

**Property Valuation and Radioactive Materials Transportation:
A Legal, Economic, and Public Perception Analysis**

*Judith A. Holm
National Transportation Program
U.S. Department of Energy
Albuquerque, New Mexico*

*A. W. Thrower,¹ Derek A. Widmayer²
Science Applications International Corporation
Germantown, Maryland*

*W. E. Portner
Science Applications International Corporation
Albuquerque, New Mexico*

ABSTRACT

The shipment of transuranic (TRU) radioactive waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico raised a serious socioeconomic issue - the potential devaluation of property values due to the transportation of TRU waste from generator sites to the disposal facility. In 1992, the New Mexico Supreme Court held in *City of Santa Fe v. Komis* that a loss in value from public perception of risk was compensable. This issue has become an extremely important one for the development of the Yucca Mountain repository in Nevada for disposal of spent nuclear fuel and high-level radioactive waste.

Much research has been conducted about the potential impacts of transportation of spent fuel and radioactive waste. This paper examines the pertinent studies conducted since the *Komis* case. It examines how the public debate on radioactive materials transportation continues and is now focused on transportation of high-level waste and spent nuclear fuel to the proposed Yucca Mountain repository. Finally, the paper suggests a path forward DOE can take to address this issue.³

INTRODUCTION

In August 1992, the New Mexico Supreme Court heard the appeal of the City of Santa Fe in a partial condemnation case, *City of Santa Fe v. Komis*. In November 1988, the landowners brought an action against the city, which annexed 43 acres of land to build a highway bypass around the town center. What made *Komis* special was that the highway was built to carry

¹ Now with the U.S. Department of Energy.

² Now with the U.S. Nuclear Regulatory Commission.

³ Supporting research for this paper was conducted under contract to the U.S. Department of Energy's National Transportation Program, Contract #DE-RQ04-2000-A66567; however, the authors wish to note that this paper reflects only their personal views and opinions, and in no way represents the opinion of the U.S. Department of Energy or its contractors.

radioactive waste from the Department of Energy's (DOE's) Los Alamos National Laboratory (LANL) to WIPP in the southeastern part of the state. For the first time, a court was asked to award damages resulting from public fears of radioactive waste transportation. The Court held in this case that a loss in value from public perception of risk was compensable.

The aftermath of the *Komis* case involves political, legal, and socioeconomic elements. The implication behind the ruling—that property owners along transportation corridors used to ship radioactive materials might suffer diminishing property values—has become a highly visible argument put forward by opponents of the development of the high-level waste repository at Yucca Mountain, Nevada.

BACKGROUND: THE *KOMIS* CASE

On November 14, 1988, the City of Santa Fe condemned 43.431 acres of a ranch owned by John and Leonia Komis for construction of a highway bypass to transport TRU waste from LANL around the city (1). Without the bypass, TRU waste shipments would travel through the city limits (2). The Komises sued, and following a jury trial, were awarded \$888,192 in damages. The total amount included \$489,582.50 for the value of the 43.431 acres taken, \$60,794.50 for severance damages to the “buffer zone” along the taken land, and an additional \$337,815 for severance damages due to public perception of risk related to the planned shipments of TRU waste (3). The Komis' land valuation expert testified that the loss to the remaining portion of the ranch because of this public perception of risk was \$1,000,000 or \$662,185 more than awarded by the jury. Both parties appealed, and the Court of Appeals certified the case to the New Mexico Supreme Court on January 10, 1992 (4).

Justice Franchini, writing for the majority, stated that “the underlying issue that forms the basis of the trial court's rulings is whether in a partial condemnation action a property owner is entitled to receive compensation for the diminution of value to the remainder of the property caused by public perception” (5). The court held that in a partial condemnation case, the diminution in market value of a property owner's remaining land because of public fear of the transportation of the waste is compensable, regardless of whether the fear is a reasonable one (6). For reasons not stated by the trial court, and apparently not disputed by the City of Santa Fe, the decision placed great precedential weight on a series of cases dealing with electric power lines and subsequent fears of cancer from electromagnetic fields. In rendering its opinion, the Supreme Court essentially drew an analogy between the power line cases and applied them to radioactive waste transportation.

We presented a paper at Waste Management '01 about the *Komis* case and its legal implications for radioactive waste management transportation. Our research led us to provide an alternative analysis for long-term impacts of the case, and showed that in both power line cases and other perception-value diminution cases, courts sometimes look beyond just economic effects at a risk-benefit comparison. Public benefits in takings cases sometimes do outweigh private ownership interests, and courts engage in a balancing of equities when they take public perceptions of risk (whether reasonable or not) into account. Although *Komis* has been cited by cases in New Mexico, to date none have followed the case's holding on the specific issue of radioactive

waste transportation and public risk perception. Now, as was true 2 years ago, *Komis* still stands alone (7).

EMPIRICAL ANALYSIS: THE GAWANDE AND SMITH STUDY

A 1999 study by Kishore Gawande and Hank Jenkins-Smith, funded by DOE and published in the *Journal of Environmental Economics and Management* (8), modeled the impacts from shipments of spent nuclear fuel containing uranium enriched in the United States and used in foreign research reactors being accepted at a storage facility at DOE's Savannah River Site in South Carolina. Gawande and Smith used a modeling technique that corrects for spatial autocorrelation with data on actual real estate transactions in three South Carolina counties through which the spent fuel was transported, as well as the results of a survey they designed and implemented to provide insights into what the analysis of the property values showed. The results of the study are enlightening:

Our analysis indicates that property values have reacted in different ways to shipments in the three counties. No declines were evident in predominantly rural Berkeley and Aiken Counties, while an economically and statistically significant decline was evident in more populous Charleston County (9).

Gawande and Smith concluded that property values in the rural areas are less affected because of a lower risk perception and more experience with nuclear materials. They also urge caution when making generalizations about the effect of spent nuclear fuel shipments on real estate property values given the discrepancy in the results from the urban and rural counties. They go on to say:

Our results, if confirmed in further studies, indicate there may be important distributional consequences of such shipments that should be considered in policy making. These consequences include suppressed property values when the shipments are highly publicized, controversial, and the focus of claims about extreme risk . . . (10)

DERIVATIVE SOCIOECONOMIC ANALYSES

While there has been no additional litigation spawned by *Komis*, the basic issue of diminished property values related to the stigma of proximity to radioactive waste transportation corridors has received much more attention in the scientific community, mostly in relation to other high-profile shipping campaigns involving spent nuclear fuel.

One study completed very early during the research on Yucca Mountain's suitability as a repository used a poll to survey residents' attitudes toward home buying given the possibility of increased spent nuclear fuel and radioactive waste shipments to Yucca Mountain. The study concluded:

Our findings also offer further evidence that homebuyers find hazardous materials within close proximity a serious concern. Yet, homebuyers who are most

knowledgeable appear to be somewhat less concerned than those who are uninformed. The implications for the planners of a high-level nuclear waste repository are that a well-thought-out public relations program may assist in overcoming only some of the resistance to the facility (11).

In October 1997, Metz and Clark reported on the results of a study to determine the impacts on property values of decisions about the spent nuclear fuel stored at two California nuclear power plants. The study revealed that no significant effects on residential property values resulted from a decision to move spent nuclear fuel from wet storage to a dry-cask storage facility or from a request to extend the reactor operating permit (12).

The issue surfaced again in the summer of 2000 during hearings held by the U.S. Nuclear Regulatory Commission (NRC) related to licensing of Private Fuel Storage, Inc. (PFS). PFS is a group of eight nuclear utilities seeking to operate a temporary spent fuel storage facility on the Goshute Indian Reservation in Skull Valley, Utah (13). As might be expected, there is considerable public opposition to the proposed facility, prominently led by Utah's Governor Mike Leavitt, who in 1997 stated "Our state faces the threat of becoming the nation's dumping ground for high level nuclear waste, and I want to stop it from happening" (14).

On August 21, 2000, Mac Brubaker, President of the Utah Association of Realtors, testified before an NRC hearing that members feared a direct impact on property values. He stated that *Komis* "involved many serious and detailed studies" (15) (the valuation evidence was based on a solitary study). He added that, based on data obtained from that study and extrapolated to the planned corridor through Utah for the PFS shipments, property owners could expect "a single business enterprise to take, without just compensation, five to twenty billion dollars" along a 100-mile transportation corridor (16). This issue has also been raised in Utah over the licensing actions by Envirocare to amend their radioactive materials license to allow them to accept higher radioactive classes of low-level waste at their facility (17).

Three studies were conducted on behalf of Nevada counties on the impacts related to the transportation of spent nuclear fuel and high-level radioactive waste through them to Yucca Mountain. These reports were developed and submitted pursuant to the Nuclear Waste Policy Act, as amended, by the counties as "affected units of local government" (18)

A summary of Eureka County's Impact Assessment Report sent to the Executive Director for the Nevada Agency for Nuclear Projects includes the following statement:

Furthermore, economic impacts on private property owners in close proximity to the rail line can be expected. Eureka County's assessor estimates that property values within three miles of the rail corridor and the existing UP [Union Pacific Railway] tracks would be adversely affected. Property values would be diminished, even in the absence of an accident, as soon as shipping of SNF and HLW commenced. In the case of a severe accident, property values would decrease by a large amount, from 10 to 34 percent, depending on their use and proximity (19).

Clark County's property value report on the effects of DOE's proposal to ship spent nuclear fuel and high-level waste to Yucca Mountain contains the following conclusions:

"Stigma resulting from an amplified perception of risk has been associated with all aspects of nuclear power plant siting and operations, and stigma has been associated with a decline in property values. Clark County investigated the likelihood and extent of property value diminution that may occur in Clark County, Nevada that is directly attributable to this program" (20).

"The research findings indicate that Clark County will likely experience assessed property value diminution ranging from \$75.2 million to \$526.5 million for three types of properties - residential, commercial, and industrial. Within this range, the projection depends on the route selected and whether the shipment campaign proceeds without incident or whether an incident occurs but does not result in any release of radioactive material. Further, this projection is based only on diminution of a limited number of land uses, thus actual losses are likely to be much higher" (21).

"Both the Clark County and New Mexico surveys also questioned respondents about their views concerning potential nuclear waste transportation impacts on nearby commercial or business property. In this case, 40.7% of the Clark County respondents indicated that commercial property would decrease with another 5.8% indicating generally 'negative effects' on properties. Interestingly, 6.2% responding to this open-ended question suggested adverse effects on business operations located near these routes" (22).

The property diminution analysis concerning nuclear waste shipments through Washoe and Elko Counties in Nevada also addressed this issue:

Given the high level of public concerns over the risks of shipping nuclear waste, the probability of an incident (even with no release of radioactive materials) may result in significant property value diminution over an extended period (23).

The Nevada Agency for Nuclear Projects issued a report that consolidates the Nevada studies and includes information on past shipments of spent fuel and other studies. It states:

Research by DOE as well as by the State of Nevada and independent scientists has demonstrated, for example, that shipments of spent nuclear fuel, especially shipments through urban areas, have the potential to negatively affect property values along transport routes, even without the occurrence of an accident or incident. An accident involving the release of radioactive material would have major consequences. DOE's own studies show that a worst case transportation accident would cause between 4 and 31 latent cancer fatalities. A 1985 DOE contractor report estimated that cleanup after a severe rail accident could cost \$620 million in a rural area and more than \$2 billion in an urban environment. State of Nevada evaluations of the same accidents, using DOE's computer models, found that the consequences could be hundreds of cancer deaths and

tens of billions of dollars in clean up costs (not including decreased property values and business losses due to stigmatizing effects of a nuclear accident) (24).

Studies developed and issued by environmental organizations have also addressed this issue. These studies mostly concern the Yucca Mountain geologic repository and specifically the transport of the spent fuel and high-level waste to the site. One such study, entitled, "Radioactive Roads and Rails: Hauling Nuclear Waste Through Our Neighborhoods," summarizes the work conducted for the Utah Association of Realtors discussed above, the Gawande and Smith study, and the *Komis* case (25).

YUCCA MOUNTAIN DEVELOPMENTS

In 1997, Congress considered amending the Nuclear Waste Policy Act to hasten characterization of Yucca Mountain and resolve the issue of commercial spent nuclear fuel storage. The Act proposed, among other things, mandating the temporary storage of tons of commercial spent nuclear fuel at the Nevada Test Site beginning in 2002, whether or not a permanent disposal site was ever developed. The Nevada congressional delegation objected strenuously to the Act's passage, and President Clinton eventually vetoed the Act. During debate, Rep. Gibbons (D-NV) outlined potential adverse consequences that could impact states besides Nevada:

Madam Speaker, what will a temporary nuclear waste repository at Yucca Mountain, Nevada, mean to private property owners in some districts? It will mean large government payoffs because the transportation of this radioactive waste will devalue their property. The New Mexico Supreme Court ruled that Mr. John Komis of Santa Fe be awarded more than \$884,000 resulting from devaluation damage to his land due to the transportation of radioactive waste past his property. If [the Act] passes, almost 80,000 tons of nuclear waste will be transported across this country, devaluing property along the way. And who will pay for this devaluation in private property? Of course, the American taxpayer. . . .(26)

In April 2001, the Nevada State Senate Committee on Transportation held a hearing at which Senate Joint Resolutions (S.J.R.) 4 and 11 were debated. S.J.R. 4 urged the Governor to designate alternate routes for transportation of nuclear waste to Yucca Mountain. S.J.R. 11 urged Congress to direct appropriate Federal agencies to prepare an environmental impact statement relating to transportation of nuclear waste materials to Yucca Mountain. During the debate on these resolutions, devaluation of property values was brought up, and the desire to include it and other socioeconomic impacts to Nevada and others in the environmental impact statement being developed by DOE on Yucca Mountain (27).

In the spring of 2002, the Secretary of Energy recommended the Yucca Mountain site to the President for development as the country's repository for disposal of spent nuclear fuel and high-level radioactive waste. In turn, the President recommended the site to the Congress. In accord with the Nuclear Waste Policy Act, Congress voted on S.J.R. 34 to support the President's recommendation over the objections of the State of Nevada. In the course of this process, House committees held hearings on the resolution.

Congresswoman Shelley Berkley (D-NV) testified at the House Subcommittee on Energy and Air Quality hearing on the President's recommendation to develop the Yucca Mountain repository. She included information about the potential property value loss in her words opposing passage of the resolution (28).

Testimony of two witnesses at the hearings conducted on S.J.R.34 by the House Committee on Transportation and Infrastructure Highways and Transit/Railroads Joint Hearing included the issue of property values and how they would be impacted by the transportation component of the Yucca Mountain repository. Congressman Dennis Kucinich (D-OH) included it in his testimony opposing the Yucca Mountain resolution, as did Robert J. Halstead in his testimony on behalf of the Agency for Nuclear Projects in Nevada opposing the repository (29, 30). Senator Diane Feinstein (D-CA) issued a statement opposing the resolution for developing the Yucca Mountain site in which she discussed potential transportation impacts on property values (31).

An Internet search reveals numerous articles covering the issue of reduced property values and Yucca Mountain. The mainstream press in Las Vegas (the Las Vegas Sun, the Las Vegas Weekly, and the Las Vegas Review-Journal) covered this aspect of the Yucca Mountain story during the 2002 congressional deliberations on site approval.

In-depth coverage of this issue is included in a Yucca Mountain Special Report series done by the publication In Business Las Vegas that includes interviews with real estate lenders, appraisers, and researchers and analysts while reporting on the specific findings of the Clark County study. The article presents a balanced discussion of the issue, with several arguments from both sides:

[Steve] Bottfeld [senior analyst with local research firm Marketing Solutions] said though property values would fall quickly, they would return rapidly (32).

[Tim] Sullivan [analyst for the Meyers Group] said the valley on a macro-economic scale would likely not suffer serious or lingering effects. "(Waste shipments) probably won't impact property values significantly in the big picture - - people will still move to Las Vegas, and it will still be a great retirement haven. I don't think it would really hurt the Las Vegas marketplace in total. But we should still be concerned about (real estate) on the direct path." Sullivan said county and city governments might have to consider remuneration for fallen property values for valley residents living near transport routes (33).

Dennis Smith of Home Builders Research Inc., echoing arguments by some in the community that Yucca Mountain might evolve into a center for high-tech science research: "If Yucca Mountain brings high-paying jobs to the area, it will do nothing but benefit the market" (34).

Las Vegas should instead turn its attention to "making sure Yucca (Mountain) is not continuously played up in the news as 'near Las Vegas.' Ninety percent of the country has no idea where Yucca Mountain is," [Aaron Paris, CEO of Reno-based industrial developer DP Partners] said (35).

Information and opinions on Yucca Mountain and the impact of radioactive materials transportation on property values can be found on the websites of groups opposing the repository. Public Citizen has a brochure on its website entitled, “Get the Facts on Property Values and Nuclear Waste Transportation.” It discusses the *Komis* case and provides a sample resolution that local governments can pass to strongly oppose transportation of any radioactive waste in or near their jurisdictions (36). Citizen Alert also has sample letters posted on its website for people to use when writing to their congressional delegation (37). The National Association of Counties (NACo) Legislative Affairs website contains their Yucca Mountain resolution that, among other things, urges DOE to assist local and state governments and tribal nations in developing a monitoring system to assess impacts to local economies and property values along transportation routes (38). Save Our Environment has a “Take Action” bulletin on its website that provides background information on Yucca Mountain and high-level waste and a summary of problems and issues available in published sources. Internet linkages are provided to several government and other agencies for additional information (39). The Alliance for Nuclear Accountability website addresses the property value issue in a paper called “Yucca Mountain: Not Safe for Nuclear Waste” (40). The United Electrical, Radio and Machine Workers of America (UE) has a resolution on its website to keep spent nuclear fuel and nuclear waste off of U.S. highways and rails. It brings up property devaluation as one reason for opposing Yucca Mountain (41).

DOE’S RESPONSE TO DATE – THE YUCCA EIS

During the scoping process for the Draft Environmental Impact Statement (DEIS) for the Yucca Mountain Repository, DOE received comments on the need to address perception-based impacts and stigma effects in the document. The State of Nevada provided comments on the Notice of Intent to prepare the DEIS published in the *Federal Register* in 1995 (42), including the following:

The Draft EIS must also consider the effects of risk perception on property values along shipping routes, and risk-related impacts on business location and expansion decisions (43).

Based on information available at the time, some of which was research funded by the Department itself, DOE decided not to address this particular subject in the DEIS because it felt that there were too many unknowns and the science was not advanced enough to address the situation knowledgeably.

Once the DEIS was released in August 1999, the issue of transportation impacts and the reduction in property values was voiced by several individuals and groups who submitted comments. The State of Nevada submitted extensive comments on the DEIS, including an entire Appendix on the socioeconomic impacts of developing and operating the Yucca Mountain facility (44). Included in Appendix I were the following statements:

Impacts associated with stigma attached to nuclear and/or hazardous facilities and activities are not psychological effects. They are real, definitive, quantifiable

impacts that are directly manifested in economic indicators such as reduced property values, reductions in tourism and conventions, suppressed economic development, and reduced business investment (45).

DOE has, in fact, sponsored its own “stigma” research that is not included in the socioeconomic analyses contained in the draft EIS. An excellent example of this research is the work done by the University of New Mexico under contract with DOE. Of particular interest is a study by Drs. Gawande and Jenkins-Smith on the effects of stigma on property values along routes in South Carolina that were used to transport spent nuclear fuel from foreign research reactors. The Gawande and Jenkins-Smith findings are extraordinarily important and relevant to the potential for stigma effects stemming from the Yucca Mountain program and related nuclear waste transportation. Specifically, the researchers found that the hazardous, nuclear nature of these shipments and peoples’ responses to them directly caused property values in urban Charleston to be “lowered in a substantive manner” (46).

Public Citizen’s Critical Mass Energy and Environment Program included the following comments on the DEIS:

The DEIS fails to consider impacts on property values both near the Yucca Mountain site and along the transportation routes upon which nuclear waste would be transported to the Yucca Mountain site (47).

The DEIS should include a section that discusses potential impacts to property values, both in Nevada near the Yucca Mountain site and throughout the nation along the transportation routes to Yucca Mountain. This analysis should include a baseline assessment of property values as well as an estimate of impacts to property values. This information is crucial because costs to taxpayers could be significant if the Department of Energy is sued by property owners for property value decreases. Further, local economies could be devastated if property values decrease significantly because of nuclear waste transportation. This analysis should also include a discussion of environmental justice issues associated with a decline in property values along transportation routes. . . (48)

Testimony provided by Sandy Green from the Board of Eureka County Commissioners on the adequacy of the DEIS included the following comment:

The DEIS does not adequately address the potential effects that this project could have on property values within our county. Our concern has several dimensions. We are concerned about the potential loss of market value because of the stigma of a nuclear waste rail line in the county. With the strong agricultural base in the county, the nuclear stigma could affect not only property values but also crop prices (49).

DOE issued a Supplement to the DEIS in May 2001 that also received comments identifying the reduction in property values as a potential issue that needed to be addressed. The Nuclear Information and Resource Service comments on the Supplement to the DEIS included:

The lack of emergency preparedness, and the impact upon property values along transport routes, are similarly inadequately addressed (50).

In response to these comments submitted on the Draft and Supplemental EISs, DOE included Appendix N in the Final Environmental Impact Statement (FEIS) on Yucca Mountain, issued in February 2002 (51). To date, this is the most comprehensive response to mounting concerns on the impacts on property values (and other socioeconomic issues). Appendix N evaluates research cited by the Nevada studies and research independently conducted concerning socioeconomic impacts from perceived risks as they relate to the Yucca Mountain repository. A study completed in 1995 by the Nuclear Waste Technical Review Board (NWTRB) and submitted to Congress (52), a study by Doug Easterling and published in Risk Analysis (53), and Nevada studies cited earlier form the bases for the response in Appendix N. Conclusions drawn in Appendix N include:

- Although a large proportion of people, when asked, report negative images of shipments of spent nuclear fuel and high-level radioactive waste, it is not clear that a substantial number of people would feel threatened by such shipments (54).
- Attitudes are usually poor predictors of behavior (55).
- Perceptions about a repository and transportation of spent nuclear fuel and high-level radioactive waste are unlikely to engender behavior that will harm the Nevada economy (56).
- Both “stigma” and the “social amplification of risk” require a trigger (e.g., a major accident) to bring about behavioral changes and adverse socioeconomic impacts (57).
- Perceptions might temporarily reduce property values along urban transportation corridors by approximately 3 percent, although other research shows that impacts might be negligible or nonexistent (58).

Appendix I concludes that more research on whether property values would fluctuate and for how long would be beneficial, although it cautions that any amount of research will not definitively tell whether shipments would cause any impact.

OTHER RESPONSES

DOE has responded to issues and concerns about radioactive material transportation associated with many of its programs, including WIPP. For example, DOE has included information on the Office of Environmental Management’s Transportation Emergency Preparedness Program

(TEPP) on its website (59). This website integrates transportation emergency preparedness activities under a single program and using a standardized approach to address emergency response concerns of state, tribal, and local officials along DOE shipping corridors. "Tools" are available on the website to assist those responders in preparing for a potential transportation incident.

In an earlier response to negative coverage about transportation of spent nuclear fuel, the Nuclear Energy Institute published an article entitled, "It's All in the Preparation" that contains information about transportation regulations and explains why spent fuel should be considered safe to transport. It also discusses ways to increase public awareness and confidence (60). Similarly, the Northeast Nuclear Waste Information Conference published statistics about spent fuel shipments and the routes used to transport DOE waste, as well as a summary of observations about the safety of DOE transportation of radioactive materials. This publication attempted to explain that there is already a significant amount of highly radioactive material being shipped, including within Nevada, and placed the proposed increases from opening Yucca Mountain in a different context (61).

Recently, Congressman John Shimkus (R-IL) addressed the issue of safe transportation of spent fuel and radioactive waste to Yucca Mountain in a special section of the publication *The Hill* (62).

OTHER USEFUL TRANSPORTATION/SOCIOECONOMIC ISSUE STUDIES

Several studies lend additional information to the debate about transportation of spent nuclear fuel and its impacts on property values. These studies were not conducted specifically to evaluate property-value impacts, but to study more general issues concerning safe transportation of nuclear waste. They are discussed here because they provide insight into how the public perceives the risks from transportation, the appropriate involvement of local government and the public in effecting safe transportation of waste, and suggestions on actions that, if implemented, could mitigate some of the negative reaction to nuclear fuel shipments.

A scientific modeling study was conducted in the late 1990s to examine the impact of spent fuel storage at reactor sites on property values. This study was commissioned and funded by the DOE because it looked like a long-term solution to spent fuel management was likely to include additional at-reactor storage rather than shipping to a Federal repository. The study was conducted using data around the Rancho Seco, CA nuclear power plant. Some of the conclusions of the study are interesting:

"Our findings reveal that the Rancho Seco nuclear power plant does appear to exert some influence on the local real estate market, as housing prices rise significantly with distance from the plant, although the slope has been flattening over time" (63).

"... there is little evidence to support the contention that media attention on the plant has a strong detrimental influence on housing in the community. Although news coverage does appear to increase the aversion to the plant as indicated by a more positive price gradient, the magnitude of the impact is low" (64).

“As the evidence presented in this article indicates, there are just as likely to be adverse economic impacts, albeit minor, of risk perceptions at the power plant sites as have been claimed for the repository in southern Nevada” (65).

POSSIBLE RAMIFICATIONS OF THE VALUATION ISSUE

As discussed earlier, the issue of whether the potential for transportation of radioactive material shipments can impose stigma damages is a controversial one, an issue that has gained prominence during the Yucca Mountain debate and no doubt will continue to be raised. While an impressive and growing number of studies and analyses have attempted to quantify potential damages to properties along potential shipping corridors, two basic facts should be kept in mind:

1. The *Komis* decision, now over 13 years old, stands absolutely alone despite hundreds of shipments and millions of potential claimants since then, leading one to conclude that if this case were in fact a new precedent, some court, sometime would surely have followed it; and
2. The numerous and complex socioeconomic analyses that attempt to quantify stigma damages for various transportation scenarios are based on a single, limited, preliminary study whose authors themselves argue that the issue requires further study. Apart from the Gawande and Smith study, there appears to be no defensible empirical evidence whatsoever that stigma from transportation even exists.

Gawande and Smith’s finding that there may be a statistically significant effect may be supported by further research, or it may not. What is certain is that repeated and sustained citations to this single isolated study in secondary sources and reports do not validate the findings themselves.

Much of the research conducted to date has used polling methodologies, as opposed to empirical or real-time data. The Gawande and Smith study, by contrast, used real estate sales data along with the result of polls to reach its conclusions. The Gawande and Smith report and DOE’s Appendix I of the FEIS on Yucca Mountain both suggest that additional research is needed. If such analysis is undertaken, we recommend it address both the devaluation of property along possible spent fuel shipping routes and at reactor storage sites. The research should use actual real estate transaction data for a significant period of time, and also investigate impacts on property values of similar hazardous material shipping campaigns for comparison.

The literature also suggests that an informed public may be less likely to perceive transportation of radioactive materials as a risky activity. This is not to say that transportation opposition stems from ignorance, but that this activity is one of many complex technical activities undertaken by a society that deems it necessary, and takes precautions to mitigate potential risk. We suggest that, if the issue of radioactive waste transportation is going to be raised in the forum of public opinion, information about the planning and precautions taken to mitigate risk also be made available.

CONCLUSION

When the *Komis* opinion was first handed down, it may have had observers of the nuclear industry wondering if the future of waste transportation had been severely impacted, since the nature of the ruling could be used by other courts examining shipping campaigns as a precedent. It appears now that *Komis*, while interesting, is not a precedent that courts are going to follow; if this were not the case, some enterprising attorney would doubtless have reaped substantial fees from related litigation. Similarly, the findings of the single study purporting to offer empirical evidence of stigma damages are of interest, but preliminary and limited in scope. Assertion of transportation opponents to the contrary, the issue of whether transportation of radioactive materials confers stigma damages on adjacent property is by no means a settled question. What seems certain, however, is that controversy on this issue will continue. Further research may refine the debate, but will likely not resolve it.

REFERENCES:

1. City of Santa Fe v. Komis, 114 N.M. 659 (N.M. 1992), 659.
2. *Id.*
3. *Id.*
4. *Id.*
5. *Id.*
6. *Id.*
7. *Komis* was cited and discussed briefly in City of Albuquerque v. Westland Development Co., 121 N.M. 144, P 2d 25 (Oct. 28, 1995). While the court said the *Komis* holding “implied” that use of the taken portion could merit compensation, it acknowledged that “*Komis*, however, does not completely answer our questions.” 121 N.M. 149. The case dealt with condemnation proceedings related to a landfill, not nuclear waste transportation, and included an extended discussion of the temporality problems inherent in property valuation. To date, all other cases citing *Komis* have done so in reference to evidentiary precedents unrelated to the valuation issue.
8. Kishore Gawande and Hank Jenkins-Smith, Nuclear Waste Transportation and Residential Property Values: Estimating the Effects of Transient Perceived Risks, University of New Mexico, Journal of Environmental Economics and Management, Vol. 42, No.2, Pages 207-233, September 2001. (Published first electronically on October 23, 2000).
9. *Id.* at 209.
10. *Id.* at 225.
11. R.W. Hoyt, R.K. Schwer, and W. Thompson, A Note on Homebuyer Attitudes Toward a Nuclear Repository, The Journal of Real Estate Research, Volume 7, No. 2, Spring 1992.
12. W. C. Metz and D. E. Clark, The Effect of Decisions about Spent Nuclear Fuel Storage on Residential Property Values, Risk Analysis, Volume 17, No. 5, October 1997, pgs 571-582.
13. Private Fuel Storage, LLC “About the Project” (information series), 2000. This factsheet and other information can be found on the PFS website at <http://www.privatefuelstorage.com>.
14. Environment News Service, “Nuclear Waste Storage on Utah Tribal Land Wins Safety Approval,” Oct. 9, 2000 (can be found on the Web at <http://ens.lycos.com/ens/oct2000/2000L-10-09-15.html>).
15. Letter from Mac Brubaker, President, Utah Association of Realtors, to the Nuclear Regulatory Commission, Doc. No. SL3-05 (Aug. 21, 2000).
16. *Id.*
17. Heal Utah, Risks Associated with Envirocare’s Proposal, available at <http://www.healutah.org/envirocare/risks.html>
18. Nuclear Waste Policy Act.
19. RE: Impact Assessment Report on proposed shipments of Spent Nuclear Fuel and High-Level Radioactive Waste through Eureka County, Nevada, letter from Pete Goicoechea, Chairman, Eureka County Commissioners to Robert Loux, Executive Director, Nevada Agency for Nuclear Projects, August 6, 2001.

20. Urban Environmental Research LLC, Clark County Property Value Report on the Effects of DOE's Proposal to Ship High-Level Nuclear Waste to a Repository at Yucca Mountain, Scottsdale, AZ, December 2001.
21. *Id.*
22. *Id.*
23. Urban Environmental Research LLC, Property Value Diminution Analysis Resulting from Nuclear Waste Shipments Through Washoe County and Elko County, Nevada, Scottsdale, AZ, February 2002.
24. Nevada Agency for Nuclear Projects, "RISKY TRANSIT – The Federal Government's Risky and Unnecessary Plan to Ship Spent Nuclear Fuel and Highly Radioactive Waste on the Nation's Highways and Rail Roads," July 12, 2001
25. Pierre Sadik, Radioactive Roads and Rails: Hauling Nuclear Waste through Our Neighborhoods, U.S. PIRG Education Fund, Washington, DC June 2002.
26. 143 Cong. Rec. H8166 (daily ed. Sept. 30, 1997).
27. Minutes of the Senate Committee on Transportation, Seventy-First Session, April 12, 2001.
28. Prepared witness testimony, The Honorable Shelley Berkley, Hearing on A Review of the President's Recommendation to Develop a nuclear waste Repository at Yucca Mountain, Nevada, U.S. House of Representative's Subcommittee on Energy and Air Quality, Committee on Energy and Commerce, April 18, 2002.
29. Statement of Congressman Dennis Kucinich, House Committee on Transportation and Infrastructure Highways and Transit/Railroads Joint Hearing on Transportation of Nuclear Waste to the Proposed Yucca Mountain Storage Facility, Press Release, April 25, 2002.
30. Testimony of Robert J. Halstead, On Behalf of the State of Nevada, Before the House Committee on Transportation and Infrastructure Highways and Transit/Railroads Joint Hearing on Transportation of Nuclear Waste to the Proposed Yucca Mountain Storage, April 25, 2002.
31. Statement of Senator Dianne Feinstein in Opposition to a Resolution Making Yucca Mountain the National Repository for Nuclear Waste, Press Release, Washington, DC July 9, 2002.
32. Jennifer Robison, Clark County Real Estate Values Jeopardized by Waste Shipments, In Business Las Vegas, Yucca Mountain Special Report, available at <http://www.inbusinesslasvegas.com/yucca/>.
33. *Id.*
34. *Id.*
35. *Id.*
36. Public Citizen, Get the Facts on Property Values and Nuclear Waste Transportation, June 2001, available at: <http://www.citizen.org/documents/property.pdf>.
37. Citizen Alert, Critical Yucca Mountain Action (May 2002), available at: <http://www.citizenalert.org/yucca/actionbulletin0502.html>.
38. NACo, Resolution to Require the United States Department of Energy to Develop National Policies Regarding the Transportation of Radioactive Waste, National Association of Counties, Legislative Affairs, American County Platform, 2002-2003 Resolutions, available at: <http://www.naco.org/leg/platform/eelu/03radioactivewaste.cfm>.
39. SaveOurEnvironment.Org, Yucca Issue Brief, available at <http://nuclearneighborhoods.org/saveourenvironment/yuccabrief/>.
40. Alliance for Nuclear Accountability, Yucca Mountain: Not Safe for Nuclear Waste, available at: <http://www.ananuclear.org/yuccaweb.html>.
41. UE Convention Resolutions, Keep Highly Radioactive Nuclear Waste Off Our Highways and Railroads, available at: http://216.239.33.100/search?q=cache:kLhfmyoSD7oC:www.ranknfile-ue.org/policy_rw.html+%22keep+highly+radioactive+nuclear+waste+off+our+highways+and+railroads%22&hl=en&ie=UTF-8.
42. Notice Of Intent for Preparation of an Environmental Impact Statement for a Geologic Repository at Yucca Mountain, U.S. Department of Energy, Federal Register Volume 60, No. 151, August 7, 1995, pgs 40164-40170.
43. State of Nevada, Comments on the Notice of Intent for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nevada, December 1, 1995.
44. Radioactivity, Stigma, and Socioeconomic Impacts – The Need for an Assessment of Impacts on Nevada's Principal Economic Sectors in the U.S. Department of Energy's Yucca Mountain Draft Environmental Impact Statement. State of Nevada Comments on the Draft Yucca Mountain EIS, Appendix I, February 24, 2000.
45. *Id.*
46. *Id.*

47. RE: Comments on the Draft Environmental Impact Statement for a Geologic Repository for Nuclear Waste at Yucca Mountain, Nevada, letter from Amy Shollenberger, Senior Policy Analyst, Public Citizen, Critical Mass Energy and Environment to Wendy Dixon, EIS Project Management, U.S. Department of Energy, February 25, 2000.
48. *Id.*
49. Testimony of Sandy Green, Board of Eureka County Commissioners, on the Adequacy of the Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Crescent Valley, Nevada, December 9, 1999.
50. Kevin Kamps, Nuclear Waste Specialist, Comments on the Supplement to the Draft Environmental Impact Statement (SDEIS) for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, Nuclear Information and Resource Services, July 6, 2001.
51. U.S. Department of Energy, Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE/EIS-0250, Appendix N, "Are Fear and Stigmatization Likely, and How Do They Matter?" Appendix dated September 8, 2001.
52. United States Nuclear Waste Technical Review Board, Report to the Congress and The Secretary of Energy: 1995 Findings and Recommendations, Arlington, VA, 1995.
53. Doug Easterling, The Vulnerability of the Nevada Visitor Economy to a Repository at Yucca Mountain, Risk Analysis, Vol. 17, No.5, pages 635-647.
54. U.S. Department of Energy, Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE/EIS-0250, Appendix N, "Are Fear and Stigmatization Likely, and How Do They Matter?" Appendix dated September 8, 2001.
55. *Id.*
56. *Id.*
57. *Id.*
58. *Id.*
59. U.S. Department of Energy, Office of Environmental Management, Transportation Emergency Preparedness Program (TEPP), available at: <http://www.em.doe.gov/otem/program.html>.
60. Alan Chapple, It's All in the Preparation, Nuclear Energy Insight, Nuclear Energy Institute, June 1997.
61. Bill Sherman and Uldis Vanagas, Radioactive Materials Transportation, The Northeast Nuclear Waste Information Conference, Montpelier, VT, October 1997.
62. Rep John Shimkus (R-IL), Ensuring Safe Transportation of Waste to Yucca, The Hill, Special Section, May 8, 2002.
63. David Clark and Tim Allison, Spent Nuclear Fuel and Residential Property Values: The Influence of Proximity, Visual Cues, and Public Information, Papers In Regional Science, Vol 78, Pages 403-421, May 1999.
64. *Id.*
65. *Id.*