establish why people participated in the workshop. Question V.B asked respondents to indicate what they hoped to accomplish by playing the games. They were instructed to check as many statements as applied. Figure 1 shows the tally of the responses. The most frequently chosen statement was that which pertained to learning about negotiation. Twenty-three (68%) of the 34 participants indicated that this was one of their goals. Fifteen (44%) of the respondents seemed intent on behaving as they would in a real negotiation. The same number were interested in understanding the interests and opinions of others. Next, 11 (32%) of the 34 indicated that they

Figure 1

TALLY OF PARTICIPANTS' RESPONSES REGARDING
THEIR GOALS IN PLAYING THE NEGOTIATION SIMULATION GAME

<u>15</u>	Behave like I would in a real negotiation and see the results
<u>15</u>	Understand the interests and opinions of others, hear why they believe as they do
<u>11</u>	Test out different behaviors from those I would typically assume in a negotiation
<u>23</u>	Learn about negotiation
<u>1</u>	Reach an agreement at any cost
<u>11</u>	Reach an agreement that I could support in real life
<u>5</u>	Make a statement about my beliefs on the issues
<u>9</u>	Other (please specify): _____

wanted to both reach an agreement they could support in real life, and test out different behaviors from those they would typically assume in a negotiation. Participants were less interested in reaching an agreement at any cost and making a statement about their beliefs on the issues. Other goals mentioned included learning effective coalition techniques and evaluating the usefulness of simulation games as teaching tools. Table 4 disaggregates the information and presents it for the three categories of learners, non-learners, and non-designated.

The goal most frequently referred to by learners was that they wanted to learn about negotiation. Seventy-five percent of learners responded this way, as did 75% of non-designated participants. A much lower proportion of non-learners (33%) indicated that their goal was to learn about negotiation.

Another goal of importance to both learners and non-designated participants, 55% and 50% respectively, was that of understanding the interests and opinions of others. Non-learners indicated that this was not an important goal.

Twelve of the twenty learners (60%) responded that one of their goals was to behave as they would in a real negotiation and see the results. This was the second most important goal mentioned by learners. Other participants mentioned this proportionately fewer times - 25% and 17% for non-designatables and non-learners, respectively.

Learners who set out to behave as they would in a real negotiation did so primarily for pragmatic reasons. They wanted to help ensure that they would be able to relate what they were learning to their real life negotiating behavior. A logical way

Table 4

SUMMARY OF PARTICIPANTS' STATEMENTS OF GOALS

<u>Statement</u>	<u>Learners*</u>	<u>Non-Learners*</u>	<u>Non-Designatable*</u>	<u>Total</u>
Behave like I would in a real negotiation and see the results.	12 (60%)**	1 (17%)	2 (25%)	= 15
Understand the interests and opinions of others.	11 (55%)	0	4 (50%)	= 15
Test out different behaviors from those I would typically assume.	8 (40%)	2 (33%)	1 (13%)	= 11
Learn about negotiation.	15 (75%)	2 (33%)	6 (75%)	= 23
Reach an agreement at any cost.	0	1 (17%)	0	= 1
Reach an agreement that I could support in real-life.	9 (45%)	0	2 (25%)	= 11
Make a statement about my beliefs on the issues.	3 (15%)	0	2 (25%)	= 5
Other (please specify):	2 (10%)	4 (67%)	3 (38%)	= 9

* 20 participants were learners; 6 participants were non-learners; and 8 participants were non-designatable.

** 60% (12/20) of learners indicated that this was one of the goals they hoped to accomplish by playing.

to do so was to behave as they normally would and see the results. One learner, who had read formal theories of negotiation, related that she always wondered if she could apply all that "academic stuff" to real life. Because the simulation "helps get at real life," she used it as an opportunity to test herself. To do so she needed to use her real life behavior. As she said, "You may think you know what you need to do [in a negotiation] but until you do it, who knows?" (27). Another learner said that he looked at the workshop as "more than just an academic exercise" and that he behaved as he normally would in an effort to diagnose his skills and identify his weaknesses as a negotiator. He wanted to be able to "relate the experience to real life so as to be able to critique [himself]" (1). One learner explained that she saw the experience as a "chance to practice, a chance to reflect on real life, and extrapolate to make it relevant to your life" (21).

Another goal important to a large number (45%) of learners was that of reaching an agreement they could support in real life. Only 25% of non-designatable participants answered that this was important and no non-learners had this as a goal. This was a goal for learners for many of the same reasons as explained above. Reaching an agreement they could support in real life enabled learners to further relate their workshop experience to their real life professional situations which demanded negotiation skills. One learner said that trying to reach an agreement she could support in real life was "good practice" for her real life work in which she would be negotiating agreements relating to LLW. She said that she "hoped to learn things [she] could apply

to [her] work" (5). One learner likened the experience to "final training before becoming part of a successful real life negotiation" (16). In this context, reaching an agreement that could be supported in real life is very important.

Some learners (40%) also indicated that they wanted to test out behaviors different from those they would typically assume in a negotiation. Thirty-three percent of non-learners indicated that this was their goal, as did 13% of non-designated participants. Half of the learners who mentioned this goal were those who also said they wanted to behave like they would in a real negotiation. These seemingly contradictory goals are explained by two factors: the participant was assigned to a role very different from what they could identify with in real life and/or the participant's role-specific instructions required behavior very different from what they would typically exhibit. One participant who mentioned both goals played the role of an environmentalist in Game I and a LLW generator (ARG) in Game II. She had a difficult time relating to the ARG role but she reported that once she began playing "being in the opposite role made [her] a good negotiator" because she was "much more tuned into differences" (21).

Overall, learners distinguished themselves by expressing the following goals:

- * Learn about negotiation (75%)
- * Behave like I would in a real negotiation and see the results (60%)
- * Understand the interests and opinions of others (55%)
- * Reach an agreement that I could support in real life (45%)

- * Test out different behaviors from those I would typically assume (40%)

C. Learners and Success in Negotiating Agreements

I hypothesized that participants who perceived that they had "learned" something would be members of groups successful in reaching a negotiated agreement in the simulations. This was not the case. Table 5 presents information regarding the outcome of negotiations. The information is disaggregated according to the categories of learners, non-learners, and non-designated.

There is no pattern to suggest that learners were influenced by whether or not their group reached agreement. In Game I, 55% of the learners were in groups that reached agreement and 40% of learners were in groups that did not reach agreement. For non-learners, the percentages were 50% and 50%, respectively. For non-designated, the percentages were 25% and 38%, respectively.

In Game II, 40% of learners reached agreement while 45% did not. For non-learners, the percentages were 50% and 17%, respectively. For non-designated, the percentages were 63% and 50%, respectively.

Many learners were in groups that did not reach agreement. This did not seem to detract from their learning experience. These learners frequently mentioned that they would have reached agreement if given more time. One learner said that while his group "did not reach an agreement" they were "extremely close" and that "more time would have helped" (26). This suggests that he was pleased with the direction the negotiation was taking. Even learners in groups that did reach agreement said that more

Table 5

SUMMARY: PARTICIPANTS AND THE OUTCOME OF NEGOTIATIONS

	<u>Game I</u>		<u>Game II</u>	
	<u>Agreement</u> (number of participants)	<u>No Agreement</u> (number of participants)	<u>Agreement</u> (number of participants)	<u>No Agreement</u> (number of participants)
Learners (20 participants)	11 (55%)*	8 (40%)	8 (40%)	9 (45%)
Non-Learners (6 participants)	3 (50%)	3 (50%)	3 (50%)	1 (17%)
Non- Designatable (8 participants)	2 (25%)	5 (38%)	3 (63%)	4 (50%)

* 55% (11/20) of learners were members of groups that reached agreement in Game I.

time would have been useful for reaching better or more inclusive agreements. One learner said that, "with more time we could have explored the concerns of all players" (24). Again, this suggests that the negotiation was going fine but could have progressed further if not for time constraints. It seems that, while actually reaching an agreement was an accomplishment, its importance was superceded by the process of the negotiation.

Chapter 8

SUMMARY OF FINDINGS

At the outset of this study I posed several questions:

- a. Did participants in the gaming simulation leave the workshop with a commitment to approach complex dispute situations, such as negotiating LLW facility siting, in a cooperative manner?
- b. For participants that did leave with a commitment to approach dispute situations in a cooperative manner, what factors contributed to this?

I hypothesized that:

- a. Some participants would leave the workshop expecting to behave in a cooperative manner when negotiating.
- b. Participants likely to be cooperative when negotiating would be those who thought that their gaming behavior closely resembled the behavior they would exhibit in a real negotiation.
- c. Participants who said they would behave in a cooperative negotiating manner were likely to have participated in a group successful in reaching a negotiated agreement.

The questionnaire I distributed to workshop participants helped me answer these questions and test my hypotheses.

I found that 59% of the workshop participants left the sessions expecting to behave in a cooperative manner when negotiating.

This answers one of my questions and supports one of my hypotheses. Some of these people, undoubtedly, came with experience as cooperative negotiators or a special predisposition toward negotiating cooperatively. The games helped confirm to these people what they already knew and believed about negotiation. But, others had their thinking shaped by experiencing the negotiation game. The game taught these people about negotiation and they were receptive to the techniques suggested.

I discovered that there were several factors which contributed to peoples' commitment to approach dispute situations in a cooperative manner. Personal goals were the most important of these factors. Players who participated with the goals of learning about negotiation, acting as they would in a real negotiation, understanding the interests and opinions of others, and reaching an agreement that they could support in real life tended to be those who expected to negotiate cooperatively in future dispute situations.

I hypothesized that participants likely to be cooperative when negotiating would be those who thought that their gaming behavior closely resembled the behavior they would exhibit in a real negotiation. I found that, of those likely to be cooperative negotiators, 60% responded that one of their goals was to behave as they would in a real negotiation and see the results. This supports my hypothesis. The participants that responded this way purposely set out to use their real life negotiating behavior during the games.

I also hypothesized that participants who said they would behave in a cooperative negotiating manner were likely to have participated in a group successful in reaching a negotiated agreement. There is no evidence to suggest that this was the case. My hypothesis was not supported by the evidence.

All of the twenty people who left the workshop expecting to behave in a cooperative manner when negotiating reported that they had learned something about the value of cooperation in negotiating situations. These people were anxious to test some of these approaches in real life. I called these people "learners". (Eighteen percent of the participants were "non-learners" and 23% were non-designatable.)

Learners possessed some special traits. Learners, more so than the other participants, saw themselves as cooperative negotiators. They did not assume traditional, positional and aggressive negotiation tactics.

Learners further distinguished themselves by the goals they reported they hoped to accomplish by participating in the workshop. A greater proportion of learners (60%), as compared with non-learners (17%) or undesignated participants (25%), reported that a goal was to behave as they would in a real negotiation and see the results. Learners reported this was an important goal because it would facilitate their ability to relate what they were learning to real life situations. They used the opportunity to diagnose their negotiating skills.

Forty-five percent of learners also reported that it was important for them to reach an agreement they could support in real life. This is compared with 25% of non-designated

participants and none of the non-learners. Learners reported that they wanted to be able to further relate their gaming experience to their professional situations.

Learners, and a nearly equal proportion of non-designated participants, wanted to learn about negotiation as well as understand the interests and opinions of others. These goals were not priorities for non-learners. Overall, it was important for learners to relate their workshop experiences with real life situations. While this does not necessarily sufficiently explain why learners learned, it does suggest the educational importance of simulating reality.

I also hypothesized that participants who said they would behave in a cooperative negotiating manner were likely to have participated in a group successful in reaching a negotiated agreement. This was not the case. There is no pattern to suggest that those who reached agreement were more likely to be learners than non-learners. Reaching agreement was clearly secondary to the process of learning about negotiation and participating in such a way as to make the experience relative to real life.

Chapter 9

CONCLUSIONS

The U.S. Department of Energy commissioned the creation of a simulation game to help those involved in LLW facility siting better manage that process. What have we learned about the use of simulation games for the purpose of preparing people to address LLW facility siting issues?

From the findings and experiences reported above, it appears that the simulation games serve three broad purposes:

1. The simulation games act as a vehicle for bringing people together to help resolve their conflicts by trying to accomplish a specific task in a simulated environment.
2. The simulation games communicate lessons about negotiation to participants.
3. The simulation games capture the dynamics and sources of conflict in the LLW facility siting process.

The simulation games bring parties together in an effort to help them resolve their conflicts and work together toward finding solutions to LLW facility siting issues. The creation of a hypothetical, simulated environment lowers the stakes and encourages a quality of communication that might not otherwise exist amongst the parties. At the same time, because it is modeled after reality, participants can relate their experiences

to an environment outside of the simulation. When the participants are representative of the groups that will be negotiating LLW issues in the real world, the situation becomes an even more valuable simulation of reality. The opportunity to interact in a non-threatening environment encourages parties to work together productively.

The simulation games and accompanying debriefings communicate lessons about negotiation. Participants are encouraged to experiment with different approaches to negotiation as suggested by the lessons. The negotiations required in the simulation games also help participants diagnose their negotiation skills to identify strengths and weaknesses. The debriefing sessions introduce participants to the notion of maximizing joint gains and suggest that these types of solutions will be discovered with a cooperative, as opposed to positional, approach to negotiation.

The simulation games capture the dynamics and sources of conflict in the LLW facility siting process. For those with little previous exposure, the games serve as an introduction to the issues, the parties, and the politics involved in LLW facility siting. For these people and others with prior exposure to and involvement with LLW issues, the games simulate the experience of siting a LLW facility. It is hoped that participants will reflect on the dynamics and the process of the negotiation exercise itself in their efforts to learn about and practice methods of effective interaction.

ENDNOTES

1. The Program on Negotiation at Harvard Law School is an inter-university consortium to improve the theory and practice of negotiation and conflict resolution. One way in which it does so is by designing and conducting negotiation simulation exercises.

2. Low-level radioactive waste (LLW) is material that has become contaminated with radioactive elements. For the most part, these are very ordinary materials such as protective clothing, paper, cleaning equipment and materials, and discarded tools and equipment that have become contaminated during the application of nuclear technologies. Other LLW include those produced or generated by:

- * commercial nuclear power reactors: filters, reactor components;
- * hospitals and research institutions: animal carcasses used in experiments, lab equipment, and organic liquids; and
- * industry: plastics and organic solvents that are waste products from the manufacturing of radiopharmaceuticals, smoke alarms, watch dials, and other products.

Most LLW is hazardous for about 300 years. (This is in contrast to the tens of thousands of years for other types of radioactive wastes). Most of the radionuclides in LLW have a radioactive half-life measured in either days or hours.

3. Commercial LLW is that generated in the course of commercial activities. It does not include LLW from Federal atomic energy defense activities such as naval reactors development and

propulsion, weapons activities, and defense materials production. It also excludes Federal research and development activities.

4. Federal atomic energy defense and research and development activities are excluded from the Act or any actions taken by regional compacts.

5. From the 1940's to the early 1960's, the most frequently used LLW disposal method was ocean dumping. Wastes were packaged in steel drums, weighted with concrete, and dumped in water at least 6,000 feet deep. Ocean dumping was expensive compared to shallow land burial, and by 1962, 95 percent of all U.S. LLW was being disposed of by shallow land burial. By 1970, all ocean dumping had stopped. A defacto moratorium was enacted into law in 1983.

The NRC is currently considering the need for technical criteria applicable to other land disposal technologies, such as aboveground engineered facilities.

6. Some communities have been successful in instituting outright bans on the siting of LLW or other undesirable facilities within their boundaries. Others have discouraged siting by instituting strict and very specific land use regulations. At least one state (Massachusetts) has been successful in a binding voter referendum (now Chapter 503, Massachusetts State Law) requiring statewide voter approval before any proposed nuclear power plant or LLW disposal or storage facility shall be constructed or operated. The same Act prohibits the state from entering into a

LLW regional compact without the approval of a majority of voters in a statewide general election.

7. The Radwaste Siting Games I and II were prepared for the Public Disputes Program of the Program on Negotiation by Wendy Rundle, Douglas Rae, and Tod Loofbourrow under the direction of Professor Lawrence Susskind and Denise Madigan. Copies of this case are available through the Case Clearinghouse of the Program on Negotiation at Harvard Law School, Cambridge, MA.

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APPENDIX A

LIST OF PARTICIPANTS

<u>Player No.</u>	<u>Affiliation (State)</u>	<u>Sex</u>	<u>Roles*</u>	
			<u>Game I</u>	<u>Game II</u>
1.	State Agency (MA)	M	PMA	ARG
2.	Federal Agency (MA)	M	PMA	Gov
3.	Academic Institution (NY)	M	GW	Gov
4.	Private Firm (MA)	M	Gov	Site A
5.	Environmentalism (NY)	F	EC	-
6.	Federal Agency (MA)	F	PMA	Site C
7.	State Agency (MA)	F	Council	ARG
8.	Academic Institution (MA)	F	Munis	Site C
9.	Citizen Activist (NH)	F	EC	Gov
10.	Private Consultant (MA)	M	Council	-
11.	LLW Generator (MA)	M	ARG	EC
12.	State Agency (CT)	M	ARG	EC
13.	Private Consultant (MA)	M	GW	-
14.	State Agency (NY)	M	PMA	Site A
15.	Environmentalism (ME)	M	GW	-
16.	Private Consultant (MA)	M	-	Site C
17.	Academic Institution (NH)	M	Munis	Site C
18.	Public Interest Group (VT)	M	GW	ARG
19.	State Agency (MA)	M	Munis	Site C
20.	Federal Agency (ID)	M	-	EC
21.	State Agency (NY)	F	EC	ARG
22.	Environmentalism (MA)	F	EC	-
23.	Citizen Activist (MA)	F	Gov	Site B
24.	Citizen Activist (MA)	M	Council	EC
25.	Private Firm (MA)	M	Gov	Site B
26.	State Agency (NY)	M	Munis	Site A
27.	LLW Generator (MA)	F	ARG	-
28.	Private Firm (MA)	M	EC	Site B
29.	LLW Generator (MA)	M	ARG	Site A
30.	State Agency (NH)	F	PMA	Gov
31.	Federal Agency (MA)	M	PMA	Site B
32.	Environmental Law Firm (MA)	M	Gov	ARG
33.	LLW Generator (PA)	M	ARG	Site A
34.	Legislative Commission (MA)	F	Council	EC

* Abbreviations:

Game I
PMA = Public Management Authority
Council = Federated Indian Tribal Council
EC = Environmental Coalition
GW = Green Wave
Munis = State Association of Municipal and
County Governments
ARG = Association of Radwaste Generators
Gov = Governor's Blue Ribbon Advisory Committee
- = did not play

Game II
Gov = Governor
EC = Environmental Coalition
ARG = Association of Radwaste Generators
Site A = Town of Alford
Site B = Town of Bellman
Site C = Town of Crandon
- = did not play

APPENDIX B
QUESTIONNAIRE USED IN THIS STUDY

This appendix contains the questionnaire that was distributed to the 34 participants at the DOE-sponsored Low-Level Waste Facility Siting Workshop. Where appropriate, participants' responses have been tallied and entered in the questionnaire. Responses to the open-ended questions (Section V: Impressions) are discussed in the body of the study.

LOW-LEVEL RADWASTE SIMULATION GAME

The purpose of this questionnaire is to find out your reactions to the game on low-level radwaste management that you played at MIT in December. The questionnaire is divided into 6 parts. Please be sure to complete all 6 parts. This should take no longer than 15 minutes.

I will call to record your responses to the questions. Your responses will be kept strictly confidential. If you have any concerns, please call me, Wendy Rundle, at 617/926-2736 or leave a message at 617/253-2026. Thank you.

I. NEGOTIATION

The following statements relate to negotiation. Please indicate whether you agree or disagree with each statement by checking the appropriate space.

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	DON'T KNOW
A. When I enter a negotiation I try to take an opening position that is much greater than what I know I will settle for.	11		22		1
B. By acknowledging the legitimacy of my adversary's concerns or problems, I can usually help us both do better.	34		0		0
C. I will agree to discuss any set of alternatives proposed by my adversary even if I am not willing to commit to them.	31		3		0
D. When I get my way it means that my adversary has lost.	31		2		1
E. I usually find it advantageous to complete one part of a negotiation before going on to the next.	12		17		5
F. Once I get what I want, I am not interested in helping my adversary further.	30		2		2
G. If I am opposed to a proposal suggested by my adversary, I almost always reveal the true reasons for my opposition.	26		7		1

II. RADWASTE SITING GAME

The following statements relate to the Radwaste Siting Game you played at MIT in December. Please indicate whether you agree or disagree with each statement by checking the appropriate space.

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	DON'T KNOW
A. The most successful players were those who invented options that the other players could accept.	33		0		1
B. The players that had the greatest impact on the agreement were those who did the best job of explaining their concerns.	24		9		1
C. The most successful players were those who focused primarily on their interests and not those of other players.	23		11		0
D. The players most likely to get what they wanted were those who never deviated from the positions they stated initially.	27		5		2
E. Prior negotiating experience was the most important factor in determining who got what they wanted.	16		7		11
F. The most successful players were those who consistently tried to accommodate other players.	20		14		0

III. SMALL GROUP INTERACTIONS

The following questions concern the interactions within the small group of which you were part, for Games One and Two. Game One involved criteria for the screening of sites. Game Two involved the selection of an actual community site.

A. Game One

1. Indicate the parties that dominated the negotiation session. Check no more than 3.

4 Governor's Blue Ribbon Advisory Committee
9 Environmental Coalition
8 Public Management Authority
11 Association of Radwaste Generators
15 Green Wave
10 State Association of Municipal and County Governments
9 Federated Indian Tribal Council

2. Indicate the parties that had the least impact on the outcome. Check no more than 3.

10 Governor's Blue Ribbon Advisory Committee
3 Environmental Coalition
5 Public Management Authority
8 Association of Radwaste Generators
8 Green Wave
2 State Association of Municipal and County Governments
13 Federated Indian Tribal Council

3. Indicate any group player whose behavior was inconsistent with behavior you would expect from a person in that role in real life.

2 Governor's Blue Ribbon Advisory Committee
4 Environmental Coalition
3 Public Management Authority
10 Association of Radwaste Generators
6 Green Wave
0 State Association of Municipal and County Governments
11 Federated Indian Tribal Council

For any that you have checked, please explain:

4. Indicate any group player whose behavior was consistent with behavior you would expect from a person in that role in real life.

12 Governor's Blue Ribbon Advisory Committee
14 Environmental Coalition
8 Public Management Authority
11 Association of Radwaste Generators
14 Green Wave
8 State Association of Municipal and County Governments
7 Federated Indian Tribal Council

For any that you have checked, please explain:

A. Game One (continued)

5. Rank in order of importance the factors that best explain the outcome of your group's negotiation. Please number the choices 1 through 6.

- 5 Parties were skillful and experienced negotiators
- 1 Design and structure of the game controlled the outcome
- 3 Personalities of the people involved in the game
- 2 The fact that it was a game and not a real negotiation
- 4 Ability to talk informally amongst parties
- 6 Other (please specify): _____

B. Game Two

1. Indicate the parties that dominated the negotiation session. Check no more than 3.

- 14 Governor
- 8 Environmental Coalition
- 10 Association of Radwaste Generators
- 11 Town of Alford
- 4 Town of Bellman
- 5 Town of Crandon

2. Indicate the parties that had the least impact on the outcome. Check no more than 3.

- 7 Governor
- 7 Environmental Coalition
- 7 Association of Radwaste Generators
- 0 Town of Alford
- 1 Town of Bellman
- 6 Town of Crandon

3. Indicate any group player whose behavior was inconsistent with behavior you would expect from a person in that role in real life.

- 5 Governor
- 5 Environmental Coalition
- 6 Association of Radwaste Generators
- 8 Town of Alford
- 6 Town of Bellman
- 6 Town of Crandon

For any that you have checked, please explain:

4. Indicate any group player whose behavior was consistent with behavior you would expect from a person in that role in real life.

- 8 Governor
- 6 Environmental Coalition
- 9 Association of Radwaste Generators
- 13 Town of Alford
- 11 Town of Bellman
- 11 Town of Crandon

For any that you have checked, please explain:

B. Game Two (continued)

5. Rank in order of importance the factors that best explain the outcome of your group's negotiation. Please number the choices 1 through 6.

- 5 Parties were skillful and experienced negotiators
- 1 Design and structure of the game controlled the outcome
- 4 Personalities of the people involved in the game
- 2 The fact that it was a game and not a real negotiation
- 3 Ability to talk informally amongst parties
- 6 Other (please specify): _____

IV. PARTICIPATION

The following questions seek to establish why you participated in the gaming sessions.

A. Indicate which of the following explains your interests in attending the gaming sessions. Check all that apply.

- 14 Learn about gaming
- 22 Learn how negotiation can be used to help solve disputes
- 12 Make professional contacts and meet others in the field
- 8 Learn about low-level radwaste issues
- 17 Learn about the interests and opinions of others in the field
- 11 Other (please specify): _____

B. Indicate which of the following reflects what you hoped to accomplish by playing. Check all that apply.

- 15 Behave like I would in a real negotiation and see the results
- 15 Understand the interests and opinions of others, hear why they believe as they do
- 11 Test out different behaviors from those I would typically assume in a negotiation
- 23 Learn about negotiation
- 1 Reach an agreement at any cost
- 11 Reach an agreement that I could support in real life
- 5 Make a statement about my beliefs on the issues
- 9 Other (please specify): _____

V. IMPRESSIONS

The following questions concern your overall impressions after playing the game.

- A. If your group was one that did not reach agreement: What, if anything, might have helped you reach agreement?

- B. If your group was one that did reach agreement: What, if anything, might have helped you reach a more inclusive or otherwise better agreement?

- C. After having played the game, do you think that your behavior in low-level radwaste facility siting will change? If so, how? If not, Why?

VI. PERSONAL INFORMATION

The following questions provide information about the person responding to this questionnaire.

- A. Name: _____

- B. Employment: _____

- C. Involvement with low-level radwaste issues: _____

- D. Education (please indicate subject and degree): _____

- E. Prior to playing the game, had you been exposed to theories of principled negotiation and simulation exercises such as these?

<u>7</u>	yes, principled negotiation
<u>1</u>	yes, simulation exercises
<u>8</u>	yes, both
<u>18</u>	no, neither

- F. Roles played: Game One _____
Game Two _____