VALUATION OF IMPAIRED PROPERTY

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Authors' Note: *There are a variety of disciplines that address various aspects of the real estate valuation problem, including land planning, accounting, and business consulting. This chapter focuses on the appraisal model, since it is most widely accepted and understood in the U.S., particularly by the courts. However, while noting that there are other ways of viewing the problem of estimating damages to real estate that are outside the scope of the appraisal process, this chapter will focus on appraisal as the paradigm of choice.*

Introduction

Determining the impact of impairment on the value of real property usually requires some type of an appraisal. Appraisal methods in the U.S. are governed by a set of standards, called the "Uniform Standards of Professional Appraisal Practice", or USPAP for short. These standards were developed in the early 1990's by the Appraisal Standards Board (ASB), a part of the Appraisal Foundation headquartered in Washington, DC[2]. Qualifications for appraisers are developed by the Appraisal Qualifications Board (AQB), also a part of the Appraisal Foundation. These two agencies can only recommend standards and qualifications to the various states. However, in the 1990's, every state in the US adopted USPAP as a matter of law, and makes a practice of adopting annual updates as they are promulgate by the ASB. Additionally, every state adopted some form of appraisal licensing by the end of the 1990's consistent with the recommendations of the AQB.

Prior to CERCLA, the Clean Air Act, and other legislation and highly publicized events (e.g. – Three Mile Island, and Love Canal), appraisers paid little attention to contamination, other than to external factors that were obvious and physically obnoxious. Thus, a smelly landfill across the street from an otherwise pristine residence would exert a downward force on the home's value, called a "negative externality". This impact was generally classified as "economic obsolescence", similar to the way the lack of indoor plumbing would be classified as "functional obsolescence." Of course, functional obsolescence can often be cured, while economic obsolescence cannot be.

In the 1980's, however, many appraisers and consultants began challenging this lack of methodology, and through a series of scholarly articles on the subject, developed recommended methods for measuring the impacts of contamination. Since many of these writers came from the eminent domain arena (the appraisers who are trained and

experienced in valuing the right-of-way "takings" for highways and other public projects), and since contamination and eminent domain had very similar impacts, these writers largely adopted right-of-way methods when valuing contaminated property.

When a portion of a property is taken by the government for a highway widening, there may be residual damage to the remainder of the property. For example, a vacant single-family lot facing a two-lane road may be worth $50,000. A road widening claims half of the lot, which should leave the remainder worth $25,000 to the lay-person observer. However, under local zoning and construction ordinances, the remaining lot may be too small for construction of a home, and might only be useful for some secondary purpose, such as a playground. As such, its value might only be, say, $10,000. Thus, the total impact of the road widening was $50,000 (the value before) minus $10,000 (the value after) = $40,000. Of this $40,000 in damages, $25,000 was the actual measurable "take" and $15,000 was damage to the remainder.

During the late 1980's and early 1990's, writers in the peer-reviewed appraisal literature noted that contamination had a similar impact on property values. For example, assume the same $50,000 lot, which now is contaminated by some event, such as an oil spill, which will cost $20,000 to remediate back up to acceptable standards. Note that the operative word is "remediate", since contaminated properties are never really rendered "clean" again. Well, on the surface, one would suspect that this property is worth $30,000 in the contaminated state: $50,000 (the value "clean") minus $20,000 (the cost to remediate, analogous to the "take" in the previous example).

However, appraisal scholars during this time period gathered increasing amounts of empirical data that demonstrated that properties such as this sold for far less than $30,000. Indeed, even after the remediation, the properties continued to sell for far less than the previous, uncontaminated value.

This additional loss, similar to the right-of-way "damage to the remainder", became known in the appraisal literature as stigma. This is the additional loss in value, over and above actual clean-up costs, which a property suffers as a result of risks and other residual characteristics.

In the late 1990's and early 21st century, the ASB finally began the process of incorporating the writings of these early scholars into USPAP, culminating with Advisory Opinion 9 that was re-written in 2002 and formally incorporated into USPAP in 2003. This advisory opinion essentially outlines the format to be followed by appraisers when faced with a contaminated property situation.

The remainder of this chapter builds on these simple themes and provides the background for Advisory Opinion 9. Much of this is highly technical, and is offered as guidance both to the lay person but also to non-appraiser advisors, such as attorneys, and to real estate academics and other analysts who may be faced with complex brownfield or other contamination situations for the first time. First, we introduce the three approaches to value used by appraisers in all situations, which mostly include uncontaminated property. Then, we address the appraisal literature and theory on how to handle contamination issues, followed by a discussion of valuation methodology in contamination situations. At the end of the chapter, we add some cautionary notes for property owners and others who have to deal with this problem on a practical level.

Three Approaches to Value

When an asset is frequently traded in an open, frictionless, efficient market, then valuing that asset

(say, for portfolio valuation purpose) is almost a trivial exercise. For example, assume you own shares of stock in a publicly traded corporation and need to know what that stock is worth, because you need to settle the estate or use the stock as collateral for a loan. The prices of all publicly traded stocks and bonds in the US, as well as other securities such as options, are available both instantly and accurately from a number of sources, most of which are either free (the internet) or relatively cheap (a newspaper). If an asset is not frequently publicly traded, but none-the-less there are plenty of nearly identical assets out there, such as a municipal bond or a privately held mortgage, then the valuation is a bit more complicated (and will probably require the services of an expert), but still the process is fairly quick, cheap, and accurate.

However, real estate suffers from inexactness. No two parcels of real property are exactly alike – even two otherwise identical dwellings in a subdivision may have subtle location or maintenance characteristics or slightly different amenities or may sell at different times, thus impacted by variable market conditions. In practice, it is nearly impossible to find two parcels of real estate that are even close matches for one another in all respects.

Even income producing property is problematic, even though in theory it should be simple. Income producing real estate, such as office buildings, apartment complexes, retail establishments, and industrial complexes, are bought and sold at the discounted present value of the anticipated future income. However, estimating that future income stream and determining a proper discount rate is fraught with error, in practice.

As a result, when appraisers issue an opinion of value, it us usually a reconciled combination of three different value estimates, each ideally based on an independent set of methods called "approaches to value[3]". These general sets of values are called the "cost approach", the "sales comparison approach", and the "income approach". USPAP requires that appraisers use all of the approaches to value unless one or more of the approaches can be shown to be inappropriate. For example, single family residences in predominantly owner-occupied neighborhoods are not bought and sold based on the discounted present value of the future income stream, and thus the income approach is generally not appropriate. Special purpose properties, such as publicly owned sports stadiums or school buildings, are rarely sold in "arms length" transactions, so the sales comparison approach would usually not be applicable in those cases.

The following sections briefly discuss these three approaches. Note that each approach is actually a general category of methods, and a full discussion of these methods is well beyond the scope of this chapter. However, this discussion will give the lay-person reader at least a basic understanding of the goals of each of these approaches. Following this discussion, at the end of this section, we present a brief note about the highest and best use study, which is a required part of all market-value appraisals and a precursor to the application of these three approaches.

Cost Approach

The cost approach values a property based on a "…comparison with the cost to build a new or substitute property. The cost estimate is adjusted for the depreciation evident in the existing property.[4]" The cost approach begins with an estimate of the value of the land, as if vacant but ready for construction of improvements to begin. In the case of a single-family residence in a new subdivision, this

is fairly simple – it's the current selling price of similar lots in the neighborhood. In the case of single-family residences in mature subdivisions without current sales of vacant lots, it may require either estimating the lot price from sales of similar lots in other "control area" subdivisions or using a land extraction technique to estimate the contributory value of the land in recent sales of improved properties in that neighborhood. In complex situations, the appraiser will use both techniques and reconcile the values of the two. More complex situations, such as income producing properties, may require subdivision development techniques, options techniques, or other advanced methods.

The appraiser then estimates the cost to construct the improvements *as if new*. The appraiser may estimate the *reproduction cost*, which is the cost of constructing identical improvements to what is there presently, or *replacement cost*, which is the cost of constructing improvements which are physically different but provide similar *utility*. This latter technique may be appropriate when the structure is old and was built with techniques which are no longer employed, or when the structure has *super-amenities* that do not contribute to the value. Regardless of which of these two techniques is employed, the appraiser will probably use one of three different methods (or, sometimes, a combination) to estimate the construction costs: the *comparative-unit* method, the *unit-in-place* method, or the *quantity survey* method.

Finally, the appraiser estimates three different categories of depreciation: *physical*, which is the wear-and-tear to the structure itself or such factors as on-site contamination or construction defects, *functional*, which is the lack of otherwise necessary amenities (e.g. – lack of indoor plumbing, lack of an elevator in a tall commercial building, etc.) and *economic*, which is the impact of external and uncontrollable forces, such as neighborhood decline or nearby (but not on-site) contamination. *Note: in a contaminated property appraisal, when the goal is to isolate the impact of such contamination, the appraiser will usually begin with the hypothetical condition that such contamination does not exist, so as to arrive at a base-line appraised value "as if uncontaminated."*

The total of all of this – land value, plus cost to reproduce or replace, minus depreciation, is the value indicated by the cost approach. In the case of special-purpose, non-income-producing property, this may be the only approach usable. However, in most cases, it is the least useful approach to value because it relies the least on market data and generally requires the most untestable assumptions by the appraiser.

Sales Comparison Approach

In the case of a single-family residence, this is usually the most reliable approach. For that reason, and since single-family appraisals are the most common in the US, it is the "approach" most commonly thought of when lay-people think of an appraisal[5].

This approach is based on comparing the "subject" property to similar properties that have sold recently. The sales prices of the similar properties are adjusted by applying appropriate units of comparison, such as lot and improvements size, amenities and other physical characteristics, conditions of sale, market and financing conditions, and locational characteristics.

Note: *In an appraisal of a contaminated property, when comparing a contaminated site to otherwise uncontaminated sites, an estimate of the market value effect of the contamination would be an appropriate adjustment. However, for development of a base-line unimpaired appraisal, once again the appraiser would invoke the hypothetical condition that the subject property was uncontaminated.*

The usual format for making these adjustments is a *sales adjustment grid*, which is similar to a spreadsheet and allows the appraiser to make consistent adjustments for various factors across all of the comparable sales used. For a single-family residence in a simple situation, three to six comparable sales is usually the norm. For a commercial property with many complex adjustments, a dozen or more comparables may be appropriate.

Adjustments for the various units of comparison are determined in a number of ways. The most common is the *matched pairs* analysis. For example, an appraiser might want to determine the contributory value of a half-bath to market values of residences in a neighborhood. The appraiser might begin by finding two recent sales of residences in that neighborhood that are similar in all respects except that one home has two and half baths and the other has only two. The difference in sales price, if all other factors were equal, should be a strong indication of the contributory value of the half bath.

Unfortunately, market data is rarely clean and neat, and one matched pair is frequently not enough to determine the true market impact of a particular unit of comparison. If the appraiser needs to do multiple matched pairs for each unit of comparison, rather quickly the appraiser will be swamped with data and analysis overload. Fortunately, techniques such as *hedonic modeling* have emerged in recent years that allow the appraiser to use large data sets and estimate marginal adjustments simultaneously. The sales comparison approach is the most commonly used approach to value for land and for owner-occupied single-family houses.

Income Approach

While there are many variations to the income approach, three different techniques are most common. They are, in order of increasing complexity, the *gross rent multiplier*¸ the *income capitalization method*, and the *discounted cash flow technique*. The first is most commonly found when appraising rental houses. In a given neighborhood, rental houses of similar quality tend to sell for a multiple of the monthly gross rent. For example, if there are several rental homes in the neighborhood which all rent for $1,000 per month, and each sold recently in the range of $100,000, then the *gross rent multiplier* in this neighborhood is approximately ($100,000 divided by $1,000 equals) 100. If the subject property rents for $900 per month, and all things are equal, then the indicated value of the subject property is $90,000 (100 times $900).

As simple as this sounds, it is rarely accurate enough. Most income producing property is valued using the *income capitalization method*. This relies on an estimate of the *net operating income* that will be generated by the property at equilibrium (sometimes called *stabilized income*). NOI, for short, is the gross expected rent, minus a factor for vacancy and collection losses, minus cash operating expenses. Note that NOI does not include debt service, income taxes, or non-cash items (such as depreciation). However, by convention, NOI includes a factor for cash reserves held for ongoing maintenance, such as roof repair, repainting, or appliance replacement. Assuming that this NOI will be enjoyed in perpetuity, the value can be estimated by dividing NOI by an appropriate *capitalization rate*, or "cap rate" for short. There are several techniques for estimating a cap rate. The most common, in situations without extenuating circumstances, is to determine the cap rates of similar income producing properties in the market. These are estimated by dividing the estimate of NOI for recent sales of similar properties by the sales prices of those properties.

Unfortunately, this technique can be fraught with error, since true NOI is often held in strict confidence by income producing property owners, and sales prices frequently include selling or financing concessions or other negotiation factors which are either not readily apparent or difficult to factor into an "arms length, cash equivalent" sales price.

As such, appraisers often rely on other alternative techniques, such as the *mortgage equity* method or the *band of investments* method for determining an appropriate cap rate. The first of these is simply a weighted average of the mortgage payment factor currently in force in the market and the equity-dividend rate demanded by equity investors. Both of these factors can be determined by well-constructed surveys.

The second alternative technique for determining a cap rate is most appropriate when there is some extenuating circumstance, such as contamination, which adds a level of risk to the investment. The appraiser may estimate the appropriate cap rate by taking a base-line cap rate (an "unimpaired" rate) and adding to it a risk premium estimated from the risk premiums demanded by investors on other risky investments, such as junk bonds or high-leverage investments. *Note: if a contaminated income-producing property is being valued, then the appraiser may need to invoke the hypothetical condition of "no contamination" and value the income stream using the base-line cap rate to determine a base-line, unimpaired value*.

A third method for estimating value via the income approach is the *discounted cash flow* analysis. This is most helpful when the cash flows are not constant in perpetuity, but rather are sporadic or delayed. This method is commonly used for analyzing subdivision developments or the returns from construction projects. The discounted cash flow method considers the time value of money, and is thus the most conceptually correct technique. Overall, the income capitalization approach is generally the dominant approach to value for income producing property.

Highest and Best Use Analysis

A market-value appraisal requires a determination of the highest and best use of the property. Any use of the property which is less than the "highest" use can be valued, but that value is something short of the market value. Implicitly, buyers of property unless constrained in some fashion will bid-up the price of a property until it is valued at whatever the highest use might be. For example, a vacant tract of high-amenity, rural land might be usable as ranch land, and ranchers may bid on it for grazing purposes. However, the unique, pristine characteristics of the site may lead the government to step in and buy it at a higher price for preservation purposes. Thus, in this case, preservation may be a higher-and-better use than ranching and farming, and the appraiser would be obligated under USPAP to render a market value at that highest-and-best use[6].

There is commonly a four-step process for determining the highest-and-best-use

1. What uses are legally permissible for the property?

2. Of the legally permissible uses, which uses are physically possible?

3. Of the legally permissible and physically possible uses, which uses are financially feasible?

4. Of the financially feasible uses, which one use is maximally productive?

In practice, the appraiser should determine the highest and best use twice – first in an ideal situation assuming that the property is unimproved and

second in the "as improved" state. If the "ideal" highest and best use is superior to the "as-is" use, then the appraiser must investigate if the difference in value between the two is greater than the cost of demolishing the current improvements and rendering the site back to an "as ideal" state. In some cases, the "ideal" use is the true highest-and-best use. In others, the demolition costs are prohibitively expensive, so the "as-is" use is highest. To make the water even muddier, sometimes the current, "as-is" use is a temporary expedient until some future date when the property can be rendered to a higher use. For example, a vacant, downtown lot may be used as a parking lot, generating income, for several years until it can be developed for an office building. In that case, the appropriate valuation model is a discounted cash flow analysis, including the income to be enjoyed during the interim use and the eventual income to be enjoyed when the property is converted to development.

Note: Contamination often affects the highest and best use of a property. For example, in an uncontaminated state, a property may be usable for residential purposes. When contaminated, it may become unusable. After remediation, the property may be usable for some lower-use (say, industrial property) but may not be used for residential purposes in the foreseeable future. Thus, the estimate of damages has to take into account the change in the highest-and-best use and the resultant impact on value.

Leaving now the basics of appraisal behind us, the next section addresses the background information behind valuing contaminated property.

Impaired Property — Background

Gamble and Downing (1982)[7] were among the first to examine the impact of contamination on residential real estate, analyzing the effects of the March, 1979, nuclear accident at Three Mile Island on nearby home values. They compared 583 residences within 25 miles of the plant with homes in a control neighborhood 75 miles away, both before and after the accident occurred using a hedonic model to isolate the pricing impacts of the event[8].

The appraisal profession in the U.S. began recognizing the negative impact of environmental contamination on property value shortly thereafter, and soon thereafter the literature was replete with guidance to aid appraisers tasked with quantifying these price effects[9]. For example, the American Institute of Real Estate Appraisers[10], in a 1988 official guidance to appraisers, noted that "…leaking underground storage tanks (LUSTS) and spills and overfills from tank systems can cause severe contamination of subject properties and surrounding parcels and seriously affect the value of those properties."[11] Patchin (1988), noted that leaking underground storage tanks have a negative effect on real estate and that even "…mildly contaminated [sites] can be expected to suffer reduced marketability."[12] A subsequent study conducted by Gamble and Downing (1984), revealed evidence that the prices of building lots were lower near landfills and that the values for residential properties located on the main access road serving the landfills were lower than other properties in the area[13].

Since that time, appraisal methodology has evolved rapidly, and by the late 1980's, American appraisers universally recognized several truths about contaminated property:

1. A property may be affected by either on-site contamination or proximate (that is, nearby) contamination.

2. The methodology that had evolved for Eminent Domain appraisal analysis proved to be the most useful for evaluating contaminated properties.

3. The cost of remediation is not, by itself, a sufficient proxy for the diminution in market value[14], since at market equilibrium (fair market value on an open market between buyers and sellers) contaminated properties sell for less than the difference between unimpaired value and the cost of remediation. This difference is called "stigma."

4. The market explicitly recognizes that remediation is often not a full cure, and hence post-remediation properties continue to suffer from a degree of stigma.

Subsequent advances in appraisal standards and methodology have helped give definition to these axioms and in 2003 the Appraisal Standards Board (ASB) incorporated this into Advisory Opinion 9 of the Uniform Standards of Professional Appraisal Practice (USPAP). In this Advisory Opinion, the ASB clearly delineates that appraisers must take contamination into account[15]. Further, the *Ethics Rule* would prohibit an appraiser from knowingly issuing an opinion that misleads the reader into believing that a property is not impacted by on-site or proximate contamination. Also, federal guidelines for appraisal of property for financing purposes obligates the reporting of any known contamination and including the impact of such in the value opinion[16]. The standard Uniform Residential Appraisal Report requires appraisers to note any adverse environmental conditions (either on-site or proximate) and, by implication, report on the impact on value[17]. As of this writing, (May, 2004), 29 states have various mandatory disclosure laws pertaining to contamination and similar circumstances, and many state courts have rules as to obligations regarding contamination and other negative situations[18].

As such, the norm for appraisal of contaminated property today is the *impaired* condition. *Unimpaired* values are usually determined only as baseline values for court cases (i.e. – calculating damages in tort situations) or in retrospective circumstances for determination of some value prior to the contamination. Financing decisions, litigation, tax assessment, and other normal appraisal situations all require that the *impaired* condition be appraised.

Contaminated Property – Fundamental Theoretical Issues

Patchin's (1988) early work on the subject of contaminated property focused on defining a framework which included clean-up costs; the availability of indemnities; the premium demanded by investors on yield or cap rates; and the impact on the cost of financing. He recommended that the appropriate analytical framework was the income approach to value using the Ellwood method to determine cap rates. Inputs to the Ellwood Method include prevailing cap rates on unimpaired property, available mortgage terms, and anticipated future improvement or decline in value. He noted, however, that there is "…virtually no chance of obtaining mortgage financing for a seriously contaminated property."[19]

Patchin (1991) was also the first to show that the decline in value is often greater than the cost-to-cure suggests.[20] Mundy (1992a) identifies this phenomenon as "stigma," a term which has continued in the lexicon to this day.[21] In his definition, Mundy (1992a) was also the first in the valuation literature to list specific criteria for stigma,[22], which are:

1. Responsibility – is someone or some company specifically shouldering the blame?

2. Exposure – has there been a risk amplification, such as in the media?

3. Disruption – does the contamination impact daily lives?

4. Concealability – is the risk hidden[23]?

5. Aesthetic effect – can the contamination be seen, felt, or smelled?

6. Prognosis – will the contamination be cleaned up in the near future?

7. Peril – is there a health risk?

8. Fear – what is the general concern level associated with this contamination?

9. Involuntary – are the property owners themselves innocent in this contamination?

These criteria, collectively, represent the necessary and sufficient conditions for stigma.

Mundy established the prevailing formula for valuation of contaminated property, which follows the methodology that had been well-established in the eminent domain appraisal literature:

	Value Unimpaired
Minus	Value Impaired
Equals	Diminution in Value

Mundy (1992b) later showed that the diminution in market value can be attributed to two different factors: a *marketability effect* and an *income effect*. He attributed the former to the increased marketing period for the asset; even in the absence of a decrease in selling price, value is diminished due to the increased time necessary to realize liquidity as well as an increase in the discount rate to account for higher risks of holding a relatively illiquid asset.[24]

Mundy (1992c) attributed the income effect to decreases in rent or occupancy, or an increase in operating expenses; since the value of a given property is defined as the fully discounted stream of anticipated benefits and costs, stigma factors in directly. Building on this, he then focused on the determination of the appropriate risk-adjusted discount rate.[25] Here, he found that the appropriate measure of the increased risk associated with holding contaminated property is a potential increase in the cost of capital, both equity and debt. While Mundy (1992c) and Patchin (1991) agree that impairment impacts the way income is capitalized or discounted, Mundy (1992c) prefers the use of varying discount rates to account for varying levels of risk in different time periods, while Patchin (1991) uses the Ellwood method to determine a cap rate. Kilpatrick, Brown, and Rogers (1999) take Mundy (1992c) one step further by showing that the impacts of an impairment can be partitioned among the risk impact (the increase in the discount rate) and the cash-flow impact (the decrease in cash flows).[26]

The question of residual post-remediation stigma has been dealt with by Patchin (1991), Mundy (1992b), and Chalmers and Jackson (1996).[27] Patchin (1991) was the first to suggest that stigma may diminish over time "once a cure is in place;" however he noted that this would be different for residences as opposed to commercial properties. Mundy (1992b) argues that this is a function of ongoing market perceptions of risk and developed a graphical representation of how such perceptions may change over time and hence value may be restored eventually. Bell (1998) adopted Mundy's (1992b) methodology and expanded it to illustrate how property values may change over time under varying circumstances.[28] Chalmers and Jackson (1996) systematize this into what they call the "contamination lifecycle", in which the effects of contamination vary according to the status in time:

before cleanup; during and after cleanup; and after remediation is completed. A recent analysis by urban economist Daniel McMillan (2003) involving residences affected by a lead smelter in Tacoma, Washington bears this out[29].

Jackson (1997) summarizes the literature on contaminated property, and lists seven fundamental factors which appraisers must consider: the cost and timing of remediation; the existence and quality of any indemnification; the degree to which the problem has been characterized; the potential for business interruption; the approval of a remediation plan; the regulatory framework; and the likelihood of 3rd party lawsuits.[30]

Valuation Methodology Employed by Appraisers for Contaminated Property

Real estate appraisal in the United States adheres to a paradigm of three traditional approaches to value: the cost-less-depreciation approach; the sales comparison approach; and the income capitalization approach, as discussed earlier.

Within these broad approaches to value, there are numerous acceptable methodologies. For example, an income approach may take the form of a direct capitalization, a discounted cash flow, or even a gross rent multiplier, to name just a few. Other more complex approaches to value, such as options pricing, are used primarily in academic forums. But generally alternative methodologies are consistent with the fundamentals of one of the three traditional approaches.

Further, Advisory Opinion 9 to USPAP incorporates the Mundy (1992a) three-step paradigm as the recommended outline for all contaminated property appraisal work-plans (Standard Rule 1 analysis) and reports (Standard Rule 2 reporting) for valuation assignments:

1. Mundy (1992a) and USPAP recommend the development of an *unimpaired* value under the hypothetical condition that the property is "free of any contamination."[31] Note that under USPAP, a hypothetical condition, which must be explicitly disclosed in a manner that is not misleading to the user of the report, requires the appraiser assume "that which is contrary to what exists but is supposed for the purpose of analysis."[32] Advisory Opinion 9 further cautions the appraiser to explicitly advise the client, in advance, as to the impact of the use of this hypothetical condition and to take care to adhere to the *Ethics* provisions of USPAP.

Interestingly enough, there is no requirement under USPAP that the property also be appraised in the *impaired* condition, so long as the nature of the hypothetical condition is fully disclosed. This allows for a significantly broad use of unimpaired appraisals. For example, many appraisers specialize in certain kinds of property (e.g.: residential) but do not have the expertise to determine *impaired* value. Thus, they would be unqualified under the *Competency* requirements of USPAP to render such an *impaired* value. However, their expertise in rendering an *unimpaired* value allows them to be of substantial assistance and value to the appraisal process by following this paradigm. For example, these "unimpaired appraisers" can lend expertise in local market conditions, provide a baseline value against which an estimate of diminution can be applied, or can assist in gathering local data on transactions of similar, impaired properties.

2. Mundy and Advisory Opinion 9 then recommend that the property be appraised without this

hypothetical condition, thus rendering an opinion of *impaired* value.

USPAP Advisory Opinion 9 recognizes that appraisers are often entering unknown waters with step 2. For example, determining the nature and extent of the contamination requires that the appraiser rely on professional judgments of other experts, such as engineers, whom the appraiser deems reliable. The *Competency* rule of USPAP prohibits the appraiser from rendering opinions in areas outside of the demonstrated expertise of the appraiser. Indeed, if, in the course of completing an appraisal assignment, and appraiser improperly renders, for example, an engineering opinion – for which he or she is not competent – then it is not the engineering standards which have been violated but rather the appraisal standards.

USPAP Advisory Opinion 9 also cautions appraisers regarding the use of extraordinary assumptions. Specifically, this is an "…assumption, directly related to a specific assignment, which, if found to be false could alter the appraiser's opinions or conclusions." For example, an appraiser may be asked to render the *impaired* value under the assumption that the property has been remediated. This requires both that the appraiser make certain extraordinary assumptions about the quality, degree, timing, and prognosis of the remediation but also requires that the appraiser make estimates about post-remediation stigma for a property which is not yet remediated. Thus, it is quite possible that several extraordinary assumptions be made. These must be fully and explicitly disclosed, and caution is again recommended regarding adherence to the *Ethics* and *Competency* provisions.

3. Finally, the difference between #1 and #2 above is the degree of value impairment.

The term *as-is* value is often mistakenly applied by appraisers. Within the context of Advisory Opinion 9, it is clear that *as-is* refers specifically to the *impaired* value, with the hypothetical condition relaxed and no extraordinary assumptions applied. However, when appraising properties within a neighborhood that have been impacted by either on-site or proximate contamination, many appraisers mistakenly use transactions within that neighborhood as indicators of comparable unimpaired value (commonly called "comps"). This clearly runs afoul of the spirit of Advisory Opinion 9. The use of such comps would, under the best circumstances, result in an estimated of impaired value, if and only if knowledge about contamination problem has fully permeated the market and all of the other necessary conditions set forth in the Definition of Market Value are met. Unfortunately, this is not always the case.

With that, it is apparent that both the *unimpaired* and the *impaired* values – the 1st and 2nd points of the Mundy (1992a) and USPAP three-step valuation paradigm – require very serious consideration of the quality and availability of the sort of data on which appraisers typically rely and the methods which appraiser typically use. For example:

1. If contamination impacts properties throughout a neighborhood, then the supposedly comparable properties within the neighborhood may or may not be impacted by either on-site or proximate contamination themselves. Thus, as discussed before, a sales comparison approach value using such comps may be irretrievably tainted with value impacts that are difficult, if not impossible to discern.

2. The salient definition of value (in the United States, most commonly this is *Market Value*) creates a set of explicit assumptions about comparables that may or may not be satisfied by transaction data.

3. Comparable *impaired* properties often do not trade, or do not trade at equilibrium prices, typically due to two reasons: the difficulty marketing contaminated real estate and because few transactions are truly comparable as a result of many diverse attributes and different types of contamination (e.g.: type of contamination, degree of contamination, location of contamination, length of time, remediation prospects). As a result, data that could normally be extracted from market comparable sales (e.g. – market cap rates, sales adjustments, depreciation, land prices) is unavailable.

The need for alternative valuation techniques is widely recognized in the appraisal literature. Chalmers and Beatty (1994)[33] discuss the requirement for "full information" dictated by the traditional United States definition of market value. However, as Simons (2002) clearly notes, the transactions data available in the market will often not reflect market values at equilibrium under the assumptions inherent in the definition of value. Thus, as shown by Simons (2002), Allen and Austin (2001)[34], McLean and Mundy (1999[35], 1998[36]), Simons, Bowen, and Sementelli (1997[37], 1999[38]), and others in the valuation literature, alternative techniques and methods are appropriate and for use when efficient transactions data is not available.

In the specific case of the Sales Comparison Approach – generally the most widely used approach in the U.S. for residential properties – Chalmers and Jackson (1996)[39] note, "[t]he use of the sales comparison approach requires extraordinary care if useful market evidence is to be extracted." No less an authority than the late Dr. William Kinnard, Jr. (the Appraisal Institute's annual award for excellence in education is named in his honor) also concluded that the sales comparison approach and the matched-pairs method is left wanting in his article, Kinnard (1992).[40] To quote Professor Kinnard, "[u]nfortunately, the market frequently does not cooperate. The net effect, therefore, is that these ideal measures tend to remain precisely that – ideal. The appraiser generally has to look elsewhere to identify the market effects of contamination on property values." Professor Kinnard's observations on the shortcomings of the traditional approaches when valuing contaminated property are supported by Patchin (1988)[41], Wilson (1994, 1996), Roddewig (1996),[42] and Weber (1997).[43]

When gathering data in complex cases, such as contaminated property, appraisers are challenged by two fundamental questions about transactions:

1. To what extent do market prices fully capture all available knowledge?

2. Even if all information is "available," to what extent are buyers and sellers able to make market value decisions.

Fundamental to the market decision-making process is the concept of rational expectations — that is, the concept that market participants fully discount whatever information they have in formulating prices. However, there is a growing body of both theory and empirical appraisal evidence showing that real estate market participants operate myopically.

Assume, for illustrative purposes, three states of the market:

1. All buyers and sellers are fully informed.

2. Some buyers and sellers are at least partially informed, some are uninformed.

3. No buyers or sellers are fully informed.

Only state number one, coupled with rational expectations, would be a sufficient condition for prices fully reflecting knowledge.[44] Some real estate

economists would admit that this first "state of being" does not exist in this market, but that this condition is not "necessary" — that efficient prices can result without this condition. In most contaminated property cases, research indicates that more often, states two and three prevail and the appraiser is left with faulty data.

In the economics literature, this first state is often referred to as "strong-form" efficiency. It is highly restrictive, and to quote Gatzlaff and Tirtiroglu (1995) "…suggesting that even insider information is reflected in current prices."[45] However, Grossman and Stiglitz (1980), in their seminal paper on the subject, show that such efficiency is impossible since costless information is both a sufficient and necessary condition for prices to fully reflect all available information.[46] Hence, in this theoretically "efficient" market, at any point-in-time, a tautology exists whereby prices fully reflect information but then at the next instant, more information comes in which updates prices instantly.[47] However, since even in capital markets, information is not costless, markets cannot be strong-form efficient and hence at any point in time, prices do not fully reflect all available information.

Theory aside, substantial empirical evidence has been amassed on the inefficiency of real estate markets. In the absence of market efficiency, simple sales comparison fails without substantial adjustments to account for lack of knowledge. To estimate most probable selling price with seller knowledge, we must utilize a valuation model which:

1. Includes information which would be rationally considered in the valuation process, and

2. Utilizes methodology congruent with practical analytical process.

The issue of information — or the lack thereof — is really at the core of the appraisal process. Lusht points out that if perfect information were available (he calls it "complete data") then appraisals would be unnecessary.[48] He likens the perfect information scenario to the stock market, where appraisals are unnecessary.[49] The task of appraisers, as he sees it, is to develop a credible appraised value from usable but imperfect data. However, Lusht points out that some degree of efficiency is necessarily imputed into the appraisal process, because without it the principal of substitution fails.

Thus, in the absence of market efficiency – when market prices fail to reveal market value – then straightforward valuation techniques fail to accurately predict market value. The appraiser then must resort to more advanced techniques to uncover market value to an acceptable degree of accuracy. Simons (2002) shows that such techniques often include, but are not limited to, survey methodology, case studies, regression analysis, and other reasonably well-tested and suitable techniques.[50]

Weber (1997) is one of the first to recommend such alternative methodologies, suggesting instead that a Monte Carlo simulation is an applicable tool in such situations. Lentz and Tse (1995) had also suggested the use of an alternative methodology, in their case options pricing as an alternative to the discounted cash flow model.[51] Jackson (1998) returns to a somewhat more traditional approach, showing that a mortgage-equity type model can be useful in quantifying the effects of stigma.[52] In the face of a broad array of methodologies used by appraisers to assess the stigma damages stemming from contamination, Mundy and McLean (1998, 1999) recommend the use of contingent valuation and conjoint measurement[53]. Kinnard and Worzola (1999) surveyed and summarized the key methodologies

currently in use.[54] While their study focused primarily on income producing property, they noted that the somewhat more traditional methods most widely used by practitioners were at odds with the more advanced techniques recommended in the academic and practitioner literature.

Over the years, a variety of acceptable methodologies have emerged and proven useful for dealing with the special circumstances faced in a contaminated property situation. These are:

Use of a Control Area. Appraisers use macrostatistics (e.g.: neighborhood income, housing stock, and other economic statistics) to develop a "control area" which is similar in nature to the neighborhood that contains the contamination. Then, properties from the control area are used as comparables, insuring that the comparable data is not impacted by proximate contamination as a negative externality.

Case Studies, Academic Studies, and National Comparables. Appraisers who specialize in contaminated property maintain data bases of similar situations, both individual properties (sortable in electronic form by property type, locational characteristics, or other salient keys) and wide-area studies (neighborhoods impacted) and are able to develop comparable data which can then be used as inputs to the traditional approaches. This type of study and its application to appraisal was illustrated by Kilpatrick (2001).[55]

Survey Research. Market research methodology has been shown to be extremely useful in determining appropriate discounts from otherwise unimpaired value. Mundy and McLean (1998a, 1998b) outline the role contingent valuation and conjoint analysis can play in determining these adjustments.[56,57] Contingent valuation involves directly asking people, in a survey, how much they would be willing to pay for specific environmental amenities or for the amount of compensation they would be willing to accept to give up specific environmental services. It is called "contingent" valuation, because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service. Conjoint analysis also depends on surveys, but differs from contingent valuation because it does not directly ask people to state their values in dollars. Instead, values are inferred from the hypothetical choices or tradeoffs that people make[58]. Both conjoint and contingent valuation are sometimes referred to as stated preferences, because respondents state what they would do in a given situation.

Hedonic Regression Modeling is widely recognized by academics as a powerful tool for extracting marginal prices of contamination, particularly from among complex data. However, regression in some cases can be extremely sensitive to model specification as well as other econometric considerations. Boyle and Kiel (2001) survey its use among environmental analysts and appraisers[59]. Regression analysis and other types of analysis based on actual sales are sometimes referred to as revealed preferences, because market participants have revealed their price preferences by making purchase decisions.

SUMMARY, CONCLUSIONS, AND CAUTIONARY TALES

In the late 1980's appraisers in the United States realized the need to develop methodologies to properly determine the impact on the value of real estate as a result of environmental contamination. What emerged was a rigorous and well-tested set of tools and techniques consistent with the well-accepted approaches to value and the Uniform Standards.

Subsequent studies of real estate values have confirmed the usefulness of these methods. Boyle and Kiel (2001)61 summarize empirical studies of the impact of contamination on residential values, while Jackson (2001)62 summarizes impacts on non-residential properties. Both of these studies confirm the usefulness of the methods that have evolved over the past 20 years.

Three cautionary notes, somewhat related to one another, are in order:

First – To use a medical analogy, if general purpose appraisers are "family practitioners", then contaminated or otherwise impaired property appraisers are brain surgeons. The field requires extensive additional education, experience, familiarity with the salient literature, and mastery of complex methods and techniques. Additionally, many – if not most – contaminated property situations involve litigation. Many attorneys prefer to use college professors as consulting experts, with the expectation that if the case goes to trial, the professor will testify. Why? College professors are trained and experienced at carefully and compellingly explaining complex subjects to lay people (e.g. – students) without being pedantic or patronizing. Unfortunately, all too many appraisers are experienced at analytical methods but are not experienced at compellingly explaining their findings.

Property owners or other interested parties who engage an appraiser for a contaminated property assignment should carefully consider if this appraiser's training, experience, publication record, testimony record, and expertise as a potential expert witness is consistent with the needs of the case. Is this appraiser familiar with the more advanced methods – as evidenced by his or her scholarly publication or extensive training?

Second – It is often said that reasonable people can have distinctly different opinions about complex subjects. As it happens, the valuation outcome of impaired property has a lot to do with the appraiser's perspective on the impacts of various characteristics. Unfortunately, the empirical evidence is not cut-and-dried, and while most reasonable appraisers agree that contamination has some impact, the degree of this impact is still a matter of some debate.

That makes it critically important that the client become familiar with the appraisers published record before engaging the assignment. What has this appraiser testified to in previous, similar cases? What journal articles has this appraiser written and published? What methods will this appraiser employ?

Appraisers without an extensive testimony or publication record often get "eaten alive" by opposing attorneys and consulting experts if the case ever makes it to trial. Even before trial, an appraiser with little experience or strong credentials in a case such as this will have problems producing a credible opinion for mediation or other negotiations.

Conversely, an appraiser with an extensive publication record my find him or herself hung by that record on the witness stand. Be sure that your appraiser both has a record and that this record is consistent with the problem for which you are engaging their services.

Finally – This really applies to all technical and scientific experts in litigation matters, but bears repeating here. It is often said that attorneys are expected to be advocates for their clients, but experts are expected to be advocates for the truth. This has a practical aspect in the courtroom. Judges and juries expect the attorneys to vigorously represent their client. However, appraisers who appear to be advocates for the client – or who appear to have entered the analysis with a preconceived outcome in mind – are both in violation of USPAP but also are totally un-believable to the court. Keep this in mind throughout the appraisal analysis, and it will serve you in good stead if your contamination matter ever goes to court.

APPENDICE: THE DEFINITION OF MARKET VALUE

Real estate appraisals performed for financing by federally insured lenders – nearly all mortgage loans — require that the analysis adhere to the necessary and sufficient conditions contained in what has come to be known as the "Definition of Market Value:

The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus.63

Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

1. Buyer and seller are typically motivated;

2. Both parties are well informed or well advised, and acting in what they consider their own best interests;

3. A reasonable time is allowed for exposure in the open market;

4. Payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and

5. The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

APPENDICE: SUGGESTED READING

One of the leading handbook for appraisers in the US is The Appraisal of Real Estate, currently in its 12th edition. It is published by the Appraisal Institute (www.appraisalinstitute.org) in Chicago.

The Uniform Standards of Professional Appraisal Practice, new editions published annually in January. Contact the Appraisal foundation (www.appraisalfoundation.org), Washington, DC.

C.F. Sirmans and Elaine Worzala, editors, Essays in Honor of William N. Kinnard, Jr. (Boston: Kluwer Academic Publishers, 2003). The late Dr. Kinnard was a former President of the American Real Estate and Urban Economic Association and one of the most highly regarded experts in the field of valuation of contaminated property. This monograph, co-sponsored by the Appraisal Institute, the Royal Institute of Chartered Surveyors Foundation, and the American Real Estate Society, is "must reading" for any appraiser or attorney in the field.

END NOTES

1 The authors are indebted to our colleagues on the staff of Mundy Associates LLC for their valuable assistance in developing this chapter.

2 USPAP was principally developed in reaction to the lack of common, independent standards for appraisals, which was at least partially held to blame for the Savings and Loan crisis. As such, USPAP is mandatory for appraisals conducted for federally-insured mortgage loan financing purposes. However, in most jurisdictions, USPAP and its collateral licensing requirements, developed by the AQB, are binding on all real estate appraisers and all appraisal situations.

3 Mundy, Bill, "The Scientific Method and the Appraisal Process", Appraisal Journal, October, 1992, 493-99.

4 The Appraisal of Real Estate 12th ed (Chicago: Appraisal Institute, 2002), pg 349.

5 Ironically, the seminal text The Appraisal of Real Estate 12th ed (op. cit.) only spends three chapters on this approach, compared with four chapters on the cost approach and five on the income approach!

6 This particular example is offered for a particular reason. In the case of public acquisitions of real property, there is an ongoing debate in appraisal circles about determining the highest-and-best-use of preservation land when the only purchaser is a government entity, which is usually the case. For a view on this debate, see Mundy, Bill, and William Kinnard, "The New Noneconomics : Public Interest Value, Market Value, and Economic Use", Appraisal Journal, April, 1998, 207-214. Further, do deal with this controversy, the U.S. Government has a special set of standards governing only federally-financed land acquisitions, called the Interagency Standards for Federal Land Acquisition (Chicago: Appraisal Institute, 2002). These standards generally apply to Federally-financed highway acquisitions, Bureau of Land Management transactions, and Forest Service dealings.

7 Gamble, H.B., and R.H. Downing, "Effects of Nuclear Power Plants on Residential Property Values," Journal of Regional Science, 1982, 457-478.

8 A hedonic model is a multiple regression equation used for disaggregting the price paid for multidimensional commodities into their component parts.

9 Kinnard, William N. and Elaine M. Worzala, "How North American Appraisers Value Contaminated Property and Associated Stigma," The Appraisal Journal, July, 1999, 269-279.

10 The American Institute was one of the two predecessor organizations to the present-day Appraisal Institute. The other predecessor organization was the Society of Real Estate Appraisers.

11 American Institute of Real Estate Appraisers; Research Department, Underground Storage Tanks: Basic Information For Appraisers (Illinois: National Association of Realtors, 1988), 3.

12 Patchin, Peter J., "Valuation of Contaminated Properties," The Appraisal Journal (January 1988), 10.

13 Hays B. Gamble, Hayes, B. and Roger H. Downing, Effects of Sanitary Landfills on Property Values and Residential Development (University Park, PA: Institute for Research on Land and Water Resources 1984), 7.

14 Throughout this chapter, the term "market value" is used. This has a very stylized meaning in the appraisal context, and represents a set of necessary conditions which must be met for an observed transaction price to be representative of value. This definition was promulgated by the Office of Thrift

Supervision, among other groups, and is required to be used in federally-insured transactions. However, the authoritative text The Appraisal of Real Estate (Chicago: Appraisal Institute, 2002) cites quite a few different definitions of value, and various courts and jurisdictions have alternative definitions of value either in their rules of evidence or in model jury instructions. The appraiser must take care to apply the appropriate definition of value in a contamination case, in accordance with USPAP Advisory Opinion 22.

15 In this context, AO-9 only really summarizes binding requirements under USPAP Rules 1-1(a), 1-2(e), 1-2(g), 1-3(b), and 1-4

16 See, for example, Fannie Mae Selling Guide VII, 303 and 405.02, or its predecessor, OTS 1989 Bulletin TB-16.

17 Fannie-Mae Form 1004, Freddie Mac Form 70.

18 See, for example, Fausett & Co v. Bullard, 229 S.W.2d 490 (Ark. 1950), Clark v. Olson, 726 S.W.2d 718 (Mo. banc 1987), Lynn v. Taylor, 642 P.2d 131 (Kan.App. 1982), McRae v. Bolstad, 646 P.2d 771 (Wash. 1982),

Fauerke v. Rozga, 332 N.W.2d 804 (Wis. 1983), Reed v. King, 145 Cal.App.3d 261, 193 (Cal.Rptr.130 1983)

19 Patchin, P.J., op. cit.

20 Patchin, P.J., "Contaminated Properties – Stigma Revisited," The Appraisal Journal, 1991, 167-172.

21 Mundy, Bill, "Stigma and Value", The Appraisal Journal, 1992a, 7-13.

22 While Mundy (1992a) was the first in the valuation literature to present these, he correctly cites the authorship of this from the sociology literature: Edelstein, Michael, Contaminated Communities: The Social and Psychological Impacts of Residential Toxic Exposure (Boulder, Colorado: Westview Press, 1988), 6.

23 Interestingly enough, the old bromide, "out of sight, out of mind" does not apply here. The greater the degree of concealability, the greater the stigma.

24 Mundy, Bill, "The Impact of Hazardous Materials on Property Value," The Appraisal Journal, 1992b, 155-162.

25 Mundy, Bill, "The Impact of Hazardous Materials on Property Value: Revisited,", The Appraisal Journal, 1992c, 463-471.

26 Kilpatrick, John A., Doug Brown, and Ronald C. Rogers, "Exterior Insulation Finish Systems and Property Values," The Appraisal Journal, 1999, 83-88.

27 Chalmers, James, and Thomas Jackson, "Risk Factors in the Appraisal of Contaminated Property," The Appraisal Journal, 1996, 44-58.

28 Bell, Randy, "The Impact of Detrimental Conditions on Property Values," The Appraisal Journal, 1998, 380-391.

29 McMillen, Daniel P; Thorsnes, Paul, "The Aroma of Tacoma: Time-Varying Average Derivatives and the Effect of a Superfund Site on House Prices," Journal of Business and Economic Statistics, 21-2, April 2003, 237-46. Note: Mundy Associates was the principal appraisal firm engaged by the attorneys representing the homeowners in this case. Branin, et. Al, v. Asarco, Inc., Pierce County, Washington.

30 Jackson, Thomas, "Investing in Contaminated Real Estate," Real Estate Review, 1997, 38-43.

31 USPAP 2003, 146.

32 Ibid, 3.

33 Chalmers, James A. and Jeffrey Beatty, "Environmental Hazards Devastate Property Values," Real Estate Valuation Spring, 1994, pg 22-28,

34 Allen, Marcus and Grant Austin, "The Role of Formal Survey Research Methods in the Appraisal Body of Knowledge," The Appraisal Journal, October, 2001, 394-399.

35 McLean, David, and Bill Mundy, "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, 1999, 1-19.

36 Mundy, Bill, and David McLean, "Using the Contingent Valuation Approach for Natural Resource and Environmental Damage Applications," The Appraisal Journal, July, 1998, 290-297.

37 Simons, Robert, William Bowen, and Arthur Sementelli, "The Effects of Leaking Underground Storage Tanks on Residential Sales Price," Journal of Real Estate Research, 1997, 29-43.

38 Simons, Robert, William Bowen, and Arthur Sementelli, "The Price and Liquidity Effects of UST Leaks from Gas Stations on Adjacent Contaminated Property," The Appraisal Journal April, 1999, 186-194.

39Chalmers, James A. and Thomas O. Jackson, "Risk Factors in the Appraisal of Contaminated Property," Appraisal Journal January, 1996, pgs 44-58,

40 Kinnard, William, "Measuring the Effects of Contamination on Property Values," Environmental Watch (published by the Appraisal Institute), Winter, 1992, pgs 1-4.

41 Patchin, Peter, "Valuation of Contaminated Properties," The Appraisal Journal, 1988, 7-16.

42 Roddewig, Richard, "Stigma, Environmental Risk, and Property Values: 10 Critical Inquiries," The Appraisal Journal, 1996, 375-387

43 Weber, B.R., "The Valuation of Contaminated Land," Journal of Real Estate Research, 1997, 379-398.

44 Assuming the other conditions in the salient definition of market value are met, such as "…*each acting prudently*…."

45 Gatzlaff, Dean, and Dogan Tirtiroglu, "Real Estate Market Efficiency; Issues and Evidence," *Journal of Real Estate Literature* 2 (1995) 157-189.

46 Grossman, S.J., and J. Stiglitz, "On the Impossibility of Informationally Efficient Markets," *The American Economic Review* 70 (1980) 393-408.

47 Grossman, S.J., and J. Stiglitz, "Information and Competitive Price Systems," *The American Economic Review* 66 (1976) 246-253.

48 Lusht, Kenneth M., "Most Probable Selling Price," *The Appraisal Journal,* July 1983.

49 Lusht's argument is actually a bit faulty in this regard, but for reasons that actually support his hypothesis. The stock market is FULL of appraisers — they are called stock analysts — simply because the stock market itself is informationally inefficient. Given that the real estate market has been shown, in subsequent studies, to be informationally inferior to the securities market, the need for appraisers and appraisals is ever more incumbent on real estate.

50 Simons, Robert A., "Estimating Proximate Property Damage from PCB Contamination in a Rural Market: A Multiple Technique Approach," *The Appraisal Journal*, (October 2002): 388-400. For his study, Dr. Simons used data gathered in the Anniston, Alabama PCB case.

51 Lentz, George, and K.S.M. Tse, "An Options Pricing Approach to the Valuation of Real Estate Contaminated by Hazardous Materials," Journal of Real Estate Finance and Economics, 1995, 121-144.

52 Jackson, Thomas, "Mortgage Equity Analysis in Contaminated Property Valuation," The Appraisal Journal, 1998, 46-55.

53 Mundy and McLean, 1998 and 1999, op, cit.

54 Kinnard, William, and Elaine Worzala, "How North American Appraisers Value Contaminated Property and Associated Stigma," The Appraisal Journal, 1999, 269-278.

55 Kilpatrick, John A., "Concentrated Animal Feeding Operations and Proximate Property Values," The Appraisal Journal, 2001, 301-306.

56 Mundy, Bill, and Dave McLean, "Using the Contingent Value Approach for Natural Resource and Environmental Damage Applications," The Appraisal Journal 1998a, 290-297.

57 Mundy, Bill, and Dave McLean, "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, 1998b, 1-19.

58 King, Dennis M., and Marisa Mazotta, "Contingent Valuation Method", Section 6 in Ecosystem Valuation, www. cbl.umces.edu/~dkingweb/. Funded by US Department of Agriculture, Natural Resources Conservation Service and National Oceanographic and Atmospheric Administration.

59 Boyle, Melissa and Katherine Kiel, "A Survey of House Price Hedonic Studies of the Impact of Environmental Externalities," Journal of Real Estate Literature 2001, 117-144.

60 Kilpatrick, John A., "Construction Defects and Stigma," forthcoming in Mealey's Construction Defects.

61 Boyle, Melissa, and Katherine Kiel, op. cit.

62 Jackson, Thomas, "The Effects of Environmental Contamination on Real Estate: A Literature Review," Journal of Real Estate Literature, 2001, 91-116.

63 Office of Thrift and Supervision, 12CFR 564.2(f), 1989; Office of the Comptroller of the Currency, 12CFR 34.42(f), 1989.