**APPENDIX II**

**STATE OF NEVADA YUCCA MOUNTAIN SOCIOECONOMIC IMPACT ASSESSMENT PROGRAM RESEARCH FINDINGS 1986 - 1997**

**Summary of Socioeconomic Findings**

The federal high-level waste program presented the State of Nevada’s Yucca Mountain socioeconomic research team1 with many unique challenges. The unique nature of a repository facility; the potential for stigmatization and its implications; the uncertain schedules; public risk perceptions and consequent behavioral responses; the highly charged political atmosphere; and the need to develop new and innovative research approaches had to be addressed and dealt with in the design and implementation of research at every step in the process. The Agency’s work assessed social and economic impacts not only by collecting and analyzing data, but by developing new ways of understanding the factors that motivate responses to high-level radioactive waste and the repository program. The research effort strongly argues for the recognition of the critical importance of socioeconomic factors and impacts in evaluating the nation's efforts to site a repository. The overall conclusion is that the federal government is not prepared at the present time to address the effects of such a project on society, and that it will have to become prepared in new and effective ways to solve the nuclear waste problems presented by public opposition and resistance to such facilities.

The Agency’s research has developed a convincing body of evidence that indicates the greatest potential socioeconomic threat from the proposed repository stems from what has been termed the "special effects" of the project. These are impacts related to intense negative perceptions and stigma associated by the public with a high-level radioactive waste repository, combined with the vulnerability of Nevada’s economy to changes in its public image. Because of the high profile nature of the whole nuclear waste disposal program, the potential exists for Nevada to become associated with these negative perceptions to the detriment of its ability to attract tourists, conventions, migrants, and diversified new industry to the state.

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1 The study team for the State socioeconomic program is comprised of respected academic researchers and consultants from around the country. The team was originally put together as a result of the extensive planning process that preceded the awarding of the contract. While members have been added and deleted over the years, the core group of researchers has remained with the program. Represented on the team are experts in an array of socioeconomic disciplines from the Nevada universities, the Wharton School of the University of Pennsylvania, Clark University, Arizona State University, University of Oregon, University of South Florida, Utah State University, and consultants from the private sector.
associated with these negative perceptions to the detriment of its ability to attract tourists, conventions, migrants, and diversified new industry to the state. This would be especially troublesome in the event of a nuclear waste accident in or near Las Vegas that might stigmatize the area and cause visitors to stay away in significant numbers. The work to date demonstrates that Nevada is uniquely vulnerable to such stigmatizing effects because of its tourism-dependent economy and State revenue structure.

The following sections describe some of the key findings of the Agency’s socioeconomic research. A complete and in-depth treatment of the impact studies and their findings can be found in the three major summary reports on the Nevada socioeconomic studies published in 1989, 1993, and 1995, respectively. In addition, two major books dealing with the policy implications of the findings of Nevada’s socioeconomic research have been published by the Agency’s study team. The Agency’s Technical Review Committee has also issued two reports of its findings with respect to the studies, and a summary of the Nevada research was published in the Proceedings of the National Academy of Sciences.

**Significant Economic Impact Findings**

- The primary economic concern for Nevada is the potential for stigma impacts on the tourist and visitor industry. Such impacts could produce significant losses to an economy dominated by visitor-based revenues. The unique importance of the visitor and tourist industry for Nevada and Las Vegas required a major effort in order to understand the potential for stigma impacts.

- Studies carried out to date indicate that populations important to Nevada’s economic well being may be highly sensitive to the radioactive risks associated with a repository and spent fuel/HLW transportation, and that the attractiveness of the state as a place to visit, move to, or invest in could be negatively impacted.

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These stigma effects are potentially of significant magnitude. In the event of a radioactive waste accident or incident that caused Las Vegas to become commonly and negatively associated with radioactive imagery, behavioral responses in terms of the visitor economy, immigration, and economic development could result in substantial negative impacts. Estimates of 5, 10, and 20 percent or larger reductions in key economic sectors are not inconsistent with the empirical evidence gathered.

A one percent drop in visitors in the year 2010\(^5\) would result in a decline of about $155 million in spending in the Las Vegas area; a five percent decline would mean a decline of more than $775 million; and a ten percent decline would mean a decline of over $1.5 billion. (For comparison, the recessions of 1980 and 1981 resulted in Las Vegas visitor declines of about 1% for 1980 and 1.5% for 1981.)

The research suggests that for each one percent drop in tourism, State revenues would be reduced by approximately $7 million and employment in Clark County would drop by approximately 7,000 jobs.\(^6\)

Under current State tax laws, repository-related increases in population cost the State and local governments more for providing public services than they provide in revenues. This difference is between $670 and $1,000 per person, per year.\(^7\) This is a consequence of the “standard effects” of the project and is separate from any stigma-induced economic effects that may occur during the life of the program.

**Risk Perception and Behavior Findings**

People perceive the potential risks from a HLW repository to be serious, the likelihood of accidents high, and the character of the risks to be dreaded by those living nearby and along transportation routes. Risk perceptions are similar for respondents in both the national and Nevada surveys.

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\(^5\) The year 2010 was used in the modeling exercise since it is a point in time when the risks from transportation, packaging, handling, and storage will all be present.

\(^6\) These figures are expressed in terms of 1989 dollars and use 1988 employment baseline projections. It is likely that projections would result in larger losses/reductions if calculated and expressed using more recent data.

\(^7\) The dependence of Nevada state and local jurisdictions on revenue contributions of visitors is unique and results from the fiscal structure of the state. Other economic developments, private or public, that do not expand the contributions of visitor spending also will have negative fiscal impacts. Public expenditures per person would have to be provided for repository-related population in excess of the revenues that these people would have contributed through taxes, fees, etc. This means that, in the absence of payments made by DOE for mitigation or compensation or changes in the Nevada tax/revenue structure, the repository program will consistently produce significant negative fiscal impacts even without negative stigma-related effects.
Public attitudes toward a repository are correlated with a number of perceptions, including the perceived seriousness of risks, trust in the program, project managers, and proponents, issues of equity and fairness, and potential economic, community, and social effects. In all cases, the research found a strong aversion to siting HLW facilities.

The research found that a majority of all respondents (nationally, in the southwest, and in Nevada) think that the HLW repository would make an area a less desirable place to live - either for retiring or starting a new business. A majority believed that a repository would also make an area a less desirable place to take a vacation.

Retirement decisions were also strongly influenced. For example, a majority of respondents in the national surveys said they would pay higher housing costs—in some cases, up to $3,000 a year—to retire in an area away from a repository.

The survey data collected during 1987-1994 document a profound lack of trust in the scientific, government, and industrial managers of nuclear waste technologies. This distrust is correlated with beliefs that a nuclear waste repository poses high and unacceptable degrees of risk.

Convention planners are averse to holding a convention in a city near a HLW repository. Even under a benign (e.g., no accident) condition, one third of the planners surveyed reduced their preference for Las Vegas. This figure increased when planners were presented with scenarios in which the repository program experienced a series of accidents.

A HLW repository could reduce the propensity to attend a convention. One-fourth (25 percent) of the attendees sampled reported they would not attend a convention if a repository were located 100 miles away, compared to only 1 percent who would avoid a city near a prison.

Trust and confidence in repository management was highly correlated with perceptions of risk from the HLW program. Structural model analysis survey data suggest that lack of trust increases people’s perceptions of risk and opposition to the repository program.

Experimental studies of the psychological processes underlying migration decisions found that younger people were particularly likely to give weight to technological hazards associated with a nuclear waste facility, providing some evidence that a repository could influence people’s choices in selecting job locations.

Women tended to be much more sensitive to repository risks than men. These findings are similar to those reported for many technological and societal hazards.
Results from the studies of stigma and imagery provided indirect evidence that a repository could have an adverse impact on Nevada's tourism economy. First, a number of individuals associated "special" facilities with the places they are located. For example, subjects in a number of surveys mentioned the nuclear-weapons test site (or related nuclear imagery) when they thought of Nevada. This suggests that the repository might also become associated with Nevada and/or Las Vegas if it is located at Yucca Mountain. Second, the thought of a nuclear-waste storage facility consistently evoked extremely negative imagery. Third, the presence of negative imagery has a dampening effect on a person's propensity to visit a place. Respondents reported lower preferences for vacationing, attending conventions, moving, or starting a business when the target place had lower imagery scores. Fourth, the presence of nuclear-related imagery produced a much lower preference for Nevada as a vacation site.

The behavioral processes described as possible responses to intense negative imagery appear relevant as well (although different in degree) to the social impact assessment of any proposed facility that produces, uses, transports, or disposes of hazardous materials.

The findings of Agency research suggest that focusing solely on the probability and magnitude of physical consequences may greatly underestimate the actual socioeconomic impact of an event. A full and complete understanding of the role of public risk perceptions and behaviors must account for the "social amplification of risk" (the effects of the media and societal communication processes) if accurate estimates are to be made for the future impacts from a HLW repository program.

The processing of risk events by the media, cultural and social groups, institutions, and individuals profoundly shapes the societal experience with risk and plays a crucial role in determining the overall societal impacts of particular hazard events.

Risk Assessment Findings

Site characterization risks: The initial activities designed to characterize the Yucca Mountain site are not risk-free, although they do not pose the level of public health risk of subsequent stages of repository development and operation. In particular, test drilling and underground studies pose some limited environmental risks, while operational and transportation accidents present other risk possibilities. These risks and the potential presence of limited amounts of tracer or experimental radioactive materials could, however, trigger events that affect public perceptions and amplify broader social impacts.

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• **Repository pre-closure risks:** Accidents will certainly occur during pre-closure activities at the repository in both the construction and operation phases. Construction risks are apt to resemble those of other large industrial and mining operations, because radiological materials will not be present. During pre-closure operations, particularly close attention should be paid to accidents involving the potential for radioactive releases, resulting in exposure of workers and the public. Various accident scenarios have been identified, but it is important to ensure that these scenarios embrace the full range of possible accidents. Potential radioactive releases must also be related to local weather conditions to assess whether the projected estimates of off-site risks are sufficiently conservative.

• **Repository post-closure risks:** The long-term risks posed by the repository depend heavily on the adequacy of the engineered and geologic barriers. These risks include both the period of so-called fission-product hazard, extending perhaps 500-700 years into the future, and the much longer term actinide-dominated hazard period continuing for thousands of years into the future. The fact that both nearby and distant future generations face risks raises important questions of equity that will affect planning for mitigation and compensation.

• **Retrieval risks:** It is required that wastes be retrievable for at least 50 years after closure of the repository. Retrieval, if it proves necessary, would pose risks to workers, to the nearby public, to transportation corridor communities, and to the environment. These risks have received only very limited attention by DOE and need further assessment.

• **The conduct of risk assessment:** Risk analysis is a comprehensive group of methodologies that can address all five risk clusters. The methods are time-consuming, costly, and demanding of technical expertise. In practice, risk assessments performed until 1988 under the auspices of DOE, including the assessment of the proposed Yucca Mountain repository, tended to concentrate almost exclusively on short- and long-term health impacts on the public. For the State of Nevada to extract the maximum benefit from the substantial amount of work performed in the DOE risk assessments without independently repeating this work involved two equally important needs. One was for Nevada to have a full, independent review of the soundness and comprehensiveness of the analysis for potential health impacts, with additions or corrections as needed. The second was for the analysis to be sufficiently disaggregated and sufficiently sensitive to broader effects to permit assessments of the risks and opportunities for preventing or mitigating related socioeconomic harms.

• **Overall adequacy:** The assessment of risks conducted by DOE has been uneven and incomplete, most notably in its inadequate conceptualization of risk problems; its failure to assess the social contributors to and ramifications of risk and risk events; its uneven attention to low-probability, interactive risks; its failure to give sufficient attention to human error, quality assurance failures, and acts of sabotage and terrorism; and the lack of a comprehensive systems approach that interrelates and compares the major types of risk.
associated with characterizing candidate sites and developing and operating a HLW repository.

- **Human factors**: Risk studies have not devoted sufficient attention to the issues of human error, quality assurance failures, and intentional acts to disrupt the transportation, handling, and disposal of high-level radioactive wastes, all of which could initiate events and subsystem and system failure, often with probabilities difficult or impossible to estimate. The Agency’s subsequent review of the conduct of federal risk assessments in 1991 found a continuing neglect of human error as a risk contributor.

- **Narrowness of assessment**: The most striking weakness of DOE risk assessments for the proposed Yucca Mountain repository is the failure to address the social amplification of risk. The interaction between risk and risk events on the one hand and social structures on the other hand carries substantial potential for producing adverse social and economic impacts in Nevada. It is certain that operational accidents will happen during site characterization, waste transportation, and pre-closure activities. High public concern, organized opposition, and intense media attention might well amplify minor risk events or management burdens.

- **Flawed frameworks**: DOE’s early conclusions concerning the site suitability of Yucca Mountain sometimes relied on deductively invalid inferences. The most serious of these flawed frameworks arose from the use of a two-valued logic not normally employed in science. This logic required that analysts evaluate site suitability in terms of only two options—that the site is either suitable or unsuitable. A third option—that the data were inadequate to assess site suitability or that site suitability is currently uncertain—was not allowed. Such a methodology created a situation in which if analysts found no disqualifying condition, then the failure to do so produced an assumption of suitability.

**Survey Research Findings**

- The survey research carried out as part of the State’s Yucca Mountain socioeconomic study provided a unique set of databases for understanding public response to the federal HLW program. The concerns expressed are most acute in Nevada, where the Yucca Mountain project has been a high profile project for over a decade. However, the perceptions of high risk from such a program are widely shared by the public nationwide, and concerns with the issues of spent fuel and high-level waste handling and transportation will become increasingly salient national issues if the federal program moves forward toward implementation. These surveys provided some insight into the nature of the issues and the types and levels of concerns the public has about management of nuclear wastes.

- National, regional, and Nevada respondents all perceive high risks associated with a repository program and react negatively to the location of HLW functions or storage.
Three-quarters of the respondents surveyed nationally believe it is unfair for one state to be asked to serve as the site for a repository for nuclear waste generated by the other states.

Important data on images, risk perceptions, and trust in waste managers and the federal program are linked to subsequent support or opposition to the repository by Nevada respondents. Nevadans are concerned that the repository would cause a loss of tourism, an evaluation supported by respondents in the national and regional surveys.

Consistently over three-quarters of the Nevada respondents oppose the Yucca Mountain project in repeated surveys taken since 1987. They support strong state opposition to the repository program even if this means giving up potential economic benefits. The research found that even direct cash payments would not induce respondents to support the repository.

Nevada residents feel strongly that they should have a decisive role in making decisions about the repository project in their state, and they feel they have been excluded from meaningful participation. They express the highest trust ratings (which have increased between 1989 to 1994) for the Governor and State officials that have opposed the current program. Trust in federal government agencies and institutions declined during this period.

Nevada residents strongly distrusted the promotional advertising campaign by the American Nuclear Energy Council in support of Yucca Mountain because they distrusted the motives of the sponsors. More than half the residents surveyed said the advertisements did not influence their position. For those who said the advertisements had some influence, almost a third (32.1%) said the presentations reduced their support for the repository while only 14.8 percent said the advertisements increased their support.

Female respondents to the national, regional, and Nevada State surveys rated the repository risks more highly than did male respondents. In the case of Nevada residents, female respondents are more likely to oppose the repository project at Yucca Mountain than are male respondents, although strong majorities of both males and females register strong opposition overall.

The belief that the repository is inevitable has declined over 6 years of survey research. While almost 90 percent thought in 1988 that the repository would be built regardless of opposition from Nevada, by 1994 this figure was closer to 50 percent.

**Economic-Demographic and Fiscal Findings**

Standard economic information is necessary and useful but not sufficient to monitor and project visitor-gaming activities in the dimensions and geographies required for repository
Visitor-gaming is a complex activity not easily allocated to or identified within standard economic reporting structures. It has various manifestations in areas such as the famous Las Vegas strip, downtown Las Vegas, communities at Nevada's state borders, and intrastate travel corridors. Visitor-gaming activities increasingly draw on national and international markets of families, junket visitors, and conventioneers who choose southern Nevada over other vacation and short-visit options. Under Nevada law, a complex array of revenues are drawn from visitor-gaming activities (e.g., gross gaming proceeds and other gaming taxes, sales and motor vehicle taxes, cigarette and liquor taxes, and lodging room taxes) and make the state even more fiscally dependent on visitor-gaming than economically dependent and more vulnerable to negative effects of the federal nuclear waste program.

Retirement migration is an increasing factor in the growth of urban and some rural communities in Nevada. These migrants can be separated into two principle groups, military and nonmilitary. The prospective pool of retirees is quite large due to aging trends and the propensity of households to move as they approach retirement age. Southern Nevada's appeal to this pool appears to have accelerated in the late 1980s because of attractions such as climate and tax structure, as well as certain special characteristics, such as Nellis Air Force Base facilities for military retirees. Although retirees bring new income to the area, they require numerous services, some of which Nevada communities are ill-equipped to provide, and the research has shown that they are vulnerable to potential stigmatizing impacts of the repository program.

Based on the attractions of location, growth, and a favorable tax system, economic diversification is taking place in the state, especially in southern Nevada, but the visitor-gaming industry effectively subsidizes this activity. As a result, non-gaming economic diversification is vulnerable in two ways: first, as a result of risk effects that could reduce the attractiveness of southern Nevada to prospective new businesses; and second, from impacts to the visitor-gaming industry that reduce that sector's ability to help pay for growth.

The Nevada Test Site is particularly important as a distinctive current economic activity in southern Nevada and as an analogous case that can provide insight into how the Yucca Mountain repository project could affect Nevada. NTS has the same operating agency (DOE), many of the same prime contractors, and similar project management policies and styles.

Important economic linkages exist between Las Vegas and other regional centers in the southwest U.S. (e.g., the Los Angeles metroplex, Phoenix). While these linkages are strong and multi-dimensional, how they actually work in various sectors and under various economic conditions is not well understood. However, any negative impacts associated with the repository program that affect southern California and Arizona will have spill-over impacts for southern Nevada.
The demography of southern Nevada reflects its economic base, its settlement pattern, and its recent rapid growth and change. Demographic character has many implications for the economic prospects, attitudes toward local and federal government, and sense of community in southern Nevada—with or without the repository project. Agency research uncovered significant linkages between economic-demographic characteristics and the way in which different groups perceive the repository program, evaluate its risks, and weigh these risks with other factors. The research found distinctions by gender, age, length of residence, level of education, household characteristics, source of income, and/or reasons for moving to the area—all topics reflected in the demographic components of integrated Economic-Demographic/Fiscal (E-D/Fiscal) system (See Figure 1).

Nevada collects significant revenues from nonresidents via various gaming, sales, cigarette, liquor, and motor fuels taxes. Thus, a repository effect that impacts one or more of these revenue bases (e.g., a stigma effect on visitor-gaming) could have wrenching effects at all government levels throughout the state.

Nevada's revenue structure is dominated by state-collected and/or state-distributed revenues. As a result, analysis and projection of revenues on an entity-by-entity basis has inherent limitations in Nevada, and reliable projections at the entity level must include a statewide dimension.

Different economic activities in Nevada have widely diverse revenue-cost implications for municipal, county, and state government. Casino enterprises, for example, generally have positive impacts on government revenues versus costs. Due to the net mine proceeds tax, mining enterprises have positive impacts—if the mine is productive over the long term. Federal government enterprises generate sales and use tax revenues as well as payments in lieu of taxes, but generally these do not cover costs.

The net, negative fiscal bias, which applies to particular basic industries in the state, are offset somewhat by the average earnings of employees, which are significantly higher among professional, technical, and crafts employees at DOE enterprises (NTS, Yucca Mountain).
than among service employees at casinos and other visitor-oriented enterprises and much more stable than most mining employment. However, the revenue-cost effects of higher earnings are in turn offset by the facts that the revenues levied from local residents generally do not cover costs (since a large portion of the revenue base is collected from nonresidents), and that the revenues levied from residents are not progressive. They rely heavily on sales and excise taxes with no state or local income taxes.

- Nevada does not have a reliable tool for tracing the revenue consequences of alternative economic futures beyond the upcoming one or two year budget cycle. A major revenue study undertaken in 1989-1990 focused on other revenue issues and did not establish such a tool.\(^9\) Without such a tool, it is difficult to trace the revenue consequences of changes in particular sectors potentially affected by the repository project (e.g., visitor-gaming, retirement migration, convention, federal service contractors, construction) for various revenue funds at state, county, and municipal levels. Given the existing capabilities, it is also difficult to calculate the net effects of revenues generated directly by an economic activity and those generated by employee spending.

**Impacts on Government Agencies and Government Systems**

- Repository-related stigma effects, depending on their scale and character, could have wrenching effects on Nevada's state and local government systems. Changes in the economic base (e.g., visitor-gaming), service population (e.g., residential and nonresidential land use and income), or population distribution could have significant effects on government facility and service systems and even on the institutional arrangements for delivery of public facilities and services. Government systems that depend on visitor-generated revenues and are geared for growth could find it particularly difficult to adapt to declining revenues, or even the potential for declining revenues associated with stigma effects. (Most state and local government systems in southern Nevada depend, to some degree, on visitor-generated revenues, and most are geared to accommodate to and catch up with growth; these government systems are not set up for stasis or decline.)

- Both standard and stigma effects of the repository project have broad effects on local government systems and requirements. Standard effects are relatively small and immediate, but stigma effects could be potentially large (although their scope and timing are not yet fully defined). Distributional issues are critical for both effects because their implication for various government entities and service areas with widely varying government service systems and capacities is extensive.

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State agencies are not adequately prepared to deal with the presence of a HLW repository. In particular, the Office of Emergency Management, Nevada Department of Transportation, the Department of Motor Vehicles and Public Safety/Nevada Highway Patrol, and the Department of Conservation and Natural Resources would be significantly impacted. These agencies, as well as the Radiological Health section of the Department of Human Resources, would also require additional training, equipment, and personnel. The Nevada Department of Transportation and the Department of Motor Vehicles would experience major negative impacts because of transportation-related problems.

The Agency’s research confirmed that ambiguities exist among State agencies’ organizational responsibilities that have implications for dealing with the impacts of a future repository. In particular, Nevada’s somewhat fragmented emergency management system would be severely taxed to keep pace with the training, preparedness, and response needs associated with the Yucca Mountain facility and the thousands of radioactive waste shipments associated with it. The increasing importance of a state emergency communication system, and determining which agency would be responsible for it, was partially stimulated by the repository issue. This has been a divisive issue affecting both State and local agencies.

The repository project, even if it were not accompanied by risk/stigma effects, would act as a net drain on the State General Fund. The positive revenue effects would derive chiefly from the state sales and use tax. On the average, General Fund revenues under the standard effects future would increase by about $1.8 million annually during site characterization, about $5 million annually during repository construction, and about $1.5 million annually during emplacement. However, economic modeling done as part of the Agency’s research in 1989 found that additional General Fund expenditures required as a result of the repository-related population increases would be approximately $4 million during site characterization, $9.6 million during construction, and about $3.1 million during emplacement, with almost half of the additional expenditures made for educational purposes (primarily the Distributive School Fund). The net projected fiscal shortfall is estimated at about $21.7 million during site characterization, $27.3 million during construction, and $40.5 million during emplacement.

The estimated costs outlined for a sample of state agencies identified as potentially most affected by the repository project, excluding the Department of Transportation, total from about $85 million to over $156 million through the year 2010 of the repository time schedule. The costs to the Department of Transportation could reach over $800 million when all necessary route segments are included. Other state agencies still need to be

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10 This analysis was initially done in 1989 and updated for certain agencies in 1990 and 1992. Subsequent changes in the proposed federal program (such as the addition of heavy-haul transport along state highways) will
studied, the repository project description needs to be more clearly and specifically articulated by DOE, agency responses need to be clarified, and management strategies need to be developed before a final impact assessment can be completed.

- Transportation risks and impacts are a major concern. The ability to respond to transportation impacts, the potential for transportation to become a disruptive issue, and the strain that transportation concerns would place on cooperation between officials and agencies were all cited as potential problems in the research.

**Social-Cultural Findings: Urban Area Effects**

- Opposition to the repository project in the Las Vegas metro area has consistently been very strong for a public issue, with over two-thirds (usually about 70 percent) opposed. The Yucca Mountain repository is a major issue. Less than 10 percent of metro area residents do not have an opinion for or against the repository project.

- The potential stigma impacts are widely recognized by urban area residents, who have concerns that visitors and tourists will be deterred from coming to Las Vegas because of the repository.

- Transportation risks were considered very high by urban residents, who felt that the urban area is most vulnerable to the consequences of accidents, given its role as a transportation center and the fact that a large population is at risk.

- There is little trust and confidence in the federal government's repository program, and substantially more confidence in the state and local officials to represent the urban area public. The problem of trust and confidence in managers of the program has been found repeatedly in the research effort.

**Social-Cultural Findings: Rural Community Effects**

- Rural Nevada cannot be treated as a single entity but must be examined on a community-by-community basis to understand responses to the Yucca Mountain repository and the social-cultural impacts. While several of the communities studied appeared similar in terms of geography, demography, and history, numerous important differences exist among them. Many of the community differences point to factors important for understanding responses to the proposed Yucca Mountain repository.
Data clearly support the premise that community context is an important element in understanding responses to the repository. Even communities with generally similar historical, social, and economic development trends (such as Caliente and Beatty) differ significantly in their acceptance of or support for the repository. For example, one major factor explaining this difference may be the extent to which residents of the communities were exposed to nuclear fallout from atmospheric weapons-testing during the 1950s and 1960s. Caliente and Mesquite residents, many of whom experienced nuclear fallout, were far less supportive of the repository than respondents of any of the other study sites except Goldfield. The strongest support for the facility was found in Amargosa Valley, Beatty, and Indian Springs, the three communities nearest the proposed facility, yet not regularly exposed to nuclear fallout.

In addition to the empirical evidence provided by the social-cultural study, one very important theoretical consequence emerged. The findings cast serious doubt on the validity and/or utility of two frequently used explanatory concepts: the NIMBY (Not in My Backyard) syndrome and risk perception shadows. While these two concepts would predict that support for the repository would be greatest in communities furthest from the site, study evidence demonstrated that support for the repository was strongest in communities nearest to the project. Communities further from the site were the most opposed to it and the most concerned about potential risks.

In refining the focus of the research towards communities at risk with respect to the repository program and repository-related waste transportation (given current assumptions about what the project will look like should it go forward), the Agency’s studies identified rural communities along potential highway and rail shipping routes as potentially most vulnerable. These include Caliente (Lincoln County); Indian Springs (Clark County); Amargosa Valley, Beatty, and Tonopah (Nye County); Goldfield (Esmeralda County); Ely (White Pine County); and Wendover (Elko County).

Social-Cultural Findings: Native American Communities

Native American tribes in the area around Yucca Mountain and along transportation routes have unique governments. As independent federally recognized entities, tribal governments have a role equivalent to states in most federal undertakings. They also have a special status according to various environmental and cultural protection acts and in the Nuclear Waste Policy Act of 1982. To date, none of the tribes in the study area has been granted "affected Indian Tribe” status under the NWPA, although several have applied. The repository project has also spilled over into the campaign by the Western Shoshone National Council, a political entity made up of representatives from many Western Shoshone tribes, to reclaim lands under the Treaty of Ruby Valley of 1863. This has brought the Western Shoshone and other tribal governmental entities into conflict with DOE as well as other federal and state
agencies. Because of the unique governmental position of tribes, their interests are not likely to be well protected or even properly represented in deliberations over the repository. They may also come into conflict with neighboring local governments over differences in positions regarding the repository, thus increasing their isolation from intergovernmental interaction.

- Most Native Americans in Nevada see the unwanted disturbance of cultural resources as the inevitable outcome of the Yucca Mountain project. Mitigation of disturbed archaeological sites is seen by some as a marginally acceptable alternative. They would prefer that no disturbance take place at all.

- The Native American tribes in the immediate vicinity of the Yucca Mountain project area and along potential transportation routes are, for the most part, economically disadvantaged. Reservations and communities in Nye, Lincoln, and Inyo counties are rural and isolated, and either lack a land base or have land bases too small to support their populations by ranching or other locally common means. A large number of people are unemployed, underemployed, and/or are living below the poverty level. Educational levels have improved in recent years, but without job opportunities in local communities, people must leave to take advantage of their training. Any negative statewide economic impacts associated with or caused by the repository or repository-related nuclear waste transportation will have a disproportionate impact on such communities because of these depressed baseline conditions.

**Compensation and Mitigation Findings**

- The literature research suggests many cases in which compensation produced or at least contributed to successful siting of unwanted facilities, but there are also a number of cases where benefits failed to overcome opposition of local residents. Compensation has been particularly ineffective in gaining support in the case of radioactive waste facilities. This is true of low-level and high-level facilities. This does not appear to be merely a problem of the level of compensation; it suggests that radioactive waste facilities raise objections that cannot be offset by compensation.

- Survey research that investigated the impact compensation has on people’s willingness to accept the development of an unwanted facility at a local site found that offering compensation doubled the proportion of respondents who would "accept" facilities such as landfills, prisons, and incinerators. However, the positive impact of compensation was not replicated when the facility to be sited was a radioactive waste repository. In none of five surveys did the introduction of benefits (e.g., tax rebates of up to $5000 per year over 20 years) produce a significant increase in acceptance. This finding was also made by University of Nevada researchers in an independent study funded by DOE.

- The Agency’s research also found that compensation will not increase public acceptance of radioactive waste facilities that are perceived as being forced on an unwilling population.
Compensation can be an effective siting tool, but only under conditions where people have the voluntary choice to accept the facility or not.

**Conclusion**

In summary, the analyses undertaken from 1986 through 1997 indicate that the development of the Yucca Mountain repository represents a significant gamble for Nevada's future economy and that potential impacts could be substantial and long lasting. The research has demonstrated that these impacts would pervade the Nevada socioeconomic context and would be manifested most dramatically in losses to the visitor economy, the retirement economy, and the business economy.