features

An Exploratory Review of the Effects of Toxic Mold on Real Estate Values

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abstract

This article reports outcomes of ten litigated toxic mold cases; a contingent valuation (CV) analysis of toxic mold in South Carolina; and mold case studies of an apartment complex near Seattle and a group of homes in Cleveland, Ohio. The litigated cases had very large payouts, some larger than the property value. Postcure reductions of 20%–37% in property value were revealed in the CV surveys. The apartment property contaminated with toxic mold had losses in excess of 60% and potentially as high as 100%. A mildly affected group of homes in Cleveland, Ohio, incurred unit remediation costs of 5%–15%.

Despite widespread recent interest in toxic mold, real estate literature has provided limited guidance on valuation issues for properties affected by it. To advance knowledge of this topic, this article first summarizes the scant quantitative data available on the effect of toxic mold on property values. A report on the nonempirical literature available on toxic mold is provided along with a summary of the settlements and verdicts in ten legal cases. Some new research conducted using contingent valuation analysis (CV) is described and more evidence of the effects of toxic mold on real estate values is revealed through study of a contaminated apartment building and a synopsis of the results of a city-led mold remediation program. The summary of the findings from these studies reveals a considerable range of potential outcomes, which suggests an urgent need for more research on the effects of toxic mold on property values.

Background

Mold is a very common occurrence in homes. The generic term *mold* includes mildew and other organisms that are typically not dangerous and can be readily dealt with by property owners or renters themselves without risk of personal injury. However, it is toxic molds that are the focus of this research.

Toxic mold includes such black-colored organisms as stachybotrys, penicillium, aspergillus, and fusarium.[1] The most feared of toxic molds is stachybotrys, also known as black mold, which is associated with respiratory infections and other negative health effects in children. Some colonies of mold do well in relatively dry conditions, while others require more moisture to thrive. Mold lives and grows well on many types of organic building materials. It is particularly insidious when there is moisture behind a wall or in an area hidden from view where the mold grows undetected and unabated while thriving on drywall, wood, or insulation material. It then can spread via spores and be readily transmitted

1. See http://www.mold-help.org.

in the air or through an HVAC system. The spores are associated with mycotoxins that can cause moderate and severe health problems in humans.

The term *toxic mold* includes fungi and mold. (All molds are fungi, but not all fungi are molds.) Toxic mold is a type of mold, not a level or measurement of mold. Guidelines for measuring toxic mold levels are vague, and there is not at present a set of standards for mold-level measurement. Local health organizations identify levels they consider dangerous on a case-by-case basis.

Real estate market guidelines for disclosure and inspection of mold are evolving. Some states have included mold disclosure as part of the real estate sales disclosure form; others have relied on general wording that would include mold. There are forms being developed by local multiple listing services for disclosure to limit liability for real estate agents. Property inspection firms with mold-related qualifications are also emerging. Appraisers are being advised to limit liability by adding language in the scope of work section of their appraisal reports to define and clarify the extent of the inspection and the limits of appraiser's expertise.[2]

Literature on Toxic Mold

Since toxic mold is a relatively new issue, there are no peer-reviewed studies that empirically address toxic mold and its effects on property values.[3] The most recent and comprehensive look at mold was by Aalberts and Hoyt, whose peer-reviewed article reflects on the role of the appraiser when evaluating toxic mold property risk.[4] Their findings suggest various issues for the appraiser to consider in conforming to the Uniform Standards of Professional Appraisal Practice (USPAP) when toxic mold is present in a property. Toxic mold has been examined in the context of commercial and residential water damage without any empirical results, while other studies have laid out the scope and nature of indoor mold in the context of suggested measures for portfolio and property managers.[5]

Finally, Bell's study of detrimental conditions contains several diagrams that may pertain to the toxic mold problem.[6] Bell lays out a set of possible scenarios of detrimental conditions and illustrates the outcomes in diagram form. These outcomes include curable and incurable conditions and a time component identifying when and if a property may recover from detrimental effects to value. The mold problem, if curable, could be the type of problem that reduces cash flow and property value for a time, after which the property largely recovers to near its original property value after remediation. On the other hand, another possible outcome is that the detrimental condition causes a total loss that creates a personal liability, such as an outstanding mortgage that is greater than the value of the land.

Legal Outcomes in Toxic Mold Cases

Large settlement awards in toxic mold lawsuits have raised expectations in mold-related litigation. An estimated 10,000 mold-related cases are pending in United States courts with a likelihood that many plaintiffs will receive large settlements.[7] Although most current cases deal with residential properties, commercial properties are increasingly involved in mold litigation. Table 1 shows the outcomes of ten toxic mold cases.

While the cases shown in Table 1 do not constitute a random sample, they include all cases written about in Mealey's litigation service publications[8] and all those listed in its verdicts and settlements database since 2000. Of these ten mold cases, nine resulted in payouts to the plaintiffs. Some awards or settlements were many times the property value and included punitive damages. Individual case outcomes for residential homes ranged from a low of $200,000 to several million dollars. One class action settlement averaged $11,700 per plaintiff. It should be noted that court verdicts and pretrial settlements do not necessarily reflect market value losses. This is especially true when punitive damages are part of a settlement and "mold hysteria" may have affected jury judgments.

2. Robert Wiley, "Mold: The Hidden Menace," *Valuation Insights & Perspectives* 7, no. 2 (Second Quarter 2002): 34.
3. A Texas appraiser used historical analysis and estimated the preremediation property value discount for properties affected with mold to be 17% to 25%. The postremediation stigma was reported to be up to 3% with full disclosure. However, this conclusion is based on only a few case studies, and the results were reported in a non-peer-reviewed publication and cannot be further verified. See Jack Schoppa, "Mold, Moisture, Stigma and Value," *Appraiser E-Gram* (October 2002), http://www.naifa.com/gram/2002oct/schoppa-oct02.html.
4. Robert J. Aalberts and Richard W. Hoyt, "Appraisers and Toxic Mold: Legal and Valuation Issues," *Journal of Real Estate Practice & Education* 6, no. 2 (2003): 203–216.
5. Del Williams, "Commercial and Residential Water Damage: The Mold Connection," *The Appraisal Journal* (October 2002): 447–449; Leonard Zumpano, Suzanne Hartley, and Ken Johnson, "The Problem with Indoor Mold for Portfolio and Property Managers," *Journal of Portfolio Management* 9, no. 2 (2003): 187–192.
6. Randall Bell, *Real Estate Damages: an Analysis of Detrimental Conditions* (Chicago: Appraisal Institute, 1999); published earlier in Randall Bell, "The Impact of Detrimental Conditions on Property Values," *The Appraisal Journal* (October 1988): 380–391.
7. Linda A. Stiefsky, "Reduce Mold-Related Risk," *Commercial Investment Real Estate* (March/April 2003): 30–32.
8. See http://www.mealeys.com.

Table 1 Summary of Outcomes of Toxic Mold Legal Cases

Case Name	Location	Nature of Case	Number of Plaintiffs	Verdict Amount	Case on Appeal	Settlement Amount	Comments
Ayaz et al. v. Fullmer Construction et al., No. 00CC06647, Calif. Super., Orange Co.	Santa Ana, CA	Mold contamination case	1	$200,000	-		
Hatley et al. v. Century-National Insurance Co. et al., No. CV 2000-006713, Ariz. Super., Maricopa Co.	Maricopa Co., AZ	Insurance carrier allegedly delayed remediating mold contamination.	1	$4 million		-	Jury awarded Hatleys $244,000 in compensatory damages and $4 million in punitive damages.
Davis et al. v. Henry Phipps Plaza South et al., No. 11631/98, N.Y. Sup., N.Y. Co.	New York County, NY	Residents maintained mold and fungi contamination caused personal injury and property damage	495 New York apartment residents (Class action)			Confidential	Plaintiffs sought approximately $9 billion in damages from two New York apartment building owners
Ballard et al. v. Fire Insurance Exchange, No. 99-05252, Texas Dist., Travis Co,	Austin, TX	Plaintiff claimed carrier acted in an unfair, deceptive, and fraudulent way when evaluating a mold property damage claim.	1	$32 million	$4 million or more	Confidential	Trial verdict, appealed down, then a settlement.
Smith et al. v. Behr Process Corp., No. 25670-3-II, Wash. App., Div. II	Tacoma, WA	Paint company appealed damages verdict in case in which residents alleged exterior paint caused mold and other property damage.	Class action		Yes	-	Jury awarded damages ranging from $14,454 to $87,818. Trial court awarded $2.18 million in attorney fees and costs, part of which was attributed to discovery violations.
Sandcastle Condominium Homeowners Assoc. v. Chodour et al., No. 724894, Calif. Super., San Diego Co.	San Diego, CA	Builder agreed to pay $125,000 to correct various defects that led to water intrusion and mold.				$125,000	
Fishburn v. Firemen's Fund Insurance Co., Insurance Appraisal Proceedings, Insurance Code [2071; CCP [1282 et seq.)	Encino, CA	Appraisal panel awarded funds to home owner for property damages and additional living expenses incurred after the house's underground heating, ventilation, and air-conditioning ducts became contaminated with mold.	1	$699,560	No		
Allison et al. v. West Del Amo Pacific Condominium Association et al., No. YC040331, Calif. Super., Los Angeles Co.	Los Angeles, CA	Condominium association found not liable for claims that a unit contaminated with mold eventually led to personal injuries. A judge in a tentative ruling denied plaintiffs' request for declaratory relief on common unit repairs.		No award	No	-	Appraisal panel
Anderson v. Allstate Insurance Co., No. 01-15330, 9th Cir.	San Francisco, CA	Home owner insurance carrier appealed and home owner cross-appealed a federal judge's decision to reduce a verdict from $18 million to approximately $3 million in a mold property damage case.	1	$18 million	$3.3 million	-	Appealed and award reduced
Colon v. Trinity Homes LLC Ind. Sup. Ct. No. 29D02-0404-PL-374	Indianapolis, IN	Home builder arrived at a settlement with property owners to begin inspecting and repairing mold damage over the next several years at no cost to home owners.	2,044			$24 million	Average award $11,700 per property

Source: Authors and Measley's verdicts and settlements database

The wide range of potential outcomes in toxic mold litigation can be partly attributed to an equally large range of physical defects. These may range from common scenarios of water leakage around sinks and bathrooms, which can be remediated quickly, to cases where mold festers undetected for long periods of time until health concerns are suspected. Consumers' lack of understanding of the issues and fear of a latent defect can contribute to a reluctance to purchase properties with past or present occurrence of toxic mold.

Contingent Valuation Analysis of Toxic Mold

Another mode of investigating the effects of toxic mold on property values when sufficient market data is not available is a form of market survey known as contingent valuation (CV) analysis. This type of analysis has sometimes been used to determine prospective buyer attitudes toward other types of contamination and defects. CV surveys of prospective buyers, addressing property defects and attributes,[9] have been used as a supportive analytical technique when a sufficient number of market sales are available for analysis. CV surveys are also appropriate when no other pertinent market data is available, as in the case of toxic mold.

The CV method was originally developed to price public goods and has been recently adapted to the estimation of discounts for private real estate properties. Chalmers and Roehr recognize the use of CV surveys for analyzing contaminated real estate in "as is" condition, especially when traditional approaches to value do not work.[10] They advocate the use of formal procedures to interview market participants, including buyers, for real estate cases that involve contamination. Most recently, McLean and Mundy; Allen and Austin; Simons; Simons and Winson-Geideman; Flynn et al., and others have set forth methodological guidance on this topic.[11]

Study Limitations

A CV analysis has certain limitations. One general concern is that if survey participants have a stake in the outcome of a case, they may give biased results to secure funds. To avoid this threat to validity, the survey presented here excludes individuals directly involved in any mold litigation. Another concern is that respondents may be inclined to provide answers that they think will please the surveyors. Consequently, the trained surveyors in the study were instructed to stay within a prearranged script and were not informed in advance about the details of the case so that this threat to research validity could also be avoided.

A third concern is that some respondents may provide answers that would not reflect their actual actions because there are no real-life consequences to providing responses to hypothetical questions (hypothetical bias). This situation has been associated with a discrepancy between stated (surveys) and revealed (actual sales) preferences.[12] To address this potential for hypothetical bias, unreasonably low bids were removed from the pricing calculations, and instead focus was placed on the marginal buyer at the top half or top quarter of the market.

Despite the potential limitations, it is appropriate to apply the CV methodology to the toxic mold question, in part because of the compete lack of other available data on the potential effects of toxic mold on property values. Moreover, empirical evidence suggests that CV outcomes do not always overstate the magnitude of losses. For example, Carson et al. compare over 600 CV results (stated preferences) with revealed preference outcomes[13] and find correlation coefficients between 0.60 and 0.98. Interestingly, the CV results were found to be smaller in magnitude (closer to zero) than the revealed outcomes.

Survey Methods

A survey research firm from Columbia, South Carolina, was engaged to contact a stratified random

9. These surveys feature full information to replicate the "well-informed buyer" assumption under the federal definition of market value. See Appraisal Institute, *The Appraisal of Real Estate*, 12th ed. (Chicago: Appraisal Institute, 2001), 23.

10. James A. Chalmers and Scott A. Roehr, "Issues in the Valuation of Contaminated Property," *The Appraisal Journal* (January 1993): 28–41.

11. David McLean and Bill Mundy, "The Addition of Contingent Valuation and Conjoint Analysis to the Required Body of Knowledge for the Estimation of Environmental Damages to Real Property," *Journal of Real Estate Practice and Education* 1, no. 1 (1998): 1–19; Bill Mundy and David McLean, "Using the Contingent Value Approach for Natural Resource and Environmental Damage Applications," *The Appraisal Journal* (July 1998): 290–297; Marcus T. Allen and Grant Austin, "The Role of Formal Survey Research Methods in the Appraisal Body of Knowledge," *The Appraisal Journal* (October 2001): 394–403; Robert A. Simons, "Estimating Proximate Property Damage from PCB Contamination in a Rural Market: A Multiple Techniques Approach," *The Appraisal Journal* (October 2002): 388–400; Robert A. Simons and Kimberly Winson-Geideman, "Determining Market Perceptions on Contamination of Residential Property Buyers Using Contingent Valuation Surveys," *Journal of Real Estate Research* (forthcoming); James Flynn et al., "A Survey Approach for Demonstrating Stigma Effects in Property Value Litigation," *The Appraisal Journal* (Winter 2004): 35–44.

12. Thomas O. Jackson, "The Contributions of William N. Kinnard, Jr. to the Field of Contaminated Property Valuation," in *Essays in Honor of William N. Kinnard, Jr.*, ed. C.F. Sirmans and E.M. Worzala, 81–89 (Norwell, MA: Kluwer Academic Publishers, 2003); Robert D. Row, Ralph C. d'Arge, and David S. Brookshire, "An Experiment on the Economic Value of Visibility," *Journal of Environmental Economics and Management* 7, no. 1 (March 1980): 1–19.

13. Richard Carson et al., "Contingent Valuation and Revealed Preference Methodologies: Comparing the Estimates for Quasi-Public Goods," *Land Economics* 72, no.1 (Feb. 1996): 80–99.

sample of 200 homeowners in South Carolina. The telephone calls to homeowners were made in November and December 2002. The methodology has been peer-reviewed, and the mold questions were included as additional scenarios as part of a litigation matter unrelated to toxic mold. Of the 200 surveys, 195 were useable for this analysis, meaning that the respondents bid (offered) a baseline housing value and answered key questions in a way that showed that they understood the environmental component of the survey. The survey methodology followed standard research protocols.[14]

The first part of the survey sets the stage and allows the respondent to become familiar with the bidding scale. It also determines the baseline price of a residential property the respondent is seeking in the context of a job move. The average baseline price bid for a home in the CV sample is $121,500, which is reasonably close to the average price of $111,300 for houses in South Carolina in 2002. When asked which of the different scenarios (property near a business park, property near a railroad track, properties with leaking underground storage tank, or property with toxic mold contamination) they were most likely to bid on, only 8% said the toxic mold scenario, the lowest percentage for any of the four scenarios presented.

With respect to the nonmold scenarios, the first potential scenario asks for any discount related to a business park located a block away. About 90% of respondents bid on the business park scenario. Another scenario asks for any discount related to a railroad track located behind the home. About 64% of the respondents bid on the railroad track scenario. Still another scenario asks for any discount related to a property that is contaminated from gasoline releases from a leaking underground storage tank. About 55% of the respondents bid on this scenario.

Two factors are of primary importance in evaluating the survey results. The first is the percentage of respondents who would bid on a scenario. The ratio of no bid to total bids reflects the loss of market demand for the property. The second factor is the potential value loss on sale. Of those that bid, the ratio of maximum bid to baseline price reflects the percentage they would pay. One minus this percentage reflects the discount, for example, if the person's baseline price was $100,000 and the maximum they would bid was $70,000, the discount would be 30%.

The Toxic Mold Scenario

The survey presented a description of a home with a toxic mold problem that had been remediated. The text description reads as follows:

> The property has a nice home on it, but in the recent past the home was subjected to water damage and a black mold was found in a bathroom area and in the basement. More investigation showed that the mold had also grown into the walls of the house. Environmental testing showed the mold to be toxic. The home was cleaned by a professional crew, which had to open the inside walls and remove the mold, and rebuild the affected parts. The local health authority has said that the mold is gone. Except for this one issue, the neighborhood is like yours, and the home is very similar to your home.

The bidding issue was determined by the following question:

> Using the scale below, where –3 means you definitely would not bid and +3 means you would, how likely is it that you would make any offer on this home?

A total of 113 respondents (58%) bid on the toxic mold scenario; 42% of the respondents did not bid. This ratio of no bid to total bids indicates a substantial reduction in the market demand for this type of property, assuming that information about this problem is available to potential home buyers. Empirical evidence also indicates that neighborhood characteristics do not independently affect the likelihood of bidding on contaminated residential property.[15]

14. The initial instrument was pretested for time length, clarity, and for other items that might cause problems; subsequent instruments used the same or very similar questions. A recent pretest of a very similar instrument among a random sample of the group to be surveyed showed no problems in comprehension, language clarity, or other issues. The population for this study was residential homeowners in all 46 counties in South Carolina, and the results can be generalized to this population. Interviewers were given instructions to call names at random and to continue making calls until the required number of interviews were completed. For this type of survey, generally about 30% of the calls result in no answer, another 30% are answered by answering machines, and 10% of the numbers are no longer active. Of the remaining 30%, about 20% participate, and nearly all of these finish the interview. The remaining 10% refuse to participate or are not the homeowner. If a telephone number does not result in a completed survey, the interviewer randomly selects another telephone number. If needed, numbers are called up to three times before they are removed from the pool. The overall response rate (i.e., useable, completed survey by qualified respondents) once the interviewer speaks to the homeowner has been over 60%. Thus, because the factors leading to nonparticipation (mostly no answer, answering machine, and some out-of-date numbers) were unrelated to demographics or other key respondent characteristics, the survey technique is sufficiently random to allow its use for statistical analysis. In addition, a split-sample technique was employed to test if the position of questions within the instrument affected the results.

15. See Simons and Winson-Geideman, Table 6b. That study also uses CV analysis to determine the effects of leaking underground storage tank contamination on residential property in eight states, including South Carolina. The research used a Probit model to include the factors associated with bidding on contaminated property, including character of neighborhood (primarily residential, commercial/mixed, etc.). These variables were not statistically significant.

Of those that bid, the following question was asked:

> What is the most you would be willing to pay for the home?

The prices bid by these 113 respondents were discounted by between 0% (the smallest discount, full value) and 99% of full value (a throw-away bid). The average discount for the property affected by the toxic mold releases was 59%.

However, not all these bids would necessarily be in the market. Due to search costs and the small number of bidders, the chances are reduced that any of the potential bidders would find a suitable home and place a bid that would be accepted by a seller. On the other hand, hugely discounted "bottom-fishing" (very low) bids would have little value in the market because it is the bids with the smallest discounts–those at the top of the market–that would get the attention of likely sellers and culminate in a sale.

The decision on which price-reduction figure to apply would be a function of supply and demand. On the demand side (represented by the CV potential buyers), there is evidence of a large, but not complete, reduction in the number of potential buyers (only 58% bid).[16] Because the survey did not specify the number of houses that are afflicted with mold, a firm percentage reduction cannot be determined. However, if there were relatively few affected units, then the losses would approximate the lower discounts associated with the top quarter of the market. This would indicate that sellers would entertain bids averaging 80% of market range (equivalent to a 20% reduction in value). If more affected units were in the market, for example all or part of an entire subdivision, market-clearing bids in the top half of the market (average loss of 37%) would probably be considered.[17] In other words, the average discount of the top quarter of potential bidders is 20% when information about the toxic mold problem is known and the problem is believed to be cured. The discount for toxic mold can be loosely interpreted as pure stigma damages.

A separate analysis based on house prices was also conducted. For a house priced at $100,000 or less, 66% of respondents bid, compared with the 53% that bid on houses priced above $100,000. The top-half bids and top-quarter bids for the lower-priced group of houses had average discounts of 37% and 21%, compared with discounts of 49% and 34% respectively for the higher-priced house group. The main difference can be attributed to three no-discount bids in the lower-priced group and none in the higher-priced group. It is reasonable to conclude that the magnitude of any loss would be greater in higher-priced houses.

Conclusions from the Toxic Mold Survey

The results of this survey demonstrate the relative undesirability of residences afflicted with toxic mold. Only 58% of prospective home buyers with full information would bid to buy a home with mold contamination, and they would discount their bids so much that many sellers would probably refuse to honor them. Full information generally means that the seller would have to disclose the condition upon listing the house for sale and that the buyer would be provided with enough information to be considered well informed. Therefore, it appears that the loss on this type of property, calculated using the CV survey approach, would be between 20% (when there is one or only relatively few affected units) and 37% (when more units are affected by toxic mold). The appropriate figure for a given situation would depend on supply and demand and would reflect postcure stigma.

This reduction in bid value is a way to measure the reduction in housing utility, or the flow of enjoyment from owner-occupied housing. It also assumes more complete information than is probably the case among actual buyers and sellers of homes in typical transactions where only sellers may know of selected defects but choose not to disclose them unless required by law.

Distinctions among Buyers

Within the marginal-bidder framework, an important issue is how to reconcile what portion of market bids should be considered. For example, there are buyers in every market that self-select, use asymmetric information, or have different levels of risk

16. The percentage of buyers willing to bid is also a function of risk aversion, confidence in the information presented, and consideration of latent defect.

17. A split sample was conducted in which about half of the respondents received a slightly different version of an unrelated scenario. The toxic mold scenario did not vary and appeared in the second and fourth sequential positions out of four scenarios. The results presented in the article are the average of all who responded on the toxic mold scenario. There was a small amount of fluctuation within the split sample. For example, the percentage of bidders for each half of the split sample ranged from 56%–62%, while the average bid was 59%–61% for each half sample. The average of the top-half bids for the split sample ranged from 36%–40%. A difference-of-proportions analysis reveals that none of the three sets of bid figures from the split sample are statistically distinct from each other at a 95% level of confidence. Therefore, the ordering of the questions does not appear to have materially affected the results.

aversion. But that does not mean that the average or typical market participant who purchases a home in that same market thinks and acts like the buyer who has an unusually high or low level of perceived or real risk. For example, a structural engineer with special expertise buying slide-zone property that others consider worthless would have a dominant bid for a property in a slide zone. This situation is more relevant for a single or very small set of properties; however, even in this situation, market depth is an important issue. After the first house sells at or near full, unimpaired value, is there another engineer ready to buy the next house? More generally, there are information and search costs, and some high bidders also look at other properties. Thus, each high bid would not get assigned to each house on the market, and bidders below the top bid would be able to acquire properties with their bids. This supports averaging the top of the market in those markets with few defective properties for sale. This is an example of a market with low supply and limited demand.

In markets with a larger supply of defective properties (such as an area with a class action lawsuit for groundwater pollution) and more potential buyers, averaging the top of the market is essential because the top buyer's bid satisfies only a small portion of the market. Although it is true that in some cases groups of buyers may have less than full information about local market conditions (e.g., large numbers of foreign buyers in a market with a speculative bubble), this is an exception and not in long-run equilibrium.

In sum, because the CV survey results include a few full (undiscounted) bids on a property with toxic mold does not mean that every house affected with mold will trade at full value without a discount. How to determine which portion of the top of the market to apply in a given situation is an important matter for future research.

Toxic Mold Case Study

Rigorous case studies can also provide guidance in determining potential real property value losses. Although generalizations may not be made from them, case studies such as that of a mold-infested apartment complex in Seattle, Washington, provide a useful look at the way events unfold and how the effects of mold (and in this case the lack of insurance) may affect a property's value.

Property Description

The case study property is an apartment complex originally constructed in 1965. Purchasing this complex was the property owner's first venture into low-equity real estate investment. When he purchased the property in 1983, the 42-unit complex had only eleven tenants and only seven of these were paying rent. The complex had poor-quality construction and lacked ventilation systems in the bathrooms and kitchens. This resulted in continuous upkeep of the buildings and higher maintenance costs than the owner expected.

Under the new owner, the rents were adjusted for the condition of the property, and economic occupancy was brought up to between 70% and 95% depending on the year. This occupancy level had been maintained for the past decade with a rental rate attractive to a low- to middle-income renter pool. The owner believed the property had a market value of $1.1 million to $1.2 million, including a land value of $300,000.[18] However, based on a review of the last three years of the property's net operating income capitalized at a local market rate and on all tenants' having month-to-month leases, the value of the complex was probably closer to $700,000. For the purpose of estimating losses in this case study, it is assumed that the asset would appraise for $750,000. The owner had a mortgage loan with recourse of $500,000 on the property, so the owner's equity position prior to discovery of the mold problem was $250,000. Although fairly typical, the recourse factor substantially complicates the analysis of this case.

Discovery of Mold and Cancellation of Insurance

In 2002, the owner of the apartment complex evicted a tenant for nonpayment of rent, and the tenant notified the health authority that he was not paying rent because of claims of a toxic mold concern. The health authority required the owner to open up the walls in the unit for inspection once the occupant had permanently vacated. This action revealed a visible amount of mold inside the walls, alarming the owner and motivating him to investigate toxic mold issues on the Internet. He discovered pictures of toxic mold that resembled the conditions of the interior of the walls in the vacated unit. His further investigation revealed the growing number of litigation cases and claims of health effects from toxic mold.

18. The data for this case study was provided by a property owner from Washington who wishes to remain anonymous due to concerns about potential tenant litigation. He provided ten years of cash-flow data for the apartment complex.

The property owner assessed his options prior to having the entire complex investigated. If an investigation revealed a toxic mold problem throughout the complex, he would be obligated to notify each of the tenants. This notification might also lead to each tenant's pursuing legal remedies. He notified his insurance company of the findings by the health authority. Insurance company representatives came to the site and tested for toxic mold. During the visit, the insurance representative notified the owner that the policy on the apartment complex would be cancelled in forty-five days. The property owner was informed that a mold claim was not covered because it is considered fungi and thus excluded in the insurance policy

As indicated, the insurance company cancelled its policy on the apartment complex forty-five days later along with the policies of the owner's five other apartment complexes insured by the property-casualty firm, some of which were of better quality. The owner of the apartment complex in this case study initially had difficulty finding insurance for properties that he owned that were not affected by toxic mold, resulting in a change in insurance premiums from a previous payment of $8,000 per year to $25,000 per year for the non-mold-related properties (a factor that is not considered in the loss estimated below). Cancellation of the insurance policy on the mold-affected property severely limited the owner's options.

Assessment of Alternative Courses of Action

The owner's options included abandoning the complex, razing the structures and pursuing a new development project on the site, or remediating the complex and re-leasing it. The potential for tenant lawsuits based on health claims, the loss of revenue during the remediation, and the re-leasing of units to new tenants (because the current tenants were likely to find other permanent housing in the interim) were important issues. Also of concern was that public knowledge of the mold problems would result in higher vacancy or lower rents. The cost to bring the building up to current building codes was unknown, and it was unlikely that the complex would be able to get insurance after remediation. The property owner also had an outstanding mortgage loan, with recourse for $500,000. Any decision would prove costly.

The owner decided that the way to minimize losses was to demolish the buildings. He notified the tenants by letter that he would be asking them to leave but was allowing them to stay rent-free for two months while they searched for replacement housing.

"Of concern was that public knowledge of the mold problems would result in higher vacancy or lower rents."

After the property was vacated, the insurance company sent the owner the results of its testing, which showed mold levels inside the buildings to be from 1,000 to 5,000 times the outside measurements. As of February 2004, the buildings had been demolished and the land was being prepared for redevelopment. The property owner refinanced another apartment complex, using the "cash-out" proceeds to pay off the outstanding mortgage balance on the contaminated property, thereby maintaining his credit throughout this financial catastrophe.

Analysis of Case Outcomes

The losses in this case can be looked at several ways. The loss of the owner's prediscovery equity of $250,000 was in excess of 100% of the equity amount due to the recourse provisions of his mortgage and demolition expenses. Before the mold problem, his balance sheet showed asset value of $750,000, liability of $500,000, and net equity of $250,000. After the mold problem, the balance sheet showed asset value of $300,000 (remaining value of the land) and liability of $500,000 from the recourse loan plus $50,000 for demolition, resulting in a net equity of -$250,000 ($300,000 – $500,000 – $50,000).

If the property owner had owned the building without financing and demolished it, the loss would have been $750,000 plus the $50,000 for demolition less the $300,000 land value, resulting in a net loss of $500,000, or 66%, based on the real estate asset. However, this scenario of 100% equity ownership is not as likely for a private investor who has borrowing capacity. It is more likely for debt-averse investors such as pension funds that do not have the tax advantages of debt. However, this would have been the best outcome for the owner and reflects loss to the property rather than to the owner.

Hypothetically, if the owner had a nonrecourse loan and had walked away from the property prior to demolition, the loss to the owner would have been 100% of equity. (The owner's net equity would be

negative in this case: net asset value of $200,000 after demolition and a mortgage liability of $500,000.) The lender would then own an asset worth about $250,000 after demolition. Since the mortgage was $500,000, the lender would suffer a loss of 50%, assuming it decided to demolish the property immediately. This scenario demonstrates the lender's risk, which will inevitably be priced into future loans in terms of rate, fees, or guarantees.

Thus, the decision to demolish the building appears to have been the best alternative under the circumstances. The best outcome under the different ownership scenarios considered here would be a loss of over 60%, which indicates that demolition was the right approach because it results in a smaller loss than incurred by riding out the remediation and re-leasing of the property.[19]

A Study of Toxic Mold in Cleveland, Ohio

Cleveland is the central city in Cuyahoga County, Ohio, with a 2000 population of about 1.6 million and over 500,000 housing units. Toxic mold is not a particularly well-known problem in Cleveland, but it is nevertheless a concern. Over the past several years, the Cuyahoga County Board of Health received 545 calls about mold and conducted 402 home visits. A total of 147 homes qualified for and were enrolled in a program designed to determine the health effects of mold on children with asthma. By program definition, all of those homes had expected remediation costs under $10,000. Of the 70 homes remediated to date, 46 (about 65%) were owner occupied and 24 were rentals. The average remediation costs were $6,900 and the average elapsed time between reporting the problem to the authorities and the final signoff that the property was cleared of the mold problem was 8.4 months.

In addition to these 70 homes, there were 12 homes remediated separately at an average cost of about $15,000. Thus, the weighted-average remediation cost of the Cleveland experience is about $8,200, or about 5%-15% of property value for an average home in this county.[20] Only two of the 70 properties were marketed and sold after a bout with mold, but their sale prices did not differ excessively from expectations; information on marketing time was not available. The sales data is too sparse at this point, however, to draw any conclusions concerning stigma or other discounts on sale.

Conclusion and Comparison of Outcomes

Little empirical information is available to determine the effects of toxic mold on property values. While some appraisers may have data in their personal files, no peer-reviewed evidence is available on the extent of property damage caused by toxic mold. To partially remedy this situation, this article presents a report of nonempirical literature available on toxic mold. Also presented is research in different parts of the United States that provides some measure of empirical results: legal case outcomes, contingent valuation surveys of postremediated residential homes in South Carolina, a case study of an apartment complex affected by toxic mold in Washington state, and a public health study of mildly affected residential property in Ohio. These studies address different parts of the mold issue and do not provide a clear answer, but they are the best data available at this time. Table 2 summarizes the findings.

The ten legal case outcomes documented since 2000 show very substantial losses due to toxic mold contamination, with the settlements often being many times the value of the property. Both individual plaintiff lawsuits and class action lawsuits have been tried and settled, and there is a very large backlog of cases. A survey of potential home buyers in South Carolina shows that potential buyers would expect a stigma discount of between 20% and 37% on postremediated residential properties that had been affected by toxic mold. A case study of an apartment complex infected with toxic mold illustrates the issues and decisions of a property owner who demolished a property rather than risk an undeterminable set of costs for a loss in excess of 100% of his equity. Finally, mildly affected properties in Cleveland had remediation costs of 5%-15% of property value.

These results present a very wide range of outcomes, which can be expected to narrow somewhat as data on mold cases becomes available, mold prevention strategies are developed, and public awareness increases. This research suggests that when the lower ranges of clean-up costs are combined with postremediation stigma, there is a generic minimum

19. Putting this property's experience back into the context of Bell's detrimental conditions diagrams, this case could be a total loss, with the added insult of personal liability because the outstanding mortgage debt was greater than the value of the land.

20. John Sobolowski (supervisor, Healthy Homes Program, Cuyahoga County Board of Health) in a telephone interview with Robert Simons.

Table 2 Summary of Toxic Mold Study Outcomes

Type of Study	Property Type	Type of Loss	Amount of Loss	Sample Size
Legal cases	Varied, mostly residential	Property, punitive damages, health issues	$11,700 to several million dollars per property	10 verdicts and settlements since 2000
Contingent valuation survey	Residential houses in South Carolina	Postremediation stigma	Stated losses of 20%–37%; 42% of respondents would not bid at all	Random sample of 195 prospective house buyers
Case study	Garden-style apartment complex near Seattle	Demolition of complex and pay-off of loans	50%–70% losses to property, over 100% loss to equity (recourse financing)	1
Health monitoring	Residential houses with children at risk for asthma in Cleveland	Remediation costs for mildly affected properties	5%–15% remediation costs	82 houses remediated after being affected by mold

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reduction in value of 25% for residential properties that are currently affected by toxic mold but that can be remediated. This reduction could increase to 50% when many affected properties are in the same market.

All that can be inferred at this early stage in toxic-mold research is that property values of units previously contaminated with toxic mold would suffer from a discounted sale price and a smaller number of interested buyers compared to similar homes without mold related histories. This suggests that more research on the clean-up costs and long-term property value effects of toxic mold is urgently needed. Proper study of this problem will provide more guidance to appraisers and other real estate market participants on liability and valuation issues related to toxic mold. Research could provide information on several related topics, including determination of the following:

- How to remediate and maintain a toxic-mold-free property
- Who is qualified to inspect mold–suspected property and how they should be trained
- The responsibilities and liabilities of real estate participants
- The insurance implications for property before and after a toxic mold event
- How investors can protect themselves against surprises from toxic mold

It may also be beneficial to address the level of market participants' knowledge about toxic mold and the phenomenon of other newly discovered market-influencing factors. This research could take the form of open-ended questions or focus groups. Research is also needed on how to reconcile supply and demand issues to determine discounts for contaminated properties when using survey data and other techniques in markets of various sizes.