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Southern Nevada Residents' Views About the Yucca Mountain High-Level Nuclear Waste Repository and Related Issues: A Comparative Analysis of Urban and Rural Survey Data

by

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The Nevada Agency for Nuclear Projects/Nuclear Waste Project Office (NWPO) was created by the Nevada Legislature to oversee federal high-level nuclear waste activities in the State. Since 1985, it has dealt largely with the U.S. Department of Energy's (DOE) siting of a high-level nuclear waste repository at Yucca Mountain in southern Nevada. As part of its oversight role, NWPO has contracted for studies designed to assess the transportation impacts of a repository.

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EXECUTIVE SUMMARY

This report presents a comparative analysis of the ways in which urban and rural residents of southern Nevada perceive the proposed Yucca Mountain high-level nuclear waste repository. The report is based on an analysis of data drawn from two separate surveys undertaken in 1988. The first of these surveys focused on the attitudes and perceptions of residents in the Las Vegas metropolitan area. The second survey addressed similar issues, but focused on the views of residents in six rural communities in three counties adjacent to the Yucca Mountain site: Amargosa Valley, Beatty and Pahrump in Nye County, Indian Springs and Mesquite in Clark County, and Caliente in Lincoln County.

Unlike several prior analyses which have examined these data separately, this report presents a parallel analysis of responses from the two surveys in an attempt to identify ways in which the views and orientations of residents in the rural and urban study areas may be similar or different. The study focuses on five major topic areas: (1) responses related to the acceptability of the repository, (2) perceived risks associated with the proposed repository, (3) perceptions of possible effects stemming from nuclear activities at the Nevada Test Site, (4) perceptions of the trustworthiness of government entities responsible for constructing and/or managing the repository, and (5) risk aversion to a variety of hazardous and noxious facilities.

In general, results of the comparative analysis suggest that residents of the Las Vegas urban area and residents from the rural communities of Caliente and Mesquite exhibit similarly strong opposition to construction of the repository at Yucca Mountain. Urban residents and residents of Caliente and Mesquite exhibited similar tendencies to view accidents involving hazardous materials as being inevitable, and to oppose transportation of hazardous materials through populated areas. Respondents from these areas also were similar with respect to their views about possible economic benefits of a repository for their communities, concerns about possible harmful effects, and assessments of the relative benefits and harms that might result if the repository were built.

Urban area responses were more similar to those of rural residents from Indian Springs and Pahrump when the analysis focused on questionnaire items dealing with the perceived risks of various hazardous and noxious facilities other than the proposed repository. Similarly, Las Vegas area residents and residents of Indian Springs and Pahrump tended to express similar views about the potential risks and health effects of nuclear programs at the Nevada Test Site. With respect to these specific issues, residents of Caliente and Mesquite tended to express a higher degree of concern and risk aversion than was evident in any of the other study areas.

The risk perceptions and repository orientations expressed by residents of Amargosa Valley and Beatty were consistently different from those of either the urban area respondents or residents in other rural study areas. Residents of Amargosa Valley and Beatty viewed NTS activities as largely beneficial, considered it unlikely

that NTS programs have caused adverse health effects for area residents, considered current procedures for handling and transporting hazardous materials to be acceptably safe, were willing to live relatively close to noxious and hazardous facilities, expressed low concern about repository health effects, and generally believed that the repository would have beneficial effects on their communities.

Analysis of bivariate relationships indicated that repository risk perceptions and levels of opposition or support for the repository are significantly associated with six variables in both the urban and rural study areas. Overall, the results suggest that risk perceptions and repository opposition are closely linked to residents' evaluations of the potential for the project to have either positive or negative effects in their communities. In addition, views about activities and programs at the Nevada Test Site are significantly related to repository perceptions. Individuals who expressed high levels of concern about the adverse consequences of either past or present test site activities also tended to express high repository risk perceptions, and to oppose repository construction. Also, those who expressed little confidence in the agencies responsible for nuclear programs tended to exhibit high concerns about repository risks, and low support for repository development.

INTRODUCTION

The proposed siting of a high-level nuclear waste repository at Yucca Mountain, Nevada has generated a maelstrom of conflict, concern, and controversy in the state. Nevada's congressional representatives as well as state-level political leaders have been virtually unanimous in their opposition to the project. The general public, especially in the metropolitan areas, has also expressed widespread dissatisfaction with and opposition to the repository. A number of statewide opinion surveys have consistently indicated that approximately three-fourths of Nevadans are opposed to having the repository built in the state. Unlike some controversial issues that generate initial interest and controversy and then fade into relative oblivion (see Downs, 1972), the Yucca Mountain repository has apparently remained a focal point of public attention and opposition since the site was first identified as a possible repository location in the early 1980s. Indeed, data from the most recent statewide opinion surveys suggest that Nevadans' opposition to the repository has increased during the past several years (Papinchak and Wingard, 1990).

Although opposition to the repository can be linked to a variety of factors, concerns about the safety of storing and transporting high-level nuclear wastes appear to be among the most important factors influencing Nevadan's views about the repository (Krannich et al., 1991; Kunreuther, Desvouges and Slovic, 1988; Mushkatel and Pijawka, 1989; Slovic, Lyman and Flynn, 1990). Media attention to problems associated with transporting and

containing nuclear, as well as other types of toxic materials, at sites throughout the U.S., appears to have sensitized large segments of the population to the potential risks associated with hazardous waste facilities. This awareness, and "the fear associated with the anticipation of future toxic exposure" (Edelstein, 1988: 170), have undoubtedly contributed to high levels of perceived risk with respect to many proposed hazardous waste facilities. Such seems to be the case with the proposed high-level nuclear waste repository. Perceived risks of such projects appear to reflect anticipatory concerns about a variety of issues. These anticipatory concerns include personal health and safety, environmental contamination, community and personal stigmatization, threats to economic well-being, loss of community autonomy lifestyle infringements, and concerns about inept or irresponsible government agencies (see Douglas, 1985; Edelstein, 1988; Jenkins-Smith et al., 1991; Stoffel et al., 1988).

Given the range of potentially important consequences that may follow from risk perceptions, two separate surveys were undertaken in 1988 to ascertain southern Nevadans' views about the Yucca Mountain repository and related issues. The first of these studies focused on the attitudes and perceptions of residents in the Las Vegas metropolitan area (Mushkatel and Pijawka, 1989). The second study addressed similar issues, but focused on the views of residents in six rural communities in three counties adjacent to the Yucca Mountain site. A number of prior analyses have examined data from these studies separately (see Krannich and Little, 1989a,

1989b; Krannich et al., 1991; Little and Krannich, 1990; Mushkatel and Pijawka, 1989).

However, parallel findings from the two data sets have not been jointly analyzed in order to identify ways in which the views and orientations of residents in the rural and urban study areas may be similar or different. The purpose of this report is to develop and present a comparative assessment of selected issues addressed in the rural and urban surveys. Because both urban and rural populations would potentially be impacted by the Yucca Mountain repository, such an analysis will provide important insights into possible repository impacts on the well-being of residents throughout southern Nevada.

RESEARCH METHODS

Samples

Data used in this analysis were drawn from two separate but partially parallel surveys conducted in 1988. The urban data are drawn from the Urban Risk Survey (Mushkatel and Pijawka, 1989), which included the cities of Henderson, Las Vegas, North Las Vegas, and the contiguous urbanized areas of Clark County. A total of 755 metropolitan area households were included in a sample generated through telephone contacts based on random digit dialing (RDD) procedures. Following a brief telephone interview and sampling of an adult household member, face-to-face interviews were conducted. The final response rate for this survey was 74.5 percent, allowing generalizability to the metropolitan area population. Further detail on the research setting, the methodology and sampling

procedures for the Urban Risk Survey is available in Mushkatel and Pijawka, 1989).

Survey data were also collected in 1988 in six southern Nevada rural communities: Amargosa Valley, Beatty and Pahrump in Nye County; Indian Springs and Mesquite in Clark County, and Caliente in Lincoln County. In each of these study communities, simple random samples of households were selected from sampling frames assembled primarily from local utility records. In addition to random sampling of housing units, random procedures were used to select one adult within the household for participation in the survey.

The survey utilized a self-completion questionnaire which was personally delivered to, and subsequently retrieved from, those included in the samples. Sample sizes and response rates were as follows:

Amargosa Valley: n = 123, response rate of 84.6%;

Beatty: n = 150, response rate of 74%;

Pahrump: n = 220, response rate of 85.9%;

Indian Springs: n = 152, response rate of 80.3%;

Mesquite: n = 152, response rate of 72.3%;

Caliente: n = 152; response rate of 86.2%.

Further detail on these study communities, and on the sampling and survey administration procedures for the rural community surveys is provided in several previous reports (see Krannich and Little 1987a, 1987b, 1987c, 1987d, 1989; Little and Krannich 1987a, 1987b; Endter et al., 1988a, 1988b; Trend et al., 1988a, 1988b, 1988c).

Measurement Approach

The questions posed to the residents of the rural and urban samples are in included in tables accompanying the analysis section of this report, which show the distribution of responses to each question. Both the rural and urban surveys utilized Likert-type and numeric response scales to obtain measures of intensity to questionnaire items, except for two questions. These two exceptions required "Yes/No" responses.

Even though similar in most respects, the questions contained in the two surveys differed in two significant aspects. First, not all of the equivalent questions were identically worded. Second, the rural and urban surveys did not use identical scale values. For example, urban residents were generally asked to assess their reaction to questions or statements on a scale with three or seven response categories. Rural residents, on the other hand, were asked to assess their reactions on a scale with eleven categories, 0 to 10.

Because of the discrepancy in scale range and question wording, exact numerical comparisons between the urban and rural groups cannot be made. However, it is possible to discuss response similarities and differences of the two survey results in a more general and less precise manner. Thus, the numeric scale response values were typically aggregated into high, middle and low categories. For example, if respondents were given a scale range of seven categories (1 to 7), responses were aggregated by combining the two highest categories, the middle three categories,

and the two lowest categories; these are referred to as high, medium and low respectively. Similarly, when respondents were allowed a scale range of eleven categories (0 to 10), their responses were aggregated by combining the three highest categories, the middle five categories, and the three lowest categories.

This aggregation of responses into high, middle and low categories allows a comparison of response patterns for the urban and rural survey participants. Unfortunately, a simple comparison between urban and rural residents is inadvisable. Survey, as well as ethnographic field data, suggest that a comparison based on aggregated responses from the six rural study communities would be inappropriate. The presence of significant differences among the six rural communities demands that a more detailed analysis be undertaken.

Previous data analyses have demonstrated that the response patterns of the six rural communities were not totally unique, but tended to cluster into three sub-groups, each comprised of two geographically proximate communities. Response patterns in Beatty and Amargosa Valley were similar, differing significantly from the patterns in the other four communities. Likewise, response patterns for Pahrump and Indian Springs were similar, as were response patterns for Mesquite and Caliente. Thus, for analytic purposes, responses were clustered into the following three community groupings: Amargosa Valley/Beatty, Indian

Springs/Pahrump, and Mesquite/Caliente.[1]

Because the proportion of the total population sampled was different across the rural study communities, it was necessary to statistically weight the responses to make each community grouping statistically representative of the two communities included in the grouping. This was done by weighting cases from whichever community in each pair had the smallest proportion of its total population included in the sample. For the Amargosa Valley/Beatty grouping, responses from Beatty were weighted by a factor of 1.71. For the Indian Springs/Pahrump grouping, responses from Pahrump were weighted by a factor of 3.38. For the Caliente/Mesquite cluster, responses from Mesquite were weighted by a factor of 1.79.[2]

COMPARATIVE ANALYSIS

Introduction

This section presents a comparative analysis of the results of the rural and urban surveys which were completed in 1988. The focus is upon some of the salient aspects of public perceptions

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[1]Approximately one year after the collection of survey data in the six rural study communities, a nearly identical survey was conducted in the town of Goldfield, in Esmeralda County. Because of the one-year delay in collection of the Goldfield data, it is not possible to know if any observed differences and/or similarities vis-a-vis responses from other study areas are the result of events that occurred during that intervening period. Therefore, Goldfield data are not included in this draft report. A brief supplemental appendix summarizing parallel results from the Goldfield data will be added to the final report for this task.

[2]Although the results are not reported here, a parallel analysis based on the unweighted data resulted in nearly identical results for the three clusters of rural study communities.

regarding the proposed siting of a high-level nuclear waste repository at Yucca Mountain, Nevada. The analysis is based on responses to 26 questions selected from the 1988 urban and rural surveys.

Five major topic areas are covered: (1) responses related to the acceptability of the repository siting process, (2) perceived risks associated with the proposed repository, (3) perceptions of possible effects stemming from nuclear activities at the Nevada Test Site, (4) perceptions of the trustworthiness of assorted government units responsible for constructing and/or managing the repository, and (5) risk aversion to a variety of hazardous and noxious facilities.

Comparisons

Choice of Repository Site

Both urban and rural residents were asked if they would choose to build the nuclear waste repository at Yucca Mountain if they were able to make the final decision as to the location. Table 1 shows nearly 70 percent of urban residents responded that they probably would not or definitely would not choose to build the repository at Yucca Mountain. Only slightly more than 23 percent indicated that they probably or definitely would choose to build the repository at Yucca Mountain, and 7 percent said they were uncertain.

The data show substantial differences among the responses of the three rural groups when they were asked the same question. Amargosa Valley/Beatty residents heavily favored construction of a

Table 1. Distribution of Urban and Rural Responses to Questions on Respondents' Decision to Build Nuclear Repository at Yucca Mountain.

	URBAN STUDY[a]
Responses	%[c]
Definitely Yes	8.4
Probably Yes	14.8
Uncertain	7.4
Probably No	16.3
Definitely No	53.1

	RURAL STUDY[b]		
Responses	Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Definitely Yes	45.9	20.9	9.9
Probably Yes	28.3	24.6	18.3
Uncertain	12.3	20.6	24.6
Probably No	6.0	7.6	14.4
Definitely No	7.4	26.2	32.7

[a] Actual question (Q.97): If you were able to make the final decision regarding the location of the nuclear waste repository at Yucca Mountain, would you build it there?

[b] Actual question (Q.59): If you were able to make the final decision regarding the location of the nuclear waste repository at Yucca Mountain, would you build it there?

[c] Total may not equal 100% because of rounding error.

repository at Yucca Mountain, with approximately 74 percent indicating that they definitely or probably would choose to locate it there. Only slightly more than 13 percent indicated that they would probably or definitely not choose that site, and 12.3 percent indicated they were uncertain. Their responses are in stark contrast to the responses obtained from the urban population.

The distribution of responses from residents of the Indian Springs/Pahrump area were more even in terms of support or opposition to the proposed repository. About 45 percent of these respondents indicated they definitely or probably would choose to build the repository at the Yucca Mountain site; about 21 percent were unsure; and about 34 percent indicated they would not chose to build the repository at the proposed location.

Mesquite/Caliente area residents were less supportive of the Yucca Mountain site than either of the other two rural subgroups. Only 28.2 percent of this group indicated that they would definitely or probably choose to build the repository, while 47.1 percent indicated that they probably or definitely would not choose to build at Yucca Mountain. Twenty-five percent in Mesquite/Caliente were uncertain.

Thus, urban residents were less uncertain and more opposed to the construction of a repository at the Yucca Mountain site than any of the three rural groups. Urban responses most closely matched the response pattern observed in the Mesquite/Caliente area.

Risk Perception

Tables 2 through 10 show the responses of both urban and rural residents to nine questions probing their perceptions of the risks involved with hazardous materials handling in general and repository risks specifically.

Transportation of hazardous waste. Table 2 depicts residents' responses to a statement that accidents involving the transportation of hazardous materials are inevitable. To some extent this question taps the extent of fatalism. On a scale of 1 to 7, urban residents showed a strong inclination to believe such accidents are inevitable. Slightly more that 54 percent of the responses were in two categories reflecting the most agreement with the statement. About 34 percent of the responses occurred in the middle range of the scale, and only 12 percent indicated that they strongly disagreed with the statement.

Rural residents, who were asked a parallel question, showed some differences among the three groups. Residents of the Amargosa Valley/Beatty area were the least likely to believe in the inevitability of such accidents, although only a minority indicated a belief that accidents are unlikely. On a scale of 0 to 10, about 33 percent of the Amargosa Valley/Beatty respondents chose responses in the top three categories (agreement), about 47 percent chose responses in the middle range (neutrality), and approximately 20 percent selected the bottom three categories (disagreement).

The responses from Indian Springs/Pahrump area residents showed a slightly stronger inclination to believe such accidents

Table 2. Distribution of Urban and Rural Responses to Questions on The Inevitability of Transportation Accidents.

URBAN STUDY[a]

Responses		%[c]
Strongly Disagree	7	5.3
	6	6.4
	5	8.8
	4	10.6
	3	14.7
	2	13.7
Strongly Agree	1	40.5

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Strongly Disagree	0	4.8	3.9	5.0
	1	5.3	3.7	1.9
	2	9.7	5.4	2.1
	3	10.3	7.3	5.4
	4	1.9	3.1	2.7
	5	22.8	16.4	15.9
	6	4.8	3.7	5.7
	7	7.6	9.9	9.4
	8	10.3	10.9	10.6
	9	7.2	10.2	9.0
Strongly Agree	10	15.3	25.5	32.3

[a] Actual question (Q.56A): Accidents involving hazardous materials are inevitable. (Question was asked as part of a series of questions dealing with the transportation of hazardous materials.)

[b] Actual question (Q.44): Accidents involving the transportation of hazardous materials are inevitable.

[c] Total may not equal 100% because of rounding error.

are inevitable. Almost half (47 percent) of their responses fell in the top three categories (agreement), 40 percent chose responses in the middle range, and only 13 percent were inclined to strongly disagree that such accidents were inevitable.

The tendency to believe in the inevitability of accidents involving hazardous materials was most pronounced among Mesquite/Caliente area residents. Just over half (51.9 percent) of these respondents selected the highest three categories on the scale (agreement). Slightly more than 39 percent gave neutral responses, while only 9.0 percent were inclined to strongly disagree with the statement.

As with the previous question, the responses of urban residents most closely matched those of the rural residents in the Mesquite/Caliente area. It should be noted, however, that even in this comparison, the urban residents' responses were slightly more concentrated at the extreme ends of the scale, with a slightly lower proportion of the responses in the neutral range. Generally, the urban residents were more skeptical about the ability to safely transport hazardous waste than the rural residents, especially in the Amargosa Valley/Beatty and Indian Springs/Pahrump areas.

Repository storage. When asked to assess the possibility that the Yucca Mountain repository could be constructed and operated within acceptable levels of safety (Table 3), about 60 percent of urban respondents indicated they felt that the facility could be constructed and operated in an acceptable manner. Even though such a response proportion suggests a belief in the relative safety of

Table 3. Distribution of Urban and Rural Responses to Questions on Acceptable Levels of Safety at Yucca Mountain Repository.

URBAN STUDY[a]

Responses	%[c]
Yes	58.8
No	41.2

RURAL STUDY[b]

Responses	Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Yes	89.6	64.6	52.7
No	10.4	35.4	47.3

[a] Actual question (Q.90): Do you think it is possible to construct and operate the repository at Yucca Mountain to make it acceptably safe?

[b] Actual question (Q.50): Do you think that a nuclear waste repository could be constructed and operated at Yucca Mountain in a way that would be acceptably safe?

[c] Total may not equal 100% because of rounding error.

the repository, a significant proportion (41.2 percent) of residents were more skeptical about the ability to construct the repository and they did not feel it could be operated in a way that would be acceptable to them.

When a similar question was posed to the rural respondents, the results varied across the subgroups. Perceptions that the plant could be built and operated in an acceptable way varied from 89.6 percent for Amargosa Valley/Beatty area residents, to 65 percent for Indian Springs/Pahrump area residents, and 53 percent for the Mesquite/Caliente area residents.

Again, urban residents generally perceived greater risks than did the rural residents, with urban responses most similar to those observed in Mesquite/Caliente. However, Mesquite/Caliente operate an acceptably safe repository than the urban residents (47.3 percent versus 41.2 percent).

Transportation of nuclear waste. When questioned about the possibility of acceptably safe transportation of nuclear wastes to the repository (Table 4), the response patterns were similar to those observed regarding the operational safety of the repository. Slightly more than 60 percent of urban respondents felt that nuclear wastes could be transported in an acceptably safe manner, and almost 40 percent felt that the transportation of nuclear waste could not be done in a way that would be acceptably safe.

Differences of opinion among the rural subgroups were observed on this item as well, with the pattern of responses comparable to those seen in the previous table. Eighty-seven percent of Amargosa

Table 4. Distribution of Urban and Rural Responses to Questions on Acceptable Levels of Transportation Safety to Repository.

URBAN STUDY[a]

Responses	%[c]
Yes	61.0
No	39.0

RURAL STUDY[b]

Responses	Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Yes	87.0	65.0	53.5
No	13.0	35.0	46.5

[a] Actual question (Q.92): Do you think nuclear wastes could be transported to the repository in a way that would be acceptably safe to you?

[b] Actual question (Q.51): Do you think that nuclear wastes could be transported to the repository in a way that would be acceptably safe?

[c] Total may not equal 100% because of rounding error.

Valley/Beatty respondents, 65 percent of Indian Springs/Pahrump respondents, and 53.5 percent of Mesquite/Caliente respondents expressed the belief that such transportation could be accomplished safely.

Again the urban responses were less favorable than those in two of the three rural subgroups. Only in the case of the Mesquite/Caliente area did rural residents perceive greater risks associated with the transportation of nuclear wastes than did urban residents.

Transportation through populous areas. Both urban and rural respondents were also asked their assessment of the statement that hazardous materials should never be transported through populated areas (Table 5). As might be expected, a large majority of the urban residents (74.5 percent) were in agreement with the statement, choosing the lowest two categories of the scale. Thus, urban residents very much believe that hazardous materials should not be transported through populous areas. About 19 percent of their responses are classified as neutral, and only 6.3 percent of the respondents disagreed with the statement.

Rural residents of the Amargosa Valley/Beatty area indicated fairly strong agreement (58.2 percent) with the statement that hazardous materials should not be transported through populous areas, but demonstrate substantially less agreement than the urban sample. About 32 percent chose responses in the middle range, and just 9.8 percent indicated strong disagreement with the statement.

The Indian Springs/Pahrump area respondents overwhelmingly

Table 5. Distribution of Urban and Rural Responses to Questions on Transportation of Hazardous Materials Through Populous Areas.

URBAN STUDY[a]

Responses		%[c]
Strongly Disagree	7	3.9
	6	2.4
	5	3.9
	4	7.7
	3	7.7
	2	12.8
Strongly Agree	1	61.7

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Strongly Disagree	0	1.5	2.2	4.1
	1	3.1	1.5	1.8
	2	5.2	1.3	2.1
	3	5.3	2.2	2.9
	4	4.1	1.8	2.1
	5	14.6	5.4	5.8
	6	1.9	2.6	2.6
	7	6.0	3.2	5.1
	8	14.9	7.4	10.3
	9	10.8	11.7	8.4
Strongly Agree	10	32.5	60.6	54.6

[a] Actual question (Q.58B): Hazardous materials should never be transported through populous areas.

[b] Actual question (Q.45): Hazardous materials should not be transported through highly populated areas.

[c] Total may not equal 100% because of rounding error.

(79.7 percent) agreed with the statement. Only approximately 15 percent of their responses occurred in the middle range, and just 5.0 percent chose the categories of strongest disagreement.

Mesquite/Caliente area residents responded similarly to the Indian Springs/Pahrump area residents, showing a high degree of agreement (73.3 percent) with the statement that transportation of hazardous materials through populated areas should not be allowed. About 19 percent of these respondents chose middle range categories, and 8.0 percent selected responses in the categories indicating strong disagreement with the statement.

Overall, urban residents' responses were highly similar to those of rural residents in the Mesquite/Caliente and the Indian Springs/Pahrump areas. About three-fourths of each group strongly agreed with the statement, 15 to 19 percent had more or less neutral feelings, and less than 10 percent disagreed with the statement.

Current transportation methods. An additional question asked respondents to react to the statement that current methods of transporting hazardous materials through their community are reasonably safe (Table 6). Urban residents showed a slight tendency towards rating current methods as safe. About 31 percent of the respondents selected the two lowest categories (agree), 46 percent of the responses occurred in the middle range, and 21.8 percent selected the two highest categories (disagree). These results suggest a slight overall tendency for urban residents to believe that current transportation methods are safe. However, the

Table 6. Distribution of Urban and Rural Responses to Questions on the Reasonable Safety of Transporting Hazardous Materials Through or Near Local Communities.

URBAN STUDY[a]

Responses		%[c]
Strongly Disagree	7	11.6
	6	10.2
	5	11.1
	4	20.7
	3	15.5
	2	18.7
Strongly Agree	1	12.2

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Strongly Disagree	0	2.8	11.0	16.1
	1	2.5	5.2	6.6
	2	1.9	5.8	5.8
	3	1.7	3.4	3.6
	4	2.9	4.5	8.5
	5	19.9	18.8	21.0
	6	2.9	6.8	8.9
	7	9.5	7.8	11.3
	8	16.8	13.4	9.3
	9	14.5	9.2	4.8
Strongly Agree	10	24.7	14.0	3.9

[a] Actual question (Q.56E): From what I know, the current methods of transporting hazardous materials through or near my community are reasonably safe.

[b] Actual question (Q.47): From what I know, the current methods of transporting hazardous materials through my community are reasonably safe.

[c] Total may not equal 100% because of rounding error.

absence of a large difference between the proportion who agreed and disagreed with the statement demonstrates a significant lack of consensus about the safety of current methods.

In contrast, over one-half (56.0 percent) of the Amargosa Valley/Beatty respondents selected the three highest categories on the scale, indicating a rather widely-held belief that transportation methods are safe. About 37 percent of these respondents selected mid-range categories, while just 7.2 percent chose the lowest categories. Thus, in Amargosa Valley/Beatty, there is some consensus in their disagreement with the transportation safety statement.

Indian Springs/Pahrump residents were less convinced than Amargosa Valley/Beatty residents that current methods of transportation are safe. Approximately 37 percent of these respondents selected the highest categories, 41.3 percent chose mid-range categories, and 22.0 percent indicated the three categories in strongest disagreement with the statement. This distribution is very similar to that observed with the urban residents and suggests meaningful disagreement about the perceived safety of current transportation within the community.

The pattern of Mesquite/Caliente area responses indicates a slightly more ambivalent attitude toward current transportation safety. Only 18.0 percent of their responses fell in the categories of highest agreement with the statement, and 28.5 percent fell in the three categories indicating the strongest disagreement. Over one-half (52.3 percent) of the respondents

selected categories in the middle range,

As already noted, the response pattern of urban residents was most similar to that of the rural Indian Springs/Pahrump area residents. Urban residents did not agree to the same extent about safety of current methods of transportation as the residents of the Amargosa Valley/Beatty area, nor did they disagree with the statement as strongly as did Mesquite/Caliente residents.

Local benefits. The distributions in Table 7 demonstrate residents' evaluation of the extent to which a repository would benefit their respective communities economically. About two-thirds (66.3 percent) of the urban respondents indicated they felt the repository would probably or definitely produce some economic benefits for the greater Las Vegas area. However, an important one-third (33.7 percent) of the respondents indicated that they felt a repository probably or definitely would not produce economic benefits for the greater Las Vegas area.

The three rural subgroups were asked a parallel, but slightly different question. Again, the responses differed by area. Almost 63 percent of Amargosa Valley/Beatty residents believed that economic benefits to their area would significantly outweigh the harmful effects. Fully 33 percent responded that the repository would be entirely beneficial. About 34 percent of their responses were in the middle range, indicating a belief that there would be about equal amounts of benefits and harm. Only 3.0 percent of their responses were in the three most harmful categories.

Residents of the Indian Springs/Pahrump area were slightly

Table 7. Distribution of Urban and Rural Responses to Questions on Economic Benefit for Local Community.

URBAN STUDY[a]

Responses	%[c]
Definitely Would Not Produce Benefits	12.5
Probably Would Not Produce Benefits	21.2
Probably Would Produce Benefits	48.0
Definitely Would Produce Benefits	18.3

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Entirely Harmful	0	1.0	4.1	9.8
	1	.4	1.9	2.8
	2	1.6	1.7	4.4
	3	.4	3.3	3.8
	4	2.0	3.3	5.9
Equal Good & Harm	5	21.3	25.9	35.7
	6	2.0	2.6	5.1
	7	8.3	8.3	8.8
	8	17.4	9.8	13.1
	9	12.4	12.1	3.9
Entirely Beneficial	10	33.4	26.9	6.7

[a] Actual question (Q.83): Some people believe that the repository would be a good thing for Nevada - producing more jobs, spending, and tax revenues. How likely do you think it is that the repository will produce benefits for the greater Las Vegas area?

[b] Actual question (Q.57): How do you think the repository would affect the economic well-being of residents or businesses in this area?

[c] Total may not equal 100% because of rounding error.

less convinced that a repository would be strongly beneficial. Still, 48.8 percent of their responses fell in the highly beneficial range, with 43.4 percent responding in the middle categories (equal good and harm). Just 7.7 percent fell in the highly harmful range.

Residents from the Mesquite/Caliente area showed even less confidence that a repository would be beneficial. Only 23.8 percent of their responses occurred in the highly beneficial categories, 58.8 percent occurred in the middle range, and 17.0 percent were recorded in the three response categories indicating a strong belief that a repository would be harmful to the local economic structure.

The different question structures and response formats used in the urban and rural surveys make direct comparisons awkward. Nevertheless, overall it appears that urban residents' responses most closely resembled the responses of the rural residents of the Mesquite/Caliente area. Urban residents were, however, slightly less inclined than Mesquite/Caliente residents to believe that the repository would be beneficial.

Health and safety risks. Residents' perceptions about the potential effects of the repository on the health and safety of area residents are presented in Table 8. About 36 percent of the urban respondents indicated they thought the risk would be very serious for Las Vegas residents, while only 19.1 percent responded that they did not feel the health and safety risks from a repository were serious. Nearly one-half (44.9 percent) chose the

Table 8. Distribution of Urban and Rural Responses to Questions on the Public Health and Safety Effects of the Repository.

URBAN STUDY[a]

Responses		% [c]
Not Serious	7	7.9
	6	11.2
	5	12.2
	4	15.1
	3	17.6
	2	13.2
Very Serious	1	22.9

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty % [c]	Indian Springs/ Pahrump % [c]	Mesquite/ Caliente % [c]
Not At All Concerned	0	25.9	15.5	7.5
	1	15.0	9.0	4.0
	2	12.1	7.1	3.3
	3	8.4	3.5	6.9
	4	2.9	3.2	4.2
	5	13.3	13.3	9.3
	6	3.3	2.6	5.1
	7	1.1	5.3	10.0
	8	5.1	9.2	11.2
	9	1.3	6.8	5.4
Extremely Concerned	10	11.5	24.5	33.1

[a] Actual question (Q.87A): How serious a risk would the activities at the Yucca Mountain repository be to the health and safety of residents in the Las Vegas area?

[b] Actual question (Q.55): If the repository is built at Yucca Mountain, how concerned are you that it might have harmful effects on public health and safety in this area?

[c] Total may not equal 100% because of rounding error.

middle range categories, indicating a neutral position.

Rural residents were asked a slightly different question about health and safety risks from the repository. They were queried about how concerned they were that the facility would have harmful effects. Amargosa Valley/Beatty area residents indicated a low level of concern. Despite their close proximity to Yucca Mountain, only 17.9 percent of the respondents from these communities selected the three highest concern categories. Close to 30 percent selected middle range responses, and fully 53.0 percent selected the response categories indicating they had very little or no concern about health and safety risks associated with the proposed repository.

Residents of the Indian Springs/Pahrump area, however, expressed much greater concern about the perceived health and safety risks. Nearly 41 percent of these residents selected the categories of high or extreme concern. As with the Amargosa Valley\Beatty residents, roughly 30 percent (27.9 percent) selected the mid-range categories, but less than 32 percent indicated that they had very little or no concern.

Mesquite/Caliente area residents exhibited even higher levels of concern over risks to public health and safety. Among these residents, approximately one-half (49.7 percent) selected the categories indicating high or extreme concern, while fewer than 15 percent selected categories indicating very little or no concern about health and safety in their area. In Mesquite/Caliente fewer than 35 percent of the residents selected the mid-range categories.

There was no close similarity among rural and urban residents' responses, although the urban pattern showed some similarity to the Mesquite/Caliente residents' responses with respect to the lack of concern (14.8 and 19.1 percent respectively). However, the percentage of residents in the Mesquite/Caliente area who indicated high concern exceeded that of the Las Vegas urban area (49.7 and 36.1 percent respectively). The pattern of responses reflecting high levels of concern among urban residents tended to be more like the response pattern observed among Indian Springs/Pahrump area residents (36.1 and 40.5 percent respectively).

A similar question asked only of the urban survey respondents queried them about their level of concern that a repository at Yucca Mountain could produce harmful effects in their area. However, this question, unlike the previous question on health and safety effects, did not specify the source of the harmful effects. Nevertheless, the question taps underlying non-specific anxieties associated with the proposed repository. The urban residents indicated substantial levels of concern that the repository could have harmful effects on the Las Vegas area (Table 9). An overwhelming 78.0 percent of the respondents indicated that they were either somewhat or very concerned, while 22.0 percent said they were not concerned at all. Of these, only 7.9 percent indicated they were not concerned at all.

Repository benefits and harm. A final question pertaining to risk perception issues asked respondents to evaluate the overall balance of benefits and harmful effects from the repository (Table

Table 9. Distribution of Urban Responses to Question on Any Harmful Effects of the Repository.

Responses	URBAN STUDY[a] % [b]
Not Concerned At All	7.9
Not Very Concerned	14.1
Somewhat Concerned	36.4
Very Concerned	41.6

[a] Actual question (Q.88): With regard to all possible effects, how concerned are you that the nuclear waste repository could produce harmful effects here in the Las Vegas area?

[b] Total may not equal 100% because of rounding error.

10). Just over one-half (52.5 percent) of urban respondents indicated that they felt the possibility of harmful effects outweighed any positive benefits. About 30 percent of the respondents believed that harmful and beneficial aspects balanced. The remaining 17.0 percent indicated they felt that the potential benefits would outweigh the potential harmful effects.

As with previous questions, the rural subgroups, when asked a nearly identical question, showed some difference of opinion. Amargosa Valley/Beatty residents generally felt that the repository would be beneficial to some degree. About 39 percent of their responses occurred in the three most favorable categories, suggesting a high level of perceived benefits. Over one-half (54.0 percent) felt there would be a close to equal split between benefits and harm. Only 7.1 percent indicated that they believed that effects would be mostly harmful.

Residents of the Indian Springs/Pahrump area were less convinced that the repository would be beneficial. Of their responses, 31.0 percent were in the categories indicating a belief that benefits would outweigh harms. Slightly more than 23 percent responded in the categories indicating a belief that harm would outweigh benefits. Nearly 46 percent indicated that harm and benefit would more-or-less balance.

The Mesquite/Caliente residents were the least convinced that a repository would be beneficial overall. Only 12.4 percent of these respondents indicated a strong belief that benefits would significantly outweigh the potential harm, while 33.6 percent of

Table 10. Distribution of Urban and Rural Responses to Questions on the Balance of Harmful and Beneficial Repository Effects.

URBAN STUDY[a]

Responses	%[c]
Harm Outweighs Benefits	52.5
About Equal	30.5
Benefits Outweighs Harm	17.0

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Entirely Harmful	0	3.4	11.9	18.2
	1	2.7	5.5	8.2
	2	1.0	5.9	7.2
	3	2.2	4.6	17.7
	4	6.1	4.7	4.2
Equal Good & Harm	5	33.7	25.0	21.2
	6	6.0	4.9	7.6
	7	6.0	6.4	3.5
	8	12.6	8.3	5.7
	9	9.7	9.5	3.2
Entirely Beneficial	10	16.6	13.2	3.5

[a] Actual question (Q.86): For the greater Las Vegas area, would you say that the possible benefits of the nuclear waste repository outweigh the possible harmful effects, that the possible harmful effects outweigh the possible benefits, or do they balance each other?

[b] Actual question (Q. 53): Generally speaking, do you think that the nuclear waste repository would have entirely harmful effects on this community, that the effects on the community would be entirely beneficial, or that beneficial and harmful effects would balance each other?

[c] Total may not equal 100% because of rounding error.

the respondents indicated a strong belief that the repository would be harmful overall. The remaining 54.2 percent of the responses fell in the middle range categories.

The responses of urban residents most closely resembled those of the rural residents of the Mesquite/Caliente area, in that both groups showed a distinct tendency toward believing that a repository would bring more harm than good. However, urban residents were the most pronounced in feeling that potential harmful effects would outweigh benefits.

Perceptions of the Nevada Test Site (NTS)

In earlier reports, responses to the perceived risks of the NTS showed high correlations with the perceptions of high risk associated with the repository (see Mushkatel and Pijawka, 1989; Krannich and Little, 1991). Because residents' views about the NTS may be a meaningful variable that influences repository risk perceptions, several questions addressing NTS perceptions were examined as additional risk perception factors.[3]

All groups were asked a series of questions specifically regarding the Nevada Test Site. First, both urban and rural residents were asked to evaluate the statement that past experience at the test site has provided safe procedures for transporting and handling nuclear material (Table 11). Urban residents tended to agree with the statement. Nearly one-third (32 percent) of the respondents indicated strong agreement, 56 percent chose middle

[3]A subsequent section of this paper will examine the relationship between NTS and repository perceptions.

Table 11. Distribution of Urban and Rural Responses to Questions on NTS Effects on Safe Handling of Nuclear Materials.

URBAN STUDY[a]

Responses		%[c]
Strongly Disagree	7	5.9
	6	6.8
	5	9.0
	4	29.0
	3	17.8
	2	18.2
Strongly Agree	1	13.3

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Strongly Disagree	0	3.8	6.9	14.7
	1	2.2	4.5	3.1
	2	2.2	3.3	4.7
	3	4.2	6.8	8.6
	4	4.7	6.1	9.8
	5	11.9	19.9	20.2
	6	4.9	3.8	9.9
	7	8.9	7.8	7.5
	8	21.6	15.6	10.3
	9	12.0	10.0	3.0
Strongly Agree	10	23.9	15.3	8.1

[a] Actual question (Q.70): To what extent do you agree with the following statement: Past experience at the Nevada Test Site has provided safe procedures for transporting and handling nuclear materials.

[b] Actual question (Q.41): To what extent do you agree with the following statement: "Experience at the Nevada Test Site has provided safe procedures for transporting and handling nuclear materials".

[c] Total may not equal 100% because of rounding error.

range responses, and only 13 percent selected the categories indicating they strongly disagreed.

Among rural residents, a majority (57.5 percent) of Amargosa Valley/Beatty respondents expressed strong agreement that past experience has provided safe procedures. About 35 percent selected mid-range categories, and only 8 percent indicated that they strongly disagreed.

Indian Springs/Pahrump area residents were somewhat less convinced that experience at NTS had provided safe transportation and handling procedures. About 41 percent of these residents indicated strong agreement with the statement, and 15 percent indicated they strongly disagreed. Over 44 percent chose middle range categories.

The Mesquite/Caliente respondents were about evenly divided on this issue. About 21 percent indicated strong agreement and 23 percent indicated strong disagreement with the statement. The remaining 56 percent selected middle range responses, indicating more ambivalent feelings about safety. Overall, the Mesquite/Caliente group were least supportive of the idea that the NTS had a good operations record for handling and transportation of nuclear waste.

Comparing the urban and rural, urban residents' responses seemed to fall somewhere between those of the Indian Springs/Pahrump group and those of the Mesquite/Caliente group. Urban residents had a nearly identical proportion of mid-range answers as seen for the Mesquite/Caliente residents, but their

strongly agree/disagree responses more closely resembled the division of the Indian Springs/Pahrump residents.

Past harm from aboveground testing. Both urban and rural groups were asked to assess the possible harmful effects of past aboveground testing (Table 12). Urban residents tend to believe that testing has negatively affected the health of Las Vegas area residents. About 39 percent of the sample selected responses indicating it was very or extremely likely that aboveground testing caused health problems, while 23.2 percent indicated it was not very or not at all likely that such testing had harmful effects. Approximately 39 percent selected middle range categories.

When rural residents were asked a similar question, Amargosa Valley/Beatty residents showed an almost complete reversal of the urban response pattern. Thirty-seven percent indicated testing was not very or not at all likely to have caused health problems in their area. Slightly more than 23 percent of these respondents indicated that health problems were very or extremely likely, with the remaining 39.9 percent selecting middle range categories. Residents of the Indian Springs/Pahrump area were more convinced that past testing was harmful. Almost 39 percent of these respondents selected the extremely likely categories, with 28.9 percent indicated that they considered it very unlikely or not at all likely the repository has created past health problems for area residents. Over 32 percent selected responses in the middle ranges. Residents of the Mesquite/Caliente area were overwhelmingly convinced that past testing caused health problems

Table 12. Distribution of Urban and Rural Responses to Questions on Past Harmful Health Effects of Aboveground Weapons Testing.

URBAN STUDY[a]

Responses		%[c]
Not Likely At All	1	12.6
	2	9.5
	3	9.3
	4	13.7
	5	15.7
	6	13.9
Extremely Likely	7	25.3

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Not At All Likely	0	17.6	13.3	4.7
	1	9.0	6.3	2.5
	2	10.4	9.3	1.2
	3	12.4	7.1	4.6
	4	4.8	6.8	1.2
	5	14.8	9.8	8.7
	6	2.6	5.0	3.9
	7	5.3	3.8	6.2
	8	5.0	8.4	12.7
	9	5.8	4.9	10.8
Extremely Likely	10	12.4	25.5	43.4

[a] Actual question (Q.64): How likely do you think it is that above ground nuclear weapons testing activities at the Nevada Test Site have, in the <u>past</u>, caused harmful health problems for people who live in the Las Vegas area?

[b] Actual question (Q.39): How likely do you think it is that above ground nuclear weapons testing activities at the Nevada Test Site have in the <u>past</u> caused harmful health problems for people who live in this area?

[c] Total may not equal 100% because of rounding error.

for area residents. Two-thirds (66.8 percent) selected the three highest categories on the scale, indicating they considered it very or extremely likely, while only 8 percent indicated that they felt it was not very likely or not at all likely that testing has affected health in the Mesquite/Caliente area. Approximately one-fourth (24.6 percent) selected middle range responses.

Unlike almost all earlier rural/urban comparisons, Mesquite/Caliente residents did not display a response pattern most similar to the distribution obtained from urban residents. In this instance, urban and Indian Springs/Pahrump residents have distributions of responses which are most alike.

Future harm from underground testing. Residents of both groups were also asked to assess how likely it is that underground testing will cause future health problems in their area (Table 13). Twenty-five percent selected responses indicating that they felt it was very or extremely likely that such testing would have future harmful effects. while approximately 34 percent selected the lowest two scale categories which signifies a belief that underground testing will not cause future health problems for area residents. Nearly 42 percent selected middle range responses.

When the same question was posed to rural residents, the Amargosa Valley/Beatty area respondents exhibited extremely low levels of concern. Fully 60.2 percent indicated that they considered it very or not at all likely that underground testing would cause health problems, while only 11.9 percent indicated they considered it very or extremely likely. Roughly 28 percent

Table 13. Distribution of Urban and Rural Responses to Questions on Future Harmful Health Effects of Underground Weapons Testing.

URBAN STUDY[a]

Responses		%[c]
Not Likely At All	1	15.2
	2	18.3
	3	14.0
	4	13.3
	5	14.2
	6	10.8
Extremely Likely	7	14.2

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Not At All Likely	0	29.7	16.7	7.5
	1	16.9	10.2	4.8
	2	13.6	9.5	6.0
	3	9.0	7.6	6.1
	4	3.9	4.4	3.4
	5	10.2	13.1	9.2
	6	1.2	7.1	8.9
	7	3.7	5.4	9.8
	8	3.8	7.6	9.0
	9	3.3	3.1	7.2
Extremely Likely	10	4.8	15.5	28.1

[a] Actual question (Q.66): How likely do you think it is that underground nuclear weapons testing activities at the Test Site will, in the future, cause harmful health problems for people living in the Las Vegas area?

[b] Actual question (Q.40): How likely do you think it is that underground nuclear weapons testing activities at the Nevada Test Site will in the future cause harmful health problems for people who live in this area?

[c] Total may not equal 100% because of rounding error.

indicated somewhat neutral feelings.

The Indian Springs/Pahrump residents exhibited higher levels of concern. Among these respondents, 36.4 percent indicated that they felt it not very or not at all likely that future underground testing would have adverse health effects on area residents. Approximately 26 percent of these respondents indicated that they felt is very or extremely likely, and about 38 percent selected mid-range categories.

As with the question on aboveground testing, Mesquite/Caliente residents showed the highest levels of concern about future health problems resulting from underground testing. Over 44 percent indicated that they felt it likely that future underground testing would create area health problems. Slightly more than 18 percent indicated that they considered it very unlikely or not at all likely to cause problems health problems, and 37.4 percent provided neutral responses to the question.

On both of the questions about aboveground and underground testing and the likelihood of resultant health problems, urban residents exhibited a response pattern that very closely resembled the response pattern from the Indian Springs/Pahrump area group. Also, as in the previous question, Mesquite/Caliente area respondents were the most concerned about negative health impacts stemming from NTS activities.

Benefits and harm from NTS. A final question addressing NTS perceptions asked both urban and rural residents whether the benefits of the test site outweighed the harmful effects, if

benefits and harmful effects were about equal, or if benefits were less than the harmful effects (Table 14). Among urban residents, approximately 32 percent of the respondents indicated that they believed benefits outweighed the harm, while a nearly equal proportion, 27 percent, indicated they felt that harmful effects outweighed The benefits. Neutral response categories were selected by the remaining 40.3 percent.

Among rural residents, the Amargosa Valley/Beatty group were the most convinced that NTS benefits outweighed the harmful effects (36.2 percent). About 62 percent of the responses were clustered in the middle categories, and fewer than 2 percent of the respondent indicated that they felt the facility had resulted in mostly or entirely harmful effects.

The Indian Springs/Pahrump residents felt very much the same way, and the distributions of the Amargosa Valley/Beatty and Indian Springs/Pahrump subgroups were very similar. In the latter group there was a very slightly lower proportion of respondents in the highest (33.0 percent compared to 36.2 percent) and neutral categories (60.0 percent compared to 62.2 percent). Similarly, there were more respondents in the Indian Springs/Pahrump area (7.2 percent compared to 1.5 percent) who believed the facility to be mostly or entirely harmful.

Mesquite/Caliente residents, on the other hand, showed nearly a reverse pattern in their responses. Only 12.5 percent indicated a belief that NTS effects were mostly or entirely beneficial, whereas 22 percent felt the effects were mostly or completely

Table 14. Distribution of Urban and Rural Responses to Questions on the Relative Balance of Harmful and Beneficial Effects of NTS Activities.

URBAN STUDY[a]

Responses	%[c]
Harm Outweighs Benefits	27.0
About Equal	40.3
Benefits Outweigh Harm	31.9

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Entirely Harmful	0	.4	2.8	11.6
	1	.4	1.7	2.6
	2	.7	2.7	8.3
	3	6.1	3.3	8.2
	4	4.3	6.2	8.6
Equal Good & Harm	5	38.1	33.2	34.1
	6	6.8	8.8	7.9
	7	6.9	8.5	6.3
	8	14.9	12.6	5.9
	9	5.8	4.9	2.0
Entirely Beneficial	10	15.5	15.5	4.6

[a] Actual question (Q.63): Generally speaking, would you say that the possible benefits of the Nevada Test Site outweigh the possible harmful effects, that the possible harmful effects outweigh the possible benefits, or do they balance each other?

[b] Actual question (Q.42): Generally speaking, would you say that the Nevada Test Site has had entirely harmful effects, that it has had entirely beneficial effects, or that beneficial and harmful effects balance each other?

[c] Total may not equal 100% because of rounding error.

harmful. The remaining 65.1 percent of the responses occurred in the middle range or neutral categories.

Rural and urban residents did not particularly resemble one another in assessing the possible effects of the test site. The major difference is the smaller proportion of urban respondents who believed that the benefits and harm were roughly equal, just 40.3 percent. This result may be an artifact of the different response options provided by the rural and urban questionnaires.

Trust in Government

An additional area of comparison concerns the level of public trust in government and governmental institutions. The surveys examined both general trust in government and trust in the ability of government entities to manage the risks of the repository in a way to prevent harmful effects to local populations (Tables 15 through 20).

Trust in federal government. Table 15 shows the responses of residents when asked how often they could trust the federal government to do what is right. As Table 15 demonstrates, urban residents were generally distrustful. Three-fourths (74.9 percent) of the urban respondents indicated that they would trust the federal government some of the time (55.0 percent) or almost never (19.9 percent). Of the remaining 25.1 percent, 21.4 percent said that the federal government could be trusted most of the time, while just 3.7 percent felt that they could trust the federal government just about always. If one looks at only the most extreme responses, the ratio of distrust to trust is 5.4:1

Table 15. Distribution of Urban and Rural Responses to Questions on Trust in the Federal Government.

URBAN STUDY[a]

Responses	%[c]
Almost Never	19.9
Some of the Time	55.0
Most of the Time	21.4
Just About Always	3.7

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Never	0	5.3	6.1	7.5
	1	5.6	5.9	6.5
	2	9.3	9.0	11.8
	3	9.7	11.0	7.7
	4	12.7	9.7	10.4
	5	27.8	26.3	25.3
	6	9.1	9.0	9.5
	7	12.1	9.5	10.6
	8	6.1	9.0	8.2
	9	1.0	2.1	.3
Always	10	1.3	2.4	2.0

[a] Actual question (Q.18): How much of the time do you think we can trust the government in Washington to do what is right?

[b] Actual question (Q.22): How often do you think you can trust the federal government in Washington to do what is right?

[c] Total may not equal 100% because of rounding error.

Among rural groups, the largest proportion of Amargosa Valley/Beatty residents appeared neutral about trusting government (72.4 percent). Nevertheless, even though most respondents selected what have been defined as neutral categories, a significantly greater proportion of these respondents were distrustful of the federal government than were trustful. While over 20 percent of those questioned indicated that they would almost <u>never</u> trust (three most distrustful categories) the government to do what is right, only 8.4 percent said they would almost <u>always</u> trust the government. The ratio of distrust to trust for this subgroup is 2.4:1.

The Indian Springs/Pahrump residents responded similarly. A large majority (65.5 percent) of respondents provided neutral responses. Of the remaining respondents, 21.0 percent indicated that they could almost <u>never</u> trust the government, and 13.5 percent indicated the government could almost <u>always</u> be trusted. The ratio of distrust to trust using the three most distrustful and three most trustful responses for the Indian Springs/Pahrump subgroup is 1.6:1.

Mesquite and Caliente residents followed the same pattern. About 64 percent of their responses fell in the neutral categories. Over 25 percent of the respondents indicated high levels of distrust (could almost never trust), and 10.5 percent indicated high trust in government (almost always trust). Thus the ratio of high trust to low trust is approximately 2.5:1.

While the two scales for urban and rural residents do not

allow exact comparisons, the urban residents appear to be the most distrustful of the four groups. The trust attitudes of urban residents most closely resemble those of the Amargosa Valley/Beatty residents. Both groups had a high percentage of responses in the middle range (76 percent and 71 percent, respectively), and both had about 20 percent of respondents indicating the federal government could almost never or never be trusted to do what is right.

Trust in state government. When the same question was posed regarding state government (Table 16), urban residents were more neutral in their opinions. About 41 percent indicated state government could be trusted most of the time, and an additional 46.7 percent felt the government could be trusted some of the time. Thus, 87.5 percent selected the two most neutral categories. With 53.2 indicating distrust and 46.9 giving answers which indicated trust, a slight degree of distrust is evident in the urban responses. The 12.6 percent of the respondents who selected the extreme categories of just about always and just about never, were evenly divided, with approximately 6 percent selecting each of these alternatives. The distrust to trust ratio is 1.1:1

Among rural residents, Amargosa Valley/Beatty respondents tended to be somewhat distrustful of the state government's ability to do what is right. About 23 percent of the respondents selected categories indicating state government could rarely be trusted, and only 9.0 percent said they felt that state government could almost always be trusted. As with the urban sample a large proportion

Table 16. Distribution of Urban and Rural Responses to Questions on Trust in State Government.

URBAN STUDY[a]

Responses	%[c]
Almost Never	6.5
Some of the Time	46.7
Most of the Time	40.8
Just About Always	6.1

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Never	0	7.1	4.0	4.9
	1	8.2	4.5	3.4
	2	7.5	6.5	6.0
	3	8.5	9.9	10.0
	4	9.1	11.6	8.6
	5	32.4	27.9	27.8
	6	6.3	11.1	10.5
	7	12.0	7.3	14.4
	8	5.2	10.2	10.8
	9	2.8	3.7	1.4
Always	10	1.0	3.4	2.1

[a] Actual question (Q.23): How much of the time do you think you can trust the government in Carson City to do what is right?

[b] Actual question (Q.23): How often do you think you can trust the Nevada state government in Carson City to do what is right?

[c] Total may not equal 100% because of rounding error.

(68.3 percent) opted for the most neutral categories. The ratio of distrust to trust here is 2.5:1.

Indian Springs/Pahrump respondents were evenly divided, with 17.3 percent selecting the high trust categories, and 15.0 percent selecting the low trust categories. Nearly 68 percent selected mid-range categories. The distrust to trust ratio is .87:1.

Mesquite and Caliente respondents felt much the same, with 14.3 percent indicating high trust in state government, and 14.3 percent indicating low trust. As with the other two rural subgroups, a large majority of the respondents gave neutral responses (71.3 percent). The distrust to trust ratio is 1:1.

In general, the responses of the urban and rural residents of these areas were remarkably similar in regard to the extent to which state government can be trusted to do the right thing. Only the residents of the Amargosa Valley/Beatty area demonstrated tendency towards high distrust of state government.

Trust in local government.[4] This relatively equivalent

[4]The urban and rural surveys used different questions to tap satisfaction with local government. While the urban survey included both city and county government in the same question, the rural survey asked two questions, one about county government and one about city government. In order to make the analysis comparable for both urban and rural surveys, the two questions utilized in the rural survey have been combined into a single distribution (Table 17). It should be noted that even though the two questions have been combined, the interpretation of the results is nevertheless, not straightforward. This follows from the fact that not all of the rural communities have the same community government structure, nor do they relate to county government in the same manner. For example, even though they have a form of town government, Amargosa Valley and Beatty are dependent upon county government for budgetary allocations. Pahrump has a similar relationship to county government, but more fiscal autonomy than the other two Nye County communities. Mesquite and Caliente are

pattern of responses was not repeated when residents were asked to evaluate their local government (Table 17). Urban residents showed a tendency toward distrust of city/county government, with nearly two-thirds (64.3 percent) of the respondents selecting either the some of the time (52.6 percent) or almost never (11.7 percent) responses. Only 35.7 percent of urban residents indicated they felt that city/county government could be trusted most of the time (31.9 percent) or just about always (3.8 percent). Over 11.7 percent thought that city/county government could be trusted almost <u>never</u>, while just 3.8 percent thought that they could be trusted just about <u>always</u>. Using the two most extreme categories, the distrust to trust ratio is 3.1:1.

Among rural residents, the Amargosa Valley/Beatty group showed a very slight tendency toward trust in local government. About 17 percent indicated high levels of trust, compared to 13.9 percent indicating low levels of trust. Somewhat more than 59 percent of the respondents selected middle range categories. The distrust to trust ratio is .8:1.

Indian Springs/Pahrump residents were slightly less trusting, but like their neighbors to the north and west, they were also fairly evenly divided in their opinions about trust in local government. High trust categories were selected by 18.4 percent, while 16.2 percent selected the low trust categories. Nearly 70

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incorporated cities, and are therefore relatively independent of county government. Indian Springs exercises little community control, with Clark County responsible for most decision making. As a result, interpretation of the data in Table 17 must be undertaken with great care.

Table 17 . Distribution of Urban and Rural Responses to Questions on Trust in Local Government.

URBAN STUDY[a]

Responses	%[c]
Almost Never	11.7
Some of the Time	52.6
Most of the Time	31.9
Just About Always	3.8

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Never	0	4.3	5.1	3.8
	1	4.6	4.2	3.4
	2	5.0	9.1	6.2
	3	11.0	11.0	10.7
	4	11.2	7.6	8.2
	5	26.1	30.1	20.2
	6	8.6	7.1	14.5
	7	12.4	10.8	12.0
	8	11.6	10.0	13.0
	9	3.2	3.6	5.8
Always	10	2.1	1.6	2.1

[a] Actual question (Q.25): How much do you think you can trust your city/county government to do what is right?

[b] Actual questions (Q.25): How often do you think you can trust the city/town government in this community to do what is right? (Q.24): How often do you think you can trust the county commissioners and county government to do what is right?

[c] Total may not equal 100% because of rounding error.

percent selected the middle categories. The resultant distrust to trust ratio using the most extreme categories is 1.1:1

Mesquite/Caliente residents showed a very slight tendency towards trust, much like the Amargosa Valley/Beatty residents. Roughly 19 percent indicated local government could be trusted all or most of the time, 65.6 percent chose categories in the middle range, and 13.4 percent indicated local government could hardly ever or never be trusted. The distrust to trust ratio is .7:1.

There does not appear to be much similarity between the responses of urban residents and those of any of the rural groups. All groups, rural and urban, had a high percentage of responses occurring in the middle categories of the scale, but urban residents had a higher percentage of extreme distrust responses. Rural residents, on the other hand, provided more trustful responses regarding local government.

Reporting nuclear related accidents.[5] The final three questions addressing government trust pertain to residents' perceptions of trust in accident reporting (credibility) and the repository site selection process (perceptions of fairness). Urban

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[5]Again rural and urban survey instruments diverged to a significant degree. Urban respondents were asked about the truthfulness of government reporting of past NTS accidents and anticipated reporting of future repository accidents. Rural respondents were asked their opinions about past reporting truthfulness of all nuclear programs. Responses of urban and rural residents to past reporting truthfulness will be discussed in relation to Table 18. However, insofar as the two questions are only approximately equivalent, the interpretation must be cautious and conservative.

Urban responses to the question regarding the reporting of future repository accidents will be discussed separately (Table 19).

residents were asked their perceptions about the proportion of past accidents at NTS that the government reported to the public (Table 18). Urban respondents showed a high level of distrust in government, with 71.8 percent indicating that they believed the government had reported only some or very few accidents. The remaining 27.3 percent indicated that they believed the government reported most or all of the accidents. Examining only the most extreme response categories, it is seen that nearly 41 percent thought the government reported very few accidents, while just 3.9 percent thought that all accidents were reported. This is a distrust to trust ratio of 10.5:1

Rural residents exhibited markedly different levels of skepticism about government believability. When they were asked how confident they are that federal agencies have provided honest and accurate information about the safety of their nuclear programs, Amargosa Valley and Beatty residents showed a tendency toward confidence in their government, with 29.7 percent indicating they were extremely confident, 53.0 percent selecting mid-range categories, and 17.4 percent indicating that they were not very confident at all. Comparing the most distrustful responses to the most trustful provides a distrust to trust ratio of .6:1.

Indian Springs/Pahrump residents were a little more evenly divided in their opinions. About 21 percent indicated they were very confident in government truthfulness in reporting, 42.5 percent selected mid-range categories, and 36 percent indicated they were not very confident at all. The distrust to trust ratio

Table 18. Distribution of Urban and Rural Responses to Questions on the Honesty and Accuracy of Past Government Reports of Nuclear Accidents.

URBAN STUDY[a]

Responses	%[c]
Very Few Accidents	40.9
Some Accidents	30.9
Most Accidents	23.4
All Accidents	3.9

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Not At All Confident	0	9.0	21.1	24.3
	1	4.3	7.9	9.3
	2	4.1	7.8	11.1
	3	8.2	7.8	9.7
	4	3.6	7.1	11.6
	5	19.7	14.9	10.6
	6	6.9	5.6	8.1
	7	14.6	7.1	8.2
	8	13.7	9.8	4.0
	9	7.7	4.9	1.5
Extremely Confident	10	8.3	6.0	1.5

[a] Actual question (Q.69): What proportion of accidents at the Nevada Test Site do you believe the government has reported to the public?

[b] Actual question (Q.52): How confident are you that federal agencies have provided the public with honest and accurate information about the safety of the government's nuclear programs?

[c] Total may not equal 100% because of rounding error.

using the most extreme responses is 1.8:1, indicating that Indian Springs/Pahrump residents were more distrustful of past government truthfulness than their Amargosa Valley/Beatty neighbors.

Mesquite and Caliente residents showed an even more marked distrust of government, with only 7.0 percent of respondents indicating a high level of confidence, whereas 44.7 selected categories reflecting a low level of distrust. The distrust to trust ratio for these respondents is 6.4:1. Just over 48 percent selected neutral categories.

The responses of urban residents reflected the most distrust in government honesty in reporting nuclear-related accidents. Comparatively, urban respondents appear to be most like those of the Mesquite/Caliente subgroup. Both groups had a very low proportion of their responses falling in the categories of extreme confidence and a relatively high proportion indicating a substantial lack of confidence. About half of the responses for both groups were in the middle or neutral range of the scale.

Reporting future repository accidents. Urban residents were also asked their perceptions about the proportion of future accidents at the proposed repository that they believe the government will report to the public (Table 19). As with the previous question, urban residents responded with answers which reflect a serious distrust in the government's willingness to truthfully report repository accidents. Almost 70 percent of the urban respondents indicated that they believe the government will report only some or very few accidents. The remaining 30.3 percent

Table 19. Distribution of Urban Responses to Question on The Honesty and accuracy of Future Government Reports on Nuclear Accidents.

	URBAN STUDY[a]
Responses	%[b]
Very Few Accidents	40.1
Some Accidents	29.6
Most Accidents	25.9
All Accidents	4.4

[a] Actual question (Q.93): What proportion of accidents at the repository do you believe the government will report to the public?

[b] Total may not equal 100% because of rounding error.

indicated they believe government will report most or all of the accidents.

Fairness of site selection process. Urban and rural groups were also asked to evaluate the fairness of the process used to select the Yucca Mountain repository site (Table 20). Sixty-four percent of the urban residents indicated that they thought the process was either unfair (40.2 percent) or very unfair (23.8 percent). Nearly 35 percent indicated they thought the process was fair (27.1 percent) or very fair (7.4 percent).

Among rural residents, the Amargosa Valley/Beatty area respondents seemed to feel the process was very fair. Approximately 46 percent indicated they thought the process was completely fair. Another 39.2 percent selected categories in the middle range of the scale, while only 14.4 percent chose categories indicating that the process was completely unfair.

The Indian Springs/Pahrump respondents were evenly divided in their perceptions of fairness, with 29.5 percent selecting categories indicating the process was completely fair, and 31.6 percent selecting categories indicating the process was completely unfair. An approximately equivalent proportion, 39.1 percent, selected categories in the middle range.

Mesquite and Caliente respondents tended to view the process as more unfair than fair. About 20 percent of these respondents indicated the process was completely fair, while 35 percent indicated the process was completely unfair. Nearly 45 percent selected mid-range categories,

Table 20. Distribution of Urban and Rural Responses to Questions on the Fairness of the Site Selection Process.

URBAN STUDY[a]

Responses	%[c]
Very Unfair	23.8
Unfair	40.2
Fair	27.1
Very Fair	7.4

RURAL STUDY[b]

Responses		Amargosa Valley/ Beatty %[c]	Indian Springs/ Pahrump %[c]	Mesquite/ Caliente %[c]
Completely Unfair	0	5.3	20.2	19.6
	1	3.0	4.2	5.4
	2	6.1	7.2	9.9
	3	6.2	5.7	4.1
	4	2.5	3.8	8.8
	5	18.0	17.2	23.0
	6	4.9	7.3	5.4
	7	7.8	5.1	3.4
	8	12.7	8.5	9.4
	9	9.7	6.2	3.7
Completely Fair	10	23.8	14.8	7.4

[a] Actual question (Q.101): To date, thinking about everything you know about the repository, do you think the process the government has used to select the Yucca Mountain site has been very fair, fair, unfair or very unfair?

[b] Actual question (Q.58): Thinking about everything that has occurred over the past year or so, how fair do you think the process of selecting Yucca Mountain as a possible site for a nuclear waste repository has been?

[c] Total may not equal 100% because of rounding error.

There appears to be little similarity between the responses given by urban residents and those of rural residents. Urban residents had the fewest responses (7 percent) in the extreme end of the scale indicating complete fairness. Indian Springs/Pahrump and Mesquite/Caliente residents tended to view the process as more fair, with Amargosa Valley/Beatty residents viewing it as quite fair.

Risk Aversion to Hazardous and Noxious Facilities

Insight into the views of rural and urban survey respondents regarding risk can be gained by examining responses regarding the minimal distance people would consider it acceptable to reside from various noxious and hazardous facilities, including the proposed nuclear waste repository. At one level, this analysis provides a context for evaluating public concern about the repository, because it permits an examination of the perceptions of the repository relative to other hazardous facilities. At another level, it provides information regarding acceptable risk, measured by the distance people are willing to live from these several types of hazardous facilities.

The results of the comparative facilities study were first reported in the Final Report of the Urban Survey by Mushkatel, Pijawka and Dantico (1991). As before, in order to make the comparative analysis between the urban and rural surveys, the rural sample was broken into 3 sub-groups: Amargosa/Beatty area; Indian Springs/Pahrump area; and the Mesquite/Caliente area.

Preferred distance[6] from hazardous facility. The simplest and most straightforward means of comparing the urban and rural subgroups is to examine the average distance respondents were willing to reside from the six hazardous facilities. As was to be expected, none of the four samples exhibited great concern with residing near a landfill (Table 21). Amargosa Valley/Beatty residents more concerned than the other groups about living near a landfill (13.5 miles), but were the least reticent about living near the other five hazardous facilities. Amargosa Valley/Beatty residents were far and away the least fearful about dwelling near a nuclear repository. Interestingly, these respondents were more concerned about a pesticide plant, a nuclear power plant and a chemical waste repository than the proposed nuclear repository. The median preferred distance from a nuclear waste repository was just 20 miles[7], while the median distance for the other three facilities was between 25 and 40 miles.

In contrast, Mesquite/Caliente residents were, overall, the most fearful and/or concerned about living near a hazardous facility. These respondents preferred, on average, to place 500 miles between themselves and a nuclear waste repository, and 200

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[6]Because many residents provided extreme estimates of the distance they were willing to live from a hazardous facility, e.g., 1,000,000 miles, the use of the arithmetic mean was an unsatisfactory statistic. Extreme scores skew the mean and any analysis based on the mean would have been misleading. Thus, the median, which is little affected by extreme scores, was used for this comparison.

[7]This is roughly the distance between these population centers and the proposed site on Yucca Mountain.

Table 21. Median Distance From Six Hazardous Facilities Respondents Willing to Reside

	Median Miles			
	Urban[a]	Amargosa/ Beatty	Indian Springs/ Pahrump	Mesquite/ Caliente
Landfill	13.5	5.0	9.5	7.0
Nuclear Power Plant	86.9	30.0	75.0	150.0
Pesticide Plant	35.5	40.0	50.0	100.0
Oil Refinery	32.5	20.0	50.0	50.0
Chemical Waste Repository	99.2	25.0	100.0	200.0
Nuclear Waste Repository	264.1	20.0	100.0	500.0

[a] Median values for the urban sample were interpolated using grouped date, while median values from the rural samples were calulated from the raw data.

miles was their preferred distance from a chemical waste repository.

The urban and Indian Springs/Pahrump samples responded with distances which were between the those of the Amargosa Valley/Beatty and Caliente/Mesquite samples. No simple pattern is evident for these two groups. For some facilities the latter were more concerned, while for other facilities the former provided responses which indicated greater concern. However, it should be noted that the urban sample was second only to the Mesquite/Caliente sample in their fear of a nuclear waste repository (264.1 miles).

Willingness to reside within 50 miles. A different approach to summarizing these data provides an only slightly different picture of the results. Table 22 shows the distribution of responses of people willing to reside within 50 miles of the six hazardous facilities. Here again data show that significant differences exist in the acceptability of these facilities among the population groups. As demonstrated in Table 21, the observed differences are not necessarily greatest between the Las Vegas Metropolitan area and the rural areas.

When the rural population groups are compared, it is evident that for all facilities except a landfill[8], the Mesquite/Caliente group is generally less accepting of hazardous facilities than the other two rural populations. A lower proportion of these residents

[8]Virtually everyone in all communities was willing to live within 50 miles of a landfill, thus reflecting the reality of modern living.

Table 22. Percent of Population Willing to Reside Within 50 Miles of Six Hazardous Facilities.

	Urban %	Amargosa/ Beatty %	Indian Springs/ Pahrump %	Mesquite/ Caliente %
Landfill	88	98	97	97
Nuclear Power Plant	37	65	45	27
Pesticide Plant	62	65	54	27
Oil Refinery	65	77	62	56
Chemical Waste Repository	29	74	38	25
Nuclear Waste Repository	19	76	39	18

were willing to live within 50 miles of the hazardous facilities than in any of the other areas. At the same time Amargosa Valley/Beatty respondents were the most accepting for every type of hazardous facility. A greater proportion of these residents were willing to live within 50 miles of a hazardous facility than was observed in any of the other areas.

To illustrate the differences between these two rural areas, while only 27 percent of the Mesquite/Caliente population were willing to live within 50 miles of either a nuclear power plant or a pesticide plant, fully 65 percent of the Amargosa/Beatty area respondents indicated that they were willing to reside within the 50 mile radius. Of the Mesquite/Caliente population, only 18 percent were willing to live within 50 miles of a nuclear waste repository, while 76 percent of the Amargosa\Beatty respondents were so willing.

Except for a landfill, residents of the Mesquite/Caliente area were less willing to live near hazardous facilities than the urban Las Vegas population. However, these differences were small for both chemical and nuclear waste facilities. For the other facilities, responses of the urban population were closer to the Indian Springs/Pahrump population than to the Mesquite/Caliente area.

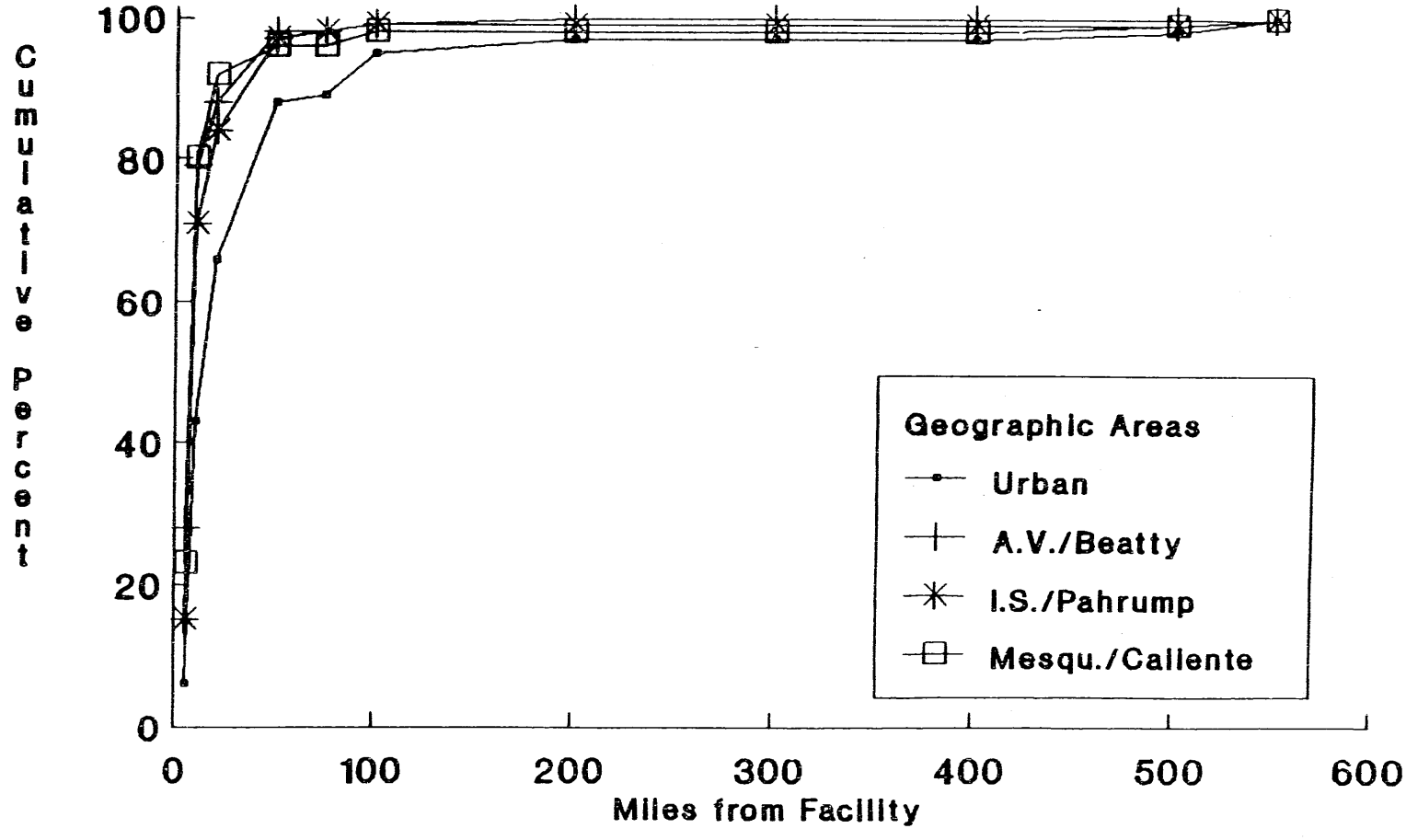
The fact that Amargosa/Beatty area residents are more willing to accept hazardous facilities than either the urban population or the other rural populations may be explained by past history. There is currently a landfill facility for the disposal of low-

level radioactive waste materials located between Beatty and Amargosa Valley operated by U.S. Ecology. Local residents have generally expressed little concern about that facility (see Trend et al., 1988a, 1988b).

For some types of hazardous waste facilities, responses of the urban population were closest to the responses of the Indian Springs/Pahrump population, e.g., nuclear power plant and oil refinery. Responses regarding chemical and nuclear waste facilities were closest between the urban and Mesquite/Caliente populations. Only 18 percent of the Mesquite/Caliente sample were willing to live within 50 miles of a nuclear waste repository. Similarly, 19 percent of the urban population were willing to live within 50 miles of a nuclear waste repository. In contrast, 39 percent of the Indian Springs/Pahrump residents were so willing, and fully 76 percent of the Amargosa Valley/Beatty area population indicated that they would be willing to live within 50 miles of the repository.

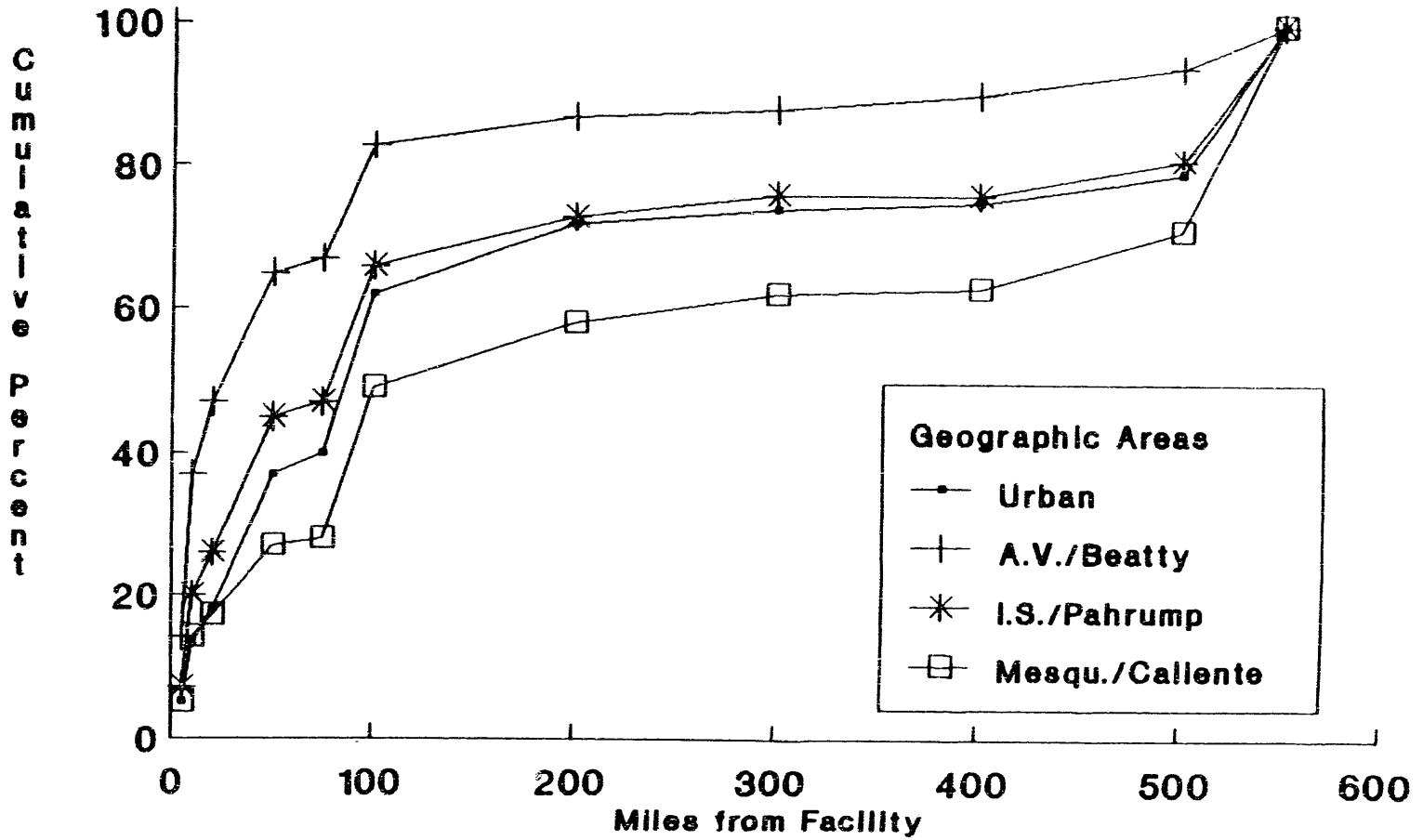
Cumulative distribution of responses. Risk aversion perceptions of the sampled populations can be further illustrated by examining the cumulative distribution of responses to the questions about the hazardous facilities. Figures 1 through 6 show the cumulative percentages of the population willing to live at various distances from the six hazardous facilities. Figure 1 demonstrates that there is little difference in risk perceptions of a landfill among the four samples, a result already evident in Table 21. Another familiar pattern can be seen in Figure 2.

Figure 1. Cumulative Distribution of Responses to Landfill Question



Maximum scale value assumed to be 550.

Figure 2. Cumulative Distribution of Responses to Nuclear Power Plant Question



Maximum scale value assumed to be 660.

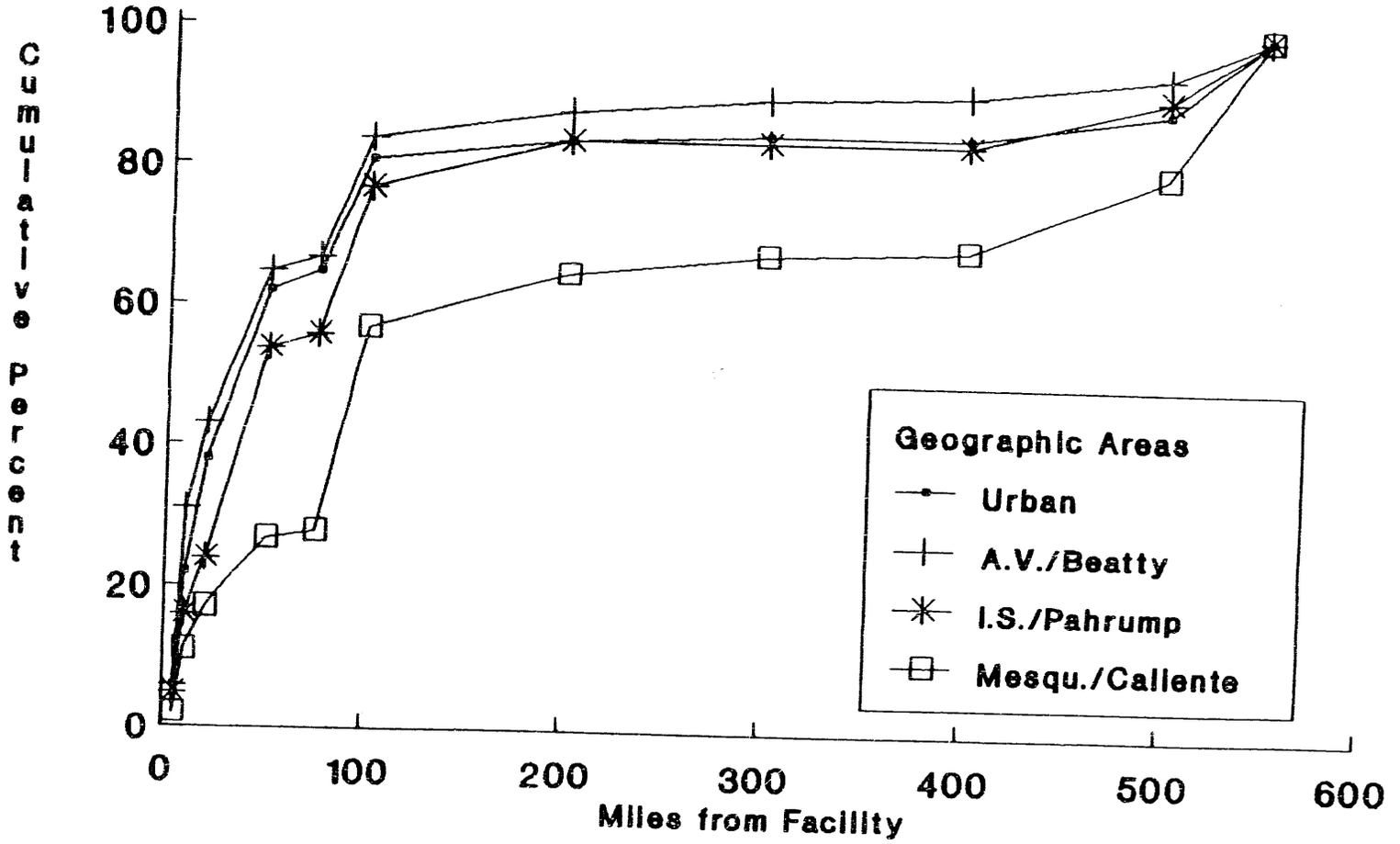
There, it is clear that a smaller proportion of the population responding with low mileage responses makes Mesquite/Caliente the most risk aversive of the four samples regarding residence near a nuclear power plant. Amargosa Valley/Beatty residents, on the other hand, with over 80 percent of the population willing to live at close distances to a nuclear power plant are the least risk aversive. The urban and Indian Springs/Mesquite samples have nearly identical distributions of responses.

An examination of the distributions for a pesticide plant indicates very similar response patterns in all communities except Mesquite/Caliente (Figure 3). The respondents in the latter area are, as in Figure 2, the most risk aversive, while the residents of Amargosa Valley/Caliente are slightly more risk accepting than the urban and Indian Springs/Pahrump area.

The responses provided by residents of all four areas were similar regarding residence near an oil refinery. A very large majority of residents were willing to reside within 100 miles of a refinery (Figure 4). However, Mesquite/Pahrump residents were least inclined to live near a refinery and Amargosa Valley/Beatty residents were most willing to live near such a facility.

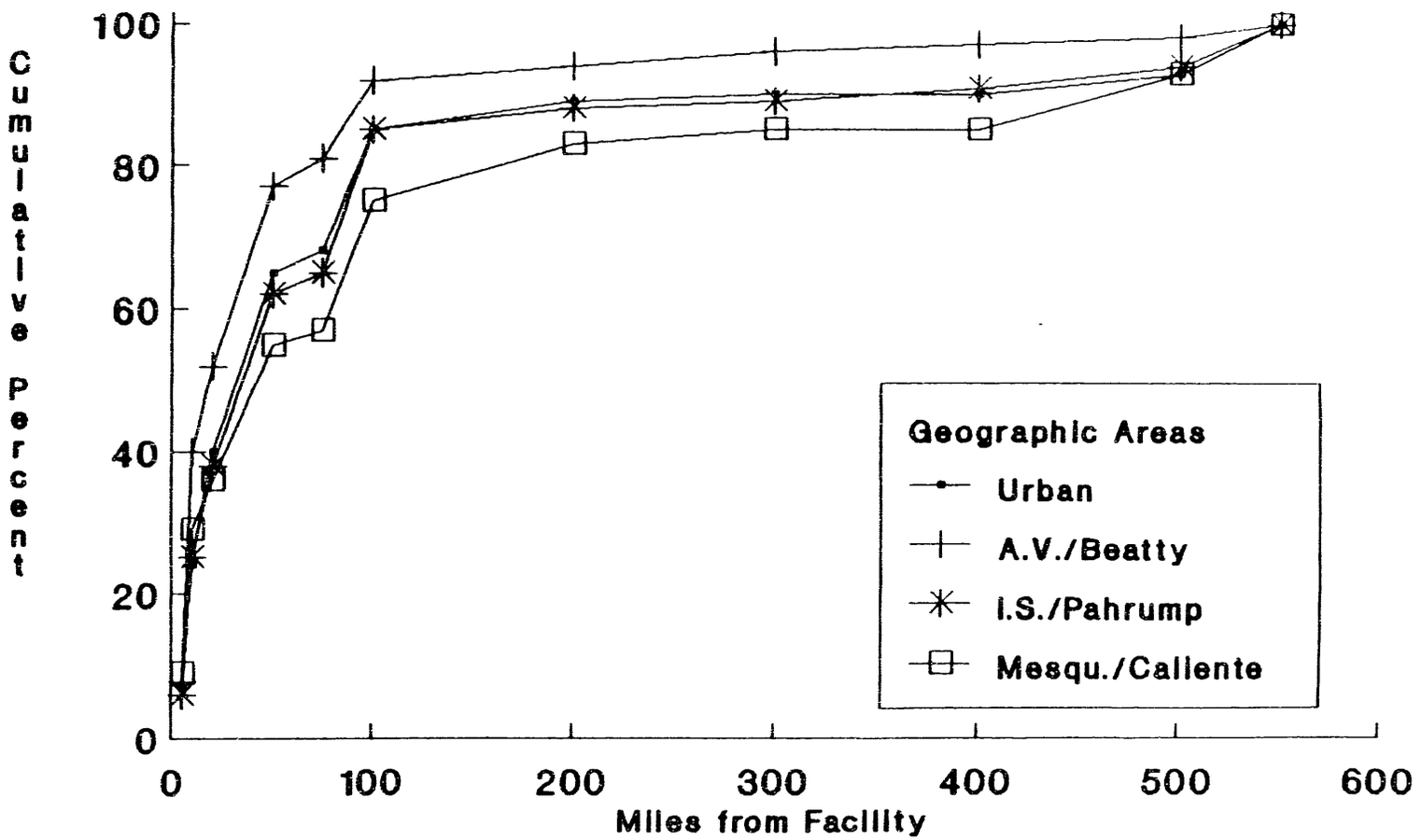
A more distinct pattern emerges when responses to the question of residing near a chemical waste repository are examined (Figure 5). As with the other facilities, residents of Amargosa Valley/Beatty were the least fearful of residence near a chemical waste repository, and Mesquite/Caliente residents were the most fearful. Urban residents were somewhat less fearful than

Figure 3. Cumulative Distribution of Responses to Pesticide Plant Question



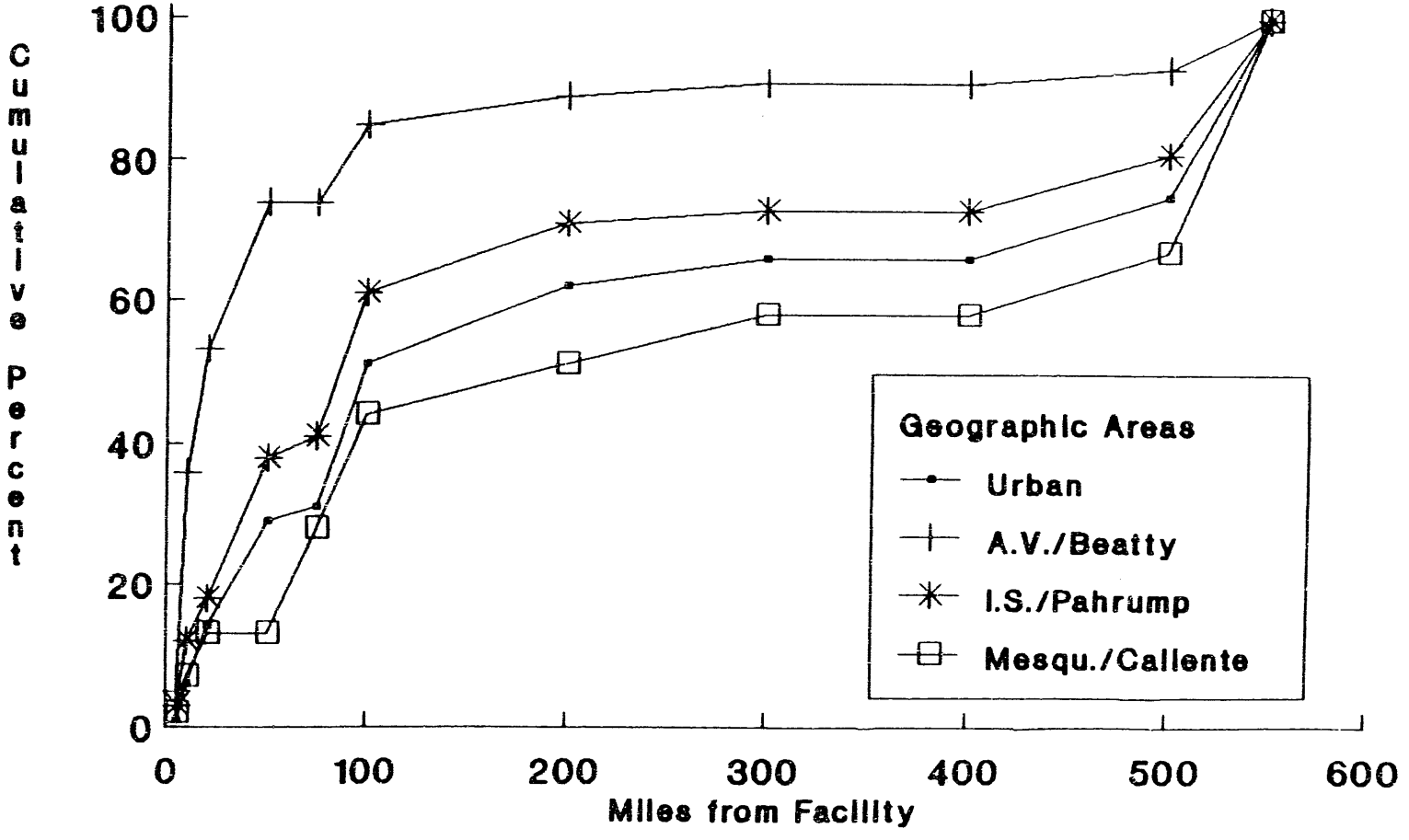
Maximum scale value assumed to be 550.

Figure 4. Cumulative Distribution of Responses to Oil Refinery Question



Maximum scale value assumed to be 650.

Figure 5. Cumulative Distribution of Responses to Chemical Waste Repository Question

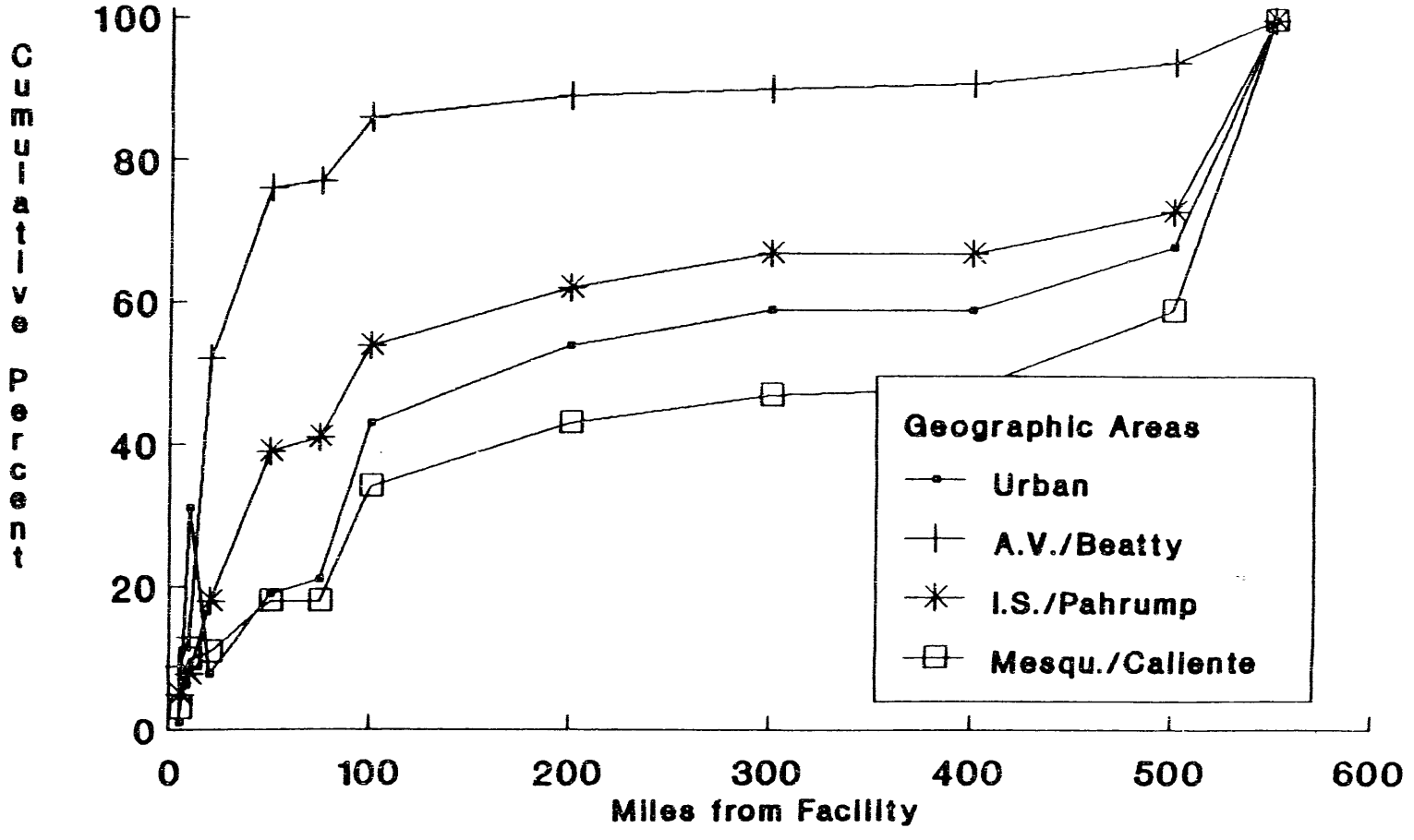


Maximum scale value assumed to be 660.

Mesquite/Caliente residents and Indian Springs/Pahrump residents were less fearful than the urban residents.

Responses to the question about the nuclear waste repository provides a very similar pattern (Figure 6). Amargosa/Beatty respondents were substantially more accepting of residence near a nuclear waste facility than any of the other three populations sampled. The were followed in levels of fearfulness by Indian Springs/Pahrump residents, the urban population and denizens of Mesquite/Caliente. The distinction between the Amargosa Valley/Beatty and Mesquite/Caliente residents is illustrated by the fact that at a distance of 200 miles from the repository, only about 43 percent of the Caliente/Mesquite population would be willing to reside, while approximately 89 percent of the Amargosa/Beatty area population would be so inclined. This compares to the 54 percent of the urban population and 62 percent of the Indian Springs/Pahrump population groups.

Figure 6. Cumulative Distribution of Responses to Nuclear Waste Repository Question



Maximum scale value assumed to be 550.

Summary of Comparative Analysis

The responses from the surveys of urban and rural Nevada residents were compared across a number of areas in an effort to determine the degree of commonality of perceptions among the two population groups. The areas examined were the acceptability of the Yucca Mountain site for a repository, risk perceptions, assessments of the effects of nuclear activities at the Nevada Test Site, trust in government and in government agencies' ability to safely manage the repository, and risk aversion to various types of noxious and hazardous facilities.

When asked if they would chose to build a repository at Yucca Mountain if the choice were theirs to make, urban residents were heavily opposed to the choice of the Yucca Mountain site. The reaction of urban residents most closely matched the response pattern of the Mesquite/Caliente area residents, who also expressed a strong sentiment that they did not desire to build a repository at the Yucca Mountain site.

The tendency of urban residents to respond similarly to the rural residents from the Mesquite/Caliente area was generally repeated for several risk perception variables. These two groups exhibited very similar response patterns on the questions about the inevitably of accidents involving hazardous materials and whether hazardous materials should be transported through populous areas. The similarity continued in their assessments of possible economic benefits of a repository for their community, concern about

possible harmful effects, and an overall assessment of the relative benefits and harms from a repository.

Similarities were less clear on the responses to questions about the "acceptably safe" construction and operation potential of the Yucca Mountain facility, the "acceptably safe" transportation of nuclear waste to the repository, the assessment of the safety of current methods of transporting hazardous materials, and the possible effects of the repository on personal health and safety. On these questions, and on the question that asked about acceptable distances to live from a nuclear waste repository, the responses of urban residents fell about halfway between the slightly more extreme views of the Mesquite/Caliente and Indian Springs/Pahrump residents.

On questions that specifically addressed perceptions of the impacts of the Nevada Test Site, urban residents' response patterns again appeared to resemble those of the Indian Springs/Pahrump residents. These two groups exhibited similar feelings about the effects of past above ground nuclear testing, as well as about the possible future effects of underground testing.

The responses of urban residents regarding the safety of procedures for transporting and handling nuclear materials fell about halfway between the positions of the rural residents of the Indian Springs/Pahrump and Mesquite/Caliente areas. Respondents from the Mesquite/Caliente area were the most extreme of all groups in the population, exhibiting the highest proportion of responses indicating they felt that the NTS had and would cause health

problems. There was little similarity between urban and rural residents on the overall pattern of evaluation of the benefits and harmful effects of a test site.

While urban respondents most closely resembled the rural residents of the Amargosa Valley/Beatty area on their views about the extent to which the federal government can be trusted, overall levels of distrust at the extreme end of the scale were generally uniform across all population groups. When the same question was asked about state government, all residents appeared to share approximately the same levels of trust. When asked about trust in local government, however, there did not appear to be any common pattern between urban residents and any of the three groups of rural residents.

There also did not appear to be any strong uniformity among the rural groups concerning the fairness of the site selection process. The urban population's view was closest to the Mesquite/Caliente population. When asked to assess the extent to which government could be trusted about reporting past or future accidents, urban residents' responses also very closely matched those of the Mesquite/Caliente area residents.

The data examined in this segment of the comparative analysis suggest a fairly strong pattern of commonality in attitudes and perceptions between the Las Vegas metropolitan area residents and the Mesquite/Caliente group. The items exhibiting the highest degree of similarity relate to perceptions of repository effects on health and safety, overall repository benefits versus harm, and

trust in government's reporting of accidents, as well as the perceptions of fairness in the siting process.

Responses of the urban population move closer to the response patterns found in the Indian Springs/Pahrump population when the items concern general attitudes about risk that are not necessarily associated with the repository. Perceptions of urban residents regarding the health impacts of the NTS more closely resemble the perceptions of the Indian Springs/Pahrump area residents than those of the Mesquite/Caliente area residents. Mesquite/Caliente residents were relatively more concerned about NTS impacts than any of the other population groups examined.

The risk perceptions expressed by residents in the Amargosa Valley/Beatty area are consistently different from those of both the urban respondents and respondents from the other rural study areas. Residents of Amargosa Valley/Beatty tend to view NTS as having largely beneficial effects, consider it unlikely that NTS programs have or will cause adverse health effects for area residents, consider current procedures for handling and transporting hazardous materials to be acceptably safe, are willing to live relatively close to a variety of noxious and hazardous facilities, express low levels of concern about repository health effects, and generally believe that the repository would have beneficial effects on the local community. Contrary to what might be expected on the basis of previous research suggesting a "Not In My Back Yard" (NIMBY) response when nearby hazardous facilities are proposed (see Edelstein, 1988), the residents of these two

communities located nearest to Yucca Mountain are significantly less concerned about, and more supportive of, the repository than are residents in any of the more distant communities. This anomalous finding is discussed in detail in the conclusions section of this report.

BIVARIATE ANALYSIS: EXPLANATORY FACTORS FOR RISK PERCEPTIONS AND LEVELS OF REPOSITORY SUPPORT/OPPOSITION

Urban Area Analysis

This segment of the analysis examines possible explanatory factors that may help to account for variations in risk perceptions[9] and views about the acceptability of building the repository at Yucca Mountain. A total of 16 variables were identified as potentially useful predictors of these two dependent variables. The selection of these variables was based upon both the researchers' knowledge of the context of the study areas and the results of prior research on risk perception and environmental attitudes. The analysis focuses first on associations between each of these possible explanatory variables and the measure of repository risk perceptions. The second set of relationships examined includes these same explanatory variables and residents' expressions of support/opposition to construction of the Yucca Mountain repository.

Most of the independent variables are found to exhibit little or no association with either of the dependent variables. That is,

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[9]The perception of risk is also used as an independent variable in the explanation of responses to the repository.

there was not a meaningful association between either dependent variable and respondents' age, income, racial/ethnic background, or past work at a federal defense facility in southern Nevada. Indices on trust factors were not developed for this analysis, although earlier studies showed strong relationships between trust indices and risk perception factors (Mushkatel et al., 1991). The analysis also attempted to examine the potential associations of the dependent variables with current employment at a federal defense facility, but the sample did not include a sufficient number of such workers to adequately develop this relationship.

However, six explanatory variables in both the urban and rural studies were found to exhibit statistically significant and substantively important associations with each of the two dependent variables. These six variables included: (1) perceptions of possible benefits and harmful effects of the repository (Question 136); (2) perceptions of the balance between beneficial and harmful effects of NTS (Question 63); (3) belief that aboveground testing at NTS caused harmful health effects (Question 64); (4) belief in the likelihood of future harmful health effects from underground testing at NTS (Question 66); (5) estimates of the proportion of accidents at NTS that have been reported by the federal government (Question 69); and (6) belief that experience gained at the NTS has established safe processes for transporting nuclear materials (Question 70). The relationships involving these variables indicate that the existence of the NTS may be an important factor in understanding repository risk perceptions.

Explanatory Variables for Risk Perception

The crosstabulation of the measure of perceived risks posed by activities at the Yucca Mountain repository (Question 87A) with six key independent variables yielded substantial and statistically significant relationships for each variable examined. The relationships are summarized in Table 23, which reports associational statistics representing the relationships between this dependent variable and each of the independent variables.

All six of the associations were statistically significant at the .001 level.[10] The Tau-c values, which can range from -1 to +1, are moderate, except for relationships involving Question 64. Because Tau-c has no straightforward operational interpretation another measure of association, Gamma, was also calculated.[11] The gamma values reported in Table 23 also indicate that each of these independent variables has a moderate to moderately strong association with the measureof perceived repository risks.

The strongest relationship is between urban residents' assessments of possible benefits/harmful effects of a repository

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[10]The probabilities reported are based on Tau-c.

[11]Gamma uses a different definition of error in prediction than Tau-c. It should be noted that ties on either independent or dependent variable are excluded from the calculation of Gamma. Gamma has a proportional reduction of error (PRE) interpretation. That is, Gamma values reflect the degree to which error in predicting the dependent variable is reduced by knowledge of the independent variable.

Table 23. Urban Study Correlations Between Seriousness of Perceived Repository Risks and Six Independent Variables

Question	Measure of Association	
	Gamma	Tau-c
Possible Benefits\Harm of Repository (Q.136)	-.594	-.465[a]
Benefits\Harm of NTS (Q.63)	-.464	-.350[a]
Perceived Health Harm From Aboveground Testing (Q.64)	-.308	-.257[a]
Likelihood of Health Harm From Underground Testing (Q.66)	-.499	-.426[a]
NTS Accidents Reported by Government (Q.69)	-.408	-.287[a]
NTS Established Safe Nuclear Transportation Procedures (Q.70)	-.458	-.372[a]

[a] $P < .001$

and their evaluation of health and safety risks posed by repository activities. For example, knowledge of perceptions of possible repository benefits/harm reduced error in predicting perceived repository risks by 59 percent (Gamma = -.594).[12].

There is a moderate relationship between urban residents' assessment of possible benefits/harmful effects of activities at the Nevada Test Site and their evaluation of risks posed by the repository. For this pair of variables, error is reduced by 46 percent (Gamma = -.464). The crosstabulations show that about 58 percent of the respondents who indicated a belief that NTS harmful effects outweighed benefits also selected the two categories of the dependent variable indicating that they considered risks from repository activities to be "very serious."

A moderate correlation (Gamma = -.308) was found for the relationship between repository risks and harmful health effects from aboveground testing, indicating that error in predicting the former variable was reduced by 31 percent. About 57 percent of those who indicated the highest level of concern about repository risks also selected the two highest categories of the scale evaluating the likelihood of harm to health from previous aboveground nuclear testing. About 57 percent who selected the second highest level of repository risk concern also indicated the

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[12]Loosely speaking, knowledge of the independent variable reduces the error in predicting the dependent variable by 59 percent. It should be noted that the Gamma's sign reflects only the direction of the prediction, and does not reflect the reduction of error.

two highest levels of likelihood of harm to health from aboveground testing.

A slightly stronger relationship exists between respondents' views about risks from repository activities were compared to their views about the likelihood of future harm to health from underground nuclear testing activities at NTS. In this instance error is reduced by 49 percent (Gamma = -.499). About 58 percent of those who indicated the highest level of repository risk perception also selected the two highest categories on the scale evaluating the likelihood of harm from underground nuclear testing. Approximately 61 percent of those who selected the second highest level of concern about repository risks also selected one of the three categories indicating they felt it extremely likely that underground testing would cause harm to personal health.

A similar pattern was observed when comparing attitudes about risks from repository activities with urban residents' evaluation of the proportion of NTS accidents reported by the federal government. For these two variables Gamma equaled -.408. Crosstabulations for these two variables show that 63 percent of those who perceived repository risks to be most serious also felt that the government reports very few accidents; about 44 percent of those who selected the second highest level of risk concern also indicated a belief that the government reports very few NTS accidents.

The final independent variable examined in this part of the analysis involved levels of agreement/disagreement with the statement that experience at the NTS has led to safe nuclear materials transportation processes. Again the relationship is moderate (Gamma = -.458). About 75 percent of those who indicated the highest level of disagreement with the statement also felt that risks from activities at the Yucca Mountain repository would be very serious. Roughly 56 percent of those who indicated the second highest level of disagreement with the statement also selected the second highest level of concern about the seriousness of risks associated with repository activities.

Explanatory Variables for Support/Opposition to the Repository

The crosstabulation of the seven key independent variables with urban residents' assessments regarding whether they would choose to build the Yucca Mountain repository also yielded generally strong and statistically significant relationships. Correlation statistics representing these relationships are presented in Table 24. All of these associations were statistically significant at the .001 level, and the Gamma values suggest moderate to strong relationships.

The most powerful relationship is between the question involving repository support/opposition and the respondents'

Table 24. Urban Study Correlations Between Respondents' Choice to Build Repository (Q.97) and Seven Independent Variables

Question	Measure of Association	
	Gamma	Tau-c
Possible Benefits\Harm of Repository (Q.136)	-.685	-.458[a]
Benefits\Harm of NTS (Q.63)	-.540	-.321[a]
Perceived Health Harm From Aboveground Testing (Q.64)	-.297	-.209[a]
Likelihood of Health Harm From Underground Testing (Q.66)	-.439	-.312[a]
NTS Accidents Reported by Government (Q.69)	-.404	-.237[a]
NTS Established Safe Nuclear Transportation Procedures (Q.70)	-.388	-.266[a]
Perceived Repository Risks (Q.87A)	-.607	-.437[a]

[a] $P < .001$

evaluation of the balance between possible harmful and beneficial effects from the repository. Knowledge of responses to the question on harmful/beneficial effects allows a 68 percent reduction of error in predicting support for the repository (Gamma = .685). About 90 percent of those who indicated a belief that possible harmful effects of the repository would outweigh any benefits also responded that they would definitely not (74.8%) or probably not (14.7%) choose to build the repository at Yucca Mountain, if the choice were theirs.

A similar, but somewhat weaker relationship exists between residents' views about possible beneficial and harmful effects from nuclear testing activities at the NTS. With a Gamma of -.540, predictive error can be reduced by 54 percent. About 92 percent of those who felt that NTS effects were generally harmful also indicated that they would definitely not (79.2%) or probably not (12.5%) choose to locate the repository at Yucca Mountain.

There were moderate relationships for the questions about repository siting and respondents' evaluations of possible harm to health from past aboveground nuclear testing (Gamma = -.297) and future underground testing at NTS (Gamma = -.439). About 84 percent of those who believed it extremely likely that above-ground testing caused health problems also indicated that they would definitely not (73.8 percent) or probably not (10.7 percent) choose the Yucca Mountain site for a repository. About 68 percent of those who selected the second highest category of likelihood that aboveground testing caused harm to health also indicated that

they would definitely or probably not choose to build the repository at Yucca Mountain.

Among those who considered it extremely likely that underground testing will cause future health problems, 78.6 percent indicated they would definitely not choose to build a repository at Yucca Mountain, and an additional 10 percent indicated they would probably not choose to build the repository. Among those who selected the second highest level of likelihood of health problems from underground testing, about 85 percent said they would either definitely or probably not choose to build the repository if they were able to make the decision.

A moderate positive association was also obtained when comparing respondents' evaluations about the proportion of NTS accidents reported by government agencies with their views about building the repository (Gamma = -.404). About 80 percent of those who indicated a belief that the government reports very few nuclear accidents at NTS also indicated that they would definitely not (66.8%) or probably not (13.0%) choose to build a repository at Yucca Mountain. Similarly, about 80 percent of those who indicated a belief that the government reports only some of the nuclear mishaps at NTS also indicated that they would definitely or probably not choose to build the repository.

This same pattern was repeated when choice to build a repository was compared with urban residents' evaluation of the statement that experience at the NTS has resulted in safe transportation procedures for nuclear materials (Gamma = -.388).

Eighty percent of those who selected the highest level of disagreement with the statement and about 74 percent of those who selected the second highest level said they would definitely or probably not choose to build a repository at the Yucca Mountain site.

A final correlation tested the relationship between the level of support/opposition to building the repository and the evaluation of health and safety risks from repository activities. This correlation yielded another moderately strong relationship (Gamma = -.607). Over 81 percent of the respondents who selected the two scale categories indicating highest levels of concern about repository risks also said that they would definitely not choose to build a repository at the Yucca Mountain site. Over 10 percent indicated that they would probably not choose to build the repository.

Rural Area Analysis

Bivariate analysis involving the three sets of rural study communities (Amargosa Valley/Beatty, Indian Springs/Pahrump, and Caliente/Mesquite)[13] was undertaken to provide an evaluation of possible similarities and differences with results obtained from the urban area sample. The analysis focused on the same two dependent variables: (1) perceptions of repository health and safety risks, and (2) levels of support/opposition for construction of a repository at Yucca Mountain. A parallel set of possible

[13]The data for the three areas were proportionately weighted to compensate for the unequal population sizes.

explanatory variables were also examined: respondent age, sex, education and income, trust in local, county, state and federal levels of government, experience working at one of several federal government facilities in southern Nevada (NTS, TTR, Nellis AFB, or Indian Springs AFB), variables addressing attitudes and perceptions regarding NTS testing activities and programs, attitudes about government honesty in reporting about nuclear program activities; and views about beneficial/harmful consequences of a repository on respondents' communities.

The analysis indicated that the independent variables exhibiting substantively important and statistically significant relationships with the dependent variables were identical to those identified in the analysis of urban survey responses. That is, variations in repository risk perceptions and levels of support/opposition were most effectively accounted for by views about the balance between potentially harmful and beneficial effects of the repository, views about the balance of beneficial and harmful effects of NTS, concerns about health risks from both aboveground and underground nuclear testing, perceived honesty of government reporting about nuclear programs, and beliefs about the degree to which NTS experience has led to safe procedures for handling and transporting nuclear materials.

The relationships involving these six explanatory variables were highly consistent across all three rural study areas. None of the variables measuring respondents' social or demographic characteristics exhibited a meaningful relationship with either of

the dependent variables.

There was only one instance in which this pattern of consistency across study areas was not observed. This involved a dichotomous measure indicating whether or not the respondent had ever worked at one of the several federal defense installations in southern Nevada. In the Indian Springs/Pahrump sample, there was a moderate but statistically significant tendency for those who had previously or currently worked at one of these facilities to report lower repository risk perceptions ($r = -.363$) and to indicate higher levels of support for repository construction ($r = -.341$).

Explanatory Variables for Risk Perception

Bivariate relationships between the measure of perceived health and safety risks from the repository (Question 53 in the rural survey) and the six key independent variables are summarized by the measures of association reported in Table 25. The statistics reported include Pearson's correlation coefficient (r), which in this analysis was calculated using the full range of scale values (0 through 10) originally measured for each of the variables.[14] To facilitate comparisons with results from the urban area analysis, response categories for all variables were

[14]Pearson's correlation coefficient (r) can vary between values of -1.0 and +1.0, with values nearer to these extremes indicative of a strong association between variables. This correlation statistic is appropriately used when both variables are measured on a quantitative scale providing at least an interval level of measurement. Unlike Gamma, r has no PRE interpretation. However, r^2, the Coefficient of Determination, has a PRE interpretation. A variant of the PRE for r^2 asserts that the value of r^2 is the proportion of variation in the dependent variable "explained" by knowledge of the independent variable.

Table 25. Rural Survey Correlations Between Perceived Repository Risks and Six Independent Variables

	Amargosa Valley/ Beatty		Indian Springs/ Pahrump		Caliente/ Mesquite	
Questions	r	gamma	r	gamma	r	gamma
Possible benefits/ harm from repository (Q.53)	-.598	-.748	-.673	-.839	-.665	-.829
Benefits/harm from NTS (Q.49)	-.472	-.690	-.493	-.693	-.447	-.616
Above ground testing effects (Q.39)	.352	.493	.559	.655	.478	.645
Underground testing effects (Q.40)	.536	.729	.650	.787	.613	.725
Federal honesty about nuclear programs (Q.52)	-.597	-.740	-.594	-.725	-.475	-.578
Safety of nuclear handling and transportation procedures from NTS (Q.41)	-.589	-.736	-.433	-.554	-.409	-.583

also collapsed into the same three groupings used in the comparative analysis presented in earlier sections of this report.[15] Measures of association reported for crosstabulations based on these grouped response values are reported as gamma.

As reported in Table 25, the correlations between perceived health and safety risks of the repository and the six key explanatory variables were all moderate to strong. All of the coefficients reported in this segment of the analysis were statistically significant at the .01 level.

Looking first at the relationships involving respondents' assessments of possible beneficial/harmful effects of the repository for their communities, we observed a moderate to strong negative correlation with risk perceptions in each of the study areas. Pearson correlation coefficients ranged from a low of -.598 in Amargosa Valley/Beatty to -.673 in Indian Springs/Pahrump. Thus, there was a pronounced tendency for those who expressed anticipation of generally beneficial effects on their communities to also express relatively low perceptions of health and safety risks from the repository.

In Amargosa Valley/Beatty, 80 percent of those choosing one of the three scale responses on the benefit/harm measure, indicating "highly beneficial" effects, also indicated one of the three values on the dependent variable indicating the lowest levels of concern about repository health and safety risks. In Indian

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[15]Values of 0, 1 and 2 grouped as "low", values of 3, 4, 5, 6, and 7 grouped as a "middle" category, and values of 8, 9 and 10 grouped as "high."

Springs/Pahrump, 73 percent of those anticipating highly beneficial consequences chose one of the three lowest risk responses for the dependent variable; ninety-two percent of those who anticipated highly harmful community effects chose one of the three highest risk responses. In Caliente, 59 percent of those who anticipated primarily beneficial consequences selected one of the three lowest values on the risk perception variable, while 90 percent of those anticipating primarily harmful community effects selected one of the three highest risk perception values.

A somewhat lower but still substantial negative correlation exists between rural residents' assessments of the possible beneficial and harmful effects of activities at NTS and their perceptions about repository health and safety risks. The Pearson's correlation coefficients were very similar across the three rural study areas, ranging from -.447 in Amargosa Valley/Beatty to -.493 in Indian Springs/Pahrump.

Thus, rural residents who felt that NTS effects were generally negative tended also to express higher levels of concern about repository risks, while those who viewed NTS as having largely beneficial effects tended to express relatively low repository risk perceptions. In Amargosa Valley/Beatty, 75 percent of those who viewed NTS effects as mostly beneficial selected one of the three lowest concern values for the repository risk perception question. In Indian Springs/Pahrump, the 62 percent who viewed NTS effects positively expressed the lowest levels of repository risk concern, while 89 percent of those who viewed NTS as having primarily

negative effects expressed very high concern about repository risks. In Caliente/Mesquite, 61 percent of those who viewed NTS effects positively indicated low concern about repository risks, while 78 percent of those who viewed NTS effects negatively indicated high concern about repository risks.

Views about the likelihood that area residents experienced harmful health effects from aboveground nuclear testing at NTS exhibited moderate to fairly strong positive relationships with repository risk perceptions. The lowest correlation was observed in Amargosa Valley/Beatty ($r = .352$), while the relationship was strongest in Indian Springs/Pahrump ($r = .559$).

In Amargosa Valley/Beatty, about 73 percent of respondents who felt that adverse health effects from aboveground testing were very unlikely, also expressed very low levels of concern about repository health and safety risks. Those who considered it highly likely that aboveground testing had caused adverse health effects were rather evenly split with respect to repository risk perceptions, with 30 percent expressing low concern, 39 percent expressing intermediate concern, and 31 percent expressing high concern about repository risks. Among Indian Springs/Pahrump respondents who considered it highly likely that adverse health effects had resulted from aboveground testing, 70 percent expressed high concern about repository risks; about 65 percent of those who considered it unlikely that testing had adversely affected health also expressed very low levels of concern about repository risks. Very few Caliente/Mesquite respondents indicated a belief that

above ground effects on health were unlikely; among those who considered such effects to be highly likely, 61 percent perceived the health and safety risks of the repository to be very high.

Similar but somewhat stronger relationships were observed between repository risk perceptions and the variable addressing the likelihood of future adverse health effects from underground nuclear testing at NTS. Correlation coefficients measuring this relationship ranged from .536 in Amargosa Valley/Beatty to .613 in Caliente/Mesquite to .650 in Indian Springs/Pahrump. In Amargosa Valley/Beatty, a majority of respondents considered it unlikely that underground testing would adversely affect the health of area residents. Among those expressing such views, 73 percent indicated low levels of concern about repository risks. In Indian Springs/Pahrump, 67 percent of those who considered future health effects from testing to be unlikely also expressed low risk perceptions about the repository; 82 percent of those who considered NTS health effects to be likely also expressed high levels of concern about repository risks. In Caliente/Mesquite, 78 percent of those who felt that adverse health effects would result from underground testing expressed high levels of concern about health and safety effects of the repository.

There was a moderate negative relationship between risk perceptions and levels of confidence in federal agencies' honesty in providing information about the safety of nuclear programs. Correlation coefficients ranged between -.475 in Caliente/Mesquite and -.597 in Amargosa Valley/Beatty. In Amargosa Valley/Beatty, 83

percent of those who expressed high confidence in the honesty of government agencies reported low levels of concern about repository safety. In Indian Springs/Pahrump, 79 percent of those who expressed confidence about provision of information about nuclear programs reported low concern about the repository, while 71 percent of those expressing little confidence in government agencies expressed high levels of concern. In Caliente/Mesquite, very few respondents indicated high levels of confidence in the honesty of information provided by government agencies; among those who reported very low levels of confidence, 69 percent exhibited high levels of concern about health and safety risks from the repository.

There was a consistent negative association between repository risk perceptions and respondents' views about a statement suggesting that experience at NTS has provided safe procedures for transporting and handling nuclear materials. Correlation coefficients ranged from a low of -.409 in Caliente/Mesquite to a high of -.589 in Amargosa Valley/Beatty. Among the majority of Amargosa Valley/Beatty respondents who strongly agreed that NTS experience had provided safe transportation and handling procedures, 75 percent expressed very low concern about repository risks. In Pahrump/Indian Springs a majority of respondents also agreed strongly with the statement; fifty-five percent of those expressing such agreement also indicated very low repository risk perceptions. In Caliente/Mesquite, responses were more evenly distributed between agreement and disagreement with the statement

about NTS experience providing safe procedures. Among those who strongly disagreed with the statement, about 81 percent expressed high levels of concern about repository risks.

Explanatory Variables for Support/Opposition to the Repository

Table 26 presents correlation statistics summarizing the relationships between each of the six key explanatory variables and the dependent variable measuring residents' assessments regarding whether they would choose to build the Yucca Mountain repository, if the choice were theirs to make. In addition, the table reports correlation statistics for the relationship between this dependent variable and the measure of concern about repository health and safety risks.

Consistently strong negative correlations were observed across the rural study areas when examining the relationship between repository support/opposition and respondents' views about the balance between potential beneficial and harmful effects of the repository on their communities. Pearson's correlation coefficients ranged from -.663 in Pahrump/Indian Springs to -.728 in Caliente/Mesquite. In Amargosa Valley/Beatty, 74 percent of those who anticipated highly positive community effects from the repository said that they definitely would build the repository if the choice were theirs; an additional 22 percent said they probably would choose to build it. In Indian Springs/Pahrump, 56 percent of those anticipating highly positive community effects stated that they definitely would choose to build the repository, with an additional 31 percent stating that they probably would choose to do

Table 26. Rural Survey Correlations Between Respondents' Choice to Build Repository and Seven Independent Variables

	Amargosa Valley/ Beatty		Indian Springs/ Pahrump		Caliente/ Mesquite	
Questions	r	gamma	r	gamma	r	gamma
Possible benefits/ harm from repository (Q.53)	-.658	-.782	-.663	-.827	-.728	-.849
Benefits/harm from NTS (Q.49)	-.477	-.629	-.603	-.733	-.429	-.547
Aboveground testing effects (Q.39)	.344	.444	.551	.630	.339	.417
Underground testing effects (Q.40)	.503	.674	.615	.679	.503	.543
Federal honesty about nuclear programs (Q.52)	-.583	-.698	-.663	-.734	-.547	-.623
Safety of nuclear handling and transportation procedures from NTS (Q.41)	-.514	-.607	-.498	-.566	-.407	-.548
Repository risk perceptions (Q.55)	.694	.751	.726	.794	.668	.626

so. In Caliente/Mesquite, respondents were more likely to anticipate negative community effects rather than positive effects from the repository. Among those who anticipated highly negative community effects, 85 percent indicated that the would definitely not choose to build the repository at Yucca Mountain.

Relationships between this dependent variable and respondents' assessments of the balance between beneficial and harmful effects of NTS programs also indicated a substantial inverse association. Pearson's correlations ranged from a low of -.429 in Caliente/Mesquite to a high of -.603 in Indian Springs/Pahrump. In Amargosa Valley/Beatty, 66 percent who considered NTS effects to be highly beneficial also responded definitely yes regarding whether they would choose to build the repository; an additional 25 percent answered probably yes. In Indian Springs/Pahrump, 51 percent of those who considered NTS effects on the community to be highly beneficial stated that they would definitely build the repository, while 27 percent stated that they would probably choose to build it. In Caliente/Mesquite, respondents were about twice as likely to consider NTS effects to be very negative as opposed to very positive. Among those who considered effects of NTS on the community to have been very harmful, 66 percent stated that they would definitely not choose to build the repository at Yucca Mountain.

Moderate positive associations were observed between rural survey respondents' views about the likelihood of adverse health effects from above ground testing at NTS and their levels of

opposition/support for building the Yucca Mountain repository. Correlations ranged from .339 in Caliente/Mesquite to .551 in Indian Springs/Pahrump. In Amargosa Valley/Beatty, about 65 percent of those who considered adverse health effects to be extremely unlikely indicated that they definitely would choose to build the repository; an additional 25 percent stated that they probably would choose to build it. In Indian Springs/Pahrump, about 76 percent of those who considered adverse health effects from above ground testing to be very unlikely indicated that they would either definitely or probably choose to build the repository at Yucca Mountain. In Caliente/Mesquite the vast majority of respondents believed it highly likely that aboveground testing had caused adverse health effects among area residents; 54 percent expressing such beliefs stated that they would definitely or probably not build the repository at Yucca Mountain if the choice were theirs.

Similar but slightly stronger relationships were observed when examining relationships between this dependent variable and respondents' views about the likelihood of future adverse health effects from underground testing at NTS. Correlations were .503 in both Amargosa Valley/Beatty and Caliente/Mesquite, and .615 in Indian Springs/Pahrump. In Amargosa Valley/Beatty, over 90 percent of those who considered adverse health effects from underground testing to be highly unlikely indicated that they would definitely or probably choose to build the repository. Among Indian Springs/Pahrump respondents who considered adverse NTS health

effects to be highly unlikely, 77 percent stated that they definitely or probably would build the Yucca Mountain facility. In Caliente/Mesquite relatively few residents considered future adverse health effects from underground testing to be highly unlikely. Among those who considered it highly likely that adverse health effects would occur, 68 percent stated that they definitely or probably would not choose to build the Yucca Mountain repository.

Relationships observed in the three rural study areas revealed a consistent pattern of moderate to strong negative association between the measure of repository opposition/support and respondents' confidence in the honesty and accuracy of information provided by federal agencies about nuclear programs. Correlations ranged between -.547 and -.663, indicating a substantial tendency for those who had little confidence in federal agencies to indicate that they would choose not to build the repository at Yucca Mountain. In Amargosa Valley/Beatty, an overwhelming majority (98%) of those who expressed high confidence in the honesty of information provided by federal agencies stated that they would definitely or probably choose to build the repository. In Indian Springs/Pahrump, 87 percent of those who expressed high confidence in federal agencies' honesty stated that they definitely or probably would build the repository, while 63 percent of those who expressed low confidence in federal agencies stated that they either definitely or probably would not build the facility. In Caliente/Mesquite, 72 percent of those who expressed very low

confidence in the honesty of federal agencies indicated that they definitely or probably would choose not to build the repository at Yucca Mountain.

Moderately high, inverse correlations were observed between opposition/support for building the repository and views about the adequacy of experiences gained at NTS for transportation and handling of nuclear materials. The correlation coefficients ranged from -.407 in Caliente/Mesquite to -.514 in Amargosa Valley/Beatty. Amargosa Valley/Beatty residents who agreed that NTS experiences had produced safe procedures tended to indicate that they either definitely (62%) or probably (27%) would choose to build the repository at Yucca Mountain. About 70 percent of Indian Springs/Pahrump residents who agreed with the statement about the safety of procedures for handling and transporting nuclear materials stated they would either definitely or probably choose to build the repository. In Caliente/Mesquite, 75 percent of those who disagreed strongly with the statement about the safety of NTS procedures indicated that they would definitely or probably choose not to build the repository; fifty-nine percent of those who agreed with the statement indicated that they either definitely or probably would build the Yucca Mountain facility.

Finally, the relationship between opposition/support for the repository and repository risk perceptions was examined. As was the case with the urban survey data, the rural data indicate a consistently strong positive correlation between these two variables. Pearson correlation coefficients ranged between .668 in

Caliente/Mesquite and .727 in Indian Springs/Pahrump. Thus, knowledge of responses on the risk perception variable allows a reduction of between 45 percent and 53 percent of the error in predicting levels of opposition/support for constructing the repository at Yucca Mountain. Among Amargosa Valley/Beatty residents, 67 percent of those who indicated very low risk perceptions stated that they would definitely build the repository, with an additional 31 percent indicating that they probably would build it. Among Indian Springs/Pahrump respondents who expressed very low perceptions of repository risks, 60 percent indicated that they would definitely build the Yucca Mountain facility and 28 percent stated that they would probably choose to build it. Respondents from Caliente/Mesquite were most likely to express fairly high levels of concern about repository risks; among those selecting one of the three highest response values for the risk perception variable, 74 percent indicated that they would either definitely or probably choose not to build the repository.

Summary of Bivariate Analyses

The results from the urban and rural surveys provide a remarkably consistent picture of the relationships between repository risk perceptions, levels of opposition/support for repository construction, and several key explanatory variables. Overall, the results obtained from both the urban and rural surveys suggest that risk perceptions associated with the proposed repository are closely linked with residents' evaluations of the potential for the project to have either positive or negative

effects in their communities. High risk perceptions were associated with beliefs that harmful community effects would exceed the possible benefits of the repository. Where possible benefits were anticipated to be prevalent, perceptions of repository risks were correspondingly low.

The relationships involving views and perceptions about the repository and perceptions about activities and programs at NTS appear to be particularly important. Individuals who express high levels of concern about the adverse consequences of either past or present activities at NTS tend also to express high repository risk perceptions, and to oppose repository construction. Also, those who have little confidence in the federal agencies responsible for nuclear programs tend to exhibit high concerns about repository risks, and low support for repository development.

Finally, repository risk perceptions are a powerful predictor of levels of opposition/support for repository construction. Not surprisingly, both urban and rural residents who express very high levels of concern about repository risks tend overwhelmingly to oppose construction of the repository at Yucca Mountain. Conversely, those who express very low concerns about health and safety risks from the repository tend generally to be supportive of repository development.

DISCUSSION AND CONCLUSIONS

The results of this comparison of selected data from the urban and rural surveys generally indicate a pattern of similarity in the views and perceptions of residents in the Las Vegas metropolitan

area and the Indian Springs/Pahrump and Caliente/Mesquite rural study areas. In contrast, the views and perceptions of residents in the Amargosa Valley/Beatty area contrast sharply with those observed among either the urban survey respondents or those from the other two rural study areas. There appear to be several likely reasons for these patterns of similarity and difference, linked in large part to the socioeconomic context and sociocultural history of each of the study areas.

Although the degree and pattern of similarity differed across specific variables, in general, the views expressed by respondents from the Indian Springs/Pahrump and Caliente/Mesquite rural study areas tended to bracket the responses obtained from residents of the Las Vegas metropolitan area. For some specific survey questions, urban response patterns were most similar to those obtained in Caliente/Mesquite, while for other items the urban responses most closely resembled those observed in Indian Springs/Pahrump. However, there were very few instances in which the overall response pattern differed greatly across these three areas.

When differences were observed among these three study areas, they reflected in part a tendency for respondents from Indian Springs/Pahrump to report slightly more positive perceptions about potential repository benefits, slightly lower concerns about repository risks, and slightly lower perceptions of risk from NTS and other hazardous and noxious facilities. At present both Pahrump and especially Indian Springs are the beneficiaries of

considerable employment and other economic factors from activities at the NTS. Both are also located near enough to Yucca Mountain to foster some realistic expectations of possible future employment and other local economic development consequences from repository construction and operation. Thus, compared to the Las Vegas metropolitan area, these communities could experience growth and development consequences from the repository that might be quite substantial relative to current development conditions. Such consequences would be far less noteworthy in the Las Vegas metropolitan area, due simply to its size and the high rates of economic and demographic expansion in Clark County. At the same time, it is important to note that neither Pahrump nor Indian Springs has recently experienced the type of severe economic decline which tends to make residents of less stable communities such as Amargosa Valley and Caliente desperate for virtually any economic development opportunity. Thus, the potential for economic opportunities does not appear to exert an overriding influence on Indian Springs/Pahrump area residents' views about the acceptability of constructing the repository at Yucca Mountain.

On some variables, distinctions between the Las Vegas, Indian Springs/Pahrump, and Caliente/Mesquite samples were more clearly attributable to a tendency for respondents from the Caliente/Mesquite area to express higher levels of concern about risks associated with the repository, NTS, and other hazardous facilities and events. Residents of Caliente/Mesquite tended in particular to express negative perceptions about the health and

safety implications of federal programs at the NTS, a response which is consistent with the fact that these are "downwind" communities that were adversely affected by radioactive fallout during the era of atmospheric nuclear weapons testing. This aversion to federal nuclear programs extends to perceptions of the Yucca Mountain repository, resulting in a tendency for Caliente/Mesquite residents to express somewhat higher levels of concern about health and safety risks and other potentially negative impacts of the repository than were evident in either Indian Springs/Pahrump or in the Las Vegas area.

Caliente in particular has experienced the type of economic decline often associated with support for virtually any type of development opportunity. However, the desire for economic development is tempered in this area by the general risk aversiveness of the Caliente/Mesquite population. Moreover, evaluations of possible economic benefits from the repository are tempered by the distance separating these rural communities from Yucca Mountain.

The obvious anomaly among the four study areas examined in this report involves response patterns obtained in the Amargosa Valley/Beatty area. In virtually all instances, responses from this area differed sharply from those obtained in the urban survey or in the surveys of Indian Spring/Pahrump and Caliente/Mesquite. Amargosa Valley/Beatty residents exhibit much lower aversion to risks associated with hazardous and noxious facilities than do residents of the other study areas. They are also much less likely

to consider it likely that NTS activities have caused adverse health effects, and generally are confident that nuclear materials can be handled and transported safely. Amargosa Valley/Beatty residents tend overwhelmingly to express low levels of concern about repository risks, anticipate beneficial rather than harmful community effects, and express high levels of support for construction of the repository at Yucca Mountain.

At first glance, the distinctiveness of responses from the Amargosa Valley/Beatty area may appear perplexing, given these communities' close geographic proximity to Yucca Mountain. According to both conventional wisdom and expectations related to the frequently-cited "NIMBY" syndrome, it might seem reasonable to expect residents of these communities to express high levels of concern about, and opposition to, the repository. However, the apparent anomaly represented by Amargosa Valley/Beatty can be accounted for by the socioeconomic and sociocultural context of the area. These communities have a long history of economic instability associated with dependence on mining and other natural resource industries; at the time of the survey, Amargosa Valley in particular was experiencing severe economic problems. These conditions contribute to a tendency for area residents to give high priority to economic development opportunities, and to respond enthusiastically to virtually any project that promises some economic stability, enhanced local employment opportunities, and/or potential spin-off development outcomes.

Also, residents of the Amargosa Valley/Beatty area already

live in relatively close proximity to the NTS, the low-level radioactive waste landfill near Beatty, and federal military testing facilities associated with Nellis Air Force Base and the Tonopah Test Range. These facilities tend to be viewed positively, in part because they have provided economic opportunities. Also, the presence of these facilities has not generated high levels of concern about risk consequences. Both Amargosa Valley and Beatty are located "upwind" from land areas encompassed by NTS, and operations at the Beatty waste landfill are generally viewed by area residents as being acceptably safe. In essence, residents of this area have accommodated their proximity to what many people would consider hazardous and noxious facilities, resulting in a tendency for residents of this area to be unusually willing to accept potential risks associated with a facility such as the proposed nuclear waste repository.

The high degree of consistency in the bivariate relationships examined in this report helps to reinforce this interpretation of how and why differences may exist across these urban and rural study areas. The bivariate relationships clearly illustrate a tendency for higher concern about the repository to be associated with concerns about the safety and consequences of NTS activities, a belief that federal agencies do not provide honest, accurate information about nuclear programs, and an expectation that economic benefits of the repository would not outweigh harmful effects. These conditions are most clearly evident in Caliente/Mesquite, where views about the repository tend to be

slightly more negative than in either Indian Springs/Pahrump or the Las Vegas metropolitan area. In contrast, lower concern about the repository is associated with anticipation of economic benefits from the repository, beliefs that NTS has had largely beneficial effects, and low concerns about adverse health effects from NTS programs. These conditions are most clearly evident in Amargosa Valley/Beatty, where views about the repository are strikingly more positive than in any of the other study areas.

In conclusion, the views held by southern Nevada residents about the proposed Yucca Mountain nuclear waste repository appear to be closely linked to area communities' histories and experiences with economic development conditions and needs. Views about the repository also are closely linked to experiences with activities at the Nevada Test Site and other potentially hazardous facilities and installations in the area. Knowledge of variables related to these factors helps to account for much of the variation in perceptions of the repository program, and can help to explain some of the similarities and differences in urban and rural response distributions.

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APPENDIX A

GOLDFIELD SURVEY ANALYSIS

Introduction

Survey data were collected in the town of Goldfield in Esmeralda County during June, 1989. Using a survey methodology identical to that adopted in the other rural study areas, a total of 150 survey instruments were distributed to a representative sample of Goldfield residents. Completed questionnaires were returned by 123 members of the sample, representing a response rate of 82 percent.

Although the questionnaire and the methodological procedures used for the Goldfield survey were identical to those used in the other rural study communities, the one-year time lag between the original rural area surveys and the Goldfield survey introduces a possible problem in attempting to compare results across all of the study communities. That is, it is not possible to determine whether any observed differences between response patterns in Goldfield and those observed in other study communities reflect fundamental differences in the views and perceptions of local residents, or whether observed differences reflect the influence of events during the one-year gap between the two survey efforts. Therefore, results derived from the Goldfield survey are presented separately to emphasize the problems which arise when attempting to compare the findings with those from the earlier rural surveys.

Response Distributions

Choice about Repository Siting

Response distributions to the question asking whether residents would choose to build the Yucca Mountain repository are presented in Table A1. Overall, a majority of Goldfield respondents (53.1%) indicated that they either probably or definitely would not choose to build the repository. Fewer than one-third (29.2%) indicated support for repository construction. These response patterns are similar to those evident among Caliente/Mesquite area residents (see Table 1, page 9), although levels of opposition are actually somewhat higher in Goldfield than in any of the other rural study areas.

Transportation Risk Concerns

Transportation of hazardous wastes. Table A-2 depicts Goldfield residents' responses to a statement that accidents involving transportation of hazardous wastes are inevitable. Overall, over one-half (53.8%) of responses were in the highest three response categories, indicating strong agreement that such accidents are inevitable. This response distribution is very similar to that evident in the Caliente/Mesquite survey (see Table 2, page 12), and reflects higher concern about waste transportation accidents than was evident in the other rural study areas.

Repository operation and transportation safety. Two questions were asked regarding whether repository construction/operation or transportation of wastes could be accomplished in a manner that respondents considered acceptably safe. As indicated in Table A-3,

Table A-1. Distribution of Goldfield Survey Responses to Question on Respondents' Decision to Build Nuclear Repository at Yucca Mountain.

Responses	%[a]
Definitely Yes	8.0
Probably Yes	21.2
Uncertain	17.7
Probably No	9.7
Definitely No	43.4

[a] Total may not equal 100% because of rounding error.

Table A-2. Distribution of Goldfield Survey Responses to Question on The Inevitability of Transportation Accidents.

Responses		%[a]
Strongly Disagree	0	6.8
	1	3.4
	2	5.1
	3	6.0
	4	2.6
	5	10.3
	6	3.4
	7	8.5
	8	11.1
	9	7.7
Strongly Agree	10	35.0

[a] Total may not equal 100% because of rounding error.

Table A-3. Distribution of Goldfield Survey Responses to Questions on Acceptable Levels of Safety for Construction/Operation of Yucca Mountain Repository and Acceptable Levels of Safety for Transporting Wastes to the Repository.

	Construct and Operate Safely	Transport Wastes Safely
Responses	%[a]	%[a]
Yes	46.9	50.5
No	53.1	49.5

[a] Total may not equal 100% because of rounding error.

about one-half of Goldfield respondents felt that neither construction and operation or waste transportation could be acceptably safe. These results are very similar to those evident in Caliente/Mesquite (see Table 3, page 14 and Table 4, page 16.

Transportation safety concerns. Table A-4 depicts Goldfield response distributions to questions regarding levels of agreement with statements that hazardous materials should never be transported through populous areas and that current methods of transporting hazardous materials are acceptably safe. Overall, a very large majority of Goldfield respondents felt that hazardous materials should not be transported through populous areas; over 80 percent of responses reflected strong agreement with the statement. This distribution is similar to what was observed in the Indian Springs/Pahrump and Caliente/Mesquite surveys (see Table 5, page 18). At the same time, relatively few Goldfield respondents felt strongly that current transportation of hazardous materials are acceptably safe; only about 28 percent expressed strong agreement with the statement. On this question, Goldfield responses reflected somewhat less concern about transportation safety than was evident in Caliente/Mesquite (see Table 6, page 20).

Repository Perceptions

Local economic benefits. Table A-5 presents Goldfield response distributions to a question asking whether residents anticipated harmful or beneficial local economic effects of the repository. The most frequent response was the scale midpoint.

Table A-4. Distribution of Goldfield Survey Responses to Questions on Transportation of Hazardous Materials Through Populous Areas and Reasonable Safety of Transporting Hazardous Materials Through Local Communities.

Responses		Transport through populated areas % [a]	Safety of current transportation % [a]
Strongly Disagree	0	3.4	16.8
	1	0.8	7.1
	2	0.8	8.0
	3	2.5	4.4
	4	0.0	3.5
	5	5.9	21.2
	6	2.5	3.5
	7	3.4	7.1
	8	11.0	11.5
	9	17.8	10.6
Strongly Agree	10	51.7	6.2

[a] Total may not equal 100% because of rounding error.

Table A-5. Distribution of Goldfield Survey Responses to Question on Economic Benefit for Local Community.

Responses		%[a]
Entirely Harmful	0	10.3
	1	3.4
	2	9.2
	3	3.4
	4	5.7
Equal Good & Harm	5	26.4
	6	5.7
	7	8.0
	8	11.5
	9	6.9
Entirely Beneficial	10	9.2

[a] Total may not equal 100% because of rounding error.

Roughly similar numbers of respondents anticipated harmful economic effects and beneficial effects. This response distribution is more similar to that obtained in the Caliente/Mesquite survey than that obtained in the other rural study areas (see Table 7, page 23).

Health and safety risks. Goldfield respondents were very similar to those in the Caliente/Mesquite study areas regarding their levels of concern about health and safety risks from the repository (see Table 8, page 25). As reported in Table A-6, over one-half of responses were above the scale midpoint, with a substantial number of respondents (44.7%) expressing a high degree of concern about health and safety risks. Thus, Goldfield responses in 1989 indicated a level of repository risk perception that was quite similar to that evident in the 1988 surveys of Caliente/Mesquite and the Las Vegas urban area, and considerably higher than that evident in either Indian Springs/Pahrump or Amargosa Valley/Beatty.

Overall repository benefits and harm. When asked to assess whether repository impacts would be generally harmful or beneficial to their community, Goldfield respondents tended to anticipate harmful rather than beneficial consequences. As reported in Table A-7, 51 percent of responses were on the "harmful" side of the scale midpoint, while only 21.6 percent were on the "beneficial" side of the scale. This distribution is quite similar to that observed in the 1988 survey of Caliente and Mesquite (see Table 10, page 30).

Table A-6. Distribution of Goldfield Survey Responses to Question on the Public Health and Safety Effects of the Repository.

Responses		%[a]
Not At All Concerned	0	9.8
	1	5.4
	2	11.6
	3	6.3
	4	6.3
	5	9.8
	6	2.7
	7	3.6
	8	9.8
	9	3.6
Extremely Concerned	10	31.3

[a] Total may not equal 100% because of rounding error.

Table A-7. Distribution of Goldfield Survey Responses to Question on the Balance of Harmful and Beneficial Repository Effects.

Responses		%[a]
Entirely Harmful	0	21.6
	1	6.9
	2	7.8
	3	9.8
	4	4.9
Equal Good & Harm	5	28.4
	6	2.0
	7	5.9
	8	5.9
	9	2.0
Entirely Beneficial	10	4.9

[a] Total may not equal 100% because of rounding error.

Perceptions of NTS Activities and Consequences

Nuclear materials handling. Table A-8 reports the distribution of Goldfield responses to a survey question addressing the effects of NTS experiences on the safety of procedures for handling and transporting nuclear materials. Responses were very mixed, although on balance respondents were somewhat more likely to agree than disagree that safe handling procedures had resulted from experience at NTS. This distribution reflects somewhat more confidence in nuclear materials handling at NTS than was evident among Caliente/Mesquite survey respondents, but less confidence than was expressed by either Indian Springs/Pahrump or Amargosa Valley/Beatty respondents (see Table 11, page 32).

Harmful effects of nuclear testing. Table A-9 reports Goldfield response distributions to questions about the potential for harmful health effects from both past aboveground nuclear testing activities and contemporary underground testing. A substantial majority of respondents felt that past atmospheric testing had caused adverse health effects for area residents; 50 percent indicated a belief that such consequences were highly likely. Regarding underground testing, a somewhat lower proportion of respondents anticipated future adverse health effects, with about one-third (34.7%) feeling that such effects are highly likely. These responses reflect somewhat less concern about NTS health effects than was evident in the 1988 survey of Caliente and Mesquite residents, and somewhat higher concern than was expressed by residents of Indian Springs and Pahrump (see Table 12, page 35

Table A-8. Distribution of Goldfield Survey Responses to Question on NTS Effects on Safe Handling of Nuclear Materials.

Responses		%[a]
Strongly Disagree	0	15.5
	1	8.6
	2	3.4
	3	3.4
	4	6.9
	5	19.8
	6	4.3
	7	9.5
	8	12.1
	9	8.6
Strongly Agree	10	7.8

[a] Total may not equal 100% because of rounding error.
and Table 13, page 37).

Table A-9. Distribution of Goldfield Survey Responses to Questions on Past Harmful Health Effects of Aboveground Weapons Testing and Future Harmful Effects of Underground Weapons Testing.

Responses		Aboveground %	Underground %
Not At All Likely	0	5.9	8.5
	1	5.9	7.6
	2	8.5	9.3
	3	5.1	10.2
	4	4.2	4.2
	5	8.5	13.6
	6	6.8	5.1
	7	5.1	6.8
	8	8.5	5.1
	9	11.0	7.6
Extremely Likely	10	30.5	22.0

[a] Total may not equal 100% because of rounding error.

Benefits and harm from NTS. Table A-10 indicates that Goldfield residents were generally most likely to express neutral opinions about the balance of harmful and beneficial effects of activities and programs at NTS. The proportion of respondents who perceived generally positive effects was similar to that evident in the Caliente/Mesquite combined study area. The proportion who perceived generally harmful effects was somewhat lower than observed in Caliente/Mesquite, but higher than observed in the other rural study areas (see Table 14, page 40).

Government credibility. Table A-11 presents Goldfield response distributions for a question that asked how confident respondents were in the honesty and accuracy of government reporting about nuclear programs. A majority (68.1%) of responses were on the "not confident" side of the scale midpoint, while fewer than 20 percent of responses reflected some degree of confidence. Responses to this question reflect slightly lower levels of confidence than were expressed by Caliente/Mesquite respondents in the 1988 survey, and much less confidence than was evident in the other rural study areas (see Table 18, page 51).

Fairness of site selection process. When asked whether or not they considered the repository site selection process to be fair, a majority (62.9%) of Goldfield respondents indicated that they thought the process was unfair. As reported in Table A-12, over one-half of responses were in the three lowest scale values, indicating a very strong opinion that the process was unfair. This distribution reflects a greater tendency to view the siting process

Table A-10. Distribution of Goldfield Survey Responses to Question on the Relative Balance of Harmful and Beneficial Effects of NTS Activities.

Responses		%[a]
Entirely Harmful	0	6.4
	1	0.9
	2	8.2
	3	4.5
	4	10.0
Equal Good & Harm	5	45.5
	6	5.5
	7	4.5
	8	9.1
	9	2.7
Entirely Beneficial	10	2.7

[a] Total may not equal 100% because of rounding error.

Table A-11. Distribution of Goldfield Survey Responses to Questions on the Honesty and Accuracy of Past Government Reports of Nuclear Accidents.

Responses		%[a]
Not At All Confident	0	31.9
	1	12.1
	2	7.8
	3	10.3
	4	6.0
	5	12.1
	6	3.4
	7	8.6
	8	4.3
	9	0.9
Extremely Confident	10	2.6

[a] Total may not equal 100% because of rounding error.

Table A-12. Distribution of Goldfield Survey Responses to Question on the Fairness of the Site Selection Process.

Responses		%[a]
Completely Unfair	0	38.1
	1	7.6
	2	6.7
	3	5.7
	4	4.8
	5	17.1
	6	4.8
	7	3.8
	8	4.8
	9	2.9
Completely Fair	10	3.8

[a] Total may not equal 100% because of rounding error.

as unfair than was evident in any of the other rural study communities; the distribution is most similar to that observed in the survey of urban Las Vegas area residents (Table 20, page 55).

Risk Aversion to Hazardous and Noxious Facilities

Table A-13 provides a summary of response patterns to a series of questions that asked how far respondents would be willing to live from various hazardous and noxious facilities. In general, Goldfield survey responses to these questions were fairly similar to those obtained in 1988 from residents of the Indian Springs/Pahrump study areas (see Table 21, page 58). In comparison to the other types of facilities listed, respondents were least willing to live near to a nuclear waste repository.

Bivariate Analysis

Data from the 1989 Goldfield survey were examined to determine whether relationships between several explanatory variables and both repository risk perceptions and support/opposition were similar to those observed for the 1988 urban and rural survey data.

As reported in Table A-14, relationships involving the set of variables selected for analysis were highly consistent with those derived from the earlier survey data (see Table 25, page 88 and Table 26, page 95). In the case of both the risk perception variable and the support/opposition variable, all of the bivariate associations were statistically significant and indicative of relatively strong relationships.

Repository risk perceptions in Goldfield were most strongly

Table A-13. Median Distance From Six Hazardous Facilities That Goldfield Respondents Are Willing to Reside and Percent Willing to Reside Within Fifty Miles.

	Median Miles	Percent Willing to Live Within 50 Miles
Landfill	5.0	92.2
Nuclear Power Plant	100.0	39.3
Pesticide Plant	100.0	42.9
Oil Refinery	25.0	67.9
Chemical Waste Repository	100.0	32.1
Nuclear Waste Repository	140.0	29.6

[a] Median values for the urban sample were interpolated using grouped date, while median values from the rural samples were calulated from the raw data.

Table A-14. Goldfield Survey Correlations Between Perceived Repository Risks, Choice to Build the Repository, and Six Independent Variables

	Perceived risks		Choice to Build	
Questions	r	gamma	r	gamma
Possible benefits/ harm from repository	-.662	-.747	-.695	-.775
Benefits/harm from NTS	-.381	-.517	-.461	-.639
Above ground testing effects	.567	.647	.565	.666
Underground testing effects	.434	.551	.463	.552
Federal honesty about nuclear programs	-.521	-.670	-.729	-.841
Safety of nuclear handling and transportation procedures from NTS	-.547	-.693	-.638	-.769
Repository risk perceptions	--	--	.714	.789

associated with perceived benefits or harms from the repository, perceptions of whether NTS activities had resulted in safe procedures for handling nuclear materials, views about the credibility of federal agency reporting about nuclear programs, and views about the health consequences of contemporary aboveground nuclear testing activities at NTS. Levels of support/opposition to building the repository at Yucca Mountain were most closely associated with the perceived credibility of federal agencies regarding reporting about nuclear programs, repository risk perceptions, views about the balance of beneficial and harmful repository effects, and perceived safety of NTS procedures for handling nuclear materials.

Discussion

Overall, Goldfield respondents surveyed in 1989 reported views about the repository program that are in most instances quite similar to those expressed in 1988 by residents of the Caliente/Mesquite study areas. That is, they were generally concerned about repository risks and other potentially harmful effects, distrustful of federal agencies responsible for nuclear programs, considered the repository siting process to be highly unfair, and unlikely to support repository development. Overall, Goldfield respondents were among the least supportive of the repository program compared to respondents in the rural study areas examined in the 1988 surveys.

At the same time, Goldfield respondents expressed levels of

general risk aversion and concerns about NTS activities that were less extreme than those evident in Caliente/Mesquite. Although there was substantial evidence that Goldfield residents have concerns about these issues, the overall response patterns were in most instances more like those observed in the 1988 Indian Springs/Pahrump surveys than those obtained in other rural study areas.

Unfortunately, it is impossible to know whether the results obtained in the survey of Goldfield residents reflect any reactions to events and issues that emerged in the year that separated the original survey conducted in other study areas and the survey of Goldfield residents. However, it is clear that in 1989 Goldfield residents held deep reservations about the proposed Yucca Mountain repository. As in the urban Las Vegas area and in several other rural study areas, these results clearly indicate the need to address risk perceptions and other attitudinal variables as a means of identifying potentially important impacts of the repository program.

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