“The Vulnerability of the Convention Industry to the Siting of High Level Nuclear Waste Repository”

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Howard Kunreuther and Douglas Easterling,
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Introduction

One of the major concerns that has been expressed regarding the proposed high-level nuclear waste (HLNW) repository at Yucca Mountain is the potential impact to Las Vegas's convention industry. Conventions and trade shows constitute a major source of revenue for Las Vegas and the State of Nevada. During 1989, approximately 1.5 million individuals attended conventions in Las Vegas, contributing over a billion dollars in gross revenue to the city's economy, according to the Las Vegas Convention and Visitors Authority (1990). These figures have more than doubled over the past decade. With the recent boom in the construction of new hotels, convention attendance can be expected to increase dramatically over the next few years, at least in the absence of any major shocks.

State officials in Nevada have long pointed to the possibility that the repository could adversely impact the Las Vegas visitor industry. For example, ex-governor Richard Bryan contended that a repository could produce losses in convention attendance and tourism, with "catastrophic consequences" for Nevada (Bryan, 1987, p. 36). This claim of economic losses has provided Nevada officials with a rationale for enacting legislation and lawsuits designed to block the Department of Energy (DOE) from characterizing the Yucca Mountain site (Swainston, 1991). For example, the state legislature passed AB 222 in 1989 which outlawed high-level waste disposal within Nevada, and the Nevada Attorney General filed a suit against DOE calling for the suspension of the repository program (State of Nevada v. Watkins, 914 F.2d 1545 (9th Cir. 1990)). These

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1 The revenue figures reported by LVCVA do not include receipts from gaming. Thus, the total contribution to the Las Vegas economy is considerably greater than $1 billion.
actions have had a tangible impact in delaying DOE's site characterization activities, at least according to DOE officials (Adams, 1990).²

The economic argument raised by Nevada officials is endorsed by a majority of the state's residents. In a 1991 survey of 500 Nevadans, 62% agreed that "A repository at Yucca Mountain could have a negative impact on the tourist and visitor economy in Nevada" (Flynn, Mertz, and Slovic, 1991). In addition, the Nevada Resort Association acknowledged the potential for visitor losses in approving a resolution that opposes the repository program (Morrison, 1991).

On the other hand, certain key actors in the repository debate argue that a repository would have a negligible impact on the decisions of people who would otherwise visit Nevada. Carl Gertz, DOE's project manager for Yucca Mountain, stated that he believed a tourism impact is "unlikely, but not impossible. You don't see that kind of reaction from the public, in general" (Kerr, 1990). The Las Vegas Review Journal was more adamantly skeptical in a 1988 editorial:

It doesn't really serve Nevada's purposes for the head of the state Nuclear Waste Projects Agency to drag out that old red herring about the proposed high level nuclear waste dump scaring off tourists...
It's not a legitimate issue; it's a bogeyman of strictly political origins.

Thus, while the prospect of economic losses is crucial to the policy question of whether a repository will (or should) be built at Yucca

² Although the Court rejected Nevada's suit and invalidated AB 222, state officials have indicated that they will find alternative approaches to fight the repository (Swainston, 1991). This prospect casts serious doubts as to whether the repository can begin operation by the scheduled opening date of 2010 (Rhodes, 1990).
Mountain, there is a good deal of disagreement as to the likelihood that these effects will actually occur. This chapter addresses the issue by reporting the results of two surveys, one of convention planners and one of convention attendees. The first survey examined whether a repository at Yucca Mountain would influence a planner's decision to hold a meeting in Las Vegas, while the second survey considered the question of whether a repository would affect an association member's decision to attend a meeting scheduled for Las Vegas.

**Theoretical Rationale for Convention Losses**

A repository could impact the Las Vegas convention industry in two distinct ways: by inducing organizations to take their meetings to alternative cities, and by decreasing the number of people who attend meetings that are still held in Las Vegas. In this section, we develop theories as to why each of these two effects could occur, first by considering the convention planning decision, and then the convention attendee's decision. These theories are then tested in subsequent sections of this chapter.

**Declines in the Number of Conventions Held in Las Vegas**

**The planning process.** To answer the question of whether a repository might decrease the number of conventions held in Las Vegas, it is important first to understand the dynamics of the convention planning process. The decision on where to hold a convention is typically made by a professional meeting planner in consultation with the organization that is sponsoring the event. Some planners work directly for the
organization, while others are independent consultants. In either case, the meeting planner serves as an agent of the officers of the organization. Given that the officers in turn represent the membership, the planner's selection of a convention site is designed to reflect the preferences and concerns of the association's members.

Planners initiate the selection process anywhere from 6 months to 10 years prior to the meeting date (larger meetings require more lead time). In selecting a city for the convention, the planner is guided by two fundamental objectives: (a) to avoid any impediments to a smooth-running meeting, and (b) to maximize attendance. As such, the planner takes into account the meeting's physical constraints (e.g. adequate meeting space, a sufficient number of hotel rooms), economic considerations (e.g. travel and hotel costs), and a variety of other factors that make the meeting more desirable to attend (e.g., climate, entertainment).

Introducing a repository into the decision. The possibility of a HLNW repository influencing the convention planner's decision is depicted in Figure 1. This figure portrays the repository as a new stimulus in the planner's "decision environment." We hypothesize that the repository will influence the planner's perception of Las Vegas in two ways: (a) the city will be perceived as a riskier place to visit, and (b) the "image" of Las Vegas (defined as the planner's subjective overall impression of the city) will become more negative. These changes in the perception of Las Vegas, in turn, lower the chances of the planner selecting the city for the

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3 Our understanding of the factors that influence planning decisions is based on a series of interviews with professional meeting planners, along with a focus group of nine planners conducted in Philadelphia in October 1987 (Kunreuther, Easterling, and Kleindorfer, 1988).
Figure 1. Influence of a Repository on Convention Planners' Decision to Hold a Meeting in Las Vegas

Stimulus

Repository at Yucca Mountain

Perceptions

Risks to Persons visiting Las Vegas

Image of Las Vegas

Hotel Costs Travel Costs

Expected Attendance if Meeting is held in Las Vegas

Concerns

Personal Liability

Evaluations

Attractiveness of Las Vegas

Attractiveness of Alternative Cities

Decision

Likelihood of choosing Las Vegas for Meeting
meeting.

The first major assumption of the model is that a repository at Yucca Mountain will influence planners’ perceptions of Las Vegas with respect to either risk or image. A number of surveys (e.g., Kunreuther, Slovic, and Desvouges, 1988; Slovic, Layman, and Flynn, 1992) have shown that many segments of the population regard the proposed repository as exceedingly harmful and otherwise noxious (e.g., bad, stupid). If the repository becomes linked with Las Vegas, these same attributions are likely to become attached to the city.

Risk avoidance. Assuming that a repository at Yucca Mountain does cause planners to assign a high risk to Las Vegas, it is likely that the city will be chosen less often as a convention site. Planners have historically paid attention to obvious risks in choosing where to hold conventions. For example, planners in our focus group indicated that they regularly avoid cities on the southern Atlantic coast during hurricane season (Kunreuther, Easterling, and Kleindorfer, 1988). Risks such as crime, earthquakes, and terrorism also have a deterrent effect.

As Figure 1 shows, the planner’s attention to risk reflects two underlying concerns. First, if there are highly publicized hazards associated with the host city, attendance at the meeting is likely to decline. For example, international planners were extremely cognizant of the fact that many Americans would not attend a meeting in Europe during the terrorist scare of 1986 (Adams, 1986). The second risk-related concern facing planners has to do with personal liability. In deciding to hold a meeting in a particular city, the planner exposes up to 100,000 delegates to some level of risk. If a tragic accident occurs (e.g., the
hotel fire that struck the Dupont Hotel in Puerto Rico), the planner faces the prospect of multimillion dollar lawsuits. These suits are likely to succeed if it can be shown that the planner was negligent in screening sites on safety criteria (Conlin, 1987). Thus, adding a major new risk to Las Vegas would certainly be of concern to the planner.

**Negative image.** There is also considerable evidence for the hypothesis that a repository-induced decline in the image of Las Vegas would reduce the number of conventions held in the city. In a 1983 survey of meeting planners, 59% indicated that it was "very important" to select a location with a "glamorous or popular image," at least for meetings that combine business and pleasure (Ziff-Davis, 1984). Las Vegas currently attracts many of these kinds of meetings, and thus would suffer losses if its image were tarnished with something like a repository.

The potential for the repository to cause image-mediated losses in the number of Las Vegas conventions is reinforced by a second survey of meeting planners (Survey Research Associates, 1987). In this survey, 63% reported that avoiding "unpopular" cities was a "very important" consideration in making a planning decision. The effect of such a label is clear in the case of Philadelphia: a study by the Philadelphia Convention and Visitors Bureau found that black convention planners avoided the city because it has an image of being dirty and hostile to blacks (Sahugan, 1988). This sort of image influences the planner because it leads to less than optimal attendance at a convention.

**Moderating factors.** It is important to point out that risk and image are but two of a much larger number of factors that the planner considers in choosing a city. For some meetings, requirements such as finding a
large bloc of hotel rooms are important, and in fact may even rule out many potential cities. For a meeting with especially strong demands, only a few cities may be viable candidates, and some of these may already be booked for the meeting date. If the planner is in a situation where Las Vegas is the only available city that can accommodate the meeting, the repository may be overlooked. In contrast, if many cities are available, the planner will have much less tolerance for risk and a negative image.

The question of whether or not a planner will avoid Las Vegas in response to a Yucca Mountain repository also depends on the types of tradeoffs that the planner is willing to make. For example, if the officers of the association are particularly concerned with minimizing the costs of attending the meeting, then the less expensive hotel rooms of Las Vegas may be sufficiently attractive to overcome the negative influence of the repository.

The fact that planners must satisfy so many selection criteria suggests that risk may be considered according to a threshold model of decision making. As long as the subjective probability of something going wrong falls below a critical probability, the planner disregards the potential for adverse effects. However, salient and pronounced risks enter into the decision, causing the city to be avoided. The question then is whether planners will perceive a repository as posing enough of a risk to enter into their decision calculus.

Declines in Attendance at Las Vegas Conventions

A similar model (depicted in Figure 2) can be constructed to describe the impact of a repository on convention attendees' behavior. This model
Figure 2: Influence of a Repository on Convention Attendees' Decision to Attend a Meeting Scheduled for Las Vegas

Stimulus

Repository at Yucca Mountain

Perceptions

Risks associated with Las Vegas

Imagery associated with Las Vegas

Evaluations

Desire to visit Las Vegas

Expected Costs

Importance of meeting

Behavior

Likelihood of attending Las Vegas for Meeting
is simpler than that for meeting planners, partly because the attendee's decision involves only two alternatives, and partly because the attendee is representing only his or her own interests, rather than acting as an agent. However, the prediction is very similar: A repository at Yucca Mountain will alter the perceived risk and image that the attendee associates with Las Vegas, which results in a decreased probability of attending a meeting that has been booked for Las Vegas.

Risk avoidance. Although the attendee's decision problem is quite different than the planner's, the attendee obviously has just as much incentive to minimize risk. As such, there are a number of examples of individuals avoiding destinations they perceive to be risky:

* Fewer tourists visited New York City following a highly publicized subway shooting in 1990 (New York Times, 1990);
* San Francisco's Fisherman's Wharf was nearly deserted following the 1989 earthquake;
* the appearance of medical waste on beaches in New Jersey and New York during the summer of 1988 led to visitor losses in the amount of $1.5 billion (Lyall, 1991); and
* the Bellevue-Stratford Hotel in Philadelphia lost so much business after the 1976 outbreak of Legionnaire's Disease that it was forced to change its name (Thomas and Morgan-Witts, 1982).

Las Vegas could suffer comparable losses if potential visitors view the repository as a major hazard.

Negative imagery. The second pathway through which a Yucca Mountain

* We are thus considering the case where the repository has not caused the planner to avoid Las Vegas.
repository could decrease attendance at Las Vegas conventions is via imagery. This process, which has been documented by Slovic, Layman, Kraus, Flynn, Chalmers, and Gessell (1991), holds that the images that come to mind when an individual thinks of a place will influence his or her desire to visit there. \(^5\) Thus, if an organization holds a meeting in a city that conjures up all sorts of positive images (e.g., ocean, sunshine, fun), members will have a much stronger desire to attend. Conversely, as more and more negative images are elicited in association with the meeting site, the chances of an individual attending the meeting decrease.

As Slovic, et al demonstrated in Chapter 3, a HLNW repository is one of the most noxious images that could conceivably be associated with a city. Thus, if Las Vegas does come to elicit the image of a repository (or related imagery such as danger, death, sickness, nuclear explosions), one would expect a major drop in attendance at Las Vegas conventions. This linkage could develop simply from the media repeatedly presenting maps indicating that Las Vegas is the closest city to Yucca Mountain.

**Moderating factors.** As with convention planners, the attendee's decision is moderated by factors other than risk and image. Individuals considering whether or not to attend a meeting in Las Vegas will take into account the importance of the meeting, the opportunity to meet with colleagues, the chance to gamble, etc. Thus, we hypothesize that the

\(^5\) This imagery mechanism presumes that the convention attendee's decision process is at least somewhat impressionistic: the various images that are elicited while the individual is deciding whether or not to attend the meeting have a direct impact on the choice. In contrast, the image mechanism posited for meeting planners is more analytic, in that a city's image is an explicit decision factor that summarizes the many characteristics associated with the city.
repository will influence the probability that the person attends the
meeting, rather than serve as the sole determinant of the decision.

Varying the Severity of the Repository Stimulus

The models presented in Figures 1 and 2 map out the way in which
planners and attendees will respond when a new stimulus—a repository at
Yucca Mountain—is introduced into the decision task. However, the degree
to which planners and attendees will respond to this stimulus depends in
large part on what the repository's track record will be. If the facility
operates without incident, and if the current political and scientific
controversies abate, then Las Vegas may not suffer any losses to its
convention industry. If however, the repository site is jarred by an
earthquake or the facility is plagued by mishaps or mismanagement, then
convention losses are much more likely.

More generally, the level of loss to Las Vegas's convention industry
should increase monotonically with the severity of repository scenarios.
Serious accidents, especially those involving the release of radiation
into the environment, will enhance the perceived risk associated with
Yucca Mountain, and with southern Nevada in general. In addition,
heightened media attention will raise the profile of the repository,
increasing the chances that it comes to mind when a person thinks of Las
Vegas. According to the above models, these sorts of events will increase
the rate at which planners and attendees avoid Las Vegas.

For especially severe repository scenarios, Las Vegas may even become
"stigmatized," i.e., widely shunned by the rest of the country (Slovic, et
al., 1991). Stigmatization occurs when a place takes on attributes that
indicate deviacy or contamination to outsiders (Jones, et al., 1984; Edelstein, 1988). This process is more virulent than the risk-avoidance and negative-imagery mechanisms described above: If Las Vegas were stigmatized by the repository, planners and attendees would actively resist any contact with the city for fear of becoming contaminated. Such an effect would undoubtedly require an extreme scenario—something comparable to the accident at Chernobyl.

**Analogous Events**

One possible way to address the issue of whether a HLNW repository at Yucca Mountain would impact the Las Vegas convention industry is to explore what has happened with analogous facilities, i.e., those that match the repository on key attributes. This approach is valid to the extent that comparable facilities can in fact be identified.

**Nevada Test Site**

One facility that is often cited by officials at DOE as being informative is the Nevada Test Site (NTS), located just adjacent to Yucca Mountain. This facility, which opened in 1951, has been the site of hundreds of nuclear-weapons explosions. These tests were conducted above ground until the passage of the Limited Test Ban Treaty in 1963, at which point testing moved below ground. The earlier tests released radiation into the atmosphere, and in many cases exposed downwind residents and observers to substantial radioactive fallout (Fradkin, 1989). Since moving below ground, the explosions still lead to temblors felt as far away as Las Vegas, but radioactive contamination is now confined largely
to underground cavities.

DOE officials have argued that the rapid growth that Las Vegas's visitor economy has experienced since 1951 is evidence that NTS has not deterred tourists and conventions. Further, the proposed repository is viewed by DOE as a more benign nuclear facility, so it should have even fewer impacts. "Our feeling is, gee whiz, the underground test program where we blow up bombs hasn't seemed to hurt tourism," according to Carl Gertz, Project Manager for Yucca Mountain (Kerr, 1990). On the other hand, in a review of NTS's economic effects, Titus (1988) found that the impact to Las Vegas's visitor economy has actually never been studied.

More importantly, even if NTS has had only a minimal effect on the visitor economy of Las Vegas, this does not necessarily mean that every community has been spared. For example, St. George, Utah, which received major doses of radioactive fallout during the 1950's, suffered a drop in its tourism and convention trade when the increased incidence of leukemia in the area was publicized (Fradkin, 1989). Thus, Las Vegas may have escaped visitor losses only because the tests were deliberately set off at times when the prevailing winds would carry the fallout away from the city (Fradkin, 1989).

Another limitation in using NTS to forecast the impact of the repository is that the two facilities differ in fundamental ways. Whereas NTS has historically (at least until recently) been viewed by the public as integral in maintaining the security of the United States, the repository has a purpose (disposal of extremely unpopular waste) that invites contempt. In fact, the novelty of the proposed HLNW repository makes it extremely difficult to identify strictly analogous facilities.  

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Radiation Accidents

While there may not be any facilities that are truly analogous to the repository, it is informative to consider analogous events (i.e., cases where radiation has been released into the environment). These events provide an indication of whether conventional losses could occur if things go wrong with the repository.

Three Mile Island. One of the most widely publicized radiation releases to occur in the U.S. was the March 1979 accident at the Three Mile Island (TMI) nuclear plant near Harrisburg, Pennsylvania. The near-meltdown of the reactor core transfixed the public, although the amount of radiation that actually entered the environment turned out to be extremely small. A study of TMI's economic impacts identified $5 million in visitor losses (including the cancellation of the National Hardware Dealers' spring convention scheduled for Harrisburg) in the 30 days following the accident (Pennsylvania Governor's Office on Policy and Planning, 1980). These losses abated relatively quickly, largely because of the short duration of the radiation threat.

Goiania. A more adverse impact to tourism accompanied a radiation release in Goiania, Brazil during the fall of 1987 (Pettersson, 1988). This release occurred when two men cut into a discarded radiotherapy machine and exposed 100 grams of cesium-137. Children playing in the junkyard were attracted to the glowing material and passed it among themselves and their families. At least 249 people suffered radiation contamination, four of whom died within two months. This event sparked fears throughout Brazil, with severe economic consequences. In terms of the visitor industry, hotel occupancy in the city dropped by about 40% for
the six weeks following the accident. In addition, scheduled conventions for General Motors, the Corrides Stock Car Association, Comansu Tractors, and the Regional Medical Association were all canceled. The effect to the visitor economy largely dissipated over the next four months as it became clear that the threat of contamination had abated.

The Three Mile Island and Colonia cases indicate that some nuclear-related accidents have the potential to disrupt the convention industry, at least in the short run. To determine whether a HLAW at Yucca Mountain could incite comparable, or even worse impacts, we turn to a research approach that considers this facility explicitly.

**Overview of Current Research**

We undertook two surveys that explored the effect that a repository at Yucca Mountain would have on convention decisions. The first survey addressed the impact of the facility on convention planners' choice of where to hold a convention. A sample of 153 planners who had booked a convention in Las Vegas reconsidered their decision under the assumption that a repository had been constructed at Yucca Mountain. Planners were presented with a number of alternative repository scenarios, ranging from benign (no accidents) to moderately severe (a series of radiation releases). Following each scenario, planners reported the likelihood that they would still choose Las Vegas as the site for their convention. These "intent" data were then input to a forecasting model to generate estimates of the number of meetings that Las Vegas would lose if the proposed scenarios actually occurred.

The second survey looked at the decisions of convention attendees.
The sample consisted of approximately 100 members from each of six national organizations (600 total). Each respondent had attended at least one of their association's last four annual meetings. As with the first survey, respondents were asked whether the presence of a HLNW repository would have an impact on their decision. However, the primary focus of this survey was to test the theory that perceived risk and imagery actually influence attendance at conventions.

**Convention Planner Survey**

**Methodology**

The convention planner survey, conducted in February 1988, was designed to test whether a repository at Yucca Mountain would have a negative impact on planners who would otherwise choose Las Vegas for a convention. We interviewed a sample of 153 meeting planners who had chosen Las Vegas as the site for a convention or trade show. Planners were recruited from a list of upcoming meetings scheduled for Las Vegas hotels. Following an initial telephone screening, planners were sent a copy of the questionnaire, and then were called back to report their responses. The response rate was a respectable 66%.

The interview first explored the process by which planners came to choose Las Vegas for the target meeting (e.g., the number of cities initially considered, the factors that were taken into account). The remaining questions had the planner reconsider the choice of a convention city under a series of scenarios in which the repository was located at Yucca Mountain.
Repository Scenarios

The scenarios presented to respondents varied with respect to seven experimental factors, the most important of which involved the severity of the events associated with the repository. The Event factor had seven levels (see Table 1), ranging in severity from no accidents over the first 10 years of repository operation (Event 2) to an investigative report indicating multiple mishaps and a higher than expected risk (Event 7). Events were described in the form of news story.

In addition to an event description, the scenario consisted of a description of how much media attention had been devoted to the event, either dampened (the story appeared only briefly), or amplified (extensive coverage by national media). The media attention factor was varied experimentally, so that half the sample saw a given event with dampened attention and the other half saw it with amplified attention.

We were also interested in whether factors such as the price of hotel rooms and meals or providing attendees with gambling chips or free show tickets might ameliorate whatever impact the repository scenarios had on planners' preferences for Las Vegas. We thus modified the scenarios to incorporate a set of amenities, shown in Table 2, and varied the level of each of them experimentally.

Each respondent was presented with nine scenarios, consisting of two replications of Event 1 (the opening of the repository), two replications of Event 7 (the investigative report), and one occurrence of each of the other five repository events. For Events 1 and 7, the two replications differed in terms of the amenities included in the scenario. After reading through a particular scenario, the planner would indicate whether
Table 1

Repository Scenarios Used in Convention Planner Survey

I. EVENTS

1. OPENING OF REPOSITORY: Construction has been completed on Yucca Mountain repository. Facility will now begin accepting shipments. (This scenario describes the purpose and physical characteristics of the repository.)

2. BENIGN HISTORY: Repository has been accepting waste for 10 years. Operations have been according to expectations. No releases of radiation or identifiable health effects.

3. MINOR ACCIDENT AT REPOSITORY: Accident involving the offloading of a transport canister. Small radiation release on loading dock, but no significant human exposure.

4. MINOR TRANSPORT ACCIDENT: Truck hauling nuclear waste overturns near Las Vegas, but no radioactivity was released into the environment.

5. MODERATE ACCIDENT AT REPOSITORY: Accident involving the transfer of high-level waste from shipment cask to storage container. Three workers were exposed to radiation and required medical treatment, but contamination confined to a small area at repository.

6. MODERATE TRANSPORT ACCIDENT: Truck transporting high-level waste crashed head-on into a gravel truck 40 miles from Las Vegas. Radiation escaped from a defective cask and 4 firefighters were hospitalized for radiation exposure. Traffic detoured for three days.

7. REPORT OF MULTIPLE MISHAPS: An independent consultant issues a report critical of operations at the repository (e.g., sloppy worker practices and insufficient monitoring by management). The risk of radioactive contamination is higher than previously assumed. Haulers have not abided by transportation regulations. Minor accidents at the facility have led to 15 cases of radiation exposure.

II. MEDIA ATTENTION

1. DAMPENED: Extensive coverage in Nevada, but only limited mention in national media and only for a single day.

2. AMPLIFIED: Extensive coverage by Nevada press and national media; lead story in New York Times and on network news broadcasts; week-long followup.
### Table 2
Amenity Factors in Convention Planner Study Scenarios

#### III. PRICE OF HOTEL ROOMS

1. Standard convention rate  
2. 10% discount from convention rate  
3. 20% discount from convention rate

#### IV. PRICE OF HOTEL MEALS

1. Standard convention rate  
2. 10% discount from convention rate  
3. 20% discount from convention rate

#### V. GAMBLING CHIPS

1. No Free Chips  
2. $50 of Free Chips

#### VI. SHOW TICKETS

1. No Free Tickets  
2. Free Ticket to one big-name show (choice of Wayne Newton or Bill Cosby) for each attendee

#### VII. COFFEE BREAKS (including Beverage Service and Snacks)

1. Standard Charge for Coffee Breaks  
2. Two Coffee Breaks per Day Free
he or she would still choose Las Vegas for the target meeting.

Reductions in the Ranking of Las Vegas

After reading a scenario (defined by the repository event, media attention, and amenity levels), planners indicated whether Las Vegas would be their first choice for the meeting under these conditions. If they said no, they then indicated how Las Vegas would rank among the possible cities. One of the possible responses to this question was "Las Vegas would no longer be considered for this meeting." By comparing Las Vegas's post-scenario ranking to the ranking that the planner initially assigned for the target meeting, we can tell whether the scenario influenced the planner's preference for Las Vegas.*

Table 3 indicates that for all scenarios, at least 30% of the planners lowered their ranking of Las Vegas relative to the initial target meeting. The greatest shift occurs for Event 7 (the release of a report indicating recurrent accidents and safety lapses), combined with amplified media attention. In this case, 75% of the sample reduced their ranking of Las Vegas.

Table 3 also reports, for each scenario, the percentage of planners who no longer considered Las Vegas to be a viable candidate for the meeting. Under the most benign scenario (Event 2 with dampened media coverage), 4% of the planners chose to eliminate Las Vegas from their list

* The vast majority of the planners (116 out of 153) assigned a ranking of 1 to Las Vegas in the no-repository case. The remainder had booked their meeting for Las Vegas even though this was not their top choice. Las Vegas was chosen in these cases either because the preferred city was not available for the meeting dates, or because the planner had been overruled by the officers of the organization.
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Sub-Sample</th>
<th>N</th>
<th>% Who Lower Their Ranking of Las Vegas</th>
<th>% Who No Longer Consider Las Vegas</th>
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<td>1A. Opening of Repository (Base Case: Dampened Media Attention &amp; No Amenities)</td>
<td>Both</td>
<td>153</td>
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<td>1B. Opening of Repository (Replication)</td>
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<td>b. Amplified</td>
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<td>2. Benign 10 Year History</td>
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</tr>
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<td>9.0</td>
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<tr>
<td>3. Minor Accident on Site</td>
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<td></td>
</tr>
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</tr>
<tr>
<td>7A. Report - Recurrent Accidents and New Risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampened</td>
<td>B</td>
<td>75</td>
<td>55.1</td>
<td>32.1</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>A</td>
<td>75</td>
<td>74.6</td>
<td>42.7</td>
</tr>
<tr>
<td>7B. Report - Recurrent Accidents and New Risk (Replication)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampened</td>
<td>B</td>
<td>78</td>
<td>55.1</td>
<td>30.8</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>A</td>
<td>75</td>
<td>74.6</td>
<td>48.0</td>
</tr>
</tbody>
</table>

**NOTE:**
For each repository event, half the sample was assigned to the dampened media attention condition and half was assigned to the amplified condition. The specific assignment is shown with the "sub-sample" column. Each respondent saw Event 7 twice. The two replications (7A and 7B) differed from with respect to the amenities factors.
of possible cities. At the other extreme, the scenario with the report of recurrent accidents and amplified media attention caused 48% of the sample to eliminate Las Vegas from consideration.

Likelihood Rating Data

The impact of the repository scenarios on planners' preference for Las Vegas can also be gauged by a second measure: the self-reported likelihood of choosing a city other than Las Vegas for the meeting. This scale ranged from 1 = "Definitely Would Select Las Vegas" to 10 = "Definitely Would NOT Choose Las Vegas." Summary statistics for this variable are shown in Table 4. Higher values reflect a greater intent to avoid Las Vegas in response to the repository scenario; a mean of 1 indicates no avoidance among the sample, while a mean of 10 reflects total avoidance.\(^7\)

The likelihood rating data parallel the ranking data of Table 3. Planners are highly resistant to Las Vegas under the amplified version of Scenarios 7A and 7B (the report indicating multiple mishaps); the mean rating is greater than 7 for each replication. In addition, even for scenarios where no mishaps have accompanied the repository, the mean likelihood of choosing a city other than Las Vegas is greater than 3.

It should be noted that both Table 3 and Table 4 classify the scenarios only in terms of Event and Media Attention, pooling over the five amenity factors. The amenity factors were ignored in reporting the

\(^7\) These statistics are restricted to the sub-sample of 116 planners who initially ranked Las Vegas first for the target meeting. The rating data for the other 37 have ambiguous meaning because it is unclear what value would have been assigned to Las Vegas in the absence of a repository (see Footnote 6).
Table 4
Reported Intent to Choose a City Other Than Las Vegas Among Those Planners who Initially Ranked Las Vegas First

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Sub-Sample</th>
<th>Summary Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A. Opening of Repository</td>
<td>All</td>
<td>N: 116, Mean: 3.70, Median: 3, Std Dev: 2.66</td>
</tr>
<tr>
<td>(Base Case: Dampened Media Attention &amp; No Amenities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B. Opening of Repository</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Replication)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>A</td>
<td>58, Mean: 3.76, Median: 3, Std Dev: 2.67</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>B</td>
<td>58, Mean: 3.62, Median: 3, Std Dev: 2.69</td>
</tr>
<tr>
<td>2. Benign 10 Year History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>A</td>
<td>58, Mean: 3.41, Median: 3, Std Dev: 2.44</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>B</td>
<td>58, Mean: 3.36, Median: 3, Std Dev: 2.66</td>
</tr>
<tr>
<td>3. Minor Accident on Site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>A</td>
<td>58, Mean: 3.95, Median: 3, Std Dev: 2.61</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>B</td>
<td>58, Mean: 4.40, Median: 4, Std Dev: 3.17</td>
</tr>
<tr>
<td>4. Minor Transport Accident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>B</td>
<td>58, Mean: 3.88, Median: 3, Std Dev: 3.07</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>A</td>
<td>58, Mean: 4.68, Median: 5, Std Dev: 2.80</td>
</tr>
<tr>
<td>5. Moderate Accident on Site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>B</td>
<td>58, Mean: 4.12, Median: 4, Std Dev: 3.12</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>A</td>
<td>58, Mean: 5.35, Median: 5, Std Dev: 3.01</td>
</tr>
<tr>
<td>6. Moderate Transport Accident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>A</td>
<td>58, Mean: 5.78, Median: 6, Std Dev: 3.22</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>B</td>
<td>58, Mean: 5.81, Median: 6, Std Dev: 3.50</td>
</tr>
<tr>
<td>7A. Report - Recurrent Accidents and New Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>B</td>
<td>58, Mean: 5.45, Median: 6, Std Dev: 3.58</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>A</td>
<td>58, Mean: 7.16, Median: 8, Std Dev: 3.01</td>
</tr>
<tr>
<td>7B. Report - Recurrent Accidents and New Risk (Replication)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dampered</td>
<td>B</td>
<td>58, Mean: 5.42, Median: 5.5, Std Dev: 3.62</td>
</tr>
<tr>
<td>b. Amplified</td>
<td>A</td>
<td>58, Mean: 7.36, Median: 8.5, Std Dev: 3.03</td>
</tr>
</tbody>
</table>

**NOTE:**
Intent is measured on a 1-to-10 scale, with 1="Definitely Would Choose Las Vegas" and 10="Definitely Would NOT Choose Las Vegas."

For each repository event, half the sample was assigned to the dampened media attention condition and half was assigned to the amplified condition. The specific assignment is shown with the "sub-sample" column.
data because they had minimal effect on planners' responses. For the likelihood rating data, the five amenity factors together explained less than 1% of the within-subject variance. In contrast, the Event factor accounted for 29.3% and the Media Attention factor accounted for 3.6%.

**Forecasting Actual Losses in Conventions**

The data in Tables 3 and 4 strongly suggest that at least some planners are likely to avoid Las Vegas in response to the repository, especially if the facility is plagued by recurrent accidents. On the other hand, it is difficult to come up with firm forecasts of convention losses based on these data. This is because statements of intended behavior are only imperfect indicators of how people will actually respond (e.g., Fishbein and Ajzen, 1975; Sheppard, Hartwick, and Warshaw, 1988).

It is however possible to model the error surrounding stated intent data. For example, Morrison's (1979) Beta-Binomial model describes a psychological process whereby a consumer's reported intent to purchase a particular good imperfectly predicts his or her actual propensity to purchase the good. The model explains in mathematical terms the link between stated intent and actual behavior. However, the model's parameters can be estimated only if the researcher has assessed both stated intent and subsequent behavior; it is unable to predict future behavior from current reports of intent.

We have extended Morrison's model to come up with a model that forecasts future behavior in the case where only stated intent has been observed (Easterling, Kunreuther, and Morwitz, 1991). This model translates a set of stated intent data (e.g., the convention planners'
ratings of the likelihood of avoiding Las Vegas following a particular repository scenario) into an estimate of the proportion of the sample that will actually engage in the behavior. This forecast is in the form of an interval, \([P'_{\min}, P'_{\max}]\), the width of which reflects the degree of uncertainty in prediction.

In general terms, the model first produces a first-cut estimate of the proportion who will engage in the behavior, \(P^*\). This is the proportion that one would expect if respondents were accurate in predicting their own behavior. \(P^*\) is then adjusted to take into account the fact that there is always some degree of bias in predicting one's own behavior. The major step in the forecasting model involves estimating how much bias is present in the intent data that has been observed. This estimation procedure relies heavily on prior studies of intended versus actual behavior where one can compute actual bias scores.

In estimating the degree of bias for the convention planner survey, we took special note of the fact that the respondents were predicting a behavior that they had repeatedly performed. This factor tends to attenuate bias. For example, consumers tend to show relatively little bias in predicting the chances of a "repeat purchase," such as a new television (Pickering and Isherwood, 1974), but generally overestimate the likelihood of buying novel goods such as a shower radio (Jamieson and Bass, 1989).

After considering a host of factors such as these, we estimated a range of possible bias scores for the convention planners (see Easterling, et al, 1991). In particular, we estimated that the actual proportion of planners avoiding Las Vegas following a repository scenario would fall
within the following interval:

\[ (P^* - s_r, P^* + s_r), \]

where \( s_r \) is the standard deviation of true intent scores for the sample.\(^8\)

This unit was adopted because it allows for an easy comparison of bias scores across intention studies. In the case of the planner survey, one standard deviation corresponds to values between 11 and 28 percentage points across the different scenarios.

Table 5 presents the model's forecast of the proportion of planners who would move their convention from Las Vegas for each repository scenario. Even for the least aversive scenario (benign 10-year history with dampened media attention), we predict that between 12% and 36% of the sample would hold the meeting somewhere other than Las Vegas. For the most severe scenario (multiple mishaps with amplified media attention), the forecast range is [47% to 80%]. Although these are relatively wide intervals, none of them include the value 0, which suggests that the repository will have some impact on the convention industry.

To translate these figures into dollar values, we note that approximately 60 conventions are booked for Las Vegas each month, and that an average convention brings in over $1.6 million in revenue (excluding gaming revenue) (LVSCA, 1990).\(^9\) We forecast that Las Vegas will lose between 15% and 39% of its bookings under Scenario 1A (the opening of the

\(^8\) A person's true intent score is his or her current best-guess probability of engaging in the behavior. The distribution of true intent scores can be estimated from the observed stated intent scores if one adopts the assumptions of Morrison's (1979) model.

\(^9\) The upward trend in the Las Vegas convention industry suggests that there will be many more than 60 conventions per month by the year 2010 (the date when the repository is projected to open).
Table 5
Forecasts of Percentage of Planners Who Would Choose
A City Other Than Las Vegas

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Estimated Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A. Opening of Repository (Base Case - No Amenities)</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>15% - 39%</td>
</tr>
<tr>
<td>1B. Opening of Repository (Replication)</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>14% - 42%</td>
</tr>
<tr>
<td>Amplified</td>
<td>15% - 37%</td>
</tr>
<tr>
<td>2. Benign 10 Year History</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>13% - 35%</td>
</tr>
<tr>
<td>Amplified</td>
<td>12% - 36%</td>
</tr>
<tr>
<td>3. Minor Accident on Site</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>17% - 42%</td>
</tr>
<tr>
<td>Amplified</td>
<td>18% - 50%</td>
</tr>
<tr>
<td>4. Minor Transport Accident</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>14% - 44%</td>
</tr>
<tr>
<td>Amplified</td>
<td>24% - 54%</td>
</tr>
<tr>
<td>5. Moderate Accident on Site</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>16% - 47%</td>
</tr>
<tr>
<td>Amplified</td>
<td>25% - 62%</td>
</tr>
<tr>
<td>6. Moderate Transport Accident</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>28% - 68%</td>
</tr>
<tr>
<td>Amplified</td>
<td>30% - 64%</td>
</tr>
<tr>
<td>7A. Report - Recurrent Accidents and New Risk</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>25% - 64%</td>
</tr>
<tr>
<td>Amplified</td>
<td>43% - 80%</td>
</tr>
<tr>
<td>7B. Report - Recurrent Accidents and New Risk (Replication)</td>
<td></td>
</tr>
<tr>
<td>Dampened</td>
<td>23% - 66%</td>
</tr>
<tr>
<td>Amplified</td>
<td>47% - 80%</td>
</tr>
</tbody>
</table>

**NOTE:**
The range on each forecast reflects uncertainty in the relation between stated intent and actual propensity.
repository, with dampened media attention). If an effect of this magnitude occurs over only the first month, the projected loss will be somewhere between 9 and 23 meetings (between $14.4 million and $36.8 million in current dollars). If however the effect lasts a year, we would predict losses of between 108 and 281 meetings (corresponding to $173-$450 million in lost revenue). The predicted losses would be even higher for Scenarios 3 through 7.

In making these forecasts, it should be noted that we are assuming that planners' current attitudes toward the repository will persist. In other words, these are provisional estimates of convention losses which would have to be modified over time if attitudes are found to change.\textsuperscript{10}

\textbf{Convention Attendees Survey}

The second survey, conducted in December 1989, examined whether a repository at Yucca Mountain would diminish the willingness of convention attendees to attend a meeting scheduled for Las Vegas. This survey asked about attendance patterns among a sample of 600 individuals who belonged to organizations holding annual conventions. Besides assessing whether a repository would lead attendees to avoid a meeting, this survey also tested the theory that convention attendance is influenced by the perceived risk and imagery associated with the host city.

\textsuperscript{10} One might wish to model this uncertainty regarding the persistence of planners' attitudes by increasing the range of possible bias scores. However, this would have generated an extremely wide range (possibly giving rise to estimates as uninformative as [0\% to 100\%]), due to the very long time lag between 1988 and 2010. Thus, we took the alternative forecasting approach of conditioning the predictions on the assumption that no changes will occur regarding perceptions of the repository.
Methodology

The first step in this survey was to recruit a set of six organizations that hold annual conventions. We imposed the following selection criteria: (a) the organization is national in scope, (b) it holds one convention (not a trade show) each year, (c) the previous four conventions (1986 through 1989) were held in four separate cities, (d) one of these meetings was held in Las Vegas, and (e) the organization is willing to provide us with its membership list. Eleven organizations met all five of these criteria. We then selected the six groups listed in Table 6 based on the objective of maximizing the diversity of the sample. While these six groups are not necessarily representative of the population of organizations that hold meetings in Las Vegas, the sample covers a wide range of professions (e.g., lab technicians, economists, bus owners), which allows us to assess the generalizability of the results.

For each of these six associations, we randomly selected members who had at least some history of attending the annual convention (those who never attend are uninformative in terms of the nature of the attendance decision). To be eligible, an association member had to have attended at least one of the past four meetings. This was determined by an initial telephone contact. Eligible individuals were then mailed a questionnaire with a return envelope. Of the 719 members who were contacted and identified as eligible, completed interviews were obtained from 600, which yielded an impressive response rate of 83.4%.

Relation of Imagery and Perceived Risk to Attendance

The first section of the questionnaire asked respondents which of the
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>American Frozen Food Institute [n=105]</td>
<td>Atlanta</td>
<td>Chicago</td>
<td>Dallas</td>
<td>Las Vegas</td>
</tr>
<tr>
<td>American Orthodontic Society [n=72]</td>
<td>Montreal</td>
<td>Las Vegas</td>
<td>Orlando</td>
<td>Dallas</td>
</tr>
<tr>
<td>Clinical Laboratory Management Assn [n=107]</td>
<td>New Orleans</td>
<td>Las Vegas</td>
<td>Dallas</td>
<td>Atlanta</td>
</tr>
<tr>
<td>Joint Council on Economic Educ [n=111]</td>
<td>Houston</td>
<td>St. Louis</td>
<td>Las Vegas</td>
<td>Hilton Head</td>
</tr>
<tr>
<td>National Purchasing Institute [n=100]</td>
<td>Orlando</td>
<td>Las Vegas</td>
<td>Chicago</td>
<td>Kansas City</td>
</tr>
<tr>
<td>United Bus Owners of America [n=105]</td>
<td>Atlanta</td>
<td>Las Vegas</td>
<td>Tampa</td>
<td>New Orleans</td>
</tr>
</tbody>
</table>
past four conventions they had attended. We then attempted to predict these attendance decisions as a function of the attendee's perception of the host city. According to the theory developed above, the likelihood of an individual attending a meeting should be determined, at least in part, by the imagery and the perceived risk associated with the city in which it is to be held.

**Imagery.** The first set of analyses tests the effect of imagery. At the beginning of the questionnaire (directly after the questions on past attendance), respondents reported the imagery that came to mind when they thought of the four meeting cities. For each city, a respondent could report up to six images. In the case of Las Vegas, the most frequently cited images were gambling, entertainment, heat, and bright lights; this ordering varied little across the six organizations.

In order to define the valence of a city's imagery, respondents rated each of their images on a scale from -2 (extremely negative) to +2 (extremely positive). These were then summed together to form the city's imagery score. With six images per city, an individual's imagery score could conceivably range from -12 to 12.

The empirical question then is whether these imagery scores can account for an individual's pattern of attendance at the past four meetings. This was assessed with a set of six logistic regressions (one per organization) in which attendance at a meeting (yes vs. no) was the dependent measure and the city's imagery score was the predictor. Each attendee contributed up to four data points.\textsuperscript{22} To account for

\textsuperscript{22} Failure to attend a meeting was ignored if the respondent had not yet become a member of the organization at the time of the meeting.
individual differences in propensity, we entered as a control variable the percentage of meetings that the individual had attended since becoming a member.

The results of these analyses are shown in Table 7. For four of the six organizations, imagery was significant at p<.05, while in one other case, the imagery effect had a p value of .07. The only organization in which imagery was clearly nonsignificant was the American Frozen Food Institute. In general then, attendance at past meetings seems to vary systematically according to the imagery associated with the host city.

The regression coefficients indicate the degree to which a change in imagery score leads to a change in the "logit" associated with the probability (q) of attending a meeting (i.e., \( \log(q/1-q) \)). For a member of the American Orthodontic Society, the logit increases by .177 for every unit change in imagery score. Translated into probabilistic terms, if a member of this organization initially had a .5 chance of attending the convention, but then the city's imagery score dropped by 10 points, the new probability would be only .15.\(^\text{12}\) The percentage point drop would obviously be smaller if the person started out with a relatively small probability of attending.

Perceived risk. The next set of analyses was designed to test whether the decision to attend a convention depends on the degree of risk associated with the host city. For these analyses we asked the attendees to rate each of the four meeting cities on three aspects of risk: (a) crime rate, (b) natural hazards, and (c) pollution and environmental

\(^\text{12}\) In this example, the logit decreases from 0 (corresponding to \(q=.5\)) to 0 - \(10 \times .177\) or -1.77. The probability value corresponding to a logit of -1.77 is .15.
Table 7
Relation Between Host City's Imagery Score and the Decision to Attend Past Meetings: Results from Logistic Regression Analysis

<table>
<thead>
<tr>
<th>Association</th>
<th>b</th>
<th>SE</th>
<th>G²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amer Frozen Food Institute</td>
<td>.035</td>
<td>.048</td>
<td>0.53</td>
</tr>
<tr>
<td>Amer Orthodontic Society</td>
<td>.177</td>
<td>.055</td>
<td>10.14*</td>
</tr>
<tr>
<td>Clinical Lab Management Assn</td>
<td>.067</td>
<td>.037</td>
<td>3.29*</td>
</tr>
<tr>
<td>Joint Council on Econ Educ</td>
<td>.132</td>
<td>.041</td>
<td>10.42**</td>
</tr>
<tr>
<td>National Purchasing Institute</td>
<td>.079</td>
<td>.040</td>
<td>3.85*</td>
</tr>
<tr>
<td>United Bus Owners</td>
<td>.106</td>
<td>.039</td>
<td>7.28**</td>
</tr>
</tbody>
</table>

NOTE:
"Imagery score" is computed as the sum of the ratings associated with the images elicited by the city. Respondents could report up to six images for each city. Each image was assigned a score from -2 ("very negative") to +2 ("very positive"). Thus, a city's imagery score can range from -12 to 12.

* p = .07.  ** p = .05.  *** p < .01.
hazards. Each of these risks was rated on a 1-to-5 scale, ranging from 1 = "unacceptable" to 5 = "excellent." Thus, higher scores on these risk indicators correspond a safer perception of the host city.

A series of logistic regression analyses (one per organization) was used to test whether perceived risk could predict attendance at previous meetings. The three risk indicators were tested simultaneously, so that the effect of each one is estimated controlling for the remaining two. We also controlled for other attributes that might be confounded with a city's risk, including hotel cost, travel cost, climate, and recreation opportunities. Thus, the regression coefficients for the risk factors reflect their incremental effect on attendance, over and above the effect that could be explained by more obvious predictors.

Perceived risk was significantly related to past attendance for three of the six organizations (see Table 8). For the American Frozen Food Institute (AFFI), two risk factors were significant: Natural Hazards at p=.01 and Crime Rate at p=.025. Crime Rate was also significant (p=.01) in the case of the National Purchasing Institute (NPI), while Pollution was significant at p=.005 within the Joint Council on Economic Education (JCEE).

The size of these effects is indicated by the regression coefficients in Table 8. These coefficients indicate how much the logit changes with a unit change in the risk indicator. For JCEE, Pollution has a coefficient of .605, indicating that a one-point drop in the Pollution rating produces a .605 decrease in the logit function among members of this organization. In terms of probabilities, consider a JCEE member who has a .5 chance of attending a convention in a city that he or she rates as "excellent" on
### Table 8

Relation Between Three Risk Factors and the Decision to Attend Past Meetings: Results from Logistic Regression Analysis

| ASSOC | CRIME RATE | | NATURAL HAZARDS | | POLLUTION/ENV HAZARDS | |
|-------|------------|----------------|------------------|------------------|------------------|
|       | b          | SE            | G²               | b                | SE              | G²               | b                | SE              | G²               |
| AFFI  | .450       | .201          | 5.02*            | .500             | .195            | 6.60**           | .138             | .215            | 0.41             |
| AOS   | .232       | .269          | 0.75             | .620             | .322            | 3.70+            | -.537            | .302            | 3.16+            |
| CLMA  | .134       | .200          | 0.45             | -.343            | .191            | 3.23+            | .256             | .198            | 1.68             |
| JCEE  | -.089      | .197          | 0.20             | -.025            | .174            | 2.09             | .605             | .217            | 7.77**           |
| NPI   | .416       | .163          | 6.54*            | .006             | .161            | 0.00             | .218             | .166            | 1.74             |
| UBO   | .118       | .150          | 0.62             | -.157            | .162            | 0.95             | .061             | .178            | 0.12             |

**NOTE:**

Risk Factors were scaled from 1="Unacceptable" to 5="Excellent." Thus, a positive regression coefficient, b, denotes a relation where more safety corresponds to a higher probability of attending.

The effect of each Risk Factors was tested controlling for Hotel Cost, Travel Cost, Recreation, Climate, and the other two Risk Factors.

* p < .10.  * p < .05.  ** p < .01.
pollution. If this rating drops by 1 unit, the likelihood of attending drops to .353; a 2-unit drop reduces the probability to .212; a 3-unit drop leads to a probability of .128; and the maximal drop of 4 points leaves the probability at only .074. Similar calculations can be performed for the other two organizations where risk was significant.

**Reported Impact of Noxious Facilities**

The above analyses indicates that the attendance decision is sensitive to the perceived risk and image of the host city. We next tested explicitly whether a repository, along with a number of other noxious facilities, would influence the decision to attend a meeting.

In this part of the survey (which appeared towards the end, after all the items reported above had been asked) respondents were told to assume that they had made a tentative decision to attend a convention. They then found out that a particular facility was located 100 miles away from the host city. Five different facilities were specified: a prison, a nuclear reactor, a hazardous waste incinerator, a low-level radioactive waste repository, and a high-level nuclear waste repository. For each facility, respondents reported whether they would "definitely attend," "probably attend," "probably not attend," or "definitely not attend."

The results from these questions are shown in Table 9. Little effect is reported for the more common facilities of a prison and a nuclear power reactor: only 1% of the sample indicated they probably or definitely would not attend if a prison were within 100 miles of the host city, while 3% reported they would not attend with the reactor. However, the three waste disposal facilities provoked much more of a reaction. For the
Table 9
Willingness to Attend a Meeting
After Finding out that a Noxious Facility
was Located 100 Miles Away

DISTRIBUTION OF RESPONSE:

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>Definitely Would Attend</th>
<th>Probably Would Attend</th>
<th>Probably Would Not Attend</th>
<th>Definitely Would Not Attend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prison</td>
<td>78.3%</td>
<td>20.4%</td>
<td>0.8%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Nuclear Reactor</td>
<td>70.6%</td>
<td>26.2%</td>
<td>2.2%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Hazardous waste Incinerator</td>
<td>65.7%</td>
<td>27.9%</td>
<td>5.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Low-Level Rad Waste Repo</td>
<td>61.3%</td>
<td>28.8%</td>
<td>7.1%</td>
<td>2.9%</td>
</tr>
<tr>
<td>High-Level Nuc Waste Repo</td>
<td>49.1%</td>
<td>28.0%</td>
<td>16.1%</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

NOTE:
Subjects were told to assume that this was a meeting that they had decided to attend prior to learning of the facility.
hazardous waste incinerator, 6.4% indicated they "definitely" or "probably" would not attend, while 10.0% reported one of these two responses for the low-level radioactive waste repository. The HLAW repository provoked the most extreme response, with 23% reporting they probably or definitely would not attend. Responses to each facility varied only slightly across the six organizations. For example, the percentage who reported they would not attend in response to a HLAW repository ranged from a low of 19% (APPI) to a high of 25% (JCOM); this difference was not statistically significant.

These intent data indicate that the HLAW repository is viewed in a much different light than any existing noxious facility. Thus, the effects on convention attendance that have been historically associated with more familiar facilities do not necessarily generalize to the HLAW repository.

Discussion

In both our surveys, decision makers who determine the well-being of Las Vegas's convention industry reported that their behavior would be influenced by a repository at Yucca Mountain. In the convention planner survey, a third of the sample indicated that they would reduce their ranking of Las Vegas if the repository opened as planned, and even greater aversion was observed under scenarios where radioactive releases occurred. In the most extreme case tested (an investigator discovers that the repository is plagued with problems similar to what has occurred at DOE's nuclear weapons facilities), three-quarters of the planners reduced their ranking of Las Vegas, while nearly a half would no longer consider Las
Vegas for their meeting.

Similarly, roughly a quarter of those persons who historically attend conventions indicated that they would not attend if the convention was being held in a city 100 miles away from a HLNW repository (the distance from Yucca Mountain to Las Vegas). Based on these surveys, we believe that a repository at Yucca Mountain has the potential to trigger major dislocations of Las Vegas's convention industry.

Validity of Intent Data

Although these statements of intent are imperfect predictors of actual behavior, we believe that the nature of the samples improves the validity substantially. In each survey, respondents were reporting on a behavior that they had engaged in many times in the past (either choosing a city for a convention or deciding whether to attend a convention). As such, respondents had strong insights into the factors that actually influence the decision they were describing.

The validity of the intent data was also enhanced by the design of the questionnaire. Prior to the questions that introduced the repository, planners were led through the steps that went into planning their target convention (e.g., the organization holding the meeting, the types of meeting facilities that were required, the importance of hotel costs). Likewise, before attendees reported on the impact of a repository, they first indicated their past attendance at conventions and considered the importance of decision factors such as travel costs. Thus, by the time the repository was introduced, respondents in each survey were firmly within the mindset of the relevant convention decision.
On the other hand, one might argue that the observed intent data reflect simply a distaste for the repository, rather than indicating that people will actually change their behavior in response to the facility. However, this interpretation is less compelling in light of the convention attendees' data. Attendees were presented with a set of facilities that each had strongly negative connotations (e.g., prison, nuclear reactor, hazardous waste incinerator). However, it was only for a HLNW repository that reports of intended behavior were affected in a major way. This suggests that respondents were in fact thinking in terms of likely behavior, rather than just attitude toward the facility.

The Importance of Perceived Risk and Imagery

The attendees survey also provides theoretical support for convention losses. Namely, attendance at conventions appears to be determined, at least partially, by the perceived risk and imagery associated with the host city. As such, planners have good reason to base their choice of where to hold the meeting on factors related to risk and image. Thus, to the extent that the imagery and perceived risk associated with Las Vegas are affected by a repository at Yucca Mountain, both planners and attendees will be less likely to make decisions favorable to Las Vegas.

It should be pointed out that the imagery mechanism can operate among convention attendees even if the risk-avoidance mechanism does not (i.e., the two pathways are not redundant). In particular, attendees who believe that the repository's impacts are confined to the immediate vicinity of Yucca Mountain may nonetheless come to include the facility as part of Las Vegas's image set, and thus may still be less likely to visit the city.
More generally, an image can affect visitor behavior even if it is unrelated to the person's expectations about what will happen during a visit. For example, the thought of Dallas conjured up images of the Kennedy Assassination among 15 members of the sample. This event occurred almost 30 years ago, and thus would not directly confront someone during a visit. Nevertheless, the extremely negative connotations of this image may lower one's desire to visit Dallas. A similar sort of "guilt-by-association" effect could occur between Las Vegas and the repository.

Uncertainty

In interpreting the data from these surveys, one must acknowledge the tremendous amount of uncertainty that is inherent in predicting the economic impacts of a repository (Erikson, 1991). A primary source of this uncertainty has to do with our inability to predict how the repository will operate; indeed, it is not even clear that it will be built at Yucca Mountain, as proposed. The scenario approach we employed in the convention planner survey provides one way to study economic impacts in the face of this uncertainty. Namely, one sets about the task of conditional forecasting, i.e., estimating the losses that would follow distinct repository scenarios. One could then define an aggregate expected impact by assigning probabilities to the alternative scenarios. Thus, two policy analysts with different assessments of the likelihood of severe scenarios (e.g., a DOE official and an official from Nevada) could each make use of the data, but might end up generating very different estimates of the overall expected impact of the repository.

Another major uncertainty involved in estimating convention losses
has to do with the strength of the link that will develop between the repository and Las Vegas. In other words, will the severe risk that the public associates with the repository extend as far as Las Vegas, and will people spontaneously think of the repository when considering whether to go to Las Vegas? Bassett and Hemphill (1991) argue that such a connection is unlikely to occur given the fact that very few respondents in the Slovic, et al (1991) surveys mentioned either the repository or the Nevada Test Site in response to Las Vegas. This lack of nuclear imagery seems to reflect, in large part, the fact that Las Vegas is so strongly associated with gambling and entertainment; these images dominate almost every other attribute of the city. However, this could change if Las Vegas continues to be linked with Yucca Mountain in the media, or if transport accidents involving shipments of nuclear waste occur close to the city.

Conclusion

Whether or not the repository actually impacts Las Vegas’s convention industry seems to depend primarily on the degree to which existing public perceptions of the facility persist over the long term. It is possible that with time the repository will be viewed in more benign terms. On the other hand, more information about the repository program may lead to even more severe perceptions of risk and may produce even worse images.

To a large extent, the connotations that the repository takes on will be determined by the degree of scientific and institutional integrity that comes to surround the program (see Chapter 3), as well as whether a need for the facility is convincingly demonstrated (Easterling, in press). In the absence of such developments, one can expect negative impacts to the
convention business of cities unfortunate enough to be linked with the repository.

Finally, it should be noted that any visitor effects that do occur will be felt not just by the local community, but also at the federal level. The "impact assistance" provision of the federal Nuclear Waste Policy Act [Section 116(c)(2) of P.L. 97-425] calls for DOE to compensate state and local governments for the negative economic impacts that result from the construction and operation of a repository. To the extent that a host state suffers major losses to its visitor industry, this provision portends significant payouts on the part of the federal government. Such a prospect needs to be seriously considered in judging the suitability of the Yucca Mountain site.
REFERENCES


Fishbein, Martin and Icek Ajzen (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research* (Reading, MA: Addison-Wesley).


