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Potential Negative Impacts of Nuclear Activities on Local Economies: Rethinking the Issue

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Surveys of public opinion about perceptions of risk associated with the nuclear fuel cycle have shown that the public professes a widespread feeling of dread, a fear of associated stigmas, and a concern about possible catastrophic nuclear accidents. Various interest groups and state governments that oppose congressionally mandated siting of centralized high-level radioactive waste (HLW) storage and disposal facilities are using this negative imagery to create a powerful, emotional obstacle to the siting process. From statistical analyses of images and location preferences, researchers have claimed that possible significant economic losses could potentially accompany the siting of HLW facilities. However, several paradoxes, or self-contradictory statements, apparently exist between the responses expressed in surveys and the actual economic and demographic behavior evidenced in the marketplace. Federal policymakers need to evaluate whether the request for a change in siting policy is based on subjective fear of a potential negative economic effect or on proven negative effects. Empirically observed behavior does not support predicted negative economic effects based on survey responses.

KEY WORDS: Risk; perceptions; surveys; behavior; nuclear.

1. INTRODUCTION

In the 1970s, the nuclear power industry and federal officials became concerned about the rapid increase in discharged high-level radioactive spent fuel assemblies stored at commercial power plants. Federal policymakers began to assess ways to keep the nuclear power option open by finding a permanent solution to the nation's difficult, contentious, and litigious spent fuel problem. Their answer was to advocate federal stewardship of spent fuel and high-level radioactive waste (HLW) from commercial nuclear power plants in centralized interim storage and long-term disposal facilities. In 1982, the U.S. Congress enacted, by an overwhelming majority, the Nuclear Waste Policy Act (NWPA) to activate that policy.

Under this new legislation, the U.S. Department of Energy (DOE) was entrusted to determine a site for one or more full-scale deep geologic repositories to permanently entomb spent fuel and HLW. This new policy was based on the premise that centralized disposal was the best scientific and technical way to protect human and environmental health and safety. Central interim storage and deep geologic disposal were also in keeping with the approaches and strategies being proposed and implemented within the international community. To expedite the siting process, Congress modified the NWPA in 1987, enacting the Nuclear Waste Policy Act Amendments (NWPAA). The NWPAA designated the Yucca Mountain site in Nevada as the sole location for a $6 billion site characterization effort. The DOE is currently determining the suitability of the site for a national repository, despite Nevada's vehement opposition to that decision. The NWPAA also created an alternative voluntary siting process to offset concerns about distributional impacts and equity. This solution involved establishment of the Office of the United States Nuclear Waste Negotiator for the purpose of finding a volunteer host for a monitored retrievable storage (MRS) facility and a repository.

The decade-old federal siting initiative has generated increasing opposition from public interest groups and state governments. This opposition has been accompanied by contentious public and political exchanges, extensive media coverage, and heightened individual perceptions of risk, which have combined to block sig-

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nificant progress. Nuclear opponents have also strongly challenged the premise of centralized siting of storage and disposal facilities.

Recently, published requests to "rethink" or reassess the congressionally mandated siting policy have increased.[1–6] These requests are a response to missed deadlines, escalating costs and a belief the siting process is stalled. A major contributor to the delays has been state government opposition based on survey findings that reveal a high percentage of respondents who consistently express an unwillingness, given a choice, to live, visit, and operate a business in proximity of nuclear-related facilities or transport routes. These survey results are being translated into predictions of possible negative economic consequences for states and local communities engaging in nuclear activities. Policymakers need to determine whether the current survey findings detect a true potential for negative economic impact on local communities or simply reflect a general public uneasiness with nuclear activities.

2. SURVEY QUESTIONS IN PERSPECTIVE

Researchers have conducted a number of surveys to determine the public's perception of risk about the nuclear fuel cycle and its components.[7–19] Recently, the Nevada Agency for Nuclear Projects/Nuclear Waste Project Office sponsored a multimillion dollar research program designed to evaluate possible perception-based impacts from the potential siting of an HLW repository at Yucca Mountain.[20] Between 1987 and 1989, researchers sponsored by the state of Nevada conducted 14 surveys designed to identify the public's perception of risk and predict the potential for socioeconomic impact from siting a repository in Nevada and transporting the spent fuel.[16] The questions were framed to elicit public opinion regarding the potential for nuclear-related accidents, hypothetical accident scenarios, personal fears, and programmatic and project concerns. They surveyed state, regional, and national populations, as well as organizations and group members. These data currently remain unavailable to the public, for neither the state of Nevada nor its researchers have made public a complete set of the survey instruments or the collected primary survey data for concurrent analysis and conclusion verification or for alternate hypothesis testing.

The Nevada-sponsored survey research resulted in predictions of possible significant economic losses for Nevada from the siting of a repository, primarily as a result of potential stigmas from associated negative imagery and social amplification of risk from minor and major events.[20,21] In the matter of the DOE's application for a water permit from the State for site characterization activities, five researchers provided depositions in September 1991, regarding the potential for economic or public perception impacts associated with the issuance of the permit for the Yucca Mountain facility. One researcher stated that if the permit is "interpreted as an issue that allows the project to move forward and, therefore, becomes a proxy essentially for, in fact, the consequences of the entire project, then clearly a whole range of consequences stem from it," similar to the "(economic) consequence of having cut the ribbon and opened the bridge."[22] No research was known that explicitly examined the relationship between a water permit and public perception.[22] Significant economic impacts have also been forecast by researchers to possibly occur at an unknown time, when the hypothetical status of the repository no longer inhibits the social amplification of key events, triggering individual, social, and institutional responses.[10] But historical empirical evidence indicates nearby nuclear activities do not affect where individuals actually live, vacation, retire, and travel to conventions. This contradiction between expressed preferences and actual behavior is a factor that researchers need to consider.

3. APPARENT PARADOXES IN THE PERCEPTIONS OF RISK

Three significant apparent paradoxes are evidenced in the literature and research reports that assess public perceptions of risk and serve as the basis for requests to rethink federal siting policy. Researchers have predicted the potential for possible significant economic losses due to associated stigmas, despite information and interpretations to the contrary. Historic marketplace conditions and demographic and economic location behavior patterns do not empirically reveal any adverse effects from proximity to nuclear-related facilities and nuclear fuel transportation routes.

3.1. Paradox 1: Preferred Distance and Actual Distance Are Often Not the Same

The first significant apparent paradox exists between the minimum number of miles people state they would prefer or are willing to be from a nuclear power plant, underground nuclear waste repository, nuclear fuel transport route, nuclear test site, or other hazardous facilities and their present location situations. Survey re-

searchers use "minimum acceptable distance" or "willingness" questions primarily as gradients or surrogate psychological measures of perceived risk and measures of comparative aversion. By establishing the distance at which a person, given a choice, would feel comfortable or uncomfortable living, working, visiting, or establishing a business in proximity to a hazardous facility or activity, researchers seek to estimate the potential adverse effect that would accompany new hazardous facilities or activities; reality shows otherwise. Assigning too robust a salience to one isolated location variable could lead to an inflation of its significance relative to other variables.

Many respondents do not seem to be cognizant of their actual proximity to nuclear facilities and activities. For example, immediately following the well-publicized 1979 Three Mile Island (TMI) reactor accident, 31% of persons living within 25 mi of a nuclear power plant did not know that a reactor was nearby.[9] This dissonance shows that the concern or perception of risk elicited by the psychological measure of distance was not sufficiently important for many respondents to research the issue or to modify behavior as a result of concerns or fears.

The apparent paradox of preferred distance is striking. People state an unwillingness to be located near a nuclear power plant, yet 80% of the population in the contiguous United States reside within 100 mi of an operating nuclear reactor. In Nevada, 26% of Las Vegas residents stated they are unwilling to live within 300 mi of a nuclear power plant (20% said that 500 mi was the limit), yet six plants are sited within 250 mi—three Palo Verde units in Arizona and three San Onofre units in California.[17] People have stated that they would not attend a conference if they learned that the host location was within 100 mi of a nuclear reactor,[12] yet most major convention cities in the United States (e.g., Baltimore, Boston, Chicago, Detroit, Houston, Los Angeles, New York, Orlando, Phoenix, Portland, San Diego, and Washington, DC) have one or more nuclear reactors within 100 mi, and some have reactors within 50 mi. Population and urban growth have overtaken most previously remotely sited nuclear power plants. Many plants were built on the edge of urban areas in the 1970s, and host communities have experienced growth rates, as a whole, of more than three times the national average.[23,24] Even with the increased public attention and potential for risk, there is no documented negative economic effect in the areas surrounding any of the four nuclear plants on the U.S. Nuclear Regulatory Commission's (NRC's) "problem facilities" list, the 15 reactors recently cited by the NRC as needing vessel testing due to age, or the soon to be operational Watts Bar reactor.

Survey and empirical data also reveal an apparent paradox with respect to preferred distances from nuclear waste storage facilities. At odds with the theorized possibility of associated stigmas from a large spent fuel storage facility is the General Electric Company's Morris operation, which maintains an inventory of 3775 spent fuel assemblies or about 1700 metric tons and is less than 50 mi from Chicago.[25] Additionally, the NRC has approved licenses for five utilities to build and operate independent spent fuel storage installations (ISFSIs) with no apparent negative economic effect, contrary to the concerns for "the stigma which is usually associated with waste sites, per se."[17] In a seeming contradiction, there were 49 responses in a telephone survey of 402 Phoenix, Arizona residents (allowed up to six images) which were categorized as "somewhere else" (images included "wouldn't want to live near one," "not where I live," and "as far away as possible") when asked about an underground nuclear waste storage facility,[10] yet they reside less than 40 mi from the three-unit Palo Verde nuclear station where over 1000 spent fuel assemblies are stored on-site. Of the Las Vegas residents surveyed, 57% stated an unwillingness to live within 100 mi of an underground nuclear repository.[17] Similarly, 48% stated an unwillingness to live closer than 100 mi of the 40-year-old Nevada Test Site (NTS) facility, yet Las Vegas is approximately 65 mi southeast of it.[17] People and businesses continue to relocate to Las Vegas and thrive, investing billions of dollars in the image-sensitive tourist industry—even though several hundred nuclear warheads are stored at Nellis Air Foce Base on the outskirts of the city, more than 700 nuclear devices have been exploded at the NTS since 1951, and a potential site for the repository is being characterized.

Many inconsistencies also exist about perceptions of risk involving nuclear waste transport and actual personal behavior. Sixty-two percent of Las Vegas residents stated an unwillingness to live closer than 20 mi to a nuclear waste shipment route,[17] yet in 1987, 24 shipments of spent fuel traversed Las Vegas on I-15 without noticeable household relocation.[26] In addition, in 1992, 20 shipments (15,000 barrels) of thorium, a radioactive heavy metal, traveled from Fernald, Ohio, through Las Vegas to the NTS facility for storage. The issue is whether people will actually act on a preference. When Oregon residents were confronted with a federal plan to transport HLW on a nearby interstate, only 4 of 127 (3%) respondents who lived closer than they preferred to that highway said that they would very likely move over the next 5 years—for a variety of reasons.[9] For

almost 40 years, nuclear fuel has been transported by truck and rail across the United States. Each year, about 7000 new fuel assemblies—400 truckloads—are shipped to commercial light-water reactors for refueling purposes. Commercial carriers handled an estimated 2600 shipments or 9000 irradiated spent fuel assemblies (approximately 40,000 metric tons) between 1964 and 1989, traveling through 42 states and many major cities, without any accidents involving radioactive releases.[26–28]

Acceptable distance questions will continue to be used as gradient or surrogate psychological measures of perceived risk and averseness. The apparent paradox lies in the fact that when questioned on the single, isolated variable of preferred distance, people frequently state an unwillingness to live near a nuclear facility or transport highway, when in actuality significant numbers continue to choose to live closer than their stated preference. Nuclear facilities and transportation routes do not empirically appear to generate the adverse public reaction and location behavior modification suggested in predictions of possible stigmas and significant aversion based on the psychological measure of preferred distance. Before policymakers can give credibility to opposition predictions of possible significant economic losses, further research is needed to determine if people understand their dissonant behavior. Researchers need (1) to ask respondents why they often have not acted on their preferences; (2) to determine their level of knowledge regarding proximities; (3) to determine whether people feel that there is a real freedom of location choice in which physically to express their location preferences; and (4) to determine whether people have quietly acquiesced to a widespread but unwanted condition of being in proximity to nuclear facilities, transport routes, and other unwanted conditions or whether there have been subtle population shifts and physical location adjustments that are not reflected in the marketplace or demographic and economic behavior.

3.2. Paradox 2: Images of Possible Catastrophic Nuclear-Related Accidents Do Not Appear to Affect Location Selections

The second significant apparent paradox involves widespread public fear of a possible catastrophic nuclear accident versus long-standing demographic and economic growth and marketplace conditions in areas near nuclear facilities and transport routes. In many surveys, people were asked to give a scaled agree or disagree response to extremely low probability scenarios that depicted a fearsome, high-magnitude nuclear accident resulting in multiple deaths or large economic losses. For example, in a 1979 CBS/*New York Times* survey, pollsters asked, "Do you think a nuclear power plant could cause an atomic explosion with a mushroom-shaped cloud like the one in Hiroshima?" This scenario is an impossibility because reactor fuel cannot explode; however, 34% of respondents answered "yes," and 30% said they did not know.[9] The TMI station, which was the site of the most serious reactor accident (partial core meltdown) in the United States, resulted in no area property damage and no fatalities.

While the public continues to fear a catastrophic nuclear accident, they do not appear to react physically to that fear. After the 1979 TMI accident, only 0.3% of all households within a 5-mi radius moved, citing the "catastrophic" accident as the catalyst; a second identical reactor unit still operates at the site.[14] A depressed 1979 South Central Pennsylvania summer tourism season was more influenced by gasoline shortages and other suggested confounding variables (such as cool and rainy local weather and a polio outbreak) than by the TMI reactor accident.[29] Furthermore, there has been no apparent shift in area business and demographic location near several DOE facilities, even after the media detailed several scenarios of potentially explosive situations (i.e., Rocky Flats' plutonium dust in the ventilation ducts, Pantex's warhead dismantling, and Hanford's leaking underground liquid HLW storage tanks). An uncomplimentary record of DOE management failures, a daunting 30-year, $300 billion environmental cleanup at 126 DOE sites, and the public's resulting lack of trust in DOE have probably enhanced the belief that a catastrophe could occur at DOE facilities. The lack of apparent behavior response to the aforementioned risks shows that the public appears to discount the claims of risk, possibly because they feel the media may overstate the environmental risk.[8]

Public opinion also reveals a strong belief that a major transportation accident could occur during movement of spent fuel to a central repository. Such an accident is postulated to result in the release of large amounts of radiation, causing widespread damage to health and property.[17,18] Fifty-two percent of Las Vegas residents expressed that the transport of wastes would be a serious risk to their health.[30] Sixty-three percent stated that they do not want to purchase a house within 5 mi of a nuclear waste transportation route,[30] but there is no documented evidence that people avoid purchasing a house within that corridor, even though spent fuel, low-level radioactive waste, and nuclear warheads continue to be shipped on Nevada interstates. The public's lack of physical reactions shows that they are either un-

aware of the activity, or choose to ignore the issue, or choose to deny that almost 3000 spent fuel shipments in the last 30 years have taken place, some originating at eight U.S. Navy ports. Little historic basis exists to support the public's fear of a catastrophic transportation accident; only five traffic incidents have occurred in three decades, with no radioactive material released and no member of the public harmed by radioactivity from the transported spent fuel.[31] The public's fear of spent fuel does not seem to be assauged by the National Academy of Science statement that the assertion of the perceived possibility of catastrophe "is qualitatively incorrect for HLW, since radioactive waste materials have far lower energy levels in comparison to those of reactors, thereby lowering the risk associated with HLW."[4]

Despite a widespread belief in a possible catastrophic nuclear accident, states and communities are fighting to retain their DOE and privately owned nuclear facilities. State and local political campaigns to retain nuclear-warhead-related research and dismantling facilities and the DOE reactor research programs are active in, for example, Tennessee, Idaho, Illinois, Ohio, Washington, Nevada, and South Carolina. Residents do not appear to be out-migrating, except as programs and jobs are terminated. Is this because the general public, for all its surveyed expressions of widespread fear of nuclear wastes, does not have a strong subjective certainty in its beliefs about perceptions of risks? In a recent survey, two-thirds of respondents gauged their beliefs to range between very uncertain to somewhat certain.[8]

3.3 Paradox 3: Location Preferences Based on Negative Images Do Not Appear to Be Reflected in the Marketplace or Demographic and Economic Behavior

The third apparent paradox lies in the fact that population and economic growth continue to occur around most nuclear facilities and nuclear fuel transport routes for a variety of reasons, although survey data reveal that the public prefers to live away from these areas. Researchers have interpreted such survey statements as predicting or suggesting a potential for significant economic losses from the siting of interim storage and permanent disposal facilities. The assumption is based on an associated stigma and the postulated resultant behavior of individuals as they attempt to reduce the risk of personal harm. Researchers have used a method, the psychometric paradigm, that produces quantitative representations or "cognitive maps" of people's risk attitudes and perceptions.[32] They have also surveyed economic agents, for example, convention and corporate real estate planners, and applied an average propensity forecasting model to the response data to generate a range of possible values for the proportion of individuals who would change their plans for a vacation, convention, or business location in Nevada as a consequence of a social amplification or heightening due to hypothetical repository-related events.[33]

The link between preferences and actual behavior is tenuous, at best, because of a host of influencing and confounding factors (e.g., inertia of a status quo, social influence, long latencies, personality traits, context, seeking to prevent a noxious outcome, needing cuing, giving a demand effect, and unforeseen costs or obstacles), which can cause an over- or underestimation in the translation.[33] Researchers have attempted to use surveys of planned purchases of consumer electronic equipment and organization support through actual payment of membership fees as tests to determine the strength of the linkage between a stated intent and an actual behavior; correlations were found to be weak.[34,35]

The Office of the United States Nuclear Waste Negotiator has sought volunteers to host the MRS and repository facilities for 4 years. Three counties and 20 Indian tribes received DOE study grants to assess the desirability of hosting an MRS. Recently two Indian tribes made formal requests to the Negotiator to enter into negotiations for the possible siting of an MRS on their reservations. A major inhibiting factor has been the concern that possible associated negative nuclear images would potentially influence personal and business location preferences, thereby adversely affecting an area's tourism, retiree inmigration, agricultural sales, and business and industry attraction.

This inhibiting factor was evidenced when Governor Leavitt rejected a request by an interested Utah county to continue its pursuit of hosting an MRS based on the concern that "the tourism and recreation industries ... would suffer significantly from the stigma ..."[36] Earlier, Governor Sullivan halted a Wyoming county from its pursuit of hosting an MRS because of the risk "that new businesses may choose not to locate in Wyoming," combined with a possible negative stigma, which could alter "our image as a state, our environment or our tourism industry."[37] Their assertions of stigma were based on survey data and assumptions, not empirical data. The governors of these two states, once major producers of uranium ore and yellow cake for the nuclear fuel cycle, did not cite examples of revealed stigma effects from their several decades of indigenous nuclear experience as evidence for a rejection. The Mescalero Apache Tribe, meanwhile, who successfully rely on their tourist-based

reservation industries, are requesting credible, formal discussions on the siting of the MRS believing it can strengthen the economy of the region over the long term.

A long-term pattern of economic and demographic growth has been occurring in communities adjacent to nuclear power plants, nuclear-related production facilities, nuclear reactor research and development centers, and spent fuel storage areas. One reason is that while the facilities were initially remotely sited, they were situated directly in the path of urban sprawl. A second reason is that host communities become attractive locations because of their enhanced services, facilities, and infrastructures, provided through large utility tax payments and high-paying job opportunities.[24] Residential growth has reached the fenced boundaries of several commercial nuclear fuel production and many test reactor facilities, such as in Wilmington, North Carolina; Princeton, New Jersey; Oak Ridge, Tennessee; and Windsor, Connecticut.[38] Industrial growth, for example, continues to occur in Barnwell County, South Carolina, host of the Savannah River Site—location of five nuclear reactors and several processing facilities that manufacture plutonium, tritium, and other nuclear weapons materials. Since 1989, relocating new companies and ongoing business expansions have created about 1200 new jobs in Barnwell County, and four solid new prospects are currently being pursued.[39] Recreational activities have also been expanding near many nuclear sites, e.g., skiing near West Valley, New York; beach tourism in Wilmington, North Carolina; and white-water rafting in Erwin, Tennessee.[38] In addition, new gaming operations are being established on Indian lands in proximity to nuclear facilities (such as the Mashantucket Pequot Reservation casino complex located 10 mi from a nuclear submarine base and 13 mi from the three Millstone reactor units), and floating casinos now ply rivers on which nuclear power plants are sited.

Five nuclear power plant sites (Surry, H. B. Robinson, Oconee, Calvert Cliffs, and Fort St. Vrain) are the locations of ISFSIs for spent fuel storage, with no apparent perception-based negative effects on tourism, agricultural products, industry, or real estate. Similarly, several ISFSIs are in the planning, licensing, and construction stages at other nuclear power plants (e.g., Rancho Seco, Prairie Island, Palisades, Oyster Creek, and Brunswick), with no apparent concerns over possible perception-based area impacts. The primary concern expressed by host states and communities is that they do not want ISFSIs to become the long-term solution to nuclear waste disposal; a secondary concern is the occurrence of a possible catastrophic accident, such as radioactive contamination of adjacent water bodies. No documented economic and demographic evidence exists that shows surrounding areas are less desirable as a destination or that people avoid the ISFSI host areas.

Despite the massive media attention focused on the HLW repository site suitability and characterization activities at Yucca Mountain and the vehement state opposition, there have been no documented signs of significant economic losses in the Las Vegas or Nevada economies. The stability of Las Vegas casino stocks, the increasing number of conventions, and the steady stream of visitors and retirees—all the lifeblood of the local economy—are not projected to decline in the future.[40] One of the confounding events that researchers need to explain is the movement of the 1987 Amendments Act through Congress, which was accompanied by suggestions from state researchers of possible significant economic losses for the Las Vegas area due to the siting of a repository, and a simultaneous upward credit rating for city of Las Vegas general obligation bonds, from Baa to A1, based on forecasts of future economic vitality; the rating still remains.[41]

Persons claim that they may not visit a locale because they associate it with a nuclear image, or they cite the presence of a nuclear power plant, a temporary spent fuel storage facility, or a repository as a possible reason for an aversion. The link, though, between location preferences based on negative images and actual location behavior is tenuous; the interplay of influencing factors and salience is confounding. Researchers need to document their hypothesis with empirical economic and demographic evidence that areas in the vicinity of nuclear facilities and transport routes are less desirable and that people consciously avoid areas that host nuclear activities.

4. CONCLUSION

There has been over 40 years of experience with the nuclear fuel cycle in the United States. The federal government strongly encouraged and openly supported nuclear development as a national energy policy of "hard" choice for the commercial generation of electric power and for powering the U.S. Navy's fleet. During this period, changing cultural attitudes and conflicting values have led to intense clashes over the direction of future energy policy, centering on this nation's reliance on the nuclear fuel cycle (extolled as a nonpolluting and independent source of energy) and spent fuel disposal options. As potential host sites are being identified and characterized under the authority of the NWPAA as possible locations for interim HLW storage and permanent disposal facilities, the intensity has increased.

Various interest groups and state governments opposed to the siting of the congressionally mandated centralized HLW storage and disposal facilities are using the documented existence of a widespread feeling of dread, a fear of associated stigmas, and a perception of possible catastrophic accidents associated with the nuclear fuel cycle to create a powerful, emotional obstacle to the siting. Vehement opposition continues to frustrate a decade of U.S. government attempts to relocate and consolidate, under federal stewardship into centralized facilities, the approximately 100,000 spent fuel assemblies (7000 are added every year) managed by 54 utilities at over 70 sites scattered across 33 states.[25,26] Negative imagery exists despite the fact that a nuclear omnipresence has evolved in the United States, with over 200 nuclear-related facilities involved in the manufacture, use, research, testing, storage and disposal of nuclear fuel and training of engineers and operators. These nuclear facilities have become integral parts of their host communities and usually stimulate local demographic and economic growth. And more than 10,000 shipments of new and irradiated fuel have been transported on this nation's highways and rails between the facilities; daily shipments continue.[25–28]

A robust research agenda should be directed to resolve the three apparent paradoxes discussed in this paper. First, survey researchers should determine if the apparent self-contradiction between surrogate "acceptable distance" measures of location aversion and actual demographic and economic location behavior patterns is based on, for example, a viable comparison, a cognitive dissonance, an ignorance of actual proximity, a reflection of actual unimportance, an inflated salience assigned to an isolated location variable, a sign of acquiescence to an unwanted condition, or the inability of people to express themselves freely in the marketplace. Second, researchers should seek to understand and correlate the "bundled" survey responses confounded by diverse personal, cultural, political, and occupational attitudes and conflicting values, combined with an asymmetrical filtering by individuals, which bias survey answers. Finally, researchers should assess the constructs of the public's negative nuclear images and perceptions of risk that influence the stated location preferences, i.e., seemingly limited public knowledge of nuclear science and technology; an unbalanced understanding of radiation; a personalization of postulated harm; an exaggerated fear of uncontrollability leading to potential catastrophes; the information and images presented to the public in literature, news media, entertainment and popular culture, which generally confound scientific assurances to the contrary; and a mixture of antitechnology, antiestablishment, and antimaterialism sentiment. Researchers also need to determine the level of subjective certainty in the public expressions of perceptions of risk regarding the nuclear fuel cycle and nuclear activities.

Recent requests for federal policymakers to reevaluate the current congressionally mandated siting policy for centralized HLW storage and disposal facilities appear to be based on a subjective fear of a potential significant negative economic effect, rather than on proven negative effects. The federal government, in the implementation of the siting process, cannot ignore the documented negative imagery and perceptions of risk associated with the nuclear fuel cycle and nuclear activities. They have become strong obstacles and tools for opponents who seek to halt the present HLW siting process, as well as for those who want to foreclose this nation's nuclear power option prematurely. The claims of various interest groups and state governments of the potential for possible significant negative economic effects from centralized HLW facility siting and accompanying transport are based on survey data and founded only in theory, methodology, and hypothesis. The public's negative imagery and perceptions of risk do not appear to be reflected in the marketplace or in discernible economic and demographic location selection behavior. Siting opponents need to explain these apparent paradoxes before continuing to propose that the current federal siting policy be changed based on negative imagery, not proven negative economic effects.

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