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YUCCA MOUNTAIN SOCIOECONOMIC PROJECT
REPORT ON THE 1987 RISK PERCEPTION
TELEPHONE SURVEYS

September, 1987

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Governor

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**HIGH-LEVEL NUCLEAR WASTE RISK
PERCEPTION TELEPHONE SURVEYS:
PRELIMINARY FINDINGS**

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NEVADA SURVEY QUESTIONNAIRE

NATIONAL SURVEY QUESTIONNAIRE

SECTION 1

INTRODUCTION AND OBJECTIVES

1.1 Introduction

The measurement of the risk-related impacts from the siting of a high-level nuclear waste (HLNW) repository represents a new and important addition to conventional socioeconomic impact studies. In particular, the driving forces behind these impacts are the risks people perceive to be associated with the repository. The impacts can range from increased anxiety for nearby residents who may dread living near the repository to fewer people who retire to Nevada because they perceive that the repository would make the State a less desirable place to live. The perceived risks from transporting wastes to a repository increase the potential scope of the impacts substantially. The overall objective of the risk studies is to appraise the extent of these impacts.

Measuring the risk impacts requires a complementary set of approaches, of which, risk surveys are the cornerstone.^a The purpose of these surveys is to provide scientifically defensible measures of the risk-related impacts. They will enable the State of Nevada to measure the risk impacts of a proposed repository based on the attitudes, opinions, perceptions, and responses of its citizens, and of those of the rest of the nation. Using established, widely recognized sampling procedures, the survey responses from a sample of citizens can be generalized to the State or nation. Equally important, by tailoring these procedures to meet the objectives that are most important to Nevada planners and policymakers, the risk impacts on key groups of citizens--e.g., people living near the proposed site vs. people living far away--can be measured, compared, and understood.

The risk surveys follow directly from a conceptual framework of how the HLNW repository affects peoples' perceptions and, ultimately, their behaviors. While Section 4 discusses this framework in more detail, the basic elements are straightforward. As shown in Figure 1-1 these surveys describe and measure:

- Characteristics of individuals
- Risks people perceive from the HLNW repository
- Views, or mind sets, they form about the HLNW repository
- Changes in behaviors--e.g., changes in retirement decisions or industrial relocations--induced by the location of the repository
- Changes in well-being of Nevada citizens, if the repository were located at Yucca Mountain.

In examining risk perceptions, we have undertaken several surveys to understand, and model, the risks people perceive from a HLNW repository. The perception analysis emphasizes the importance of the characteristics of the

^aFor a discussion, see Mitchell and Carson [1987] and Smith, Desvousges, and Freeman [1985].

Figure 1-1. Relationship of risk perceptions to well-being of Nevada citizens.

potential risks from a repository--e.g., would nearby residents dread living near it. Additionally, the analysis considers both the sources of the perceived risks--e.g., transportation accidents, storage accidents, or groundwater contamination--and the perceived likelihood of the repository activities causing accidents or contamination. It also examines the characteristics of the individuals--e.g., risk awareness, knowledge of a repository, location--that may influence these perceptions.

Once the risks people perceive from the HLNW repository are characterized, we profile people's conceptions of, or overall views toward, the repository. These conceptions include the importance of long-term considerations, the perceived potential benefits, and the perceived equity of the repository being located in one state. Again, we describe the views of both Nevada residents and those of the rest of the United States.

As noted earlier, the risk-induced behaviors are a crucial component of the overall risk impact area. As a first step in developing models of these behaviors, we have asked respondents about whether a HLNW repository would make an area a less desirable place to live--either to start new businesses or raise a family. We also considered whether it may affect their decisions to attend conventions or take vacations. Results from the survey are only one part of the total project effort. However, our findings imply that further steps to model, and ultimately predict, the risk-induced behaviors are warranted. Risk-induced behavioral studies will be accomplished in Years 2 and 3 of the study.

The final area addressed in the risk studies is the effect the repository may have on people's perceived well-being or utility. Again our efforts here are preliminary with regard to the overall Socioeconomic Project, but they do show that some economic measures of well-being can provide one useful gauge of whether people feel they would be better or worse off with an HLNW repository located near them. Our later efforts will include other broader measures of well-being that consider social and political considerations, in addition to the economic ones (Year 2 Nevada behavior/well-being research).

To address the risk-related issues, we have developed an integrated set of risk surveys. They comprise four main activities: a series of three focus groups; a telephone survey of U.S. households; and a telephone survey of Nevada households. Following these surveys, a series of risk perception-behavioral studies will be undertaken. We have designed these activities to complement each other because no single survey questionnaire or data collection method can address the wide array of complex measurement issues presented by the risk surveys. In addition, a set of surveys will be undertaken of non-Nevada residents in order to measure risk-induced effects on migration, economic investment, and tourism. Figure 1-2 highlights the six activities that pertain to the surveys of Nevada residents' perceptions and well-being.

Each activity takes advantage of the comparative strengths of the data collection method chosen. These strengths include the following:

Figure 1-2. Integration of risk survey activities.

- The focus groups target small groups of people to provide insights about attitudes, opinions, and perceptions along with evaluating potential questions for the surveys.
- The telephone surveys, which focus on risk perceptions, are most effective in measuring attitudes and opinions that will affect people's perceptions of the risks associated with the HLNW repository. They establish a baseline of risk perceptions in Nevada and in the rest of the United States. They also begin to address mitigation and compensation issues.

While employing several surveys and studies offers potential advantages, these can only be realized if they are systematically integrated. To achieve the necessary integration, the surveys are based on the common conceptual framework. The framework also underpins the survey questionnaires which are the major vehicles for integrating the survey activities. Mitchell and Carson [1987] and Smith and Desvousges [1986] emphasize the crucial role of the questionnaires in complex environmental surveys. They also employ a coordinated research design to ensure that the framework is consistently implemented.

1.2 Objectives

This document reports the findings of the telephone survey activities. These surveys will include representative samples of residents in Nevada and the rest of the United States. The five objectives of these surveys are to:

- Establish a baseline for the perceived risks from an HLNW repository,
- Assess the factors that influence the risks people perceive from a repository,
- Describe how people would view an HLNW repository,
- Explore the potential magnitude of risk-induced behaviors, and
- Provide preliminary measures of the potential changes in economic well-being from the siting of an HLNW repository.

These objectives are especially relevant to the State of Nevada. By fulfilling these objectives, the telephone survey will provide timely information for Nevada planners and policymakers, as well as adding to the understanding of these issues for structuring the future research activities.

1.3 Guide to the Report

The remainder of this report includes ten sections:

- Section 2 describes the role of the inventory of concerns and focus groups in the telephone survey questionnaire development process.

- Section 3 highlights the implementation of the telephone survey including the sampling and data collection activities.
- Section 4 presents the conceptual framework that has guided both the survey questionnaire development and the empirical analysis of the survey data.
- Section 5 summarizes the empirical findings on perceived risks from the HLNW repository. It presents measures of the seriousness of the risk, along with analyzing the factors that affect risk perceptions.
- Section 6 profiles the survey respondents' view of the repository. It also highlights how the environmental attitudes of respondents in the telephone surveys compare with other National surveys.
- Section 7 presents the empirical findings on the potential magnitude of risk-induced behavior. It addresses whether respondents think an HLNW repository would make nearby areas less desirable to take vacations, attend conventions, raise families, start new businesses, or retire.
- Section 8 highlights the empirical survey findings on economic well-being, along with whether tax rebates would make an HLNW repository more acceptable to nearby residents.
- Section 9 discusses distance and location in relation to perceptions of the repository.
- Section 10 discusses the implications of the telephone survey for Nevada planners and policy-makers and for future research activities.
- Section 11 lists the cited references.

The survey questionnaires for both the National and Nevada surveys follow Section 11.

SECTION 2

FOCUS GROUPS AND INVENTORY OF CONCERNS

2.1 Introduction

Before conducting the risk perception telephone surveys, we conducted three focus groups and compiled an inventory of concerns from the printed media. The objectives of these activities were to identify repository-related hazard issues and aid in developing the questionnaires. The activities complemented each other. The inventory stimulated ideas and issues about the HLNW repository that were addressed in the focus group sessions. The focus group participants added their particular perspective as well. Overall, the activities provided useful qualitative insights into the perception of the HLNW repository.

The inventory of concerns, compiled from the printed media, provided many insights for understanding the range of views people have about the HLNW repository. It showed how people view the siting process as a whole, the role of the Department of Energy (DOE), and their attitudes toward compensation and safety issues. With this background, it was possible to conduct the focus groups more effectively, as well as develop ideas for the survey questionnaire.

Over the past decade, researchers have used focus groups to learn about consumers' perceptions of various products or services. These small group discussions, which are led by an experienced moderator, allow people to freely express their ideas, impressions, concerns, and opinions about the topic of interest--the risks associated with the siting of the HLNW repository. (See Calder [1977] and Cox, Higgenbotham, and Burton [1976].) With the combination of spontaneity and structure, the focus groups can be highly effective in the early stages of a complex research project. For example, Desvousges et al. [1984] and Smith and Desvousges [1987] found focus groups to be an essential part of the process of developing a questionnaire on hazardous waste risks. Kunreuther et al. [1978] also have endorsed focus groups, or in-depth group interviews, as valuable in developing survey questionnaires.

In risk surveys, focus groups reduce the distance between the researchers who ask the questions and the respondents who must answer them. The groups provide the opportunity to explore the perceptual cues people use in answering questions, along with attitudes, experiences, or characteristics that may prove to be important. The focus groups also can be effective in pretesting visual aids to be used in the field survey. Finally, the groups can help to ease the complexity of the topics that will be covered in both the telephone and field surveys by identifying the language people ordinarily use. Listening to how people think about a topic also can suggest ways to effectively sequence survey questions.

This section highlights the findings from both the inventory of concerns and the focus groups. In particular, it discusses the role these activities played in developing the questionnaire for the telephone survey.

2.2 Inventory of Concerns

In developing our research design, the issues and concerns that are most relevant to the HLNW repository have also played an important roles. By closely monitoring the popular press, other news media, and public comments on the repository, we developed an inventory of the major concerns. For a more detailed discussion of the findings from the inventory, see Kunreuther et al. [1978].

Several recurring themes emerged from this inventory. These include:

- DOE. Virtually all of the materials from media sources expressed an overwhelmingly negative, even hostile, attitude toward DOE. The inventory showed a general distrust of DOE because of its secrecy, lack of candor, disregard for the need to involve State officials and members of the public, and insensitivity to alternative points of view.
- Site Selection Process. There was a strong feeling that the site selection process has been neither fair nor unbiased. There was a general opinion that the site selection decision had already been made, and that it had been made based on political, not technical, criteria.
- Hasty Decisions. Another concern involved apparently arbitrary deadlines in the repository selection process. The sources suggested that too much emphasis was being placed on speed and not enough on safety. Whether repository sites should even be considered was also mentioned because issues such as whether we should bury the wastes at all and whether the waste could be reprocessed have not been adequately addressed.
- Potential Consequences. The inventory revealed many concerns about potential risks. Of particular concern were transportation accidents, radiation leaks and spills, the possibility of terrorism/sabotage, contamination of water supplies, and the effect of underground weapons testing and natural forces (e.g., earthquakes) on the viability of a permanent waste storage facility. Many sources also noted that emergency prevention and emergency management issues had not received adequate attention. Concerns about the potential effects of the repository on future generations also were frequently mentioned.
- Economics. Economic consequences of the repository were frequently discussed. At one extreme, some sources argued that negotiating for compensation is fundamentally immoral or mercenary. At the other extreme, many seemed to feel that compensation demands can (and should) be used as a punitive measure against the Federal government. The majority, however, seemed to be willing to discuss compensation issues, including the forms they could take, if Nevada were selected as the site.
- Stigma Effects. There was some level of concern about the effects of the repository on the State's image. This was usually expressed in terms of decreased levels of tourism, destruction of property values,

and the negative influence of the repository on prospective businesses and residents.

- State Government. The State government was often pictured as defending Nevada's interest against DOE. There was a considerable sentiment that the State government should have a higher level of involvement in the repository project.

2.3 Focus Group Design

There are two important considerations in designing focus groups: the location of the groups and the composition of each group. The research team decided that having a focus group in one of the very small towns near the repository site would not be advantageous because of the potential influence that the focus group could have on people's perceptions, knowledge, and understanding of the risks associated with a HLNW repository. Such a group might have stimulated interaction that would not have occurred otherwise.

However, on the composition of the groups, the second important design issue, the research team decided to select a heterogeneous group from each location, instead of a homogeneous group that had some unique feature. At the outset of the project, the team could not identify any particular group that possessed features of relevance or importance for the research. Therefore, a mix of people from each location was chosen to provide the researchers with a general sense of how survey questions about HLNW repository risks would be received.

Figure 2-1 provides a profile of the three HLNW repository risk focus groups held in Pahrump, Las Vegas, and Caliente, Nevada. These three sites chosen for focus groups provided different perspectives into areas of interest for the research objectives. Pahrump provided insights from a small community that could experience some of the risks and socioeconomic impacts of the proposed repository. Las Vegas yielded some perspective on the concerns regarding the repository's effect on gaming and tourism, as well as on possible transportation issues. And Caliente, in northern Nevada, was chosen to provide some information on how the repository is perceived and how much is known about it in an area where transportation is likely to be the main source of risk.

The economic situations in each of the three locations differed as well. Caliente, once a railroad and mining center, has experienced a significant economic decline in recent years as these two concerns no longer operate in the town and a highway bypass has cut down on drive-through traffic. Pahrump's economy, while sluggish, has been stable, and the area has gained some new residents from many government-related activities. Las Vegas, on the other hand, has experienced rapid growth in the last two decades.

These differences in economic conditions affected participants' perceptions about the tradeoffs between the potential economic benefits and the potential risks from a HLNW repository. They also played a part in shaping many of the other attitudes and opinions expressed in the sessions.

Session	Location and Date	Participants	Purpose
1	Pahrump, Nevada October 15, 1986	9	<ul style="list-style-type: none"> • Preliminary survey questions • Perceptual cues • Question wording • Issue identification
2	Las Vegas, Nevada October 30, 1986	8	<ul style="list-style-type: none"> • Further work on questions • Scales for questions • Ranking exercises
3	Caliente, Nevada November 19, 1986	9	<ul style="list-style-type: none"> • Preliminary questionnaire • Alternative scales • Rating vs. ranking of alternatives

Figure 2-1. Focus groups for HLNW repository risk survey: a profile.

2.4 Focus Group Procedures

Participants for the focus groups were selected by researchers based on suggestions made by contacts in each of the three cities. Individuals recruited were people who the contacts believed would provide thoughtful and interesting insights. Held in relatively formal settings, each session lasted 2 hours. This type of setting apparently makes participants feel both that they are going to learn something and that their opinions are valued by the research team. Two hours is about the maximum feasible length for focus group sessions.

Each of the three sessions was tape-recorded. The Las Vegas session was also videotaped through a one-way mirror located in the room. Researchers feel that it is important to tape-record the sessions because it is impossible for them to remember all the specifics mentioned on their own. As long as the presence of the tape recorder is explained at the outset, there are usually no objections and it does not have a noticeable effect on the conversation. A videotape is useful in identifying which person made the comments on the voice recording, as well as showing gestures and other nonverbal forms of communication that a voice tape will not record.

2.5 Findings From Focus Group Sessions

Statistically, the participants in focus groups are not representative of the general population. They do not necessarily reflect the attitudes and concerns of the population as a whole. However, they are useful in helping researchers design an effective questionnaire which will gather information on attitudes and concerns of the general population. By finding ways to elicit people's perceptions of the potential risks of a HLNW repository, the researchers were able to ask the right questions in their telephone survey.

Three themes regarding risk perceptions emerged in the focus groups. First, the test site clearly established a baseline for most participants' risk perceptions:

The first thing I think about is we do have the test site here and certainly we do have radiation already, and so if there is a possibility it can help us economically, I cannot see that it is going to hurt us as far as being unsafe any more than the situation we are in.

I don't know how high level the waste would be, but it can't be higher than what they've been blowing off out there [at the test site] for 30 years.

Alternatively, some participants' knowledge of test site activities led to heightened concerns regarding the potential risks from a HLNW repository. The following quotes illustrate this phenomenon:

I personally don't want to live very near where they put it [nuclear waste], because back in the 1930s when they were doing above-ground testing, they were quite sure, quite certain it was safe, and

they assured everybody who lived around it [that it] was safe, and it was not.

It frightens me. I'm not knowledgeable about it, but I know the dangers my boyfriend goes through every day from being burned [at the test site]. I don't know what level of waste is out there or how it's going to be buried ... I'd like to know the potential hazards of this thing.

Second, most people were concerned with risks related to transportation of the high-level nuclear wastes:

It could be the safest place in the country to plant the stuff. But even if it is the safest place, I have a real question of how we're going to get it there.

I think that the chances of an accident in transporting would be far greater than once it was to the site and deposited. I think you are dependent on too many other factors that you can't be sure of the safety.

In fact, Las Vegas and Caliente participants perceived auto accidents as the most serious of the selected risks presented to them to evaluate (see Figure 2-2). Generally, most participants expressed at least some concern over risks related to the transportation of the nuclear wastes to the repository.

And third, perceptions about the tradeoff between the risks from and the potential economic benefits of the repository differed across the three groups. As noted earlier, these differences are related to the economy of the specific location of the focus group. Almost all focus group participants were aware of the potential economic benefits that a HLNW repository would provide for southern Nevada.

Rural Nevada is in a bad economic slump. We need the money. It would put people to work.

It will mean jobs and will give the area a boost.

Not surprisingly, the participants in Caliente, with the worst economy of the three focus group cities, placed greater emphasis on these economic benefits of the repository. Pahrump participants recognized the economic benefits, but they did not view them as being essential to the economic survival of their town. And the focus group participants in Las Vegas felt that the risks outweighed any potential benefits.

Participants in all three groups rated the likelihood of siting the repository at Yucca Mountain very highly, though there was more disagreement among Caliente participants than among participants at the other two locations. See Figure 2-3. Some participants expressed the opinion that if the Federal government wanted to locate the repository at Yucca Mountain, there was little the State could do to stop it. They pointed out that the Federal government already owns the land being considered for the repository.

^a Average for group based on a 1-10-10 scale with 1 representing "not at all serious" and 10 being "very serious"

^b Average for group based on a 1-10-5 scale with 1 representing "not at all serious" and 5 being "very serious"

Figure 2-2. Perceived seriousness of selected risks:
Las Vegas and Callente Focus Groups.

Figure 2-3. Perceived likelihood of the repository being sited at Yucca Mountain:
Pahrump, Las Vegas, and Caliente Focus Groups.

Finally, some participants suggested that Yucca Mountain might actually be the best place from a scientific standpoint. As one person said, "Why ruin two places when you've already got one ruined?"

In the area of mitigating the transportation risks, participants evaluated alternatives that ranged from color coding of containers to aid in identification, to tracking shipments, to extensive driver training, to preventing shipments through urban areas. Figure 2-4 highlights the findings. Using special containers and preventing shipments through certain areas were the two dominant alternatives.

With regard to compensation measures, the majority of participants in all three groups favored taxes on shipments to support schools, parks, and public facilities as the most effective form of compensation. Because Nevada has relatively low property taxes and utility rates, there was little support for compensation programs to reduce these costs. Figure 2-5 summarizes these results.

Several other findings from the three focus groups also are noteworthy. Most participants in all three groups had some knowledge of the potential economic benefits of siting the repository at Yucca Mountain. However, there was a general lack of knowledge of other aspects of the repository. Also, participants in Las Vegas and Pahrump demonstrated that people's perceptions are related to their attitudes toward government involvement, effectiveness, and credibility. Pahrump participants, many of whom had direct contact with the nearby test site, were more positive in their assessment of the government's competence in this area. On the other hand, there was widespread lack of confidence among participants at the Las Vegas focus group session in the credibility of information provided by the Department of Energy.

These findings are consistent with other studies of risk perceptions that have found perceptions to be related to people's awareness levels, knowledge, and attitudes, especially toward governmental involvement, effectiveness, and credibility. (See Slovic [1987].) Additionally, the focus groups helped to evaluate the potential wording of questions, the scale for measuring people's perceived risk, and their ability to answer certain types of questions. The experiences of the group participants suggested that the telephone survey should provide considerable flexibility for exploring perceived risks from the repository, but that more detailed considerations of mitigation alternatives would require visual aids to be effective.

The focus groups provided many useful insights for developing the survey questionnaires. In doing so, they have fulfilled their primary objective. In part, these insights stem from the illuminating comments offered by the focus group participants. These citizens openly discussed the various complexities posed by the proposed siting of the HLNW repository. They considered not only how it might affect them, but how it could affect others. The participants also candidly evaluated the alternative survey questions.

In addition to these insights, the focus groups brought another dimension to the overall research process. They provided a vehicle for the research

^aPercentage of participants perceiving the mitigation alternative as effective

^bAverage effectiveness ranking of mitigation alternative as a percent of best possible effectiveness ranking (i.e., 5).

^cAverage effectiveness rating of mitigation alternative as a percent of best possible effectiveness rating (i.e., 5).

Figure 2-4. Perceived effectiveness of selected alternatives for mitigating transportation risks:
Pahump, Las Vegas, and Callente Focus Groups.

^a Average effectiveness ranking of compensation alternative where 1 is "least effective" and 5 is "most effective."

^b Average effectiveness rating of compensation alternative where 1 is "not effective" and 5 is "very effective."

**Figure 2-5. Perceived effectiveness of selected compensation alternatives:
Las Vegas and Caliente Focus Groups.**

team to evaluate new ideas, reconsider old ones, and search for underlying themes. Although somewhat unanticipated, these benefits were substantial.

2.6 Implications

Overall, the focus groups, and the inventory of concerns, provided insurance that the surveys would address the important issues, and that the questions used to address them would be understandable. In fact, the two activities were complementary. The inventory of concerns provided a sense, or feel, for the printed messages Nevada residents had been receiving about the HLNW repository. This stimulated potential themes and issues for the focus group sessions. The reactions of participants in these sections provided another perspective on these themes. Such themes could be examined again with survey data which are based on representative samples of target populations.

The focus groups and inventory of concerns provided intuitive sounding boards for considering questions in the telephone survey. When an item in the questionnaire was under review, comments from focus group participants, or from the inventory of concerns, frequently helped to clarify how the item should be constructed. These activities also provided a baseline for evaluating the coverage of the questionnaire. These findings enabled us to decide whether the questionnaire was covering most, if not all, of the important issues. The ultimate value of these activities is best seen in the questionnaire that was developed for the telephone surveys.

SECTION 3

SURVEY IMPLEMENTATION

3.1 Introduction

This section describes the procedures used to conduct the telephone survey. It describes the process used to develop the questionnaire, the procedures used to select the sample, and the quality assurance procedures used in completing the actual interviews. Each of these components played an important role in the survey. How well they were completed ultimately determined the quality of the data that were collected.

3.2 Questionnaire Development

The survey questionnaire is the cornerstone of the survey. It must consistently balance the researcher's need for information with the respondent's interest in and ability to participate in the study. Such a balance can best be achieved through an iterative process that includes extensive pretesting. This process is made even more effective by acquiring reviews from people of different points of view. Additionally, the questionnaire must be designed to accommodate the strengths and weaknesses of the particular mode of data collection (telephone surveys were used in this phase of the risk studies). Ultimately, the questionnaire has to be administered consistently in all interviews.

After completing the focus group activities and the inventory of concerns, formal development of the survey questionnaire for the telephone survey began. This development process included:

- Preparing 12 drafts of the questionnaire,
- Conducting 150 pretest interviews at various locations throughout the drafting process,
- Obtaining reviews from the State of Nevada steering committee, the peer review committee, and a group of nationally-recognized survey experts, and
- Completing final pretests and consistency checks at the two survey research centers that conducted the surveys.

The Gordon Black Corporation in Rochester, New York, and the University of Nevada-Las Vegas Survey Research Center conducted the telephone surveys in March 1987, using sampling frames provided by Survey Sampling Inc. Research Triangle Institute (RTI) coordinated and supervised the activities at both locations. These two groups were chosen because of their respective expertise in conducting national surveys and surveys in Nevada.

As further quality assurance measures, the risk team prepared a detailed interviewer training manual for each survey. The manuals covered general

interviewing practices and the particular features of the national and Nevada questionnaires. The manuals were identical except for the slight differences in the questionnaires. In particular, the Nevada questionnaire included several additional questions on unique issues such as the perceived risk from nuclear weapons testing.

Additionally, the risk team trained the interviewers at both locations using these manuals. Each training session lasted 2 hours and included mock interviews that were critiqued. Both survey centers monitored the data-collection efforts closely. The National survey took 1 week to complete, and the Nevada survey required about 10 days. Professional supervisors personally monitored interviews, in addition to checking each questionnaire as it was completed (in the Nevada survey). The National survey used computer-assisted interviewing techniques that were tailored to the needs of the HLNW survey. The final questionnaires for each of the two surveys are included at the end of this report.

3.3 Sampling Procedures

In order to assure that the results of any survey are credible (i.e., that one can confidently say that the findings of a study actually reflect the attitudes, opinions, and beliefs of the larger population from which the sample was drawn), it is necessary to understand how the respondents in the study came to be interviewed. For example, do the viewpoints of the Nevada residents included in this study accurately portray the beliefs of all Nevadans?

To answer this question, two types of information are needed. First, one needs to know how the sampling frame was developed and how elements within it were identified; that is, how certain telephone numbers were selected for possible inclusion in the study. A description of how the sampling frame, designed by the private company supplying the sample of telephone numbers, follows. Survey Sampling, Inc. supplied the telephone numbers.^a Second, one needs to know how specific telephone numbers were actually included in the study. (Use of the sample numbers is described later).

Development of the Sample

For both the National and Nevada telephone surveys, a similar sampling design was used to generate a list of telephone numbers for possible inclusion in the studies. This procedure resulted in two stratified random samples--one which could be generalized to the United States as a whole (i.e., used to describe national beliefs about the nuclear waste repository), and one which could be generalized to Nevada.

Selection of Counties. The universe of sampling points was the total number of residential households with telephones. People who lived in institutions of any kind (e.g., group quarters on military bases, prisons, nursing homes, etc.) were excluded from these surveys. To equalize the probability of selecting a telephone number that is assigned to a household (rather than a business or

^aSee Survey Sampling, Inc. (n.d.)

non-working number) in the sample area, samples were first systematically stratified to all counties in proportion to each county's share of telephone households in the survey area. To obtain reasonable estimates of telephone households by county, a special data base was developed on the basis of the 1980 Census for residential telephone incidence. These figures; updated annually with data on new telephone installations provided at the state level, were applied to current projections of households by county.

All counties in the continental U.S. were included in the National sample area and all counties in Nevada were included in the Nevada sample area. Geographic areas were defined from combinations of the counties. Next, the sum of estimated telephone households was calculated and divided by the desired sample size to produce a sampling interval.

The investigators for these two surveys determined that a national sample of 1200 and a Nevada sample of 800 would have sufficiently acceptable sampling errors (i.e., the range of the confidence interval around research results) to be able to accurately describe the characteristic attitudes of the two sample groups. Additionally, because of the concern about residents in rural southern Nevada, two additional samples were drawn in Nevada, one from Nye County and one from Lincoln County. Each of these samples was to result in 100 additional interviews. Because these are over-samples, they were not included in general computations of the results from the Nevada residents since that could bias the sample in the direction of rural points of view. When reported, they were discussed separately or weighted to allow for their proportional representation among all Nevada residents.

Once this interval size was determined, a random number was drawn (between 0 and the maximum size of the interval) and the sample was selected in a systematic "nth" fashion from a random starting point. Any county whose population of estimated telephone households equals or exceeds the sampling interval was automatically included in the sample, while smaller counties are included with a probability proportionate to their size.

Identificaiton of Numbers Within Counties. Exchanges (the first three numbers of a telephone number) were assigned to a single county on the basis of where listed residents live. Nationally, about 80% of all exchanges appear to fall totally within county boundaries. For those overlapping county lines, the exchanges were assigned to the county with the highest number of listed residents.

For each county included in the sample, one or more unique telephone numbers were selected by systematic sampling from among all working blocks of numbers in all telephone exchanges assigned to the county. A "block" is defined as the first two digits of a telephone number within an exchange. A "working block" is a block of 100 contiguous numbers which contains at least three listed residential telephone numbers. Each working block in an exchange was then weighted in proportion to its share of the listed phones in that exchange.

Creation of Sample Numbers. Once the sample size was allocated, a ^{second} sampling interval was calculated for each county by dividing the number of listed telephone households for the county by the portion of the sample allocated to that county. Using a random start within this interval, those exchanges and working blocks falling within the interval were sampled on a systematic basis. Since random samples were desired for these two surveys, two more digits, randomly chosen from the range 00-99, were added to each of the blocks selected, thus providing seven digit phone numbers with area codes where necessary.

Cautionary Remarks on the Sampling Design. Although the sampling design discussed above is very well thought out and developed, all sampling schemes have some weaknesses which could result in some degree of bias in the research findings. In general, these biases do not appear to be substantial in this case; however they should be mentioned in order to provide the reader with adequate information with which to evaluate the results. Three potential sources of bias can be identified from the methodology used to develop the sampling frame:

1. Counties with larger populations were more likely to be included.
2. Counties with higher percentages of telephone coverage were likely to be over-represented.
3. Counties with higher percentages of listed telephone numbers in directories were likely to be over-represented.

The extent to which these factors could statistically affect research results has not been specified by the company providing the sampling frame.

Inclusion of Respondents: The National Survey. The national telephone survey was conducted by the Gordon Black Company (GBC), resulting in 1,201 completed interviews. To produce a sampling frame of telephone numbers, GBC applied a regional sampling design to the national sample of telephone numbers supplied by Survey Sampling Inc. GBC has identified five regions of the country (see Map 3-1) from which samples of telephone numbers, proportionate to their populations, are drawn. Table 3-1 presents the population percentages used to determine the proportion of interviews which needed to be completed for each region.

Then, based on the desired sample size (1200 for this study), a target figure for needed interviews was determined (Table 3-1). In order to produce a sufficiently large pool of initial telephone numbers that would result in the desired number of completed interviews, GBC began with ten times the number of needed telephone numbers. For example, in their Northeast region, it was determined that 296 interviews would be needed. Initially, approximately 2900 telephone numbers were generated for this region.

This initial procedure is necessary in general population surveys that rely on computer-generated sampling frames of telephone numbers. A relatively large number of such numbers will be non-sample numbers, indicating that they are non-residential numbers (e.g., belonging to businesses, government offices,

FIGURE 3 - 1. TELEPHONE SURVEY SAMPLING REGIONS

TABLE 3-1. SAMPLE SIZES FOR NATIONAL SURVEY BASED ON REGIONAL POPULATIONS

Region	Percent of Population	Completed Interviews	
		Expected	Actual
Northeast	24.7%	296	296
South	22.4%	269	270
Great Lakes	18.4%	221	221
Central	15.2%	182	182
West	<u>19.3%</u>	<u>232</u>	<u>232</u>
Total	100.0%	1200	1201

group home facilities) or numbers that are not in service. Non-sample numbers are not included in the computation of response rates for a survey; however, other non-resolved numbers (e.g., no answers, busy signal, contacts without interview completion), refusals, and terminations are included in response rate calculations.

Table 3-2 presents the disposition of telephone numbers for the national survey. Unfortunately, GBC uses a category of "interim" numbers for statistical, record-keeping purposes. The figures in the table refer to the number of attempts (rather than to the actual number of telephone numbers) to reach potential respondents. Since these are non-mutually exclusive categories (meaning that the same number may appear in multiple categories including the final disposition categories), GBC was unable to provide information on the total number of telephone numbers they used to get a final sample of 1201 interviews. Without this information, it is impossible to compute a response rate for the survey.

Knowledge of the response rate is very important because it provides an indicator of how generalizable the survey results are to the population from which the sample was drawn. Most academic survey research centers try to attain a 70-80% minimal response rate for general population surveys which rely on random digit dialing sampling frames (like the one used in these studies). If all of the interim calls resulted in final dispositions for the national survey (which they surely did not despite attempts by GBC to redial each telephone number until it was either resolved or had been tried at least four times by an interviewer), the best response rate that could have been achieved was 35.1%. Given this low response rate, population projections made from this data should be treated as "indicators of possible trends" rather than as actual representations of public attitudes.

Inclusion of Respondents: The Nevada Survey. Interviews with Nevada residents were conducted by the Survey Research Center at the University of Nevada, Las Vegas (UNLV), resulting in 797 interviews in the general State sample. Additional interviews were completed in special studies of Lincoln County (N=100) and Nye County (N=99). Survey Sampling, Inc. originally provided 5000 telephone numbers to UNLV for these three samples.

For the general State sampling frame, the numbers were proportionate to the residential populations in each county of Nevada. Table 3-3 presents the population percentage used to determine the number of telephone numbers provided for each county and the number of completed interviews per county.

Table 3-4 indicates the final dispositions of the 5,954 numbers included in the UNLV sampling frame. Nine hundred fifty-four additional numbers were created by varying the last digit of the provided sample numbers that fell out of the sample (i.e., that were non-working or assigned to businesses) to accommodate a large number of non-working or non-assigned numbers in the original frame.

Unfortunately, a final response rate for each of the three Nevada surveys cannot be calculated because disposition statistics were computed on the three samples collectively. Using legitimate sample elements in the table, however,

TABLE 3-2. DISPOSITION OF SAMPLE TELEPHONE NUMBERS FOR THE NATIONAL SURVEY

Disposition	Number
Final:	
Completed Interviews	1201
Refusals	1789
Terminations	320
Language Barriers	109
Not in Service	2050
Business	400
Interim: ^a	
No Answer	2848
Busy	626
Callbacks Required	827

^aThese categories are not mutually exclusive of final disposition classifications and cannot be used to compute response rates.

TABLE 3-3. SAMPLE SIZES FOR NEVADA STUDY BASED ON COUNTY POPULATIONS

County	Percent of State Population	Number of Phone Numbers in Frame	Completed Interviews
State Study:			
Clark	58.9%	2919	462
Douglas	2.5%	128	18
White Pine	.8%	41	8
Eureka	.1%	6	3
Lyon	1.6%	69	12
Lander	.4%	19	3
Elko	2.0%	102	21
Mineral	.6%	29	6
Esmeralda	.1%	4	0
Carson City	4.0%	199	29
Pershing	.3%	13	4
Humboldt	1.0%	48	9
Storey	.1%	7	0
Churchill	1.6%	82	12
Washoe	24.4%	1194	182
Nye (State Sample)	1.3%	60	13
Lincoln (State Sample)	.4%	10	10
Totals	100.1%	4930	792
numbers with unidentified prefixes		80	5
Total sample size		5010	797
Special Surveys:			
Nye County		460	99
Lincoln County		484	100

TABLE 3-4. DISPOSITION FOR SAMPLE TELEPHONE NUMBERS FOR
THE NEVADA SURVEYS

Disposition	Frequency	Percent
Refusals	1,501	25.2%
Terminations/ Incompletions	144	2.4%
Language Barriers	30	.5%
Not in Service ^a	1,649	27.7%
Businesses ^a	370	6.2%
Not Qualified to Participate ^a	38	.6%
No Answer	866	14.5%
Answering Machines	134	2.2%
Phone Numbers Changed (no follow-up)	48	.8%
Continually Busy	83	1.4%
Unsuccessful Call-backs	95	1.6%
Completed Interviews	<u>996</u>	<u>16.7%</u>
Total	5,954	99.8%

^aThese categories are not included in response rate calculations.

it appears that a collective response rate of 25.6% was achieved by UNLV. As was true for the National survey, results from this data should be treated as "indicators of possible trends" rather than as actual representations of public attitudes.

3.4 Respondent Profile

As shown in Table 3-5 our respondents had socioeconomic characteristics that are similar to those based on Census data. Census data for the United States show males comprising 48.7 percent of the population and females 51.3 percent. However, in both the National and Nevada surveys the numbers were effectively reversed, with males comprising 51.4 percent and 51.8 percent and females comprising 48.6 percent and 48.2 percent in the National and Nevada surveys.

The median age in both surveys was 39.5 years, using the midpoint of the age responses divided into five age ranges. Mean ages differed slightly between the three surveys. The mean age for National survey respondents was 41.7 years, while the mean age for Nevada survey respondents was 37.4 years. The mean and median ages in both surveys were higher than the median age for the United States as a whole--31.5 years. This is not surprising because our sample included only adult decision-makers.

In the area of education, the median number years of education completed was 14 for both the National and Nevada survey respondents, slightly above the national median years completed of 12.6. In both surveys, roughly 90 percent of the respondents had at least graduated from high school, and 26.2 percent of the respondents in the National survey and 22.7 percent in the Nevada survey had received at least undergraduate degrees from college.

The median family income for both surveys was \$30,000, again a result of placing a respondent's family income into one of eight income ranges and using the midpoint of that range to represent income level. This compares to a national median family income of \$27,735.

The distribution of occupations in the two surveys paralleled national data obtained from the Census. The greatest number of respondents classified their occupation as professional/technical, managerial, or service related. These three categories are in the top four categories in the Census based on percentage of employed persons in each occupation.

A significant number of respondents in both surveys were not employed outside the home, however. Retirees composed 12.5 percent of the National sample and 14.6 percent of the Nevada sample. Likewise, 12.5 percent of the National sample and 12.6 percent of the Nevada sample listed themselves as homemakers.

Respondents were asked how long they had lived in their present community to see if length of time spent in a community might affect or explain one's decisions concerning a HLNW repository. Length of residence

TABLE 3-5. SOCIOECONOMIC PROFILE

	Nevada survey	National survey	National statistics
Age (years)			
Median	39.5	39.5	31.5
Mean	37.4	41.7	--
Std. deviation	11.1	15.2	-- (as of 7-85)
Education (years completed)			
Median	14	14	12.6
Mean	13.6	13.5	--
Std. deviation	2.4	2.8	-- (as of 3-85)
Family income (\$)			
Median	30,000	30,000	27,735
Mean	31,994	31,784	--
Std. deviation	19,430	20,952	-- (1985)
Length of residence in present community (years)			
Median	10	17	59.3% ^a
Mean	15.1	20.2	in same house as
Std. deviation	14.1	16.9	5 years previously (as of 3-85)
Sex (%)			
Male	51.8	51.4	48.7
Female	48.2	48.6	51.3 (as of 7-85)
Occupation (%) (4 top frequencies of respondents in the labor force)			
Professional or technical	22.8	30.7	
Managerial	10.2	10.9	
Service worker	16.8	9.4	
Clerical	12.4	--	
Craftsman	--	10.1	
Occupation (%) national statistics (1985)			
Technical, sales, and administrative support			31.0
Managerial and professional activity			24.1
Operators, fabricators, and laborers			15.7
Service operations			13.5

(continued)

TABLE 3-5 (Continued)

	Nevada survey	National survey	National statistics
Not in the labor force			
As % of total noninstitutionalized population	29.3	29.5	35.2
As % of those not in labor force			
Retired	49.8	42.5	34.7 ^a
Homemakers	43.6	42.5	45.7
			(as of 2-87)

^aClassified as "other" includes retirees as well as other categories, such as discouraged workers and the voluntarily idle.

Sources for National Statistics:
Statistical Abstract of the United States 1987. 107 ed., U.S. Department of Commerce, Bureau of Census, Washington, DC, December 1986.

Employment and Earnings. Vol. 34, No. 3, U.S. Department of Labor, Bureau of Labor Statistics, Washington, DC, March 1987.

was somewhat longer in the National survey as opposed to the Nevada survey. Respondents in the National survey had lived in their present community for 20.22 years on average, with the median length of residence being 17 years. Average length of residence for the Nevada survey was 15.06 years, with the median being 10 years. This consistently shorter time span for Nevada residents might be explained by the population migration to the West in recent times as the regional economy has grown. Thus, with a greater likelihood of having a relatively higher percentage of residents who had recently moved to the State, the Nevada survey would be more likely to have an overall shorter length of residence than the National survey.

3.5 Implications

The iterative process for developing the survey worked effectively. Each draft produced significant improvements in question content and/or administration. By pretesting drafts that involved major revisions, understandability and ease of administration also were enhanced. When the final pretest was completed just prior to the surveys, only two minor technical changes were needed in the skip patterns. The questionnaire flowed smoothly, as evidenced by the very low numbers of partial interviews. This is especially significant because the 20-minute length of our interview was somewhat long for a telephone interview.

The sampling and survey administration went smoothly as well. Refusals were higher than desired, but they were not out of line with other telephone surveys. Because most refusals occurred at the initial contact, the nature of our survey was unlikely to have contributed to the refusal. Equally important, the socioeconomic characteristics profiled for respondents in the National survey compared reasonably well with those from Census data.

SECTION 4

CONCEPTUAL FRAMEWORK

4.1 Introduction

The risk surveys involve complex conceptual and empirical issues. In part, this complexity stems from their defiance of traditional boundaries of scientific inquiry. Sociological, psychological, and economic factors interact in ways that are vaguely understood. Social and political institutions affect the interactions as well. This section presents a conceptual framework that begins to shed some light on the issues involved in measuring the risk impacts associated with the siting of a HLNW repository.

The conceptual framework builds on the literature on risk perception, decision processes, and policy analysis regarding the siting of noxious facilities. The framework integrates economic, psychological, and decision science concepts. As of now, the framework is preliminary because the empirical and conceptual analyses are not completed.

In this section, we briefly summarize the issues from each of the relevant research areas and then propose a set of hypotheses that are investigated in the empirical sections that follow.

4.2 Relevant Background Literature

4.2.1 Risk Perception

A large number of studies initiated by Paul Slovic and his colleagues at Decision Research have analyzed a set of factors that characterize the perceived risks of various hazards. (See Slovic, Fischhoff, and Lichtenstein [1982] and Slovic [1987]). These studies have shown that perceived risk is quantifiable through a number of factors. The most important factors related to the degree of perceived risk by lay persons are dread, controllability, and catastrophic potential (i.e., the number of people who could die or be injured in a single accident involving the hazard). Moreover, experts' perceptions of the risk are not directly related to these or other factors that influence lay persons, so that risk perceptions of lay persons are not easily related to that of experts.

4.2.2 Decision Processes

In making choices under uncertainty, individuals are limited in their ability to process information on alternatives and outcomes. Simon [1955] initiated a large body of research that revealed that individuals have limited knowledge of alternative courses of action and limited awareness of possible consequences. Under these circumstances it is reasonable for them to consider specific alternatives as acceptable or unacceptable. In other words, people search for feasible solutions rather than optimal ones.

Recent studies of decision-making under risk and uncertainty reveal that individuals have difficulty in understanding the concept of probability. Tversky and Kahneman [1974] have shown that individuals use rules of thumb and exhibit systematic biases in estimating the probabilities associated with specific events. Kunreuther et al. [1978] have shown that these biases are particularly pronounced when one is dealing with low probability-high consequence events such as the risks from natural hazards.

Finally, there is considerable empirical evidence that individuals use sequential models of choice when choosing between alternatives facing them. For example, individuals will set specific standards (e.g., an acceptable mitigation level) and will eliminate options that do not meet these criteria independent of other considerations (see Schoemaker [1980]). These models are noncompensatory in that alternatives that are eliminated on the basis of a specific dimension or standard will not be evaluated on other dimensions.

The evaluation of a Monitored Retrieval Storage (MRS) facility in Tennessee illustrates the use of such a noncompensatory model by a group of individuals. A local task force needed to assure itself that the technology for the MRS could be judged safe according to some criterion before evaluating the operation of the proposed facility (see Peele [1987]). Similar decision rules are likely to be utilized by individuals regarding their evaluation of a potentially hazardous facility (e.g., an alternative may be eliminated by an individual because it does not meet specific safety standards in which case no amount of proposed compensation will be deemed acceptable).

4.2.3 Policy Alternatives

A rich literature has emerged on siting hazardous facilities to examine the types of policy options for alleviating the concerns of the host community as well as our society. Perhaps the most important conclusion from these studies is that in order to obtain public acceptance of a facility one needs to develop a strategy comprised of a set of policy tools which satisfy three basic principles:

- Protection of public health, safety, and the environment,
- A meaningful role for affected local governments in the siting process, and
- A recognition of negotiation or bargaining with incentives and compensation as an important part of the decision-making process.^a

Empirical studies support the importance of developing an integrated set of policies for facilitating the siting process rather than relying on a specific option such as compensation. For example, a 1980 telephone survey of 426 randomly selected residents of three rural Wisconsin communities on the

^aSee Carnes et al. [1983] for an overview of compensation literature in the nuclear waste siting area.

acceptability of hosting a nuclear-waste repository indicated that a package of policy tools (including compensation, access to information, and power to shut down the facility) were able to change the initial opposition of 24 percent of these individuals (see Sorenson, Soderstrom, and Carnes [1984]). Each policy looked at on its own only had a marginal effect, however. Similar conclusions emerged from a field survey of residents in Hudspeth County, Texas, a proposed site for a low-level radioactive waste disposal facility. Although there was substantial opposition to the storage facility, a significant number of residents felt that a combination of additional information, implementation of thorough safety procedures, and adequate compensation would make such a project more acceptable to them.^b

Finally, a set of equity considerations is needed to guide the development of policies for siting a radioactive waste facility. Kasperson, Derr, and Kates [1983] have developed the following three principles regarding equity which should be considered in siting decisions:

- The beneficiaries of an activity should bear associated burdens proportional to the benefits enjoyed and, conversely, the imposition of a harm or burden should be accompanied by a proportional benefit.
- The experience of risk should be shared rather than concentrated within the population of beneficiaries.
- The imposition of a harm or burden should be made as voluntary as can reasonably be achieved through encouraging informed consent.

Principle 1 suggests that compensation is an appropriate policy tool for sharing benefits and costs of locating a facility in one location. Principle 2 will be difficult to implement if there is only one high-level radioactive waste facility. When combined with Principle 3, it indicates that safety should be of the utmost concern. Carter [1987] takes this position by recommending that Congress focus on a single site (Yucca Mountain, Nevada) with a robust overall system of containment so that the risks are extremely low for the many thousands of years that the waste remains dangerously radioactive. In addition, Carter feels that on grounds of equity generous compensation should be given to the State for housing the nation's radioactive waste.

4.3 Conceptual Framework

The telephone survey is guided by a conceptual framework with specific elements depicted in Figure 4-1. The relationship between each of these elements draws on the theoretical and applied studies described in the previous section. For example, an individual's perception of the risk associated with a HLNW repository will be a function of the different risk characteristics (e.g., dread, unknowability, concern with future generations) as well as the degree of

^bSee Murdock and Hamm [1987] for further discussion of this case.

Figure 4-1. Conceptual framework.

trust the person has in the government in making the repository as safe as possible.

The resulting perceived risk will affect an individual's perception of the repository. One way of characterizing "perception of repository" is a characterization as to how the person views the economic benefits of a repository in relation to its risks. Specifically, if a repository is built, will it stimulate economic growth in the community to the extent that the benefits outweigh the risks? In addition, is a repository the best way to permanently store high-level nuclear wastes?

Another view of the "perception of repository" is from an equity perspective. Is it fair for Nevada or a facility in the West to store the waste from the entire country or is it more desirable to have repositories in different regions of the country? Those individuals who feel that many repositories are desirable may oppose the facility in Nevada on these grounds rather than on the basis of economic considerations. On the other hand, if an individual does not feel that each region of the country should have a repository, this may reflect their opposition to a repository anywhere in the United States rather than concerns with fairness.

Figure 4-1 also suggests that a person's perception of the repository will be affected by his socioeconomic characteristics (e.g., age, sex, education, income) and knowledge regarding certain features of the repository (e.g., how long it will be storing waste). There is relatively little known as to how these factors will affect the perception of the repository. The focus groups in Nevada suggested that females were more concerned with the risk from a repository than males and would therefore be likely to have a more negative perception of the repository.

Finally, we come to the bottom line--people's attitudes toward a repository. The telephone survey included three types of questions for measuring this variable:

- Would the person vote for or against building a permanent repository in the United States?
- Would the person accept some form of rebate or credit on his Federal income taxes each year as compensation for having a HLNW repository within 100 miles of his home (National survey) or at Yucca Mountain (Nevada survey)?
- Would a person be willing to pay extra taxes to the Federal government in order to move a planned repository from within 100 miles of his home (National survey) or at Yucca Mountain (Nevada survey) to some distant state?

4.4 Hypotheses for Testing

To guide the development and analysis of the telephone questionnaire, we formulated a set of hypotheses regarding the relationship between risk perception and attitude to the repository. These hypotheses were based on the

literature related to risk and decision processes summarized above, as well as the analysis of newspaper reports from Nevada and the focus groups conducted in advance of the survey. The following is a summary of the key relationships which we were interested in investigating based on these hypotheses.

4.4.1 Perceived Risk

We hypothesized that individuals who perceive the risks of a HLNW repository located 100 miles from their home (National survey) or at Yucca Mountain (Nevada survey) to be more serious than the average in the sample (Q. 11g) would have the following characteristics:^c

- Be less knowledgeable about nuclear wastes (Q. 5-8)
- Perceive an accident at a repository to involve certain death (Q. 12a)
- Perceive an accident at a repository could kill many people at one time (Q. 12b)
- Feel scientists did not adequately understand the risks from a repository (Q. 12c)
- Feel people near a repository would not be able to control the risk (Q. 12d)
- Dread living near a repository (Q. 12e)
- Do not trust the government to make the repository as safe as possible (Q. 14)
- Feel a repository is not the best way to permanently store high-level nuclear wastes (Q. 15c)
- Perceive the benefits of the repository to outweigh the risks (Q. 15d and 15f)
- Are risk averse (Q. 21a and 21c)
- Have not graduated from college (Q. 23)
- Are female (Q. 30)
- Own their own home (Q. 33).

^cAll question numbers refer to the ones in the Nevada survey. The National survey was practically identical to the Nevada one except that there were several questions, specific to Nevada, which were not asked. See the questionnaires at the end of this report.

4.4.2 Voting Preferences

We hypothesized that those who would vote in favor of locating a repository at Yucca Mountain (Q. 20) would have the following characteristics relative to individuals who oppose the repository in Nevada, which for most respondents is synonymous with opposing all three proposed sites:^d

- Be more knowledgeable about nuclear wastes (Q. 5-8)
- Have low perceived risks associated with a nearby repository (Q. 11g)
- Trust the government to make the repository as safe as possible (Q. 14)
- Feel that each region of the country should have a repository (Q. 15b)
- Perceive the net benefits of the repository to outweigh the risks (Q. 15d and 15f)
- Feel it is not very important that a local committee would have the power to shut down the repository if they should decide it is unsafe (Q. 16c)
- Have completed college (Q. 23)
- Are male (Q. 30)
- Do not own their own home (Q. 33).

4.4.3 Willingness to Accept a Rebate

We hypothesized that rebates or credits on one's Federal income tax would only induce respondents to vote to locate a repository within 50 or 100 miles of their home (National survey) or at Yucca Mountain (Nevada survey) if they had similar characteristics to those listed above for voting preferences.

The proposed model of choice suggests that if an individual perceives the potential risk from a HLNW repository to be serious, then no amount of compensation in the form of a rebate will cause them to vote for a repository. Hence, we hypothesized that the "perceived seriousness of risk" variable would be of critical importance in determining whether a person is willing to accept a tax rebate in exchange for agreeing to locate a repository nearby his or her residence.

^dIn the National survey only 14 percent of those who opposed Yucca Mountain were in favor of having a repository at either of the other two proposed sites. The remaining individuals (47 percent) were opposed to any site. In the Nevada survey 23 percent favored one of the other two proposed sites and the remaining 44 percent were opposed to having any site.

4.4.4 Willingness to Pay Increased Taxes

We hypothesized that the same variables that would influence willingness to accept (WTA) a rebate would also be important with respect to willingness to pay (WTP) increased taxes in exchange for locating a repository in a distant state rather than 50 or 100 miles from one's home (National survey) or at Yucca Mountain (Nevada survey). In contrast to WTA where we felt that individuals would not accept a rebate of any amount if they perceived the repository risk to be too high, we hypothesized that a person might be willing to pay small annual tax increases (e.g., \$100), but not large tax increases (e.g., \$2,000) even if they perceived the repository risk to be serious. Accepting a rebate is often viewed as a bribe if the risk to health and safety is perceived to be serious. Paying increased taxes to move a proposed facility is not viewed in this light and hence the choice may be made more on the basis of economic tradeoffs than simply bartering people's lives.

4.5 Implications

This section highlighted the various elements of the conceptual framework along with presenting some hypotheses that Guided and will guide our empirical analyses. As noted earlier, our framework is evolving. Eventually we will integrate each component in the framework in a systematic way. This integration will be combined with additional empirical analyses to explore the interrelationships between perceived risks, views of the repository, risk-induced behavior, and well-being.

SECTION 5

PERCEIVED RISK: EMPIRICAL RESULTS

5.1 Introduction

This section presents the empirical results on perceived risks from a HLNW repository. The results follow directly from the conceptual framework presented in the previous section. The findings include the perceived seriousness of the risk and the factors that influenced these perceptions, including the characteristics of the risk and the likelihood of a large radiation release occurring.

The findings in this, and following empirical sections, are based on both descriptive statistics and more rigorous multivariate regression methods and factor analysis. The results do not include any sample weighing adjustments that may be necessary for the Nevada data. Thus, our findings should be viewed as preliminary until they can be combined with the subsequent risk studies. Nevertheless, most of the major findings are unlikely to change because they are statistically robust.

5.2 Perceived Seriousness of Risks

Measuring the perceived risks associated with the HLNW repository was a fundamental objective of the telephone surveys. As part of the questioning process, the interviewers asked people about general environmental issues and attitudes, and about the perceived seriousness of risks from various sources. To elicit risk perceptions, the interviewers used a scale with ranking from 1 to 10, with 1 valued at not at all serious and 10 valued at very serious. Smith et al. [1987] also used this scale, which worked well in the focus groups and pretest interviews. The Nevada questionnaire asked about the potential risks if a repository were located at Yucca Mountain, while the National survey asked about a repository 100 miles from a respondent's home.

As shown in Figure 5-1, people rated the potential risks from a repository more seriously than risks they perceived from any of the other sources that were included. The average seriousness rating was 6.2 in the National survey and 5.6 in the Nevada survey. Risks from water pollution caused by toxic chemicals, the next highest concern, had an average seriousness rating of 5.8 nationally, and 5.2 in Nevada. As shown in Table 5-1, the mean values for perceived risks by Lincoln County (5.2) and Nye County (5.2) residents were about the same as people who resided elsewhere in Nevada (5.7). While these means are statistically different (at the 10-percent level of significance), the magnitude of the differences is less than one-half of a point on the scale.

For additional perspective, the Nevada questionnaire also asked about risks from transporting wastes to Yucca Mountain and the risks from nuclear weapons testing. The transportation risks were viewed as equally serious (mean rating of 5.9) while weapons testing was rated at 4.7. When the responses to these questions of residents within Nevada are compared, the differences are again small. Nye County residents had an average rating of 5.3

Vertical Scale 1-10. 1-Not at all Serious, 10-Very Serious.

Figure 5-1. Average perceived seriousness from various sources.

TABLE 6-1. AVERAGE SERIOUSNESS OF RISK IN NEVADA BY AREA OF STATE

Area	Perceived risk from HLNW repository			Perceived risk from transportation of HLNW to repository			
	Mean	S.D. of Mean	n	t-statistic ^a	Mean	S.D. of Mean	n
Lincoln County	5.100	12.222	94	-1.579	5.705	11.231	95
Nye County	5.214	9.013	103	-1.517	5.346	9.763	104
Rest of Nevada	5.743	11.313	748	--	5.983	10.707	750

^at statistic is for the difference in means between each county and the rest of the State of Nevada.

The formula used was:
$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2} \cdot \frac{n_1 + n_2}{n_1 + n_2}}$$

The critical value for a significant difference at the .05 = 1.658

The critical value for a significant difference at the .01 = 2.368

for transportation risks, compared to 5.7 for Lincoln County and 6.0 for the rest of the state. The difference for Nye County is statistically significant (at the .05 level of significance) but again the magnitude is small. Additional insights can be gained from the distribution of the perceived risk responses. Figure 5-2 shows the distribution of responses for both the Nevada and National surveys. Generally, the distribution of responses is similar, except that Nevada residents are more likely to rate the seriousness at the two endpoints of the scale. Overall, almost 38 percent of those surveyed nationally rated the potential risk as 8 or higher on the 10-point scale, while almost 35 percent of Nevadans put their risks on the high end of the scale.

Additional data show that women related the risks as more serious than men. As shown in Figure 5-3, the lower seriousness ratings from Nevada men account for the higher percentage of responses at the lower end of the scale in Figure 5-2, especially the 16 percent at not at all serious. In particular, 44 percent of the male respondents in the Nevada survey gave ratings of 3 or less (compared to 30 percent nationally). The higher rating by women is consistent with many previous surveys of attitudes toward nuclear power (Mitchell [1984]).

Nevada residents, however, were more concerned about transportation risks than the respondents in the National survey. As shown in Figure 5-4, almost 80 percent of the Nevada respondents agreed at least that the most serious risk from a repository would be from transporting the wastes. This compares to 67 percent of the respondents in the National survey who agreed with the statement on transportation risks.

5.3 Risk Characteristics

The survey included questions that asked respondents to characterize the risks associated with the repository. The questions included characteristics that have proven important in previous psychometric studies of risk perception (Slovic [1987]; Slovic, Fischhoff, and Lichtenstein [1985]). In our analyses of the risk characteristics, the perceived seriousness of the risks to future generations emerged as the most influential factor affecting the risk perceptions associated with the HLNW repository. As shown in Figure 5-5, 76 percent of the respondents in the National survey strongly agreed (or agreed) that the repository would pose serious risks for future generations. In Nevada, the percentage was 66 percent. Figure 5-5 also indicates that 70 to 89 percent of those surveyed nationally strongly agreed or agreed that risks from a HLNW repository would be fatal, perhaps for many people at once, and that the repository would be dreaded by those living near it. Some 87 percent disagreed with the statement that those living near the repository would be able to control the risk. The Nevada respondents rated the risk characteristics about the same as the National survey. All of these responses are consistent with the characterizations of nuclear power and nuclear waste found in previous studies.

The correlations across respondents between six risk perception characteristics for the National and the Nevada samples were subjected to a principal components factor analysis. A separate analysis was done for each sample. In both cases, two dominant factors emerged, accounting for 56 percent of the variance in these scales for the National sample and 61 percent of the

Perceived seriousness of an HLNW repository located at Yucca Mountain (Nevada survey)

Perceived seriousness of an HLNW repository 100 miles from your home (National survey)

Figure 5-2. Distribution of responses.

Figure 5-3. Comparison of seriousness ratings for locating a nuclear waste repository 100 miles from your home (Yucca Mountain for Nevada respondents).

Figure 5-4. "The most serious risk from a repository would be from transporting the wastes to it."

Figure 5-5. Risk characteristics.

variance in the Nevada responses. The factors were rotated orthogonally to simple structure and the results are shown in Table 5-2. Factor 1 appears to be the dread risk factor that has emerged in previous studies, being defined in terms of fatal and possibly catastrophic accidents, risk to future generations, and dread. Factor 2 is defined in terms of only one characteristic, the degree to which scientists are perceived to understand repository risks.

Another important way to characterize the perceived risks associated with a repository is in terms of the likelihood that it would release a large amount of radiation into the environment as a result of accidents, general deterioration, or human malevolence. The interviewers asked respondents to indicate the likelihood of such large releases of radiation during the first 5 or the first 20 years that the repository would be open. (The different lengths were randomly assigned to different respondents.) Our results indicated that the time period made almost no difference in the responses. Various types of radiation releases were perceived just as likely to occur in the first 5 years as in the first 20 years. Figure 5-6 combines results from these two variations. In both the National and Nevada surveys, two sources of large radiation releases emerged as more likely: transportation accidents and contamination of underground water. In the National survey, 78 percent of the respondents thought transportation accidents were at least somewhat likely to occur, while 74 percent thought the contamination of underground water was at least somewhat likely. The percentages were almost identical for the Nevada respondents. The perceived likelihoods of large radiation releases are orders of magnitude greater than the estimates of technical experts.

A heuristic version of the perceived risk model based on the conceptual framework is illustrated in Equation (5.1). (The model will be expanded and refined as the research evolves.) In this model, people form their perceptions of the risks from the HLNW repository

$$PR^* = F(A, K, C, E, L, S) \quad (5.1)$$

where

PR^* = perceived risk from the repository

A = individual's attitudes toward repository siting (and probably nuclear-related issues in general)

K = knowledge about the repository issues

C = characteristics of the risk

E = experiences associated with repository or nuclear issues

L = individual's location

S = individual's socioeconomic characteristics

TABLE 5-2. ROTATED FACTOR LOADINGS FOR RISK PERCEPTION
CHARACTERISTICS IN THE NATIONAL AND NEVADA SAMPLES

Risk characteristic	National sample		Nevada sample	
	Factor 1	Factor 2	Factor 1	Factor 2
Accident could kill many people at one time	.78	-.08	.77	-.02
Accident would involve death	.76	.00	.80	.03
Repository could pose serious risks for future generations	.68	.32	.73	-.24
People would dread repository	.61	.07	.70	-.02
Scientists understand repository risks	-.11	.89	.04	.94
People will be able to control risk	.42	.48	.50	.43

Figure 5-6. Likelihood of wastes being released into environment.

based on attitudes, experiences, knowledge, location, and socioeconomic characteristics. The statistical results, contained in Table 5-2 provide support for the conceptual hypotheses. Regardless of the model or statistical approach, the results showed that the characteristics of the risk, the perceived likelihood of large amounts of radiation being released, and the perceived seriousness of the risks for future generations are the most important factors influencing perceived risks from the repository. For cross-section data, the models also explain a high percentage of the variation in perceived risks (almost 40 percent nationally and greater than 50 percent in Nevada).

Table 5.3a defines each of the variables used in undertaking cross tabulations for both the National and Nevada telephone surveys. A statistical analysis of each variable with two key dependent variables (VOTE and RISK) is presented in Table 5.3b. A chi-square analysis reveals the statistical significance of each variable in the National and Nevada surveys for these simple cross tabulations. For example, the variable AGE is statistically significant with respect to VOTE at the .025 level for the National survey and only at the .112 level for the Nevada survey. It is highly significant with respect to Risk Perception in both the National and Nevada surveys.

As will become clearer in the more detailed analyses which follow, some variables which are statistically significant in simple cross tabulation may be nonsignificant in multiple regression equations. Table 5.3b should thus be viewed as a first step in trying to determine significant relationships between variables.

A more detailed analysis of the relationships between some socioeconomic variables and risk perception is presented in Table 5.4 through Table 5.6 for the National and Nevada samples. Looking at Table 5.4, we see that females have a higher perceived risk than males in both surveys. Table 5.5 suggests that individuals with incomes less than \$35,000 perceive the risk from a repository to be higher than those with higher incomes. Table 5.6 reveals that non-college graduates both in the National and Nevada survey perceive the risk to be higher than those who have college degrees.

Each of these four socioeconomic variables taken by themselves are statistically significant with RISK PERCEPTION on the basis of the chi-square values depicted in Table 5.3b. On the basis of these three tables one could conclude that, other things being equal, the type of person perceiving the risk from a repository to be highest would be a woman earning less than \$35,000 in annual income who has not graduated from college. Of course, this conclusion is based on an extrapolation from simple cross-tabulations. When turning to multiple regression models some of these socio-economic variables such as income are no longer statistically significant. Table 5-7 defines each of the variables used in the regression analyses which follow.

The National survey results showed women, and non-whites rated the risks higher, all else being equal. In Nevada, the results for women held true in some models but not others. When the person's rating of the seriousness of nuclear wastes was included, the parameter for sex became insignificant at conventional levels. This is not surprising given the large differences in

TABLE 5-3a. MODIFIED VARIABLE DEFINITIONS AND CATEGORIES

Variable Name	Question Numbers Used in Creating Variable	Definition	Categories
WTA	17	Willing to accept repository	0 = No 1 = Yes
WTP	17	Willing to pay to avoid repository	0 = No 1 = Yes
VOTE	20	Vote to locate repository in Nevada	0 = No 1 = Nevada
RISK	11g	Mat: Risk from repository located 100 miles from here Mev: Risk from repository located at Yucca Mountain	0 = Not serious 9 = Very serious
KILLMAY	12b	An accident at a repository could kill many people at once	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
SCIDROW	12c	Scientists understand the risks from a repository	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
WATERRAD	13b	Likelihood of release of radior from waste leaking into groundwater	1 = Very likely 2 = Somewhat likely 3 = Somewhat unlikely or very unlikely
TRANSPORT	13c	Likelihood of release of radiation from transportation of waste to repository	1 = Very likely 2 = Somewhat likely 3 = Somewhat unlikely or very unlikely
FUTURISK	15e	Repository would pose serious risks to future generations	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree

TABLE 5-3 (Continued)

Variable Name	Question Numbers Used in Creating Variable	Definition	Categories
SCHOOL	23	Level of education	0 = Non college graduate 1 = College or post-college graduate
AGE	26	Age	1=21., 2=29.5, 3=39.5, 4=49.5, 5=59.5, 6=69.5
SEX	30	Sex	0 = Female 1 = Male
RACE	28, 29	Race	0 = Non black 1 = Black
NUMBER	45	Stance or use of nuclear power for electricity	0 = In favor 1 = Opposed
KNOWLEDGE	6, 7, 8	Knowledge of high level nuclear waste issues	0 = Low knowledge 3 = High knowledge
CONTROL	12d	People living near a repository control the risk	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
DREAD	12e	People dread living near a repository	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
LIKEACC	13a	Likelihood of radiation being released due to accident at a repository	1 = Very likely 2 = Somewhat likely 3 = Somewhat or very unlikely
TERRORIST	13d	Likelihood of radiation being released due to terrorist sabotage at repository	1 = Very likely 2 = Somewhat likely 3 = Somewhat or very unlikely
SEATBELT	21e	Wears seatbelt	1 = Always 2 = Usually 3 = Sometimes 4 = Never

TABLE 5-3 (Continued)

Variable Name	Question Numbers Used in Creating Variable	Definition	Categories
QUESEXT	21b	Questions information from experts	1 = Always 2 = Usually 3 = Sometimes 4 = Never
WARRANT	21c	Buys extended warranties	1 = Always 2 = Usually 3 = Sometimes 4 = Never
CHANGENV	22a	People have right to change environment	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
NOLIMITS	22b	No limits to growth for advanced countries	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
PLANTRSK	11d	Risk from nuclear power plant	1 = Not at all serious 10 = Very serious
CHEMRSK	11e	Risk from hazardous chemicals at landfills	1 = Not serious 10 = Very serious
POLITICS	27	Stand on political issues	1 = Very liberal 2 = Somewhat liberal 3 = Middle of the road 4 = Somewhat conservative 5 = Very conservative
LOCALPAR	16c	Importance of local committee having power to shut down repository	1 = Very important 2 = Somewhat important 3 = Not at all important
REPBEHE	15d, 15f	Rounded Mean of BEHE1 and BEHE2	1 = Mean of BEHE1 and BEHE2 ≤ 2 2 = Mean of BEHE1 and BEHE2 = 3 3 = Mean of BEHE1 and BEHE2 = 4

TABLE 5-3 (Continued)

Variable Name	Question Numbers Used in Creating Variable	Definition	Categories
BENE1	15d	Repository would stimulate economic growth in nearby communities	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
BENE2	15f	Economic benefits outweigh risks	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
INCOME	36	Family income	0 = LE \$35,000 1 = GT \$35,000
EQUITY	15b	Each region of the country should have repository	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
OUTDOORS	4a	Described as outdoors person	1 = Very well 2 = Somewhat 3 = Not at all
VACATION	9a	Less desirable location for vacation	0 = Yes 1 = No
CONVENTN	9b	Less desirable location for convention	0 = No 1 = Yes
NEUBUSH	9c	Less desirable location for new business	0 = No 1 = Yes
RAISEFAM	9d	Less desirable location to raise a family	0 = No 1 = Yes
RETIRE	10	Would change retirement plans	0 = No 1 = Yes
HIHOUSE	10a	Would change even if had to increase housing costs	0 = No 1 = Yes

TABLE 5-3 (Continued)

Variable Name	Question Numbers Used in Creating Variable	Definition	Categories
TRUSTSTA	14b	Level of trust in State Government	1 = No trust 10 = Complete trust
TRUSTLOC	14c	Level of trust in Local Government	1 = No trust 10 = Complete trust
TRUST	14a	Trust of Federal Government	1 = No trust 10 = Complete trust
TRUSTFWL	14a	Trust of Federal Government	1 = Trust LE3 2 = Trust G13, LT8 3 = Trust GE8
OWNHOME	33	Home ownership	1 = Own home 10 = Do not own home
TESTRISK	11c	Risk from nuclear weapons testing site	1 = Not serious 10 = Very serious
DEATH	12a	Accident at repository involves death	1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree

Table 5.3b. Statistical Significance of Variables as a Function of Vote and Risk Perception.

	VOTE				RISK PERCEPTION			
	National		Nevada		National		Nevada	
	χ^2 Value	Signif. Level	χ^2 Value	Signif. Level	χ^2 Value	Signif. Level	χ^2 Value	Signif. Level
WTA	8.3	0.004	122.7	0.000	103.1	0.000	87.2	0.000
WTP	1.5	0.221	30.0	0.000	48.2	0.000	37.5	0.000
KILLMANY	4.6	0.205	138.9	0.000	172.7	0.000	287.7	0.000
SCIKNOW	5.6	0.133	32.0	0.000	57.8	0.001	51.8	0.003
WATERRAD	10.4	0.006	206.9	0.000	290.3	0.000	328.4	0.000
TRANSPORT	11.6	0.003	142.6	0.000	173.0	0.000	270.9	0.000
FUTURISK	7.3	0.064	313.6	0.000	268.1	0.000	387.5	0.000
SCHOOL	13.5	0.000	8.4	0.004	26.6	0.002	24.9	0.003
AGE	12.8	0.025	7.5	0.112	72.5	0.006	79.6	0.000
SEX	8.4	0.004	43.8	0.000	82.2	0.000	69.7	0.000
RACE	17.1	0.129	5.6	0.017	20.2	0.017	12.7	0.177
NONUKER	13.0	0.000	66.7	0.000	102.6	0.000	126.3	0.000
KNOWLEDGE	3.8	0.281	95.7	0.000	67.5	0.000	123.5	0.000
CONTRLRK	0.7	0.867	73.6	0.000	77.5	0.000	91.8	0.000
DREAD	6.6	0.084	107.5	0.000	133.0	0.000	148.7	0.000
LIKEACC	10.9	0.004	170.6	0.000	172.6	0.000	296.2	0.000
TERRORST	3.8	0.283	77.5	0.000	137.5	0.000	233.6	0.000
SEATBELT	2.6	0.460	2.9	0.412	29.5	0.335	24.0	0.628
QUESEXPT	2.9	0.403	2.8	0.427	40.0	0.052	34.8	0.144
WARRANT	7.2	0.066	4.6	0.200	56.7	0.001	42.2	0.031

(Table continues)

Table S.3b, continued.

	VOTE				RISK PERCEPTION			
	National		Nevada		National		Nevada	
	χ^2 Value	Signif. Level	χ^2 Value	Signif. Level	χ^2 Value	Signif. Level	χ^2 Value	Signif. Level
CHANGENV	2.1	0.552	9.1	0.028	68.3	0.000	42.2	0.031
NOLIMITS	2.6	0.460	5.9	0.116	51.3	0.003	35.0	0.138
PLANTRSK	26.7	0.002	105.9	0.000	863.5	0.000	604.0	0.000
CHEMRSK	22.8	0.007	51.5	0.000	695.8	0.000	538.0	0.000
POLITICS	10.6	0.005	16.8	0.002	22.3	0.218	40.2	0.290
LOCALPWR	29.0	0.000	154.2	0.000	178.4	0.000	156.5	0.000
BENE2	3.8	0.280	202.9	0.000	96.9	0.000	167.9	0.000
INCOME	9.2	0.002	7.7	0.005	16.4	0.058	28.8	0.001
OUTDOORS	1.7	0.434	7.7	0.021	21.3	0.263	22.2	0.222
VACATION	6.4	0.011	131.8	0.000	218.2	0.000	155.5	0.000
CONVENTN	7.0	0.008	77.6	0.000	155.0	0.000	110.1	0.000
NEWBUSN	5.2	0.023	110.3	0.000	205.7	0.000	132.5	0.000
RAISEFAM	10.3	0.001	101.3	0.000	244.7	0.000	116.4	0.000
RETIRE	10.9	0.001	228.8	0.000	328.7	0.000	261.7	0.000
HIHOUSE	0.03	0.863	12.7	0.000	19.1	0.024	34.1	0.000
TRUSTSTA	22.4	0.008	51.9	0.000	160.0	0.000	183.0	0.000
TRUSTLOC	18.0	0.035	25.9	0.002	186.0	0.000	128.9	0.001
TRUSTTML	11.2	0.004	110.4	0.000	100.4	0.000	97.4	0.000
OWNHOME	7.4	0.007	6.7	0.010	16.1	0.064	23.2	0.006
TESTRISK	NA	NA	157.5	0.000	NA	NA	746.9	0.000
DEATH	4.7	0.194	139.6	0.000	192.3	0.000	234.6	0.000

OCCUPATION

NA = question not asked

TABLE 5-4. Perceived Seriousness of Risk as a Function of Sex

	National Survey		Nevada Survey	
	Male	Female	Male	Female
Low	31.1	13.0	46.0	22.2
Medium	39.6	36.6	25.5	31.4
High	29.3	50.5	28.6	46.4
N	555	598	446	494

TABLE 5-5. Perceived Seriousness of Risk as a Function of Income

	National Survey		Nevada Survey	
	Less Than \$35,000	Greater Than \$35,000	Less Than \$35,000	Greater Than \$35,000
Low	20.9	25.6	30.6	43.1
Medium	36.4	42.1	27.8	29.1
High	42.7	32.3	41.6	27.8
N	794	359	640	306

TABLE 5-6. Perceived Seriousness of Risk as a Function
of Education

	National Survey		Nevada Survey	
	Non-College Graduate	College Graduate	Non-College Graduate	College Graduate
Low	19.4	30.6	31.8	44.3
Medium	37.7	39.5	28.9	26.0
High	43.0	29.9	39.3	29.7
N	849	304	727	219

Table 5-7 VARIABLE DEFINITIONS

Variables	Description	Coding
REPOS RISK	Perceived risk from repository	1-not at all serious 10-very serious
LOCT YUCC*	Perceived risk from repository at Yucca Mountain	1-not at all serious 10-very serious
TRAN YUCC*	Perceived risk from transportation if repository at Yucca Mountain	1-not at all serious 10-very serious
TRUST FED	Trust in Federal government to make repository safe	1-no trust 10-complete trust
TRUST STATE	Trust in state government to make repository safe	1-no trust 10-complete trust
TRUST LOC	Trust in local government to make repository safe	1-no trust 10-complete trust
BENEFITS	Combination of Economics Benefits Questions	0-if respondent did not strongly agree with both statements "Repository would stimulate economic growth" and "Economic benefits would outweigh the risks." 1-if respondent strongly agreed with one of the statements and not the other. 2-if the respondent strongly agreed with both statements.
KNOW	Level of knowledge about nuclear wastes. Combination of correct responses to where wastes are now stored, current disposal method, and length of time stored.	0-incorrect responses on all 3. 1-correct response on one of the questions. 3-correct responses on all 3 questions.
SCHOOL	Last year of school completed	Actual number of years completed
NONUKER	Not in favor of nuclear power	1-against nuclear power 0-for nuclear power

(continued)

TABLE 5-7 (continued)

Variables	Description	Coding
MOSTRANS	Most serious risk associated with repository would be from transporting waste to it	1=yes 0=no
AGE	Age of respondent	Actual age
LOCALSHUT	It is important for local authorities to have shut down power	1-very important or somewhat important 0-not important
HELMS	Politically conservative?	1=yes 0=no
HART	Politically Liberal?	1=yes 0=no
KILLLOTS	Accident could kill many at once	1-strongly agree 0-all others
SCIKNOW	Scientists understand the risks involved with a repository	1-strongly agree 0-all others
WATERRAD	Likelihood of wastes looking into underground water	1-very likely 0-all others
TRANSACC	Likelihood of accidents while wastes were being transported to repository	1-very likely 0-all others
FUTURISK	Repository would pose serious risks for future generations in Nevada	1-strongly agree 0-all others
SEX	Sex of respondent	1-male 0-female
WHITE	Race of respondent	1-white 0-nonwhite
RADWASTE	Severity of radioactive wastes from nuclear power plants for U.S. as a whole	1-not at all serious 10-very serious
LINC*	Dummy variable for Lincoln County	1-from Lincoln County 0-not from Lincoln County
NYE*	Dummy variable for Nye County	1-from Nye County 0-not from Nye County

(continued)

TABLE 5-7 (continued)

Variables	Description	Coding
ORGANIZ	Type of organization respondent works for	1-govt. agency or non-profit organization 0-private company
TESTSITE	Severity of risks from nuclear weapons test site	1-not at all serious 10-very serious
INCOME	Total family income before taxes 1986	actual numbers in eight dollar categories
OWNHOME	Respondent owns home?	1-yes 0-no
NUCLEAR TEST	Severity of radiation from nuclear weapons testing for U.S. as a whole	1-not at all serious 10-very serious
DOLLAR AMOUNT	Amount of payment or rebate for WTA & WTP and amount of higher housing costs for retirement	WTA = 1000, 3000, 5000 WTP = 100, 500, 2000 Housing Costs = 500, 1000, 2000
VOTE	Vote yes or no for repository at Yucca Mountain	1-yes 0-no
WTA	Willing to accept compensation to locate repository?	1-yes 0-no
WTP	Willing to pay to avoid locating repository?	1-yes 0-no
RAISEFAM	Would nearby repository make community a less desirable place to raise a family?	1-yes 0-no
NEWBUSN	Would nearby repository make community a less desirable place to start a new business?	1-yes 0-no
CONVENTION	Would nearby repository make community a less desirable place to attend a convention?	1-yes 0-no
VACATION	Would nearby repository make community a less desirable place to go on a vacation?	1-yes 0-no

(continued)

TABLE 5-7 (continued)

Variables	Description	Coding
RETIRE	Would a repository near where you had planned to retire make you change your plans?	1=yes 0=no
HIHOUSE	For those responding "yes" to RETIRE, would you still change your plans if it resulted in the indicated higher housing costs each year?	1=yes 0=no
EACH REGION	"Each region of the county should have a repository."	1-strongly agree 0-all others
KIDS	Children under 12 years old in household?	1=yes 0=no

*These two variables replaced Reposrisk in the Nevada Survey.

*These are two dummy variables from the Nevada Survey only.

TABLE 5-8. PERCEIVED RISK FROM HLW REPOSITORY: REGRESSION RESULTS

Variables	National Survey			Nevada Survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
INTERCEPT	5.367 (22.056)	8.326 (13.457)	8.226 (9.816)	4.316 (16.124)	6.669 (9.633)	1.970 (2.655)
KILLLOT	1.221 (5.839)	0.868 (4.626)	0.731 (3.812)	1.767 (7.220)	1.412 (5.988)	0.823 (3.938)
SCIKNOW	0.517 (-1.976)	-0.464 (-1.879) ^a	-0.471 (-1.996)	-0.214 (-0.616) ^a	-0.191 (-0.574) ^a	-0.229 (-0.792) ^a
WATERRAD	0.871 (4.473)	0.689 (3.695)	0.602 (3.376)	1.466 (5.897)	.993 (4.124)	0.379 (1.780) ^a
TRANSAC	0.932 (4.769)	0.908 (4.849)	0.737 (4.098)	1.348 (5.616)	1.360 (5.773)	0.977 (4.784)
FUTURIS	1.209 (5.916)	1.058 (5.397)	0.802 (4.234)	1.086 (4.278)	.868 (3.559)	0.514 (2.413)
TRUSTED	-0.088 (-2.400)	-0.048 (-1.363) ^a	-0.032 (-0.937) ^a	-0.113 (-2.896)	-0.069 (-1.497) ^a	-0.013 (-0.410) ^a
SCHDOL	---	-0.083 (-2.616)	-0.080 (-2.649)	---	-0.065 (-1.497) ^a	0.026 (0.644) ^a
AGE	---	-0.020 (-3.516)	-0.010 (-2.856)	---	-0.021 (-2.166)	-0.006 (-0.726) ^a
SEX	---	-1.132 (-6.894)	0.965 (-5.935)	---	-0.746 (-3.031)	-0.280 (-1.555) ^a
WHITE	---	-0.646 (-2.529)	-0.556 (-2.270)	---	.003 (1.231) ^a	-0.031 (-0.073) ^a
NONUKER	---	-0.893 (4.968)	0.677 (3.898)	---	1.109 (4.804)	0.519 (2.546)
KNOW	---	-0.258 (-2.360)	-0.295 (-2.822)	---	-.539 (-4.366)	-0.329 (-3.052)
RADWASTE	---	---	0.261 (9.111)	---	---	0.172 (5.467)
LINC	---	---	---	---	---	0.103 (0.350) ^a

(continued)

TABLE 5-8 (continued)

Variables	National Survey			Nevada Survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
NYE	---	---	---	---	---	0.401 (1.449) ^a
ORGANIZ	---	---	---	---	---	-0.864 (-3.844)
TESTSITE	---	---	---	---	---	.407 (12.812)
F Value	43.223	34.455	41.251	67.928	45.388	57.684
Adjusted R ²	.227	.317	.337	.350	.417	.504
N	864	864	864	745	745	745

^at-statistic is not significant at the .05 level of significance. All parameter estimates without this note are significant at least at this level.

Note: Numbers in parentheses are the t-ratios.

ratings for this variable between men and women that we noted earlier. Higher levels of education and knowledge about nuclear wastes contributed to lower perceived risks but these factors had less influence than the risk characteristics and likelihood factors. In the Nevada survey, education followed a pattern similar to the variable sex.

The results in Table 5-8 also show that the risk perceptions of residents in Lincoln and Nye Counties are not different than those of residents in other parts of Nevada. The lack of significance in the coefficient implies that the intercept term for these counties is not statistically different when the other factors in Model 3 are controlled in the regression analysis. This is consistent with the slight differences found in the mean values of perceived seriousness. In subsequent project activities, we will explore interactions between the other independent variables in the model and the qualitative variable for residents of Lincoln and Nye Counties.

The Nevada results in Model 3 also support a hypothesis that arose in the focus groups. This is that the test site serves as a baseline for perceived risks. The results were that people who rated the risks from the test site high were more likely to rate the risks from a repository higher. Also in Model 3, the results for the organization variable suggest that people who work for non-profit organizations or the government consider the risks less serious than those who work for private businesses. This variable was not significant for the National survey.

5.4 Implications

Overall, the telephone survey findings on risk perceptions are clear-cut. People in both Nevada and the rest of the United States perceived the potential risks associated with a HLNW repository to be serious. Almost three-fourths of the respondents also think that serious accidents; those involving large releases of radiation, are likely to happen. If people ultimately change their current or planned behavior such as move, change jobs, or take trips or retire outside of Nevada, in response to these perceptions rather than responding to the technical risk estimates; then the potential risk-related impacts could be much higher than those anticipated by the Department of Energy.

SECTION 6

VIEW OF THE REPOSITORY

6.1 Introduction

This section describes how people viewed the HLNW repository. After characterizing the risk perceptions in the previous section, we considered whether people were willing to weigh the benefits against the costs of a repository. Additionally, we elicited their views of the overall desirability, and feasibility, of siting a HLNW repository, along with their knowledge and attitudes toward nuclear power in general. For each of these issues, the views of Nevada were compared and contrasted to those in the National survey.

This section also considers two potential views of Nevada residents that arose in the focus groups. It considers the influence of the test site on repository perceptions, and it examines the perceived likelihood of the repository being located at Yucca Mountain. This section concludes with a detailed examination of the voting behavior of respondents in a hypothetical vote on locating the HLNW repository nearby.

6.2 Overall View of the Repository

To depict the respondent's overall view of the repository, the survey questionnaire asked respondents a wide range of questions about the repository, their perceptions of its potential benefits and costs, and the equity of locating a single repository. These questions asked the extent to which respondents agreed or disagreed with a list of statements summarized in Table 6-1. A reasonably clear picture emerges about the respondent's view of the repository:

- About 56 percent of Nevadans agree (at least) that each region should have a repository, while only 46 percent of the National survey respondents agree.
- Almost 53 percent of Nevadans agree that a repository is the best way to permanently store high-level nuclear wastes, compared to almost 48 percent of the National survey respondents.
- Nevada residents are divided almost equally on whether the repository would stimulate economic growth in nearby communities. Only 27 percent of the national survey respondents agree with this statement.
- Neither group of respondents, however, thinks the economic benefits would greatly outweigh the risks (28 percent in Nevada, 25 percent nationally).
- Only 23 percent of Nevada residents agree that Nevada is the safest place in the United States for the repository.

TABLE 6-1. RESPONDENTS' VIEWS OF A REPOSITORY

"The Economic Benefits to Nearby Communities from a Repository Would Greatly Outweigh the Risks"			"A Repository is the Best Way to Permanently Store High-Level Nuclear Wastes"	
	Nevada Survey (%)	National Survey (%)	Nevada Survey (%)	National Survey (%)
Strongly agree	3.6	2.4	7.4	8.8
Agree	24.5	22.7	45.5	39.9
Disagree	49.1	49.6	19.5	18.6
Strongly disagree	14.6	19.2	4.8	7.8
Don't know	7.8	6.5	22.3	24.2
"Each Region of the Country Should Have a Repository"			"A Repository Would Stimulate Economic Growth in Nearby Communities"	
	Nevada Survey (%)	National Survey (%)	Nevada Survey (%)	National Survey (%)
Strongly agree	16.3	12.8	6.2	3.3
Agree	39.8	33.9	38.8	23.6
Disagree	36.4	32.1	48.2	48.1
Strongly disagree	6.5	17.2	6.7	17.6
Don't know	4.4	4.7	7.5	8.0
"Nevada is the Safest Place in the United States for the Repository"			"Nevada is the Best Place for the Repository Because the Nuclear Weapons Test Site is Already Here"	
	Nevada Survey (%)		Nevada Survey (%)	
Strongly agree	2.9		3.6	
Agree	28.5		27.6	
Disagree	48.8		42.3	
Strongly disagree	22.1		20.6	
Don't know	12.9		6.5	

*These two questions appeared only in the Nevada survey.

- Only about 30 percent of Nevada residents agree that Nevada is the best site because the weapons testing site is located in Nevada.

6.3 Awareness of Nuclear Wastes

As shown in Figure 6-1, Nevada survey respondents showed a higher level of awareness about high-level nuclear wastes than did the National survey respondents. Given the nuclear weapons testing site, in addition to Nevada being one of three locations in consideration for the HLNW repository, Nevadans seemed to exhibit greater cognizance of nuclear issues in general. For example, 35 percent of the Nevada respondents had read or heard about high-level nuclear wastes more than 10 times in the past 3 months, compared to only 17 percent nationally. Likewise, only 28 percent of Nevada respondents had read or heard about wastes less than five times in the past 3 months, as opposed to 40 percent nationally.

Two ways of obtaining information on the subject proved significant in both surveys. Of the respondents in Nevada who had read or heard about wastes in the past 3 months, 58.7 percent of these people had bought a newspaper or magazine or watched a television program specifically to learn about high-level nuclear wastes, while only 48.9 percent of the similar group in the National survey had done so. An even higher percentage of respondents who had been aware of high-level nuclear wastes during the past 3 months had discussed the issue with friends or relatives--71.0 percent in Nevada and 63.9 percent nationally.

Not surprisingly, one method of obtaining information on high-level nuclear wastes had not been employed to a significant degree by either group. Less than 10 percent of the respondents in both samples had attended a public or neighborhood meeting about high-level nuclear wastes (6.7% for Nevada and 5% for National).

However, awareness did not translate perfectly into knowledge, with only 20 percent of either group knowing where wastes are now stored. As shown in Figure 6-2, over three-fourths of Nevada residents knew that underground disposal is the disposal method being considered most seriously in the United States today. This compared with 64 percent of the respondents in the National survey. As shown in Figure 6-3, 27 percent of Nevada residents (and only 18 percent nationally) knew that the repository would store wastes for longer than 1,000 years. In contrast, 12 percent of Nevada residents (and 9 percent nationally) thought the wastes would be stored for less than 10 years.

6.4 Attitudes Toward Environmental and Nuclear Power Issues

In addition to being more aware of nuclear issues regarding the repository, Nevadans consistently ranked higher on questions in which environmental issues were involved. As shown in Figure 6-4, 33.2 percent of Nevada respondents, in comparison with 23.5 percent of National respondents, ranked environmental problems as more important than other problems faced by their communities. The two samples were more comparable with the percentages that ranked environmental problems just as important as other problems (53.8% for Nevada and 57.9% for National).

Have you read or heard anything about high-level nuclear wastes in the past 3 months?

Figure 6-1. Awareness of high-level nuclear waste.

Figure 6-2. "Which method for disposing of HLNW is being considered most seriously today in the United States?"

Figure 6-3. "How long do you think an HLNW repository will store wastes?"

Figure 6-4. Importance of environmental problems in relation to others.

Dunlap [1985] cites a 1982 Louis Harris poll which shows that public concern over environmental issues has been high for several years. Ninety five percent of the Harris national sample viewed disposal of hazardous wastes as a "serious problem," and 93 percent of the respondents said pollution of lakes and rivers by toxic substances from factories was a "serious problem." As shown in Figure 6-5, both Nevada and National respondents made their attitudes about spending funds to control pollution known. Both samples emphatically rejected the assertion that too much is already being spent on pollution control. Seventy-seven percent of the people in Nevada and 71 percent of the people in the National sample said that the statement "I am someone who thinks we are already spending too much on pollution control" described them 'not at all.'

In a similar question cited in Dunlap [1985], the National Opinion Research Corporation asked a national sample in 1984 whether they thought we were spending "too little," "about right," or "too much" on "improving and protecting the environment." A majority of the sample (58 percent) said "too little," while only 7 percent said "too much." Therefore, the results from the Nevada and National telephone surveys follow the general trend found in other national polls on the topic.

Perhaps the largest difference in environmental attitudes between the two samples was brought out by the question in which respondents were asked if they would describe themselves as outdoors people. Fifty-seven percent of the National respondents, but over 92 percent of those in Nevada, said they would. In fact, 61 percent of the people in Nevada said that "I am an outdoors person" described them very well, in comparison to only 24 percent nationally.

Attitudes concerning the use of nuclear power as a form of electricity proved telling (Figure 6-6). Nevada respondents, more so than National respondents, tended to respond at the extremes of the options regarding the statement "I am someone in favor of nuclear power as a form of electricity." Thirty-four percent of Nevadans as opposed to 31 percent of the National group said this statement described them very well. Twenty-nine percent of the Nevada sample stated that it did not describe them at all. This compared with 20 percent nationally. This relative tendency toward the extremes might be explained by a significant number of Nevadans having a positive view of nuclear industries as a result of the economic impact they have seen from the weapons testing site. Likewise, there could be just as many people concerned with the environment who see the risks from nuclear power as dangerously high.

Despite this relative grouping toward the extremes, slightly more (37%) of the Nevada respondents take a middle ground in the debate than take an extreme position. However, it should be noted that it is a significantly lower percentage than that of the National respondents (47%).

In "Public Opinion: Behind the Transformation," Dunlap [1985] postulates that environmental concern has rebounded somewhat from its position during the late 1970s partly as a result of the Reagan administration's general anti-regulatory stance. He feels that this may have led many to believe they

Figure 6-5. Extent to which "I am someone who thinks we are already spending too much on pollution control" describes you.

Figure 6-6. Extent to which "I am someone in favor of nuclear power as a form of electricity" describes you.

cannot trust the Federal government to protect the environment. This hypothesis appears to be borne out by results from both telephone surveys. As shown in Figure 6-7 respondents rated their trust in government to make the repository safe on a 10-point scale, with 1 meaning no trust and 10 meaning complete trust. In both the National and Nevada surveys, trust in the Federal government to make the repository safe received the lowest mean ranking (4.8 in Nevada and 4.9 nationally).

By contrast, mean trust rankings for local government scored highest in both surveys (5.9 in Nevada and 5.6 nationally), with rankings for State government falling between the two in both surveys. However, even the local trust rankings did not reflect an overwhelming faith in government on any level when dealing with a HLNW repository.

In one area, the two telephone surveys showed less extreme opinions than comparable other national survey data. In a national survey from 1982, Dunlap [1985] found that 84 percent of the respondents agreed that "the balance of nature is very delicate and easily upset by human activities." However, in this telephone survey, approximately 45 percent of respondents in each group expressed similar sentiment by disagreeing with the statement "People have the right to change the environment to meet their needs."

Likewise, 76 percent of the respondents in the Dunlap survey agreed that "the Earth is like a spaceship with only limited room and resources." Again, respondents in the National and Nevada telephone surveys did not find the issues of limits to growth and scarce resources serious concerns. Only about 50 percent of each sample disagreed with the statement "There are no limits to growth for advanced countries like the United States."

6.5 Perceived Likelihood of Repository at Yucca Mountain

In the Nevada Survey, respondents were asked to rate the likelihood of the repository being located at each of the three sites currently under consideration by the Federal government. By far (Figure 6-8), most Nevadans seemed to feel that the repository is almost a certainty for them and their State. Over 89 percent of the respondents felt that it was either very likely, or somewhat likely, that the repository would be located at Yucca Mountain. This compared to 25 percent of the respondents who believed it was at least somewhat likely that the repository would be located in Hanford, Washington, and 41 percent predicting similar likelihood for siting in Deaf Smith County, Texas. Respondents' strength of belief concerning location at Yucca Mountain was also reflected in the percentage of "Don't Knows" for each question. An average of approximately 12 percent of the respondents answered "Don't Know" for each of the other two likelihood questions. Only 4 percent responded "Don't Know" when asked to rate the likelihood of the repository being placed at Yucca Mountain.

6.6 Voting Preferences

Individuals in both the Nevada and National surveys were asked the same question regarding their voting preferences:

Vertical Scale 1-10. 1--No Trust At All, 10--Complete Trust

Figure 6-7. Trust in Government to make repository safe (mean responses).

Figure 6-8. Likelihood the repository would be located at an identified location according to Nevada respondents.

"If a vote were held today on building a permanent repository, would you vote for locating a repository at:

Hanford in Washington State,

Yucca Mountain in Nevada,

Deaf Smith County in Texas,

None of the Above, or

Don't Know."

Figure 6-9 reveals the percentage of individuals who favored each of the proposed sites or opposed them all. The most significant finding is the rather large proportion of individuals who voted for none of the three sites. Of those who did support one of the three, Yucca Mountain was the most preferred site in both the National and Nevada surveys. Yet slightly less than one-fourth of the respondents in each of the surveys were willing to vote for Yucca Mountain as a site for a HLNW repository.

Turning now to the factors which influence people's intended vote, there were some interesting differences and similarities regarding the National and Nevada surveys. As hypothesized above, in both sample groups those who perceived the potential risks from a HLNW repository to be serious are much more likely to oppose "Yucca Mountain as a site" than those who feel the risk to be relatively low (Q. 11g).

Figure 6-10 graphically depicts this relationship for both the National and Nevada survey for three levels of risk based on a 10-point scale for seriousness (1 being not at all serious and 10 being very serious). At the National level 38 percent of those who perceived the risk to be low (1-3) voted "Yes" to Yucca Mountain while only 22 percent favored this site if they perceived the risk to be serious (8-10). Within the Nevada group, the contrast was even more extreme. Fifty-three percent favored the facility if they perceived the risk to be low while only 5 percent voted for Yucca Mountain if they perceived the risk to be serious.

The percentage of individuals in each category was also revealing. At the National level, approximately 25 percent of the sample felt the risk was low while 39 percent perceived it to be serious. In Nevada approximately 35 percent of the sample perceived the risk to be low and 37 percent perceived it to be serious.

Several other variables related to perceived risk from releasing large amounts of radiation into the environment (Q.13 a-d) were also statistically significant for the Nevada and National survey. For example, relatively few individuals said they would vote for a repository if they felt that it was very likely that wastes would leak into underground water during the first 20 years a repository would be open. A similar pattern emerged for perceived risks associated with radiation being released from an accident happening at a

Figure 6-9. If a vote were held today on building a permanent repository, where would you vote for locating it?

Figure 6-10. A comparison of perceived risk of a nearby repository and respondent votes for locating the repository at Yucca Mountain.

repository and wastes being transported to a repository. These "perceived risk" variables are highly correlated with the "perceived seriousness of the repository" and hence are insignificant in the ordinary least-squares (OLS) regression analysis.

One variable which was significant in the regression models for characterizing voting behavior in both surveys was the respondent's view of how important it is to give a local committee the power to shut down the facility if that committee decided the facility was unsafe (Q. 16c). For the National survey, as shown in Figure 6-11, only 25 percent of those who felt that it was very important for local authorities to have this power voted in favor of siting the repository at Yucca Mountain. Almost half of those who did not feel this power was important supported the repository siting at Yucca Mountain. An even more extreme relationship holds for the Nevada data. A relatively small percentage (14 percent) voted for Yucca Mountain siting of the repository if they felt it was very important for local authorities to have control over its operation, while 58 percent of those who felt this control was not at all important voted to locate the repository at Yucca Mountain.

There were several other factors that influenced voter attitudes in the Nevada survey which had no statistically significant impact at the national level. As shown in Figure 6-12, only 11 percent of those Nevadans who had little trust in the Federal government to make the repository as safe as possible (1-3 on a 10 point scale)^a supported siting the repository at Yucca Mountain, while almost half (48%) of those who had high trust (8-10) supported siting the repository at Yucca Mountain. Less extreme differences existed in the National survey responses. Presumably this was because there was less concern by people in other parts of the country since the HLNW site would not be near them.

We constructed a variable which measured the perceived benefits of a HLNW repository in relation to the risks (Q. 15d, 15f) and utilized this factor to measure how it influenced a person's decision to site the repository at Yucca Mountain. The vast majority of Nevada respondents (92%) felt that there would be no economic benefits from the repository. Only 21 percent of these individuals said they would vote for Yucca Mountain. Of the 2 percent who viewed the repository as an economic benefit, 79 percent indicated that they would vote for Yucca Mountain siting of the repository. In contrast, approximately one-sixth of the national respondents felt that there would be significant benefits from the repository, but only 31 percent of these individuals voted for Yucca Mountain.

Knowledge about high-level nuclear waste by individuals in Nevada influenced people's attitudes toward the repository. Approximately one-third of the residents had no factual knowledge of HLNW issues (Q. 6-8), and only 12.5

^aA 10-point scale was used with 1 being no trust at all and 10 being complete trust. Those who rated trust from 1-3 were placed in the "low" category; 4-7 in the "medium trust" category, and 8-10 in the "high trust" category.

Figure 6-11. A comparison of the relative importance of local authorities being able to shut down the repository if deemed unsafe and respondent votes for locating the repository at Yucca Mountain.

Figure 6-12. A comparison of level of trust in the Federal Government to make the repository safe and respondent votes for locating the repository at Yucca Mountain.

percent of these people voted for a repository. Approximately 5 percent of the sample knew a great deal about nuclear waste issues and in this group over 60 percent voted for the repository. The relationship between knowledge and voting behavior was in the same direction for the national sample, but not statistically significant.

The other variable which was statistically significant for the Nevada survey was "concern with radioactive wastes from nuclear power plants" for the United States as a whole (Q. 2). The attitude toward voting for Yucca Mountain was in the expected direction. Respondents with a low-perceived risk were much more likely to vote in favor of a repository at Yucca Mountain than those who had a high-perceived risk of pollution from nuclear power plants. As with the other variables discussed above, the relationship was the same for the National survey but much less significant statistically.

One variable that was statistically significant in the National survey but insignificant for the Nevada sample was the statement "Each region of the country should have a repository" (Q. 15b). This variable was intended to measure equity concerns, but the responses suggested that it had a different interpretation at the national level. Over one-third of those who strongly agreed or agreed with the statement favored a repository at Yucca Mountain while only one-fourth of those who disagreed or strongly disagreed cast a positive vote for the repository in Nevada. This suggests that this statement was too subtle to measure concerns with fairness or equity. Rather, it measured attitude toward a repository in general. For the Nevada sample there was literally no difference in voting patterns between those who agreed or disagreed with the statement; approximately 25 percent of each group voted for the repository.

The statistical regression equations for vote for Yucca Mountain (Value = 1) or not vote for Yucca Mountain (Value = 0) are depicted in Table 6-2 for both surveys. The coefficients of each variable can be interpreted as the change in the probability that an individual with this particular characteristic would vote in favor of siting the repository in Yucca Mountain. To illustrate, consider the final equation derived from the Nevada data. The intercept term reflects the probability of a positive vote for Yucca Mountain without considering any of the significant variables in the equation explicitly. Now suppose an individual has a relatively low estimate of the perceived seriousness of the risk of a repository (e.g., a value of 2 on the 1 to 10 scale). Using the risk coefficient from Model 3 and the Nevada survey data shows that the probability of voting for the repository is now decreased by .05 (i.e., $2 \times .026$). Had the estimate of the perceived risk been extremely high (e.g., 10), then the probability of a positive vote would have been decreased by .26 (i.e., $10 \times .026$). A similar change in probabilities can be determined for each variable. (Refer to Table 5-7 for definitions of the variables used). The hypothesized relationships described in the previous section seems to be confirmed with the data from the Nevada survey. The most significant variables are "perceived risk from the repository," "power to shut down the facility," "trust Federal officials to operate safely," "knowledge," "concern with radioactive waste from nuclear power plants," and "net perceived benefits of the repository in relation to risks." The resulting $R^2 = .33$ is quite high for cross-sectional data and suggests that there is a systematic relationship between voting attitudes and perceived risk, trust, and knowledge.

TABLE 6-2. VOTE TO LOCATE REPOSITORY AT YUCCA MOUNTAIN

Variables	National Survey			Nevada Survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
INTERCEPT	9.374 (11.796)	9.116 (1.129) ^a	9.252 (2.237)	9.616 (24.651)	9.316 (7.892)	9.456 (4.317)
REPOSURISK	-0.019 (-4.030)	-0.013 (-2.511)	-0.016 (-1.910)	---	---	---
LOCTUCC ^b	---	---	---	-0.004 (-10.096)	-0.030 (-4.333)	-0.028 (-3.771)
TRANUCC ^b	---	---	---	---	-0.021 (-3.008)	-0.019 (-2.753)
TRUSTED	---	0.006 (1.129) ^a	0.005 (0.633) ^a	---	0.030 (6.285)	0.028 (5.578)
BENEFITS	---	-0.005 (-0.097) ^a	-0.007 (-0.129) ^a	---	0.179 (5.106)	0.108 (4.600)
KNOW	---	0.010 (0.503) ^a	0.009 (0.482) ^a	---	0.084 (5.552)	0.070 (4.441)
SCHOOL	---	0.010 (1.940)	0.010 (1.009) ^a	---	---	-0.002 (-0.355) ^a
NONUKER	---	-0.052 (-1.719) ^a	-0.050 (-1.602) ^a	---	---	-0.027 (-0.896) ^a
MOSTRANS	---	0.079 (2.105)	0.002 (2.264)	---	---	0.014 (0.433) ^a
AGE	---	0.001 (1.294) ^a	0.001 (1.037) ^a	---	---	0.001 (0.062) ^a
LOCALSHUT	---	---	-0.115 (-2.631)	---	---	-0.176 (-4.856)
HELMS	---	---	-0.014 (-0.440) ^a	---	---	0.049 (1.092) ^a
HART	---	---	-0.008 (-1.949)	---	---	0.030 (0.909) ^a
F Value	10.244	4.070	4.016	259.062	83.257	37.904
Adjusted R ²	0.0149	0.0238	0.0319	0.2327	0.3258	0.3423
N	1008	1008	1008	851	851	851

^at-statistic is not significant at the .05 level of significance. All parameter estimates without this note are significant at least at this level.

^bThese two variables replaced the "REPOSURISK" variable in the Nevada survey.

Note: Numbers in parentheses are t-ratios. Dependent variable: Vote - 1 = Yes, 0 = No.

The picture is somewhat different for the National sample where the issue of locating a HLNW site is not nearly as salient as in Nevada. The three significant variables are "perceived risk from the repository," "trust Federal officials to operate safely," and "locate repository in each region of the country." None of these variables explain a significant portion of the variance as evidenced by the low $R^2 = .05$. Upon reflection, we have concluded that most people in the country have not given much thought as to how they would vote regarding a HLNW repository if such a referendum were considered. Nevada residents, on the other hand, are very concerned with this issue, as evidenced by the highly significant regression equation.

6.7 Summary

Overall, the analysis of the respondents' views of the repository yields some striking findings. At the forefront, our results show that a sizable majority of Nevada residents are strongly opposed to the HLNW repository being located at Yucca Mountain. While the Nevada residents are somewhat more likely than their counterparts in the National survey to think the repository will benefit nearby communities, they generally feel that the repository will be a bad economic bargain. Yet, Nevada residents show a strong sense of totalism about their State being selected as the repository site. About 90 percent thought it was (at least) likely that the repository would be at Yucca Mountain.

The opposition to the HLNW repository is consistent with a strong endorsement for spending public dollars to protect the environment. Respondents in the Nevada survey showed more concern and support for the environment than their counterparts in the National survey. The environmental attitudes are generally consistent with national trends in other surveys.

SECTION 7

RISK-INDUCED BEHAVIOR: EMPIRICAL RESULTS

7.1 Introduction

An important concern for the State of Nevada is the potential effect of a HLNW repository on people's decisions about where to vacation, work, or live. Appendix A.2.6 from the First Year Socioeconomic Progress Report provides a detailed discussion of the conceptual issues. As noted earlier, this research on risk-induced behaviors is at an earlier stage than the risk-perception research. Before modeling behavior, it was necessary to develop a better understanding of the perceptions that underlie the behavioral decisions.

At the same time, however, the telephone survey offered an opportunity to explore the potential for such magnitudes, at least in a preliminary way. Having both the National and Statewide surveys provides further insights from comparisons of the two groups' responses. Thus, the findings and results for risk-induced behaviors are more confined to the insights for the future research activities that are being planned for Years 2 and 3. This section highlights the findings on risk-induced behaviors.

7.2 Risk-Induced Behaviors: General Findings

The telephone survey includes two questions to help assess the potential magnitude of risk-induced behaviors. As shown in Figure 7-1, even the preliminary results were striking. Eighty percent of the National survey respondents indicated that a HLNW repository located 50 miles away would make an area a less desirable place to raise a family. Seventy percent in Nevada agreed. The percentage is almost as high for starting a new business (72 percent nationally, 63 percent in Nevada). The only behavior that appears less sensitive to the repository siting is the willingness to attend a convention. Only 48 percent of the Nevadans stated the repository would make the nearby area less desirable. This suggests that the longer people think they would be in an area, the more likely they think the area would be less desirable. Comparison of Figure 7-1 with Figure 7-2, reveals that increasing the distance away from the repository, from 50 to 100 miles, had only a minor influence on the responses.

A similar question was asked about retirement. Our results, shown in the top part of Figure 7-3, indicate that 66 percent of the respondents nationally said that a repository being located 50 to 100 miles from where they had planned to retire would make them change their plans. The low percentage of "don't know" responses suggests that people were relatively certain about their preferences. Whether these intentions would lead to actual behavior is an issue that must be addressed in further research.

Those who answered "yes" to the retirement question were asked if they would still change plans if the cost of the change were \$500, \$1,000, or \$5,000. As shown in the lower part of Figure 7-3, 75 to 80 percent answered yes, with the ten-fold range costs having little effect on the responses. In Nevada, the majority of respondents also indicated that they would change their retirement

Figure 7-1. Risk-induced behaviors: community located 50 miles from repository.

Figure 7-2. Risk-induced behaviors: community located 100 miles from repository.

WOULD LEARNING THAT A HIGH-LEVEL NUCLEAR WASTE REPOSITORY WAS LOCATED NEAR WHERE YOU HAD PLANNED TO RETIRE MAKE YOU CHANGE YOUR RETIREMENT PLANS?

IF YOU WOULD CHANGE YOUR RETIREMENT PLANS, WOULD YOU STILL CHANGE THEM IF IT RESULTED IN THE INDICATED HIGHER HOUSING COSTS EACH YEAR?

Figure 7-3. Effects of repository and retirement plans.

plans, although the percentage was about 10 percent less than in the National sample. Of those who did say "yes," a similarly high percentage said they would still change even if the cost to them were \$5,000.

Women in the National sample were 13 percent more likely than men to answer "yes" to the retirement question, but were 10 percent less likely to be willing to change their plans if it cost money. Age had little effect on the responses to these retirement questions except that, in the National sample, 55 percent of those over age 55 said they would change their plans even if it would cost them \$5,000. In Nevada, however, the percentage was much lower (12 percent).

7.3 Risk-Induced Behavior: Simple Models

We have developed a simple model to examine the risk-induced behavior responses. The model hypothesizes that whether an individual considers an area to be less desirable will depend on his perceptions of the seriousness of the potential risks from a HLNW repository, the characteristics of those risks, and the perceived likelihood of an accident occurring at the repository. The model also suggests that the responses will be influenced by an individual's socioeconomic characteristics--e.g., income or geographical location--as well as his experiences and attitudes toward the environment in general, and the repository in particular. When the model is applied to the retirement question, the cost of changing retirement decisions is also considered.

Table 7-1 presents the telephone survey results for attending a convention, taking a vacation, and raising a family. Separate models are presented for both the National and Nevada samples. Looking first at the convention equations, the results show that the perceived risk variables are the most important determinants of whether an individual thinks a repository would make a less desirable place to attend a convention. The size of the coefficients on the characteristics of the risk--that it would involve and pose serious risks for future generations and the likelihood of accidents--suggests these are the most important determinants of an individual's evaluation. The perceived seriousness of the risk also is a significant determinant in the convention desirability evaluation.

The only significant attitudinal variable in the convention equation is the degree of trust in local officials. The results imply that people who have higher levels of trust in local governments were less likely to think the HLNW repository would make an area less desirable. The coefficient for age suggests that older people were more likely to find the area less desirable for conventions than younger people would. This model explains about 20 percent of the variation in the convention equation, which is respectable for models using cross-sectional data. In fact, the adjusted R² is quite similar across all the models in Table 7-1.

The results for the convention equation for the Nevada survey are consistent with the National results, except that the likelihood of accidents and age were not significant. Perhaps most interesting in these results is the coefficient for whether an individual lives in Nye County. The results show that Nye County residents were less likely to think the repository would make

TABLE 7-1. RISK INDUCED BEHAVIOR

Variables	National survey			Nevada survey		
	Convention equation	Vacation equation	Raise family equation	Convention equation	Vacation equation	Raise family equation
INTERCEPT	-0.019 (-0.293) ^a	0.407 (4.096)	0.593 (13.120)	0.454 (5.801)	0.405 (3.893)	0.555 (10.496)
REPOSRIK	0.048 (0.953)	0.055 (10.923)	0.045 (10.309)	0.027 (5.012)	0.040 (7.715)	0.035 (6.853)
LikeACC	0.125 (3.406)	0.080 (2.308)	---	0.047 (1.159) ^a	0.072 (1.850) ^a	---
AGE	0.004 (4.532)	---	---	-0.003 (-1.849)	---	---
Accdeath	0.112 (3.178)	---	---	0.113 (2.793)	---	---
TRUST LOCAL	-0.010 (2.824)	-0.014 (-2.597)	---	-0.018 (-3.403)	-0.019 (-3.083)	---
OUTDOORS PERSON	0.014 (0.491) ^a	---	---	-0.035 (-1.078) ^a	---	---
Notoutwq	---	---	0.026 (0.814) ^a	---	---	0.013 (0.287) ^a
DREAD	---	0.100 (3.188)	0.000 (2.000)	---	-0.000 (-0.152) ^a	0.005 (2.055)
Changenv	---	---	---	---	---	---
TRUST STATE	---	---	-0.010 (-3.534)	---	---	-0.014 (-2.498)
OWNHOME	---	---	-0.055 (-2.221)	---	---	-0.077 (-2.384)
LINCOLN	---	---	---	0.008 (1.258) ^a	-0.019 (-0.303) ^a	-0.103 (-1.910)
NYE	---	---	---	-0.122 (-2.374)	0.010 (0.305) ^a	-0.030 (-0.588) ^a
FUTURE RISK	0.120 (3.003)	0.093 (2.006)	0.049 (1.009) ^a	0.203 (5.141)	0.228 (6.008)	0.100 (2.523)

(continued)

TABLE 7-1 (continued)

Variables	National survey			Nevada survey		
	Convention equation	Vacation equation	Raise family equation	Convention equation	Vacation equation	Raise family equation
EDUCATION	---	-9.613 (-1.925)	---	---	-0.004 (-0.551) ^a	---
F Value	34.593	44.328	36.108	20.480	27.841	18.499
Adjusted R ²	0.1924	0.2031	0.1747	0.1739	0.1996	0.1460
N	987	1020	995	833	861	819

^aNote: Numbers in parentheses are t-ratios.

an area less desirable for conventions. Also shown in Table 7-1, the evaluations of Lincoln County residents were not different than people who lived elsewhere in Nevada. These residents, however, were less likely to think the repository would make an area a less desirable place to raise a family. In contrast, the Nye County residents' responses on raising a family were not different from residents elsewhere.

The results from the raising family models have several other interesting features. In the National survey, people who owned their home and people who had higher levels of trust in State government were less likely to think a HLNW repository would make an area less desirable. The same is true for the Nevada survey respondents. If respondents thought nearby residents would dread living near the HLNW repository, they were more likely to think the area would be less desirable for raising a family.

Table 7-2 presents the results for the new business and retirement evaluations. The new business results were similar to those noted for the other models. The retirement equation, however, adds additional insight. In particular, people who viewed the HLNW repository risk as catastrophic were more likely to think an area would be a less desirable place to retire. This was true for both the National and Nevada survey. A respondent's income level also influenced his responses in the retirement model for the National survey. Higher income people, all else being equal, were more likely to think the repository would make nearby areas less desirable. Income was not a significant determinant for Nevada residents, however. Finally, the retirement models also explained the highest percentage of the variation (31% National and 37% Nevada) among the risk-induced behavior responses.

The pay higher housing cost models involve different dependent variables. For the respondents who said the repository would make a nearby area a less desirable place to retire, we also asked them whether they would pay higher housing costs to be further away from the repository. In this model, the dependent variable was coded as a 1 when the respondent would pay the higher housing costs and 0 when the respondent would not. As noted earlier, three housing cost amounts were randomly assigned--\$500, \$1,000, and \$5,000. Respondents were told they would incur these costs each year. As in the other models, perceived risks were a significant determinant of whether individuals would agree to pay the higher costs. For the National survey, increases in the dollar amounts had no significant effect. In contrast, the Nevada survey results showed that the higher dollars reduced the likelihood that someone would agree to pay. Income was a significant and positive determinant in the responses of people in the National survey but not in the Nevada survey. The positive direction is consistent with expectations based on economic theory. Finally, these models explain a much lower percentage of the variation in the dependent variable, implying that much more sophisticated modeling needs to be done to predict these responses better.

7.4 Implications

Overall, these initial findings strongly endorse the need for additional research to better understand the potential for risk-induced behavior. At the outset, our survey findings showed that the HLNW repository does make an

TABLE 7-2. RISK INDUCED BEHAVIOR

Variables	National survey			Nevada survey		
	New business equation	Retirement equation	Pay higher housing costs-- retirement equation	New business equation	Retirement equation	Pay higher housing costs-- retirement equation
INTERCEPT	0.380 (12.108)	0.315 (5.040)	0.655 (9.944)	0.347 (10.230)	0.378 (7.287)	0.720 (11.302)
REPOSIRISK	0.048 (10.032)	0.062 (12.932)	0.012 (2.194)	0.041 (7.000)	0.047 (9.292)	0.016 (2.730)
Notoutwq	0.007 (1.003) ^a	---	---	0.013 (0.204) ^a	---	---
FUTURE RISK	0.070 (2.145)	0.063 (2.047)	0.099 (3.373)	0.119 (2.800)	0.110 (3.076)	0.050 (1.424) ^a
DREAD	0.108 (3.412)	0.083 (2.572)	0.032 (1.000) ^a	0.078 (1.779)	0.034 (0.880) ^a	-0.054 (-1.428) ^a
Changenv	-0.052 (-1.445) ^a	---	---	-0.043 (-0.870) ^a	---	---
WATERRAD	---	0.074 (2.616)	-0.003 (-0.120) ^a	---	0.136 (3.984)	0.027 (0.791) ^a
TRUSTED	---	-0.018 (-3.425)	-0.000 (-1.051) ^a	---	-0.031 (-5.622)	-0.005 (-0.778) ^a
Killlots	---	0.087 (2.797)	-0.005 (-0.104) ^a	---	0.089 (2.408)	0.005 (1.826) ^a
INCOME	---	0.000001 (1.908)	0.000003 (4.586)	---	-1.070E-07 (-0.227) ^a	0.000002 (1.840) ^a
WHITE	---	-0.050 (-1.422) ^a	0.020 (0.087) ^a	---	0.169 (2.344)	-0.000 (-0.003) ^a
DOLLAR AMOUNT	---	---	-0.000003 (-0.531) ^a	---	---	-0.00002 (-2.133)
LINCOLN	---	---	---	-0.051 (-0.916) ^a	-0.113 (-2.415)	-0.107 (-1.835) ^a
NYE	---	---	---	-0.003 (-0.050) ^a	-0.033 (-0.708) ^a	0.073 (1.253) ^a
F Value	38.654	50.895	5.607	18.222	46.473	3.806
Adjusted R ²	0.1628	0.3091	0.0084	0.1339	0.3698	0.0647
N	968	892	572	780	776	446

^aNote: Numbers in parentheses are t-ratios.

area less desirable. Even when presented with much higher costs of retirement elsewhere, people still expressed a willingness to change retirement plans. Because of the potential significance to Nevada, these impacts bear much closer examination. Especially important will be the need to consider the populations who are most likely to consider Nevada for relocation, either to start a new business or retire. As noted earlier, some of this work is underway, but it will become a major focus in Years 2 and 3 of the research. The telephone survey findings endorse the potential usefulness to Nevada planners of such efforts.

SECTION 8

ECONOMIC MEASURES OF WELL-BEING: SURVEY FINDINGS

8.1 Introduction

This section presents the findings on the perceived well-being questions that were included in the telephone survey. As with the risk-induced behavior findings, these results are based only on a few questions. They focus mainly on economic considerations and are not an exhaustive attempt to explore the impacts on other dimensions of well-being.

One way economists measure changes in well-being is by how much individuals would pay to locate the HLNW repository in a distant state. This type of question was asked of half the respondents in both the National and Nevada surveys. Each survey also included a question that examined a second version involving financial influence. It asked how much compensation individuals would need to be as well-off as they were without the HLNW repository. This section also reports the preliminary findings on the relative importance of different forms of compensation, along with some findings about mitigation.

8.2 Willingness to Accept a Rebate

One of the central questions in the conceptual framework relates to whether individuals would accept compensation in return for having a HLNW repository relatively close to their residence (i.e., within 50 or 100 miles). We hypothesized that those people who perceived the risk of a repository to be sufficiently high and/or were concerned with the management and control of the facility by the government would be unwilling to accept even relatively high monetary rebates or Federal income tax credit as compensation for the repository.

To examine this hypothesis, we asked a pair of willingness-to-accept (WTA) questions which varied the dollar rebates given to individuals for 20 years should the repository be located within 50 or 100 miles of their home (National survey) or at Yucca Mountain (Nevada survey). Under these conditions the individual had to decide whether he would vote "yes" or "no" for the repository in the specified location if he were given a credit or rebate on his Federal income taxes of either \$1,000, \$3,000, or \$5,000 for each of the next 20 years.^a If the person voted "yes," then the same question was asked again except that the credit or rebate was halved from the original amount; if the person voted "no," then the same question was asked with the credit or rebate doubled over the original amount.

^aHalf of the sample in both the National and Nevada surveys were asked the WTA questions; the other half were asked willingness-to-pay (WTP) questions. Of the WTA group, approximately one-third were given each of the initial dollar figures of \$1,000, \$3,000, or \$5,000.

The responses to this question were rather revealing for both the National and Nevada sample as shown in Figure 8-1. In both surveys between 26 and 31 percent of those sampled were willing to accept compensation in return for the facility in their "backyard" whether the indicated annual dollar rebate to the person over the next 20 years is \$1,000, \$3,000, or \$5,000. A chi-square analysis for each of the samples indicates that there is no statistical difference in behavior across these three monetary rebate levels for either the National or Nevada sample.

In the case of the National sample there is a marginally statistically significant difference (at the .08 level) in the percentage of individuals who would accept a rebate as a function of the distance that they resided from the repository. Approximately 25 percent said they would accept a rebate if the repository were within 50 miles of their home; this percentage increased to 32 percent when the facility was proposed to be within 100 miles of their residence. A similar analysis could have been undertaken for the Nevada sample by specifying distance from the Yucca Mountain repository for each of the residents in the sample, but this would have required specifying the location of each person in relation to the proposed site. This level of investigation was beyond the scope of this project.

The factors that are most closely associated with an individual's willingness to accept a rebate have some similarities and some significant differences between the National and Nevada sample. In both surveys the perceived seriousness of the risks from a HLNW repository was the most significant variable affecting the WTA decision. Figure 8-2 reveals the differences in behavior between the "low," "medium," and "high" risk groups.^b A majority of those in the "low" risk would accept compensation for the repository while a much smaller percentage (10% for the Nevada sample; 14% for the National sample) of the "high" risk group would agree to the repository in return for some compensation.

The perceived economic benefits of the repository in relation to risks is also a significant variable in both surveys. As pointed out above, there were relatively few individuals in Nevada and somewhat more in the National survey who perceived that the repository had net positive benefits. However, these individuals were much more likely to accept rebates than those who felt that the risks exceeded the benefits. Eight out of the nine Nevadans who had very positive feelings about the net benefits of the repository said they would accept a rebate if the repository were located at Yucca Mountain. Over half of those in Nevada who felt that on balance the repository benefits exceeded the risks stated they would accept a rebate if it were located in their state. The remaining 92 percent of the Nevada sample felt the risks clearly outweighed the benefits and only 28 percent of this group responded that they would have been willing to accept compensation in exchange for the repository.

^bWe used the same classification of variables for our analysis of WTA as in our voting behavior analysis in Section 6. Thus, for the risk variable "low" is 1-3, "medium" is 4-7, and "high" is 8-10.

Figure 8-1. Willingness to accept compensation to locate an HLNW repository nearby.

HORIZONTAL AXIS MEASURES LEVEL OF PERCEIVED RISK

Figure 8-2. Perceived risk and willingness to accept.

At the national level there were similar differences, but a much larger proportion of the sample (19 percent) felt the benefits greatly exceeded the risks. Over half of this group were willing to accept compensation if the repository were located near their home. In contrast, for the 25 percent of the National sample who felt that the net benefits were decidedly negative, only 13 percent were willing to accept a rebate.

The one other variable that had a statistically significant impact on an individual's attitude toward accepting compensation in both surveys was the measure of equity using the question: "Each region of the country should have a repository" (Q. 15b). A larger proportion of those National respondents who Strongly Agreed or Agreed with this statement were willing to accept a rebate than those who Disagreed or Strongly Disagreed with this statement as shown in Figure 8-3. One interpretation of this finding is that people who feel that the burden of the radioactive waste problem should be shared more equally through regional repositories are also sympathetic to some form of benefit-sharing through rebates to residents with an increased exposure to the risk.

Regarding the relationship between attitude toward government and WTA, two variables are statistically significant in the final regression equation for the Nevada survey. Specifically, most individuals who felt it is important for local authorities to have the power to shut down the facility and those who had little trust in Federal officials to make the repository as safe as possible would not accept a rebate in the Nevada survey. Over half of those who felt it was unimportant for local authorities to have shut down power or had great trust in Federal officials would accept compensation for having a repository near their home. A similar but less extreme pattern existed in the National survey, but neither of these two variables was statistically significant in the final regression equation.

Those who were in favor of nuclear power as a source of energy (Q. 4b) were more likely to accept a rebate than those opposed to nuclear power. In both the National and Nevada surveys approximately 36 percent of those who liked nuclear power were willing accept a rebate while only 15 percent of those opposed to nuclear power would accept compensation. This variable was insignificant in the regression analysis for the Nevada sample, presumably because it is highly correlated with some other risk-related question. It was, however, significant at the national level.

We again investigated the relationship between socioeconomic variables and willingness to accept a rebate but found no statistical relationship when looking at the variables individually. The income variable becomes significant in the regression model for both the National and Nevada samples. The higher the income level, the less likely an individual was to accept a rebate. This finding confirms one's economic intuition: a repository is more attractive to less wealthy individuals if they feel they can get a monetary reward for accepting the repository. From a policy perspective there are conflicts that naturally emerge between equity and efficiency. This finding suggests consideration of siting a repository in a lower income region because individuals are more willing to accept it for a monetary exchange. Other factors, of course, would influence the decision. There is no easy answer for siting the repository, yet all the considerations must be addressed as part of the siting decision.

Figure 8-3. Perceived risk and equity: "Each region of the country should have a repository."

Table 8-1 presents the regression equations for several models estimated with the National and Nevada survey data. Those individuals who were willing to accept a rebate have a value of $WTA=1$; those who were not are given a value of $WTA=0$. Thus, the intercept term can be interpreted as the probability that an individual will accept compensation when none of the significant variables are incorporated in the analysis. As in the voting preference equations, the coefficients for each independent variable reflect the impact that a change in the level has on willingness to accept a rebate in return for the repository. For example, in Models 2 and 3, a Nevada resident who perceived the risk from the repository at Yucca Mountain to be very low (e.g., a value of 2) would have a decreased probability of .08 (i.e., $2 \times (-.04)$) of accepting a rebate. A person whose perceived risk was very high (e.g., a value of 8) would have a decreased probability of .32 (i.e., $8 \times (-.04)$) of accepting a rebate.

We have included the variable "Dollar" in both regression equations to indicate that the amount of the rebate has an insignificant impact on the WTA decision. In both the National and Nevada surveys, t-ratios are insignificant because the standard errors are considerably greater than the coefficients for this variable. Even when differences in income and other attitudinal variables are controlled, the higher dollar amounts had no effect on the likelihood of someone accepting a rebate. This was true for Lincoln and Nye County residents as well.

8.3 Willingness to Pay Increased Taxes

Another investigation examined willingness to pay increased Federal taxes over the next 20 years as a means of siting a proposed facility further away from the respondent's home. In the case of the Nevada survey, the question indicated that the Federal government had decided to put a HLNW repository at Yucca Mountain. For the National survey the repository was to be located either 50 or 100 miles from the respondent's home. As in the WTA question, three dollar amounts (\$100, \$500, or \$2,000) were randomly assigned to individuals who were asked the WTP questions. If a person indicated he would not be willing to pay the stated amount, then a second question was asked which halved the tax increase. If he was willing to pay the initial tax dollar figure, then the question was repeated with double that tax figure.

Approximately 65 percent of the National and Nevada samples responded they were not willing to pay any increased taxes to move the proposed facility elsewhere. This finding, coupled with the WTA result, suggests that there would be strong resistance to having a repository located near homes (in the sense that most people would still oppose a facility through a negative vote) even if substantial rebates were offered to them. Hence, once a decision was made to locate it in their region, most people would not be willing to pay increased taxes to change this decision.

TABLE 8-1. WILLINGNESS TO ACCEPT COMPENSATION TO LOCATE REPOSITORY NEARBY

Variables	National survey			Nevada survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
INTERCEPT	0.697 (12.469)	0.612 (5.572)	0.844 (5.124)	0.657 (11.245)	0.481 (4.942)	0.786 (3.994)
DOLLAR AMOUNT	0.00001 (0.716) ^a	0.00001 (0.959) ^a	0.00001 (0.895) ^a	0.00002 (0.140) ^a	-0.00002 (-0.145) ^a	0.288E-07 (0.048) ^a
REPOSRTISK	-0.007 (-10.219)	-0.058 (-8.101)	-0.000 (-8.084)	-0.000 (-8.989)	-0.042 (-5.283)	-0.042 (-5.373)
BENEFITS	---	0.189 (2.576)	0.156 (2.598)	---	0.182 (3.089)	0.212 (3.534)
LOCALSHUT	---	0.077 (1.224) ^a	0.058 (0.901) ^a	---	-0.082 (-1.326) ^a	-0.084 (-1.369) ^a
TRUSTED	---	0.014 (1.847) ^a	0.014 (1.796)	---	0.031 (3.725)	0.029 (3.470)
KNOW	---	0.026 (1.020) ^a	0.040 (1.503) ^a	---	0.000 (0.224) ^a	0.039 (1.421) ^a
NONJAKER	---	-0.115 (-2.749)	-0.122 (-2.902)	---	-0.050 (-0.935) ^a	-0.061 (-1.141) ^a
EACHREGION	---	---	0.055 (0.935) ^a	---	---	-0.091 (-1.478) ^a
SEX	---	---	-0.019 (-0.461) ^a	---	---	0.015 (0.333) ^a
AGE	---	---	-0.0002 (-0.157) ^a	---	---	-0.003 (-1.328) ^a
SCHOOL	---	---	-0.020 (-2.654)	---	---	-0.003 (-0.327) ^a
INCOME	---	---	-9.444E-07 (-0.896) ^a	---	---	-0.000003 (-2.634)
OWNHOME	---	---	0.018 (0.398) ^a	---	---	-0.101 (-1.966)
KIDS	---	---	-0.001 (-0.027) ^a	---	---	0.032 (0.599) ^a

(continued)

TABLE 8-1 (continued)

Variables	National survey			Nevada survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
LINCOLN	---	---	---	---	---	-0.011 (-0.141) ^a
NYE	---	---	---	---	---	0.062 (0.762) ^a
F Value	52.298	18.436	10.148	40.482	16.643	9.182
Adjusted R ²	0.1796	0.2005	0.2145	0.1740	0.2265	0.2593
N	469	469	469	374	374	374

t-statistic is not significant at the .05 level of significance. All parameter estimates without this note are significant at least at this level.

Note: Numbers in parentheses are t-ratios.
Dependent variable: WTA - 1 = Yes, 0 = No.

It is important to emphasize that this finding does not suggest that individuals are in favor of a repository. Rather, it implies that their concerns are not sufficiently strong for them to sacrifice future income over the next 20 years to relocate the repository to another state. There was one significant difference between individuals' attitudes toward WTA and WTP, particularly in the National sample. In contrast to the insensitivity by individuals to the magnitude of the rebate (WTA), the amount of the tax increase had a statistically significant impact on whether a person would be willing to pay to relocate the repository for the National survey. As shown in Figure 8-4, over 44 percent would pay increased taxes of \$100 to move the repository, while only 28 percent would agree to do so if the tax increase were \$2,000. In Nevada, the variable has a chi-square value which is statistically significant at the .05 level.

The variables which had an impact on WTP were similar to the factors influencing WTA except they were not as significant statistically. For example, as shown in Figure 8-5, in both the Nevada and National surveys between 47 and 48 percent of those who perceived the risk of a nearby repository to be serious were willing to pay increased taxes to move it to a distant state. Approximately 20 percent would be willing to pay this amount if they perceived the risk to be low. These percentage differences are smaller than for the WTA case, as can be seen from Figure 8-2.

The most important variables which influenced the decision on WTP at the National level in order of importance were: perceived risks of the repository, perceived benefits in relation to risks, the dollar amount one would have to pay in increased taxes, and the ability of a local committee to shut down the repository. For the Nevada survey there were three variables which affected people's WTP: education level, perceived risk, and ability of a local committee to shut down the facility.

The regressions shown in Table 8-2 indicate that the relationships between these variables and WTP are in the expected direction. The interpretation of the coefficients are the same as for the other two regression equations. Thus, if one perceived the risk to be high or were unwilling to retire to a desirable area due to the location of a repository, then one would be more likely to be willing to pay increased taxes to locate the repository elsewhere. The opposite is also true in cases in which there were a low perceived risk or the repository had no effect on one's retirement location. These findings suggest that individuals are willing to pay the Federal government nonnegligible sums of money each year to avoid having a repository nearby if they feel it is unsafe and/or they do not feel their community has sufficient control over the facility. Hence, there is symmetry in the attitude toward WTA and WTP based on these two surveys.

8.4 Mitigation and Forms of Compensation: Survey Results

A series of questions dealing with various mitigation measures and compensation alternatives was included in both the Nevada and National telephone surveys to gauge respondents' attitudes about the repository in relation to mitigation. The introduction to the set of mitigation questions was worded

Figure 8-4. Willingness to pay to avoid locating an HLNW repository nearby.

HORIZONTAL AXIS MEASURES LEVEL OF PERCEIVED RISK.

Figure 8-5. Perceived risk and willingness to pay.

TABLE 8-2. WILLINGNESS TO PAY TO AVOID LOCATING REPOSITORY NEARBY

Variables	National survey			Nevada survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
INTERCEPT	0.136 (2.311)	-0.069 (-0.668) ^a	-0.556 (-2.776)	0.199 (3.705)	0.278 (2.585)	-0.160 (-0.662) ^a
DOLLAR AMOUNT	-0.0001 (-2.689)	-0.0001 (-2.930)	-0.0001 (-2.823)	-0.00005 (-1.799) ^a	-0.00005 (-1.863) ^a	-0.00004 (-1.415) ^a
REPOSIRISK	0.053 (7.051)	0.050 (6.064)	0.055 (6.343)	0.038 (5.199)	0.029 (3.455)	0.028 (2.765)
BENEFITS	---	-0.056 (-0.720) ^a	-0.037 (-0.463) ^a	---	0.089 (0.970) ^a	0.079 (1.073) ^a
LOCALSHUT	---	0.210 (2.942)	0.243 (3.341)	---	0.087 (1.215) ^a	0.111 (1.527) ^a
TRUSTED	---	0.007 (0.766) ^a	0.013 (1.370) ^a	---	-0.016 (-1.771) ^a	-0.017 (-1.847) ^a
KNOW	---	0.024 (0.836) ^a	0.007 (0.240) ^a	---	0.032 (-1.079) ^a	-0.049 (-1.584) ^a
NONUSER	---	-0.013 (-0.264) ^a	0.030 (0.612) ^a	---	0.035 (0.603) ^a	0.034 (0.578) ^a
EACHREGION	---	---	0.077 (1.211) ^a	---	---	0.001 (0.020) ^a
SEX	---	---	0.022 (0.479) ^a	---	---	-0.007 (-1.287) ^a
AGE	---	---	0.00004 (0.023) ^a	---	---	0.001 (0.281) ^a
SCHOOL	---	---	0.021 (2.286)	---	---	0.029 (2.590)
INCOME	---	---	0.000002 (1.690) ^a	---	---	-2.271E-08 (-0.017) ^a
OWNHOME	---	---	0.030 (0.571) ^a	---	---	0.089 (1.547) ^a
KIDS	---	---	-0.007 (-0.141) ^a	---	---	-0.004 (-0.078) ^a

(continued)

TABLE 8-2 (continued)

Variables	National Survey			Nevada Survey		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
LINCOLN	---	---	---	---	---	0.001 (0.010) ^a
NYE	---	---	---	---	---	-0.132 (-1.635) ^a
NUCLEARTEST	---	---	---	---	---	0.001 (0.145) ^a
F Value	30.332	10.177	6.402	15.179	5.632	3.410
Adjusted R ²	0.1174	0.1271	0.1464	0.0707	0.0800	0.0990
N	441	441	441	373	373	373

t-statistic is not significant at the .05 level of significance. All parameter estimates without this note are significant at least at this level.

Note: Numbers in parentheses are the t-ratios.

Dependent variable: WTP-1 = Yes, 0 = No.

hypothetically to avoid leading respondents into believing the decision to site the repository had already been made. The question was framed: "Suppose the Federal government decided to put a high-level nuclear waste repository..." and then asked respondents to rate the importance of various mitigation measures that could be taken.

The alternative receiving the highest percentage of "very important" in both surveys was the one which stated that the Federal government would set the safety standards and have an inspector on site at all times. Ninety-one percent of the Nevada respondents and 89 percent of the National respondents rated this "very important." These high percentages might not seem to fit with another finding from the surveys; that respondents gave the Federal government the lowest trust rankings in making the repository safe. This discrepancy might be explained by the fact that people viewed Federal safety standards and inspection as a minimum requirement for locating a repository nearby.

That Federal standards were perceived as a minimum condition was borne out by importance rankings for alternatives which involved local officials. Approximately 70 percent of the respondents in both surveys felt it was "very important" for a local committee to offer safety advice for the repository, as well as to have the power to shut down the repository if they decided it was unsafe.

In the area of economic or pecuniary compensation, less than 50 percent of both samples rated rebates on Federal income taxes, jobs created by a hightech Federal project, and large Federal grants for community improvement as "very important." Importance rankings were similar in both the Nevada and National surveys. The percentage of each sample ranking these compensation alternatives as "very important" ranged from about 35 to 45 percent.

Respondents in the Nevada survey were presented with one additional compensation alternative: protection of property values. They rated this alternative higher than the other compensation measures. Sixty-one percent of the Nevadans felt it was "very important" that the Federal government protect property values within 100 miles of the repository. Given the prominence the issue of a repository has assumed in the State of Nevada, it is quite understandable that Nevadans felt it was important to ensure their property values. And as noted earlier, a large majority of Nevadans thought it is likely that the repository will be located at Yucca Mountain.

While there was strong opposition to locating the HLNW repository in Nevada, and offers of hypothetical rebates did not change this, there was general support for the equity of compensation, once a decision is made to locate the repository. A large majority of respondents in both surveys (about 80 percent) agreed with the general idea of compensation for the State in which the repository would be sited.

8.5 Implications

Both the National and Nevada telephone surveys strongly support the hypotheses that we formulated on the basis of our conceptual framework.

Based on our analysis, three implications can be drawn from the telephone survey findings on economic well-being:

- There is substantial opposition to a HLNW repository and compensation in the form of rebates is unlikely to change people's attitudes. Most individuals would vote against a repository near their residence even if they would receive as much as \$5,000 per year for the next 20 years.
- Perceived risk of the repository is the single most important variable in predicting how a person is likely to vote regarding a repository and his/her attitude toward WTA and WTP.
- Individuals, particularly in the Nevada survey, are much more willing to support a repository if they trust the Federal government and feel that a local committee would have the power to shut down the facility if it were declared unsafe.

These three observations suggest that to prevent substantial opposition to locating a repository in Nevada or elsewhere, there needs to be a significant change in people's attitudes toward the risk as well as development of increased trust in the government. By giving the local community more power with respect to controlling the operation of the facility, comfort levels may then be increased. Only after these three elements, risk, trust, and control, are explicitly dealt with should some form of rebate or compensation be considered as an appropriate policy tool for facilitating the siting of a HLNW repository.

SECTION 9

DISTANCE AND LOCATION IN RELATION TO REPOSITORY

9.1 Introduction

This section analyzes the impact of respondents' locations on their perceived risk, risk-induced behavior and their economic sense of well-being as affected by the high-level nuclear waste repository. More specifically we investigated whether there were any differences in attitudes by region for those respondents participating in the National survey and whether distance from the Yucca Mountain proposed site affected the responses of those in the Nevada survey.

9.2 Regional Differences

Given the small number of responses in most of the individual states, we analyzed differences in attitudes by examining eight different regions of the country. Even with this aggregation, the sample sizes were still not very large, ranging from 32 responses in the New England region to 209 in the Great Lakes area of the country.

Our general conclusion is rather straightforward. There do not appear to be any significant differences between regions with respect to attitudes toward the repository. Table 9.1 presents the relevant figures related to the seriousness of the perceived risk from a high-level nuclear waste repository either 50 or 100 miles from the respondent's home. There were only minor differences between the regions with the percentage of those perceiving the risk to be serious ranging from a low of 33% (East South Central) to a high of 44% (West South Central). A chi-square analysis indicated that these differences between regions were not statistically significant. The variables measuring attitude toward the repository also did not differ significantly between regions as depicted in Table 9.2.

9.3 Risk Perception and Distance Within Nevada

A much more interesting set of findings emerged when we investigated whether Nevada residents differed in their attitudes as a function of their distance from the proposed repository at Yucca Mountain. Residents were assigned to specific towns by zip codes and then relevant air and road mileages were specified (Figure 9-1). In the analysis which follows, we used air mileage as the measure of distance and examined differences between four key counties (Nye, Lincoln, Clark and Washoe).

Turning first to the perceived seriousness of the risk, Table 9.3 depicts the differences as a function of air distance from the repository. Note that the greatest percentage of people with high perceived risk appeared at a distance of 76-100 miles. This group of respondents predominantly reside in and around Las Vegas. The high level of concern in Las Vegas was further indicated by examining the perceived seriousness of risk within the four principal counties. Clark County, in which Las Vegas is located, had the

NATIONAL SURVEY:
Table 9.1. Seriousness of Perceived Risk from "A High-Level Nuclear Waste Repository 100 Miles From Your Home."

Note: Low equals ratings of 1, 2, or 3
Medium equals ratings of 4, 5, 6, or 7
High equals ratings of 8, 9, or 10

NATIONAL SURVEY:
Table 9.2. Responses to "Willingness to Accept," "Willingness to Pay" and "Vote on a Referendum" Questions
(Percent Yes and No)

* N = No. of Respondents

Counties, Independent City; County Subdivisions (Townships); and Other Places

NUMBER OF INHABITANTS

NEVADA 35-23

Bureau of the Census, 1960

Figure 9-1. Distances from the proposed repository.

TABLE 9-3. Perceived Seriousness of Risk if Repository Were Located at Yucca Mountain (by Air Distance from Proposed Repository,

(Nevada Survey 8)

Perceived Risk	Less Than 75 Miles	76-100 Miles	101-200 Miles	Over 200 Miles
Low	38.7	29.8	39.1	38.1
Medium	35.5	23.8	33.4	29.3
High	25.8	46.4	27.5	32.7
Number of Respondents	93	416	174	263

Low = 1-3 on rating scale

Medium = 4-7 on rating scale

High = 8-10 on rating scale

largest percentage of residents who perceived the risk to be high (44.7%) and Washoe County, where Reno is located, was second (36.3%). In other words, Table 9.4 suggests that the rural counties near the repository (Nye and Lincoln) had a much lower perceived risk than the more distant, urban regions of Nevada.

The perceived risk of the nuclear weapons testing site provided an interesting comparison with the proposed repository since residents of Nevada have had to live with the potential of radioactive harm for a number of years. Table 9.5 presents the percentage of respondents who perceived the risk to be low, medium or high as a function of air distance from the proposed repository (which is highly correlated with the air distance from the test site). Comparing the figures with those of Table 9.3 suggests that residents of Nevada viewed the nuclear weapons test facility as safer than the proposed radioactive waste storage facility at Yucca Mountain. It is interesting to note that only 13% of the residents within 75 miles of the nuclear weapons testing site (and hence approximately the same distance from the proposed repository) perceived the risk to be high. More than twice these percentages of residents living further from the test site felt the risks to be very serious.

9.4 Attitude Toward Repository and Distance in Nevada

The voting preferences of residents in different parts of Nevada mirrored the above findings. Although most individuals in Nevada were opposed to the repository, Table 9.6 indicates that of the respondents who would vote to locate the repository at Yucca Mountain, a larger percentage were residents of areas within 75 miles of the proposed facility. The rural-urban distinction was also reinforced by looking at the county data in Table 9.7. Forty-seven percent of the residents in Lincoln county and more than one-third of those in Nye county indicated that they would vote to locate the repository at Yucca Mountain. In contrast, less than 25% of those in Clark County (Las Vegas) and 17% of those in Washoe County (Reno) stated that they would vote in favor of a Yucca Mountain repository. More research is needed through field survey activities to better understand these differences.

Finally we turn to the impact of distance and region on residents' willingness to accept (WTA) compensation in return for a repository and willingness to pay (WTP) to locate it in a distant state if the Federal government had decided to place it in Nevada. As shown in Table 9.8, almost half of the residents living within 75 miles of the proposed repository responded that they would accept a reduction in their taxes over the next 20 years and vote in favor of a repository at Yucca Mountain. In contrast, less than 30% of those living further from Yucca Mountain responded they would accept this type of compensation. However, the importance of these differences was diminished by a chi-square analysis of WTA and "Air Distance" which indicated that there was no statistical significance between these two variables.

A comparison between the four key counties reinforced the point that one should not expect to find any unusual differences between residents in different regions of Nevada in their willingness to accept compensation. It is true that the percent willing to accept compensation was somewhat higher in the rural counties closest to Yucca Mountain than in the urban areas as shown in Table 9.9. However, the percentage differences between the regions was not very large.

TABLE Q-4. Perceived Seriousness of Risk if Repository Were Located at
Yucca Mountain (by County)

(Nevada Survey 1)

Perceived Risk	Nye	Lincoln	Clark	Washoe
Low	35.2	41.6	30.4	31.1
Medium	40.7	32.3	24.9	32.7
High	24.0	26.1	44.7	36.3
Number of Respondents	108	96	445	190

Low - 1-3 on rating scale

Medium - 4-7 on rating scale

High - 8-10 on rating scale

TABLE 9-5. Perceived Seriousness of Risks from Nuclear Weapons Testing Site (by Air Distance from Proposed Repository)

(Nevada Survey 1)

Perceived Risk	Less Than 75 Miles	76-100 Miles	101-200 Miles	Over 200 Miles
Low	57.6	40.6	50.8	42.7
Medium	29.4	28.9	23.1	30.1
High	13.1	30.6	26.0	27.1
Number of Respondents	92	412	177	269

Low = 1-3 on rating scale

Medium = 4-7 on rating scale

High = 8-10 on rating scale

TABLE 9-6. Vote to Locate Repository at Yucca Mountain (by Air Distance)
(Nevada Survey 1)

	Less Than 75 Miles	76-100 Miles	101-200 Miles	Over 200 Miles
No	60.2	75.3	66.3	79.1
Yes	39.7	24.7	33.7	20.9
Number of Respondents	78	109	163	268

TABLE 9-7. Vote to Locate Repository at Yucca Mountain (by County)
 (Nevada Survey 1)

	Nye	Lincoln	Clark	Washoe
No	65.7	52.9	75.9	82.7
Yes	34.3	47.1	24.1	17.3
Number of Respondents	102	87	436	196

TABLE 9-8. Willingness to Accept Compensation to Locate Repository at
Yucca Mountain (by Air Distance)

(Nevada Survey 1)

	Less Than 75 Miles	76-100 Miles	101-200 Miles	Over 200 Miles
Would Not Accept	51.2	70.5	72.8	72.3
Would Accept	48.8	29.5	27.2	27.7
Number of Respondents	43	200	81	137

TABLE 9-9. Willingness to Accept Compensation to Locate Repository at Yucca Mountain (by County)

(Nevada Survey 1)

	Nye	Lincoln	Clark	Washoe
-----	-----	-----	-----	-----
Would Not Accept	58.3	60.4	72.7	74.2
Would Accept	41.7	39.6	27.9	25.8
-----	-----	-----	-----	-----
Number of Respondents	48	48	215	93
-----	-----	-----	-----	-----

The data with respect to willingness to pay to avoid locating the repository at Yucca Mountain revealed that there was a relatively small difference between residents' attitudes either as a function of air distance (Table 9.10) or by county (Table 9.11). A smaller fraction of residents living less than 75 miles from Yucca Mountain said they would pay to move the repository than those who reside further from Yucca Mountain. Similarly a smaller proportion of those residing in Nye and Lincoln Counties stated they would pay to move the repository elsewhere than in the two urban counties of Clark and Washoe. A chi-square analysis of WTP and "Air Distance" indicated that there was not a statistically significant relationship between these two variables.

TABLE 9-10. Willingness to Pay to Avoid Locating Repository at Yucca Mountain (by Air Distance)

(Nevada Survey 9)

	Less Than 75 Miles	76-100 Miles	101-200 Miles	Over 200 Miles
Would Not Pay	72.5	63.4	68.1	63.2
Would Pay	27.5	36.6	31.9	36.8
Number of Respondents	40	213	91	136

TABLE 9-11. Willingness to Pay to Avoid Locating Repository at Yucca Mountain (by County)

(Nevada Survey 1)

	Nye	Lincoln	Clark	Washoe
Would Not Pay	73.6	70.7	62.7	59.4
Would Pay	26.4	29.3	37.3	40.6
Number of Respondents	53	41	233	106

SECTION 10

FINDINGS AND IMPLICATIONS

10.1 Introduction

This section highlights the findings from the telephone survey and draws some implications for Nevada planners and for further research. From the outset, we have cautioned that the telephone survey is only one step in an integrated research project. The telephone survey was designed to begin the process of learning about perceived risks, mitigation, risk-induced behaviors, and compensation. Because of this design, we have explored these issues but not in the depths that each requires. The research activities in Years 2 and 3 are being planned to take these additional steps.

10.2 Findings

Overall, the findings from the telephone risk surveys were clear-cut. The results showed that people perceived the potential risks from a HLNW repository to be serious, the likelihood of accidents high, and the character of the risks to be dreadful for those living nearby. The risks to future generations and from transportation accidents were the most important factors affecting perceptions, along with the perceived likelihood of groundwater contamination. The risk perceptions were very similar for respondents in both the National and Nevada surveys. These findings also were consistent with earlier findings about the risks from nuclear wastes in particular, and nuclear power in general. Our empirical models are very robust, explaining a high percentage of the variation in perceived risk. They are the first to be based on a national sample of households.

The perceived seriousness of risks also influenced people's attitudes toward the HLNW repository. A large majority of Nevada residents opposed the repository being located at Yucca Mountain. Even when offered a hypothetical tax rebate of \$10,000 a year from the Federal government, the majority of respondents opposed the repository. This was true in both the National survey when the repository was proposed to be located near a respondents home (50 or 100 miles) and the Nevada survey when it was proposed to be located at Yucca Mountain. The opposition was especially pronounced among people who considered the potential risks to be very serious (8 or higher on the 10-point scale). This could imply that many people, both in Nevada and nationally, are unwilling to trade the potential risks from a repository for additional income. Perhaps larger rebates might have changed their opposition, but we strongly doubt it.

The willingness to pay (WTP) and willingness to accept (WTA) results clearly implied that the Nevada residents perceived that the HLNW repository would reduce their economic well-being. This perception seemed to hold true both for residents in Lincoln and Nye Counties as well as for residents in other parts of Nevada. More investigation is needed to positively confirm these findings, but the preliminary findings are reasonably clear.

Although opposing the repository, a large majority of Nevada residents thought that it is very likely Nevada will be selected. This seems to imply a fatalism among Nevada residents that the repository decision will be made despite their opposition.

An analysis of the National survey revealed no statistically significant regional differences with respect to risk perception and attitude toward the repository. The Nevada survey suggested that those within 75 air miles of the repository perceived the risk from the repository to be lower than others in the state and had a more positive view of it being located in Nevada as reflected in their voting attitudes and willingness to accept compensation. The analysis by county in Nevada suggested that there may be a significant rural-urban difference. Residents of Las Vegas and Reno were significantly more opposed to the repository than those in smaller communities.

Our findings also indicate that Nevada was the only one of the three candidate sites that received more than 20 percent of a hypothetical vote. Although a substantial majority of respondents in both surveys opposed the HLNW repository being located in Nevada, this finding implied that Nevada is more closely linked, in people's perceptions, to the repository than either the Hanford, Washington, or Deaf Smith County, Texas, sites. Determining whether these linkages are well established will be a major focus of the risk-induced behavior studies in Year 2. The telephone survey findings could indicate that the site characterization activities, as well as the overall public attention being given to the HLNW repository questions, are beginning to link Nevada with the repository. This is now somewhat speculative but can also be investigated in the risk-induced behavior studies and in future telephone survey updates of the perceptions baseline.

The telephone survey findings revealed that a majority of respondents, both nationally and in Nevada, perceived that the HLNW repository would make an area a less desirable place to live--either for retiring or starting a new business. In the National survey, a majority believed that the repository would also make an area a less desirable place to take a vacation. Shorter convention trips were the least affected. These intentions were most clear for retirement decisions. For example, a majority of respondents in the National survey said they would pay higher housing costs--in some cases, agreeing to \$3,000 each year--to retire in an area away from the repository.

At this stage, our survey results indicate only intentions. Assessing whether these intentions actually lead to behavioral changes will be a major focus of the risk research in Years 2 and 3.

10.3 Implications for Nevada Planners and Policy-Makers

On the basis of these results, what seems to underlie the attitude of the public in the two surveys is that the perceived risks associated with a repository are above an acceptable level, possibly determined on the basis of some comparability criterion (with other known risks) which we do not yet understand. It would appear that only when risks meet some acceptability criteria are individuals willing to consider income-risk tradeoffs.

The question naturally arises, therefore, as to what determines (both from a policy perspective as well as a socio-demographic perspective) the domain of acceptability and compensability. It appears that control, monitoring and related mitigation measures are central to this question. For example, in our sample, respondents were much more concerned with the ability of the local government to monitor and shut down the facility if it were considered unsafe than they were with compensation. They wanted to feel comfortable in having a repository in their "backyard"; where backyard may be as far as 100 miles from their home. Especially for those lacking trust in State and Federal authorities, violation of this "bonded" control tended to significantly reduce their compensability domain.

We suspect that a closer and more detailed analysis will reveal other relatively inflexible determinants of acceptability and compensability. These determinants are clearly critical for understanding the necessary mitigation and control measures which will have to be designed in order to ensure acceptability by the public. They will also be very important in the legitimization phase of the siting evaluation process in structuring the manner in which repository risks are represented and communicated to the public and policy makers.

10.4 Implications for Future Research

The telephone survey provides benchmarks for developing field survey questions while suggesting areas which need to be investigated through additional data collection. Some of the more important topics which should be considered are:

1. A more detailed analysis of attitudes by residents of alternative types of compensation (e.g., compensation in kind) and how this would impact their behavior.
2. Attitudes toward different mitigation measures that would influence attitudes towards the repository.
3. Types of tradeoffs individuals are willing to make between compensation and mitigation measures.
4. Increasing our understanding of trust and how we can measure it.
5. Determining what bothers people about the repository. We could list a set of factors and check off those that are most relevant to a person's concern about the repository and/or what would be necessary for them to vote for a repository in their backyard.
6. Increasing our understanding of the role that equity plays in shaping attitudes toward a repository. What factors are important in achieving some feelings of equity (e.g., what should Nevada get for being willing to host a repository?). An important consideration here is focusing on the process by which a repository will finally be selected.

7. Elicitation of perceived likelihood of different repository risks through visual devices such as a risk ladder. Can we get better measures of the importance of different components of risk (e.g., dread, catastrophic potential, impact on future generations) through some type of visual approach?
8. Attitudes toward noxiousness and its relationship to distance. Comparison of attitudes to a repository and other types of noxious facilities. Can one determine a demand for distance building on earlier studies in this area?
9. Relationship between individual attitudes and community involvement. Are there differences in individual attitudes as a function of community involvement (e.g., social interaction, group membership), the structure of the community (e.g., town meetings vs. hierarchical relationship) and other factors determined to be important by socio-cultural studies.
10. Questions eliciting risk-induced behavior and social amplification aspects. These questions could build on the items in the telephone survey related to vacation planning, convention attendance and retirement plans.

Some type of scenario presentation may be required to incorporate these factors into the subsequent investigation so as to measure well-being with and without a repository. One could have a base case scenario which would then be modified in specific ways according to some type of factorial design so one could draw statistical conclusions.

SECTION 11

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APPENDIX

Nevada Survey Questionnaire

Baseline Survey for High-Level Nuclear Waste Repository Risks

INTRODUCTION: Part I

Hello, my name is _____. We're conducting a study of energy and the environmental issues. I'm calling from the Survey Research Center at the University of Nevada, Las Vegas. Because we must interview an equal number of adult male and female decisionmakers, may I please speak with an adult male in your household?

1. Would that be you?

a. Yes 01 → (Go to Introduction, Part II)

b. No 02 ↓

1a. May I speak with him now?

a. Yes 01 → (Repeat Introduction, Part I and Go to Introduction, Part II)

b. No 02 ↓

1b. May I speak with the female decisionmaker over 18 years of age?

a. Yes 01 → (Repeat Introduction, Part I and Go to Introduction, Part II)

b. No 02 ↓

Day Time

--	--

When would be a good time to call? (Record Callback Time)

RETURN questionnaire for reinterview.

INTRODUCTION: Part II

We're interested in learning your attitudes and opinions on issues about energy and the environment. You may choose not to answer a question, or simply say "don't know" if that's appropriate. In all cases, your answers will be kept strictly confidential. (READ IF NECESSARY: Because we have scientifically chosen the telephone numbers, your cooperation is especially important.)

SECTION I: ENVIRONMENTAL ATTITUDES

2. First, I'm going to read a list of several sources of pollution. On a scale from 1 to 10, with 1 meaning not at all serious and 10 very serious, please tell me how serious a problem you think each source of pollution is for the UNITED STATES AS A WHOLE. The first source is: Read list. Record number in blanks, repeat scale.

- a. Garbage from city or county landfills
- b. Air pollution from cars and factories
- c. Radioactive wastes from nuclear power plants
- d. Water pollution from toxic chemicals
- e. Acid rain from power plants
- f. Radiation from nuclear weapons testing

3. Compared to other problems that your community faces, would you say environmental problems are: *Read list, repeat "Compared to . . ." if needed.*

- a. More important 01
- b. Just as important 02
- c. or, Less important 03
- d. Don't Know 94

4. When it comes to the environment, people describe themselves in various ways. For each statement I read, please tell me if the statement describes you very well, somewhat, or not at all. First, *(Read list)* does that describe you . . . *Read answer choices.*

	Very well	Somewhat	Not at all	Don't Know
a. I am an outdoors person	01	02	03	94
b. I am someone who is in favor of nuclear power as a source of electricity	01	02	03	94
c. I am an environmentalist	01	02	03	94
d. I am someone who thinks we are already spending too much on pollution control	01	02	03	94

SECTION II: KNOWLEDGE, AWARENESS, AND SALIENCE OF NUCLEAR WASTE ISSUES

The next few questions are about high-level radioactive wastes from nuclear power plants.

5. During the past 3 months, have you read or heard anything about high-level nuclear wastes?

- a. Yes 01 → *(Go to Question 5a)*
- b. No 02 → *(Go to Question 8)*

5a. During the last 3 months, how often have you read or heard anything about high-level nuclear wastes? Was it . . . *(Read list.)*

- a. Less than 5 times 01
- b. Between 5 and 10 times 02
- c. More than 10 times 03
- d. Don't Know 94

5b. People get their information about high-level nuclear wastes in a variety of ways. In the last 3 months, have you . . . *(Read list.)*

	Yes	No	Don't Know
a. Bought a newspaper or a magazine or watched a television program specifically to learn something about high-level nuclear wastes?	01	02	94
b. Attended a public or neighborhood meeting about high-level nuclear wastes?	01	02	94
c. Discussed high-level nuclear wastes with friends or relatives?	01	02	94

6. Now I'm going to ask some questions about what you know and think about high-level nuclear waste issues. Please feel free to say "don't know" if that's appropriate. Do you think most of the high-level wastes are now stored . . . (Read list.)

- a. At the power plants that produced them 01
- b. At regional processing centers 02
- c. or, At one temporary storage site 03
- d. Don't Know 94

7. Which method for disposing of high-level nuclear wastes is the option being considered most seriously in the United States today?

- a. Putting the wastes in the ocean floor 01
- b. Burying them deep underground 02
- c. or Shooting them into space 03
- d. Don't Know 94

8. One method the Federal government is considering for storing these nuclear wastes is an underground repository. The repository would store high-level wastes from nuclear power plants over 1,000 feet below the earth's surface. The wastes would be stored underground in specially sealed canisters. Do you think the high-level nuclear waste repository will be designed to store wastes for . . . (Read list.)

- a. 1 to 10 years 01
- b. 10 to 100 years 02
- c. 100 to 1,000 years 03
- d. Longer than 1,000 years 04
- e. Don't Know 94

SECTION III. RISK-INDUCED BEHAVIOR

9. Now I'd like you to think about a community that would be located about (Read circled mileage) (50 , 100) miles from a high-level nuclear waste repository. For each of the items I read, please tell me if you think that being located about (Read circled mileage) (50 , 100) miles from a repository would make that community a less desirable place for you to (Read list.)

	Yes	No	Don't Know
a. Visit on a vacation	01	02	94
b. Attend a convention	01	02	94
c. Locate a new business	01	02	94
d. Raise a family	01	02	94

10. Suppose now you learned that a high-level nuclear waste repository was located within (*Read circled mileage*) (50 , 100) miles of where you had planned to retire. Based on what you know today, would this make you change your retirement plans?

- a. Yes 01 → (*Go to Question 10a*)
- b. No 02 → (*Go to Question 11*)
- c. Don't Know 94 → (*Go to Question 11*)

10a. Suppose you would have to pay (*Read circled dollar amount*) \$ _____ (\$500 , \$1,000 , \$5,000) each year in higher housing costs if you changed your retirement plans. Would you still change them?

- a. Yes 01
- b. No 02
- c. Don't Know 94

SECTION IV: RISK PERCEPTIONS

11. Now, I'd like you to think about health and safety risks that you face each year. On a scale from 1 to 10, with 1 being not at all serious and 10 being very serious, how serious are the risks you personally face each year from . . . (*Record response and probe for range or number.*)

- a. Accidents in the home? _____
- b. On that same 1-to-10 scale, how serious are the risks you face from accidents on the job? _____
- c. On that same 1-to-10 scale, how serious are risks you face from the nuclear weapons testing site? _____
- d. On that same 1-to-10 scale, how serious are the risks you face from nuclear power plants? _____
- e. On that same 1-to-10 scale, how serious are risks you face from being exposed to hazardous chemicals from abandoned landfills? _____
- f. On that same 1-to-10 scale, how serious would the risks be for you from transporting high-level nuclear wastes, if the repository were located at Yucca Mountain? _____
- g. On that same 1-to-10 scale, how serious would the potential risks be for you from a high-level nuclear waste repository if it were located at Yucca Mountain? _____

12. I am now going to read some statements about the risks from a high-level nuclear waste repository in the United States. Please tell me the extent to which you agree or disagree with each.

	Strongly agree	Agree	Disagree	Strongly disagree	Don't Know
a. An accident at a repository usually would involve certain death	01	02	03	04	94
b. An accident at a repository could kill many people at one time	01	02	03	04	94
c. Scientists adequately understand the risks from a repository	01	02	03	04	94
d. People living near a repository would be able to control the risk	01	02	03	04	94
e. People would dread living near a repository	01	02	03	04	94

13. The Federal government is planning to make the repository as safe as possible. But there is always some chance that radiation could be released. I'm going to read a list of various ways that a large amount of radiation could be released into the environment from a repository. I'd like you to think about how likely or unlikely each might be. During the first (*Read circled years*) (5 , 20) years a repository would be open, how likely do you think it is that a large amount of radiation could be released from (*Read list and scale.*)

	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely	Don't Know
a. An accident happening at a repository ..	01	02	03	04	94
b. The wastes leaking into underground water	01	02	03	04	94
c. The wastes being transported to a repository	01	02	03	04	94
d. Terrorist sabotage at a repository	01	02	03	04	94

SECTION V: ATTITUDES TOWARD REPOSITORY AND COMPENSATION

14. Various levels of government would have an interest in the safety of a high-level nuclear waste repository. On a scale from 1 to 10, with 1 now meaning no trust at all and 10 complete trust, please tell me how much you trust each of the following to make the repository as safe as possible. (Read list and record number in blank. Repeat scale.)

- a. Federal government officials _____
- b. State government officials _____
- c. Local government officials _____

15. Please tell me the extent to which you agree or disagree with the following statements about a high-level nuclear waste repository.

	Strongly agree	Agree	Disagree	Strongly disagree	Don't Know
a. The Federal government should compensate the state in which a repository is located	01	02	03	04	94
b. Each region of the country should have a repository	01	02	03	04	94
c. A repository is the best way to permanently store high-level nuclear wastes	01	02	03	04	94
d. A repository would stimulate economic growth in nearby communities	01	02	03	04	94
e. A repository would pose serious risks for future generations in Nevada	01	02	03	04	94
f. The economic benefits to nearby communities from a repository would greatly outweigh the risks	01	02	03	04	94
g. The most serious risk from a repository would be from transporting the wastes to it	01	02	03	04	94
h. Nevada is the safest place in the United States for the repository	01	02	03	04	94
i. Nevada is the best place for the repository because the nuclear weapons test site is already here	01	02	03	04	94

16. People have suggested many steps to make a high-level nuclear waste repository more acceptable to residents in nearby communities. Suppose the Federal government decided to put a high-level nuclear waste repository at Yucca Mountain in Nevada. I'm going to read a list of various steps that could be taken; please tell me how important it would be to your community to have such a step taken. *(Read list and repeat scale.)*

	Very important	Somewhat important	Not at all important
a. The Federal government would set strict safety standards and have an inspector at the repository at all times	01	02	03
b. A local committee would offer safety advice for the repository	01	02	03
c. A local committee would have the power to shut down the repository if they decided it was unsafe	01	02	03
d. Residents living within 100 miles of the repository would receive rebates or credits on their Federal income taxes for 20 years	01	02	03
e. The Federal government would start a large high-tech project that would create many new jobs in communities within 100 miles of the repository	01	02	03
f. The Federal government would provide large grants for improving schools, parks, and hospitals in communities within 100 miles of the repository	01	02	03
g. The Federal government would protect property values in communities within 100 miles of the repository	01	02	03

17. Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository at Yucca Mountain in Nevada. This repository would be built according to Federal safety standards. Suppose instead that by increasing your Federal income taxes by \$_____ (Read circled dollar amount) (\$100 , \$500 , \$2,000) each year for the next 20 years, the repository could be located in a distant state. Would you be WILLING TO pay these INCREASED taxes?

- a. Yes 01 → (Go to Question 17a)
- b. No 02 → (Go to Question 17b)
- c. Don't Know 94 → (Go to Question 17b)

- 17a. Suppose your taxes would be increased by \$_____ (Read circled dollar amount) (\$200 , \$1,000 , \$4,000) each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO pay these INCREASED taxes?

- a. Yes 01 → (Go to Question 18)
- b. No 02 → (Go to Question 18)
- c. Don't Know 94 → (Go to Question 18)

- 17b. Suppose your taxes would be INCREASED by \$_____ (Read circled dollar amount) (\$50 , \$250 , \$1,000) each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO pay these INCREASED taxes?

- a. Yes 01
- b. No 02
- c. Don't Know 94

18. Suppose instead your community were offered a large grant for improved public services like schools, parks, or hospitals to have the repository located at Yucca Mountain. Would you vote to locate the repository under these terms?

- a. Yes 01
- b. No 02
- c. Don't Know 94

19. The Federal government is now considering three locations for a permanent high-level nuclear waste repository: Hanford in Washington State, Yucca Mountain in Nevada, and Deaf Smith County in Texas. Please tell me how likely you think the repository would be located at
(Read list and record)

	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely	Don't Know
a. Hanford in Washington State	01	02	03	04	94
b. Yucca Mountain in Nevada	01	02	03	04	94
c. Deaf Smith County in Texas	01	02	03	04	94

17. Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository at Yucca Mountain in Nevada. The local communities would be able to set safety standards for the repository. Suppose instead that by increasing your Federal income taxes by \$_____ (Read circled dollar amount) (\$100 , \$500 , \$2,000) each year for the next 20 years, the repository could be located in a distant state. Would you be WILLING TO pay these INCREASED taxes?

- a. Yes 01 → (Go to Question 17a)
- b. No 02 → (Go to Question 17b)
- c. Don't Know 94 → (Go to Question 17b)

17a. Suppose your taxes would be increased by \$_____ (Read circled dollar amount) (\$200 , \$1,000 , \$4,000) each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO pay these INCREASED taxes?

- a. Yes 01 → (Go to Question 18)
- b. No 02 → (Go to Question 18)
- c. Don't Know 94 → (Go to Question 18)

17b. Suppose your taxes would be INCREASED by \$_____ (Read circled dollar amount) (\$50 , \$250 , \$1,000) each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO pay these INCREASED taxes?

- a. Yes 01
- b. No 02
- c. Don't Know 94

18. Suppose instead your community were offered a large grant for improved public services like schools, parks, or hospitals to have the repository located at Yucca Mountain. Would you vote to locate the repository under these terms?

- a. Yes 01
- b. No 02
- c. Don't Know 94

19. The Federal government is now considering three locations for a permanent high-level nuclear waste repository: Hanford in Washington State, Yucca Mountain in Nevada, and Deaf Smith County in Texas. Please tell me how likely you think the repository would be located at
(Read list and record)

	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely	Don't Know
a. Hanford in Washington State	01	02	03	04	94
b. Yucca Mountain in Nevada	01	02	03	04	94
c. Deaf Smith County in Texas	01	02	03	04	94

17. Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository at Yucca Mountain in Nevada. This repository would be built according to Federal safety standards. Suppose also you could receive a (Read circled dollar amount) (\$1,000 , \$3,000 , \$5,000) rebate or credit on your Federal income taxes each year for 20 years. Would you vote to locate the repository at Yucca Mountain?

a. Yes 01 → (Go to Question 17a)
 b. No 02 → (Go to Question 17b)
 c. Don't Know 94 → (Go to Question 17b)

- 17a. Suppose the credit or rebate were \$ _____ (Read circled dollar amount) (\$500 , \$1,500 , \$2,500) each year for 20 years, would you vote to locate the repository at Yucca Mountain?

a. Yes 01 → (Go to Question 18)
 b. No 02 → (Go to Question 18)
 c. Don't Know 94 → (Go to Question 18)

- 17b. Suppose your taxes would be REDUCED by \$ _____ (Read circled dollar amount) (\$2,000 , \$6,000 , \$10,000) each year for 20 years, would you vote to locate the repository at Yucca Mountain?

a. Yes 01
 b. No 02
 c. Don't Know 94

18. Suppose instead your community were offered a large grant for improved public services like schools, parks, or hospitals to have the repository located at Yucca Mountain. Would you vote to locate the repository under these terms?

a. Yes 01
 b. No 02
 c. Don't Know 94

19. The Federal government is now considering three locations for a permanent high-level nuclear waste repository: Hanford in Washington State, Yucca Mountain in Nevada, and Deaf Smith County in Texas. Please tell me how likely you think the repository would be located at (Read list and record)

	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely	Don't Know
a. Hanford in Washington State	01	02	03	04	94
b. Yucca Mountain in Nevada	01	02	03	04	94
c. Deaf Smith County in Texas	01	02	03	04	94

17. Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository at Yucca Mountain in Nevada. The local communities would be able to set strict safety standards for the repository. Suppose also you could receive a *(Read circled dollar amount)* (\$1,000 , \$3,000 , \$5,000) rebate or credit on your Federal income taxes each year for 20 years. Would you vote to locate the repository at Yucca Mountain?

- a. Yes 01 → *(Go to Question 17a)*
- b. No 02 → *(Go to Question 17b)*
- c. Don't Know 94 → *(Go to Question 17b)*

17a. Suppose the credit or rebate were \$ _____ *(Read circled dollar amount)* (\$500 , \$1,500 , \$2,500) each year for 20 years, would you vote to locate the repository at Yucca Mountain?

- a. Yes 01 → *(Go to Question 18)*
- b. No 02 → *(Go to Question 18)*
- c. Don't Know 94 → *(Go to Question 18)*

17b. Suppose your taxes would be REDUCED by \$ _____ *(Read circled dollar amount)* (\$2,000 , \$6,000 , \$10,000) each year for 20 years, would you vote to locate the repository at Yucca Mountain?

- a. Yes 01
- b. No 02
- c. Don't Know 94

18. Suppose instead your community were offered a large grant for improved public services like schools, parks, or hospitals to have the repository located at Yucca Mountain. Would you vote to locate the repository under these terms?

- a. Yes 01
- b. No 02
- c. Don't Know 94

19. The Federal government is now considering three locations for a permanent high-level nuclear waste repository: Hanford in Washington State, Yucca Mountain in Nevada, and Deaf Smith County in Texas. Please tell me how likely you think the repository would be located at *(Read list and record)*

	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely	Don't Know
a. Hanford in Washington State	01	02	03	04	94
b. Yucca Mountain in Nevada	01	02	03	04	94
c. Deaf Smith County in Texas	01	02	03	04	94

20. If a vote were held today on building a permanent repository, would you vote for locating a repository at

a. Hanford in Washington State	01
b. Yucca Mountain in Nevada	02
c. Deaf Smith County in Texas	03
d. or, None of the above	04
e. Don't know	94

SECTION VI. RESPONDENT AND HOUSEHOLD CHARACTERISTICS

Now, a few final general background questions.

21. For each of the following statements I read, please tell me how often you

	Always	Usually	Sometimes	Never	Don't Know
a. Wear your seatbelt when you drive your car	01	02	03	04	94
b. Question information from experts or other authorities	01	02	03	04	94
c. Buy extended warranties or service contracts	01	02	03	04	94

22. Please tell me the extent to which you agree or disagree with the following statements:

	Strongly agree	Agree	Disagree	Strongly disagree	Don't Know
a. People have the right to change the environment to meet their needs	01	02	03	04	94
b. There are no limits to growth for advanced countries like the United States	01	02	03	04	94

23. What was the highest grade of school or college that you completed?

No school	01
Grade school (1-8)	02
Some high school (9-11)	03
High school graduate (12)	04
Some college (13-15)	05
College graduate	06
Postgraduate (17+)	07
Don't Know (<i>Don't read.</i>)	94
Refused	97

24. What is your occupation? (Circle appropriate category)

a. Professional or technical (accountant, engineer, lawyer, technician, writer, designer)	01
b. Farmer	02
c. Managerial (official, proprietor, administrator, buyer, superintendent)	03
d. Clerical (teller, clerk, adjuster, receptionist, secretary, bookkeeper)	04
e. Sales worker (stockbroker, sales clerk, insurance, advertising)	05
f. Craftsman (foreman, electrician, dental technician, mechanic, plumber)	06
g. Operative (butcher, machine operator, seamstress, assembler)	07
h. Transport operative (busdriver, truckdriver, cabbie)	08
i. Service worker (maid, butler, dental assistant, waiter, nurse's aid, hairdresser, policeman, fireman)	09
j. Laborer (garbage collector, construction worker, longshoreman)	10
k. Other	11
l. Retired	12*
m. Student	13*
n. Unemployed	14*
o. Homemaker	15*
p. Don't Know (Don't read)	94*

*Go to Question 26.

25. How would you describe the organization you work for? (Read list.)

a. Company or business	01
b. Government agency	02
c. Not-for-profit organization	03
d. Self-employed	04
e. or, Other	05
f. Don't Know	94

26. In which age category may I place you?

a. 18-24	01
b. 25-39	02
c. 40-54	03
d. 55-65	04
e. 65 and over	05
f. Don't Know	94

27. Which of the following terms best describes your usual stand on political issues?

- a. Very liberal 01
- b. Somewhat liberal 02
- c. Middle of the road 03
- d. Somewhat conservative 04
- e. Very conservative 05
- f. Don't Know 94

28. To which racial group do you belong?

- a. White 01
- b. Black 02
- c. Asian or Oriental 03
- d. Native American Indian 04
- e. Other 05

29. Are you of Hispanic origin?

- a. Yes 01
- b. No 02

30. *(Please indicate sex of the respondent)*

- a. Male 01
- b. Female 02

31. About how many years have you lived in your present community?

_____ years

32. What is your ZIP code? _____

33. Do you own your own home?

- a. yes 01
- b. No 02

34. How many people live in your household? _____

35. Are there any children under 12 in the household?

- a. Yes 01 → (If yes. How many? _____)
b. No 02

36. Finally, I'd like to read some general categories regarding levels of family income. They include total family INCOME from ALL SOURCES BEFORE TAXES during 1986. Please tell me to stop when I get to yours.

\$5,000 or under	01	\$50,001 - \$65,000	06
\$5,001 - \$15,000	02	\$65,001 - \$85,000	07
\$15,001 - \$25,000	03	\$85,001 and over	09
\$25,001 - \$35,000	04	Don't Know (Don't read)	94
\$35,001 - \$50,000	05	Refused	97

TERMINATION

Thank you very much for your cooperation. Your answers will be most helpful in this study.

National Survey Questionnaire

03/23/87 13:44

SEQ: 0

Sequence number 0
Interviewer 0
Elapsed time
Date

1. Hello, my name is _____. We're conducting a study of energy and environmental issues from the Gordon S. Black Corporation, a national market research firm. (BECAUSE WE MUST INTERVIEW AN EQUAL NUMBER OF ADULT MALE AND FEMALE DECISION MAKERS, MAY I PLEASE SPEAK WITH AN ADULT MALE IN YOUR HOUSEHOLD? IF NOT AVAILABLE CONDUCT INTERVIEW WITH ADULT FEMALE. IF THAT IS IMPOSSIBLE AT THIS TIME, SCHEDULE A CALL BACK AND TERMINATE.)

{ QUOTA
{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

2. INTERVIEWER: ENTER MALE OR FEMALE

[1] MALE
[2] FEMALE

3. We're interested in learning your attitudes and opinions on issues about energy and the environment. You may choose not to answer a question, or simply say don't know if that's appropriate. In all cases, your answers will be kept strictly confidential. (READ IF NECESSARY. Because we have scientifically chosen the telephone numbers, your cooperation is especially important.)

{ ROTATE
{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

4. ENTER NUMBER INDICATED BY ARROW.

[1] 50 MILES
[2] 100 MILES

(IF Q0004 LT +0000 SKIP TO Q0004)

{ ROTATE
{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

5. ENTER NUMBER INDICATED BY ARROW.

[1] 1
[2] 2

03/23/87 13:44

SEQ: 0

(IF Q0005 LT +0000 SKIP TO Q0005)

6. First, I'm going to read a list of several sources of pollution. On a scale from 1 to 10, with 1 meaning not at all serious and 10 very serious, please tell me how serious a problem you think each source of pollution is for THE UNITED STATES AS A WHOLE.

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

7. How serious would you rate garbage from city or county landfills?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

8. (ON THAT SAME 1-10 SCALE, how serious would you rate) air pollution from cars and factories?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

9. (ON THAT SAME 1-10 SCALE, how serious would you rate) radioactive wastes from nuclear power plants?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

10. (ON THAT SAME 1-10 SCALE, how serious would you rate) water pollution from toxic chemicals?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

11. (ON THAT SAME 1-10 SCALE, how serious would you rate) acid rain from power plants?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

12. Compared to other problems that your community faces, would you say environmental problems are: MORE IMPORTANT, JUST AS IMPORTANT, or LESS IMPORTANT than other problems that your community faces?

[1] More important
[2] Just as important
[3] Less important
[8] Don't Know
[9] Refused

13. When it comes to the environment, people describe themselves in various ways. For each statement I read, please tell me if the statement describes you VERY WELL, SOMEWHAT WELL, or NOT AT ALL WELL?

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

14. I am an outdoors person. (DOES THIS DESCRIBE YOU?)

[1] Very Well
[2] Somewhat Well
[3] Not at all Well
[8] Don't Know
[9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

15. I am someone who is in favor of nuclear power as a source of electricity. (DOES THIS DESCRIBE YOU?)

[1] Very Well
[2] Somewhat Well
[3] Not at all Well
[8] Don't Know
[9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

16. I am an environmentalist. (DOES THIS DESCRIBE YOU?)

[1]	Very Well
[2]	Somewhat Well
[3]	Not at all Well
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

17. I am someone who thinks we are already spending too much on pollution control. (DOES THIS DESCRIBE YOU?)

[1]	Very Well
[2]	Somewhat Well
[3]	Not at all Well
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

18. The next few questions are about high-level radioactive wastes from nuclear power plants. During the past 3 months, have you read or heard anything about high-level nuclear wastes?

[1]	Yes	Q0025
[2]	No	Q0025
[8]	Don't Know	Q0025
[9]	Refused	Q0025

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

19. During the last 3 months, how often have you read or heard anything about high-level nuclear wastes? (READ LIST)

[1]	Less than 5 times
[2]	Between 5 & 10 times
[3]	More than 10 times
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

20. People get their information about high-level nuclear wastes in a variety of ways. In the last 3 months, have you bought a newspaper or a magazine or watched a television program SPECIFICALLY to learn something about high-level nuclear wastes?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

21. Have you attended a public or neighborhood meeting about high-level nuclear wastes?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

22. Discussed high-level nuclear wastes with friends or relatives?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

23. Now, I'm going to ask some questions about what you know and think about high level nuclear waste issues. Please feel free to say "don't know" if that's appropriate. Where do you think most of the high-level wastes are now stored? At the power plants that produced them; at regional processing centers, or at one temporary storage site? (READ LIST)

[1]	Power Plants
[2]	Regional Processing Centers
[3]	One temp. storage site
[8]	Don't Know
[9]	Refused

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{ NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

24. Which method for disposing of high-level nuclear wastes is the option being considered most seriously in the United States today? Putting the wastes in the ocean floor; Burying them deep underground; or Shooting them into space?
(READ LIST)

[1]	Put wastes in ocean floor
[2]	Bury deep underground
[3]	Shoot them into space
[8]	Don't Know
[9]	Refused

{ NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

25. One method the Federal government is considering for storing these nuclear wastes is an underground repository. The repository would store high-level wastes from nuclear power plants over 1,000 feet below the earth's surface. The wastes would be stored underground in specially sealed canisters. How long do you think the high-level nuclear waste repository will be designed to store wastes.
(READ LIST)

[1]	Less than 10 years
[2]	10 to 100 years
[3]	101 to 1,000 years
[4]	Longer than 1,000 years
[8]	Don't Know
[9]	Refused

26. Now I'd like you to think about a community that would be located about (SEE BELOW) from a high-level nuclear waste repository. For each of the items I read, please tell me if you think that being located about (SEE BELOW) from a repository would make that community a less desirable place for you...

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

26B. Would it be a less desirable place to visit on a vacation?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

27. (Would it be a less desirable place) to attend a convention?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

28. (Would it be a less desirable place) to locate a new business?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

29. (Would it be a less desirable place) to raise a family?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

30. Suppose now you learned that a high-level nuclear waste repository was located within (SEE BELOW) of where you had planned to retire. Based on what you know today, would this make you change your retirement plans?

[1]	Yes	
[2]	No	Q0033
[8]	Don't Know	Q0033
[9]	Refused	Q0033

REF(Q4)

{ ROTATE
{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

31. ENTER NUMBER INDICATED BY ARROW.

[1]	\$500
[2]	\$1,000
[3]	\$5,000

(IF Q0031 LT +0000 SKIP TO Q0031)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

32. Suppose you would have to pay (SEE BELOW) each year in higher housing costs if you changed your retirement plans. Would you still change them?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

REF(Q31)

33. Now, I'd like you to think about health and safety risks that you face each year. On a scale from 1 to 10, with 1 being NOT AT ALL SERIOUS and 10 being VERY SERIOUS, how serious are the risks you personally face each year.

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

- 33B. How serious would you rate the risks from accidents in the home

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

34. (ON THAT SAME 1 TO 10 SCALE), how serious would you rate the risks you face from accidents on the job?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

35. (ON THAT SAME 1 TO 10 SCALE), how serious would you rate the risks you face from nuclear power plants?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

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{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

36. (ON THAT SAME 1 TO 10 SCALE), how serious would you rate the risks you face from being exposed to hazardous chemicals from abandoned landfills?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

37. (ON THAT SAME 1 TO 10 SCALE), how serious would you rate the potential risks to you from a high-level nuclear waste repository if it were located about 100 miles from your home?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

38. I am now going to read some statements about the risks from a high-level nuclear waste repository in the United States. Please tell me the extent to which you AGREE or DISAGREE with each.

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

39. An accident at a repository would involve certain death.
Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

40. An accident at a repository could kill many people at one time.
Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

41. Scientists adequately understand the risks from a repository.
Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

42. People living near a repository would be able to control the risk.
Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{ NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

43. People would dread living near a repository.
Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{ ROTATE
{ NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

44. ENTER NUMBER INDICATED BY ARROW.

[1]	5 YEARS
[2]	20 YEARS

(IF Q0044 LT +0000 SKIP TO Q0044)

45. The Federal government is planning to make the repository as safe as possible. But there is always some chance that radiation could be released. I'm going to read a list of various ways that a large amount of radiation could be released into the environment from a repository. I'd like you to think about how LIKELY, or UNLIKELY, each might be. During the first (SEE BELOW) a repository would be open, how LIKELY do you think it would be that a large amount of radiation could be released from (PRESS ENTER).

{ NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

46. An accident happening at a repository. Would you say it would be VERY LIKELY, SOMEWHAT LIKELY, SOMEWHAT UNLIKELY, or VERY UNLIKELY. (THAT THIS WOULD RESULT IN THE RELEASE OF A LARGE AMOUNT OF RADIATION)

[1]	Very Likely
[2]	Somewhat Likely
[3]	Somewhat Unlikely
[4]	Very Unlikely
[8]	Don't Know
[9]	Refused

REF(Q44)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

47. The wastes leaking into underground water. Would you say it would be VERY LIKELY, SOMEWHAT LIKELY, SOMEWHAT UNLIKELY, or VERY UNLIKELY. (THAT THIS WOULD RESULT IN THE RELEASE OF A LARGE AMOUNT OF RADIATION)

[1]	Very Likely
[2]	Somewhat Likely
[3]	Somewhat Unlikely
[4]	Very Unlikely
[8]	Don't Know
[9]	Refused

REF(Q44)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

48. The wastes being transported to a repository. Would you say it would be VERY LIKELY, SOMEWHAT LIKELY, SOMEWHAT UNLIKELY, or VERY UNLIKELY. (THAT THIS WOULD RESULT IN THE RELEASE OF A LARGE AMOUNT OF RADIATION)

[1]	Very Likely
[2]	Somewhat Likely
[3]	Somewhat Unlikely
[4]	Very Unlikely
[8]	Don't Know
[9]	Refused

REF(Q44)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

49. Terrorist sabotage at a repository. Would you say it would be VERY LIKELY, SOMEWHAT LIKELY, SOMEWHAT UNLIKELY, or VERY UNLIKELY. (THAT THIS WOULD RESULT IN THE RELEASE OF A LARGE AMOUNT OF RADIATION)

[1]	Very Likely
[2]	Somewhat Likely
[3]	Somewhat Unlikely
[4]	Very Unlikely
[8]	Don't Know
[9]	Refused

REF(Q44)

50. Various levels of government would have an interest in the safety of a high-level nuclear waste repository. On a scale from 1 to 10, with 1 now meaning no trust at all and 10 complete trust, please tell me how much you trust each of the following statements to make the repository as safe as possible.

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

- 50B. How much would you trust Federal Government Officials?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

51. (ON THAT SAME 1 TO 10 SCALE), how much would you trust State Government Officials?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

52. (ON THAT SAME 1 TO 10 SCALE), how much would you trust Local Government Officials?

[10]
[9]
[8]
[7]
[6]
[5]
[4]
[3]
[2]
[1]

53. Please tell me the extent to which you STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE with the following statements about a high-level nuclear waste repository.

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

54. The Federal government should compensate the state in which a repository is located. Do you: (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1] Strongly Agree
[2] Agree
[3] Disagree
[4] Strongly Disagree
[8] Don't Know
[9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

55. Each region of the country should have a repository.
Do you: (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1] Strongly Agree
[2] Agree
[3] Disagree
[4] Strongly Disagree
[8] Don't Know
[9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

56. A repository is the best way to permanently store high-level nuclear wastes. Do you: (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

57. A repository would stimulate economic growth in nearby communities. Do you: (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

58. A repository would pose serious risks for future generations. Do you: (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

59. The economic benefits to nearby communities from a repository would greatly outweigh the risks. Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

60. The most serious risk from a repository would be from transporting the wastes to it. Do you (STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?)

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

61. People have suggested many steps to make a high-level nuclear waste repository more acceptable to residents in nearby communities. Suppose the Federal government decided to put a high-level nuclear waste repository in a geologically safe place (SEE BELOW) from your community. I'm going to read a list of various steps that could be taken; please tell me how important it would be to your community to have such a step taken.

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

62. The Federal government would set strict safety standards and have an inspector at the repository at all times. Would that be VERY IMPORTANT, SOMEWHAT IMPORTANT or NOT AT ALL IMPORTANT.

[1]	Very Important
[2]	Somewhat Important
[3]	Not At All Important
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

63. A local committee would offer safety advice for the repository.
Would that be VERY IMPORTANT, SOMEWHAT IMPORTANT or NOT AT ALL
IMPORTANT.

[1]	Very Important
[2]	Somewhat Important
[3]	Not At All Important
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

64. A local committee would have the power to shut down the repository if
they decided it was unsafe. Would that be VERY IMPORTANT, SOMEWHAT
IMPORTANT or NOT AT ALL IMPORTANT.

[1]	Very Important
[2]	Somewhat Important
[3]	Not At All Important
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

65. Residents living within 100 miles of the repository would receive
rebates or credits on their Federal income taxes for 20 years.
Would that be VERY IMPORTANT, SOMEWHAT IMPORTANT or NOT AT ALL
IMPORTANT.

[1]	Very Important
[2]	Somewhat Important
[3]	Not At All Important
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

66. The Federal government would start a large high-tech project that would create many new jobs in communities within 100 miles of the repository. Would that be VERY IMPORTANT, SOMEWHAT IMPORTANT or NOT AT ALL IMPORTANT.

[1]	Very Important
[2]	Somewhat Important
[3]	Not At All Important
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

67. The Federal government would provide large grants for improving schools, parks, and hospitals in communities within 100 miles of the repository. Would that be VERY IMPORTANT, SOMEWHAT IMPORTANT or NOT AT ALL IMPORTANT.

[1]	Very Important
[2]	Somewhat Important
[3]	Not At All Important
[8]	Don't Know
[9]	Refused

REF(Q4)

{ ROTATE
{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

68. ENTER NUMBER INDICATED BY ARROW.

[1]	A
[2]	B

(IF Q0068 LT +0001 SKIP TO Q0068)
(IF Q0005 NE +0001 SKIP TO Q0077)

{ ROTATE
{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

69. ENTER NUMBER INDICATED BY ARROW.

[1]	\$100
[2]	\$500
[3]	\$2,000

(IF Q0069 LT +0000 SKIP TO Q0069)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

70. Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository in a geologically safe place (SEE BELOW) from your home. (READ STATEMENT SHEET FOR REFERENCE BELOW). Suppose instead that by increasing your Federal income taxes by (SEE BELOW), each year, for the next 20 years, the repository could be located in a distant state. Would you be WILLING TO PAY THESE INCREASED TAXES?

[1]	YES	
[2]	NO	Q0074
[8]	Don't Know	Q0074
[9]	Refused	Q0085

REF(Q4) REF(Q68) REF(Q69)

(IF Q0069 NE +0001 SKIP TO Q0072)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

71. Suppose your taxes would be increased by \$200 each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO PAY THESE INCREASED TAXES?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

(IF Q0069 NE +0002 SKIP TO Q0073)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

72. Suppose your taxes would be increased by \$1,000 each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO PAY THESE INCREASED TAXES?

[1] YES
[2] NO
[8] Don't Know
[9] Refused

(IF Q0069 NE +0003 SKIP TO Q0085)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

73. Suppose your taxes would be increased by \$4,000 each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO PAY THESE INCREASED TAXES?

[1] YES Q0085
[2] NO Q0085
[8] Don't Know Q0085
[9] Refused Q0085

(IF Q0069 NE +0001 SKIP TO Q0075)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

74. Suppose your taxes would be increased by \$50 each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO PAY THESE INCREASED TAXES?

[1] YES
[2] NO
[8] Don't Know
[9] Refused

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(IF Q0069 NE +0002 SKIP TO Q0076)

{ NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

75. Suppose your taxes would be increased by \$250 each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO PAY THESE INCREASED TAXES?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

(IF Q0069 NE +0003 SKIP TO Q0085)

{ NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

76. Suppose your taxes would be increased by \$1,000 each year for the next 20 years to locate the repository in a distant state, would you be WILLING TO PAY THESE INCREASED TAXES?

[1]	YES	Q0085
[2]	NO	Q0085
[8]	Don't Know	Q0085
[9]	Refused	Q0085

(IF Q0005 NE +0002 SKIP TO Q0085)

{ ROTATE
{ NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

77. ENTER NUMBER INDICATED BY ARROW.

[1]	\$1,000
[2]	\$3,000
[3]	\$5,000

(IF Q0077 LT +0000 SKIP TO Q0077)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

78. Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository in a geologically safe place (SEE BELOW) from your home. (READ STATEMENT SHEET FOR REFERENCE BELOW). Suppose also you could receive a (SEE BELOW) rebate or credit on your Federal income taxes each year for the next 20 years. Would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES	
[2]	NO	Q0082
[8]	Don't Know	Q0082
[9]	Refused	Q0085

REF(Q4) REF(Q68) REF(Q77)

(IF Q0077 NE +0001 SKIP TO Q0080)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

79. Suppose the credit or rebate were \$500 each year for 20 years, would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

REF(Q4)

(IF Q0077 NE +0002 SKIP TO Q0081)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

80. Suppose the credit or rebate were \$1,500 each year for 20 years, would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

REF(Q4)

(IF Q0077 NE +0003 SKIP TO Q0085)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

81. Suppose the credit or rebate were \$2,500 each year for 20 years, would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES	Q0085
[2]	NO	Q0085
[8]	Don't Know	Q0085
[9]	Refused	Q0085

REF(Q4)

(IF Q0077 NE 0001 SKIP TO Q0083)

{NUMERIC closed ended qn with 01 responses expected. Length= 01 }

82. Suppose your taxes would be reduced by \$2,000 each year for 20 years, would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

REF(Q4)

(IF Q0077 NE +0002 SKIP TO Q0084)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

83. Suppose your taxes would be reduced by \$6,000 each year for 20 years, would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

REF(Q4)

(IF Q0077 NE +0003 SKIP TO Q0085)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

84. Suppose your taxes would be reduced by \$10,000 each year for 20 years, would you vote to locate the repository (SEE BELOW) from your home?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

REF(Q4)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

85. Suppose instead your community were offered a large grant for improved public services like schools, parks, or hospitals to have the repository located (SEE BELOW) from your home. Would you vote to locate the repository under these terms?

[1]	Yes
[2]	No
[8]	Don't Know
[9]	Refused

REF(Q4)

{ ROTATE

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

86. If a vote were held today on building a permanent repository, would you vote for locating a repository at
(ROTATE WITH ARROW -- ALWAYS READ "NONE OF THE ABOVE" LAST)

[1]	Hanford in Wash. State
[2]	Yucca Mountain in Nevada
[3]	Deaf Smith County in Texas
[4]	None of the above

87. For each of the statements I read, please tell me how often you do the following:

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

87B. Wear your seatbelt when you drive your car. Would that be ALWAYS, USUALLY, SOMETIMES or NEVER.

- [1] Always
- [2] Usually
- [3] Sometimes
- [4] Never
- [8] Don't Know
- [9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

88. Question information from experts or other authorities. Would that be ALWAYS, USUALLY, SOMETIMES or NEVER.

- [1] Always
- [2] Usually
- [3] Sometimes
- [4] Never
- [8] Don't Know
- [9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

89. Buy extended warranties or service contracts. Would that be ALWAYS, USUALLY, SOMETIMES or NEVER.

- [1] Always
- [2] Usually
- [3] Sometimes
- [4] Never
- [8] Don't Know
- [9] Refused

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SEQ: 0

90. Please tell me the extent to which you STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE with the following statements.

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

- 90B. People have the right to change the environment to meet their needs.
Do you STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

91. There are no limits to growth for advanced countries like the United States. Do you STRONGLY AGREE, AGREE, DISAGREE, or STRONGLY DISAGREE?

[1]	Strongly Agree
[2]	Agree
[3]	Disagree
[4]	Strongly Disagree
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

92. What was the highest grade of school or college that you completed?
(DO NOT READ LIST - USE TO PROMPT ONLY IF NECESSARY)

[1]	No school
[2]	Grade school (1-8)
[3]	Some high school (9-11)
[4]	High school graduate (12)
[5]	Some college (13-15)
[6]	College graduate
[7]	Postgraduate (17+)
[8]	Don't Know
[9]	Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

93. What is your occupation? (INTERVIEWER: REFER TO REFERENCE SHEET;
ENTER RESPONSE BELOW)

- [1] Professional or technical
- [2] Farmer
- [3] Managerial
- [4] Clerical
- [5] Sales worker
- [6] Craftsman
- [7] Operative
- [8] Transport operative
- [9] Service worker
- [10] Laborer
- [11] Other
- [12] Retired
- [13] Student
- [14] Unemployed
- [15] Homemaker

(IF Q0093 BE +0012 : +0015 SKIP TO Q0096)

(IF Q0093 LT +0000 SKIP TO Q0096)

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

95. How would you describe the organization you work for?
Is it a: (READ LIST)

- [1] Company or business
- [2] Government agency
- [3] Not-for-profit org.
- [4] Self employed
- [5] Other
- [8] Don't Know
- [9] Refused

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SEQ: C

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

96. In which age category may I place you? Are you...

- [1] Between 18 and 24
- [2] Between 25 and 34
- [3] Between 35 and 44
- [4] Between 45 and 54
- [5] Between 55 and 64
- [6] Or, 65 and older?
- [8] Don't Know
- [9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

97. Which of the following terms best describes your usual stand on political issues?

- [1] Very liberal
- [2] Somewhat liberal
- [3] Middle of the road
- [4] Somewhat conservative
- [5] Very conservative
- [8] Don't Know
- [9] Refused

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

98. To which racial group do you belong? Black, White, Oriental/Asian, or some other?

- [1] Black
- [2] White
- [3] Oriental/Asian
- [4] Other
- [8] Don't Know
- [9] Refused

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SEQ:

C

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

99. Are you of Hispanic origin?

[1]	Yes
[5]	No
[8]	Don't Know
[9]	Refused

{ N: 0 X: 100

{NUMERIC open-ended qn with 01 responses expected. Length= 03 }

101. About how many years have you lived in your present community?
INTERVIEWER: ENTER NUMBER OF YEARS.

*

{NUMERIC open-ended qn with 01 responses expected. Length= 05 }

102. What is your zip code? INTERVIEWER: ENTER ZIP CODE

*

{NUMERIC closed-ended qn with 01 responses expected. Length= 01 }

103. Do you own your own home?

[1]	YES
[2]	NO
[8]	Don't Know
[9]	Refused

{NUMERIC open-ended qn with 01 responses expected. Length= 02 }

104. How many people live in your household?
INTERVIEWER: ENTER NUMBER

*

(IF Q0104 EQ 1 SKIP TO Q0106)

{ NUMERIC open-ended qn with 01 responses expected. Length= 02 }

105. How many children under 12 years of age are in your household?
INTERVIEWER: ENTER NUMBER

*

{ MUST

{ NUMERIC closed-ended qn with 01 responses expected. Length= 02 }

106. Finally, I'd like to read some general categories regarding levels of family income. They include total family INCOME from ALL SOURCES BEFORE TAXES during 1986. Please tell me to stop when I get to yours.

- [1] \$5,000 or under
- [2] \$5,001 - \$15,000
- [3] \$15,001 - \$25,000
- [4] \$25,001 - \$35,000
- [5] \$35,001 - \$50,000
- [6] \$50,001 - \$65,000
- [7] \$65,001 - \$85,000
- [8] \$85,001 and over

109. Thank you very much for your cooperation.

C(Complete) T(Incomplete) R(Refusal)

COMPLETE CODES

- 1 REGION 1 - NORTHEAST
- 2 REGION 2 - SOUTHERN
- 3 REGION 3 - GREAT LAKES
- 4 REGION 4 - CENTRAL
- 5 REGION 5 - WESTERN
- 6
- 7
- 8
- 9
- 10

INCOMPLETE CODES

- 1 BUSY
- 2 NO ANSWER
- 3 CALL BACK
- 4 BUSINESS
- 5 LANGUAGE BARRIER
- 6 PHONE DISCONNECT
- 7 TERMINATED
- 8 OVER QUOTA
- 9
- 10

Status:
Type:

END

**DATE
FILMED**

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