Valuation of Contaminated Sites

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Presented by Stuart Carmichael

Contact: stuart@cwpc.com 604-730-8889

www.cwpc.com

Definitions: Contaminated Property

- **Environmental Contamination:** *"Adverse environmental conditions resulting from the release of hazardous substances into the air, surface water, groundwater or soil."*

- **Environmental Risk:** *"The additional or incremental risk of investing in, financing, buying and/or owning property attributable to its environmental condition. This risk is derived from perceived uncertainties concerning:*
  1) *the nature and extent of the contamination;*
  2) *estimates for future remediation costs and their timing;*
  3) *potential for changes in regulatory requirements;*
  4) *liabilities for clean-up (buyer, seller, third party);*
  5) *potential for off-site impacts; and*
  6) *other environmental risk factors, as may be relevant."*

- **Environmental Stigma:** "*An adverse effect on property value produced by the market's perception of increased environmental risk due to contamination."*

- **Impaired Value:** *"The market value of the property being appraised with full consideration of the effects of its environmental condition and the presence of environmental contamination on, adjacent to, or proximate to the property. Conceptually, this could be considered the "as-is" value of a contaminated property."*

- **Remediation Cost:** *"The cost to clean up (or remediate) a contaminated property to the appropriate regulatory standards. These costs can be for the clean-up of on-site contamination as well as mitigation of off-site impacts due to migrating contamination."*

  Source of above definitions: *The Appraisal of Real Property That May be Impacted by Environmental Contamination*, USPAP (Uniform Standards of Professional Appraisal Practice) Advisory Opinion 9, 2003 edition.

- *"Stigma is an intangible factor which may not be measurable in terms of cost to cure but may have real impact on market value. Where there is a market perception that a property is or has been affected by contamination, despite the availability of information that remedial work has taken place, the market will often pay less than normal unaffected value."*

  Source: Valuation of Contaminated Land in Australia: Exposure Draft, Australian Institute of Valuers and Land Economists, April 1993;

Contaminated Site Sales

#	Location	Asking Price	Negotiated Price & Sale Date	Cost Estimate of Contamination	Cost Paid for Contamination	Discount for Contamination	Adjusted (net) Price	Comments
1	South Vancouver Industrial Area	$3,500,000	$3,000,000 1992		$500,000 (paid and undertaken by the vendor)	$250,000 (discount for stigma and future risk)	$2,750,000	The asking price was $3,500,000, with the original negotiated price being $3,000,000. A $250,000 discount was negotiated for stigma and future risk. $500,000 in remediation was paid and completed by the vendor.
2	Vancouver	-	$1,500,000 2004			$100,000	$1,400,000	Vacant site utilized as a parking lot. Purchased for its redevelopment potential. A $100,000 discount was secured for site remediation costs.
3	Vancouver	-	$1,715,000 2000			$125,000	$1,590,000	Industrial site purchased for multi-family housing. Due to the site contamination the purchaser held back $125,000 of the original negotiated sale price.
4	Vancouver	Listed under an open bid process	$14,000,000 2013	±$800,000		$761,000	$13,239,000	Improved commercial/retail property. Remediation costs were estimated by the vendor's environmental consultant at $800,000; however, the discount was negotiated at $761,000.
5	Vancouver	-	$3,000,000 2014	±$900,000		$900,000	$2,100,000	Development site previously used for oil storage and a foundry. Roughly one third of the property is improved with an abandoned two-storey industrial building. Clean-up costs are estimated at $900,000, which was deducted from the original contract price, which had already been negatively impacted due to the knowledge of contamination.
6	Vancouver		Under Negotiation 2013 (collapsed deal)					Gas station site. The site was under negotiation for purchase by a local residential developer; however, upon further testing it was discovered that contamination had migrated onto nearby residential properties and city roads. The parties were unable to reach an agreement due to remediation costs and the deal collapsed.

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Contaminated Sites Sold "As Is"

#	Location	Asking Price	Sale Price Sale Date	Percent of Asking Price	Comments
1	Vancouver	$2,600,000	$1,650,000 2013	63% (of asking)	Improved commercial property utilized as a drycleaner, causing soil contamination. Original asking price of $2,600,000 was reduced to $2,175,000 and $1,950,000 before selling at $1,650,000.
2	Vancouver	$2,500,000	$1,300,000 2005	52% (of asking)	Previous gas station with soil contamination. Property was sold "as is" and buyer was to assume all responsibility for on and off-site remediation as well as future risk.
3	Vancouver	$2,399,000	$1,150,000 2013	48% (of asking)	Former gas station undergoing remediation at the time of sale. Subsequent to the date of sale a rezoning application was submitted in order to develop 6, two-family residential lots.
4	Vancouver	$5,500,000	$3,875,000 2009	70% (of asking)	Former gas station which had not been remediated at the time of sale. The clean up took roughly 3 years, with the Certificate of Compliance issued in December 2012. The property was subsequently redeveloped with a 4-storey mixed-use building.

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Resales of Sites Before and After Remediation

#	Location	Site Size (acres)	Site Condition	Sale Price Sale Date	Comments
1	Vancouver	0.15	Contaminated Clean	$625,000 2009 $1,773,300 2012	Former autobody shop. At the time of the 2009 sale a Phase II environmental report had been completed, indicating soil contamination. Original listing price in 2008 was $1,100,000. Prior to the 2012 sale the building was demolished and the site remediated. The site was sold in 2012 to a developer who subsequently constructed a 4-storey condominium building.
2	Vancouver	0.21	Undergoing remediation Clean	$1,350,000 2003 $2,060,000 2005	Single tenant 13,905 sq.ft. industrial building constructed circa 1978. Soil contamination existed prior to 2003, however as a condition of sale the vendor was required to complete remediation resulting in a long closing period. The site was clean at the time of the 2005 sale.
3	Delta	17.50 (net)	Impaired (100,000 m³ of wood waste)	$2,700,000 2006	Irregular shaped lot bisected by a road with the larger portion fronting the Fraser River (±282 ft). Based on legal plans the entire site is 23.909 acres. An easement area of 4.25 acres is located on the east side of the main parcel and is fenced off. The easement includes an option to purchase for the consideration of $10.00. Approximately 2.16 acres is located on the southeast side of the road, adjacent to a slough, dividing the site into two portions. The 2.16 acres of land is low lying and has limited development potential. Therefore, the net site area is considered to be 17.50 acres. At the time of the first sale the property had approximately 100,000 m³ of wood waste (enough to fill 40 Olympic-sized pools) accumulated on the site deposited over many years by a lumber mill on the adjacent eastern site. As a result, the site required extensive remediation.
			Partially remediated	$4,285,000 $8,570,000 (adjusted) 2008	The sale in 2008 was a transfer of a 50% partner interest to the other 50% partner. As such, only 50% of the interest in the property is represented in the $4,285,000 sale. The transaction was reportedly based on market values and therefore the sale price has been adjusted to reflect a 100% transfer. At the time of sale, the material on site was being sifted and the wood and organic waste was being removed and then trucked to a site where it was burnt as fuel.
			Clean and Cleared	$12,450,000 2009	The most recent sale is a share transaction, whereby the vendor avoids the property purchase tax, however, the agent confirmed the sale is an arms length market value transaction. A Certificate of Compliance had been issued on the site, however, it needed fill and preload. Sand was to be pumped from the river at a cost of $800,000 to the purchaser. The property was purchased in order to construct a new facility.
4	Vancouver	18.27	Contaminated Clean	$2,005 2005 $23,000,000 2007	Industrial site sold to be utilized as a cast-concrete facility. An estimated $500,000 in remediation was required, which was paid for and undertaken by the purchaser. The clean site then sold two years later to a developer, who intended to assemble and redevelop the site for business park use.
5	Richmond	1.75	Environmental and Fire Damage	$625,000 2004 $2,430,000 2007	Industrial site improved with a badly fire-damaged building, originally constructed circa 1998. The fire and environmental damage was due to a fire of the bio-conversion plant on site in July 1999, resulting in a fermentation tank covered in polyurethane erupting and leaking into the soil. The plant had initially cost roughly $28 million to construct and it was reported that the purchaser hoped to salvage some of the equipment. The initial purchaser repaired the building prior to selling the remediated facility to a recycling/disposal company.

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Delta Landfill and Impaired Land Sales

#	Property Location	Sale Date & Sale Price	Site Size (Acres)	Zoning OCP	Price per Acre	Comments
1	Delta	**$12,800,000** Current Listing **$13,800,000** 2008 Listing **$6,837,000** 2007 Listing **$1,690,000** 2004	12.503	I-2 & I-6 Industrial	**$1,023,754** **$1,103,735** **$546,829** **$135,168**	Property was listed in 2008 for $13,800,000 (later reduced to $12,800,000) and has been re-listed at $12,800,000 from August 2009. Last sold in July 2004. Older improvements of nominal value. Long, narrow adjacent parcels bisected at the rear by rail line. Only access to the rear can be made through adjacent parcel. No crossing agreement available. Front portion also severed by River Road. Small portion to the north has river frontage. Portions to the front, near River Road have been filled, remainder will require fill. Area south of CN line is 4.60 acres and is partially treed and partially filled.
2	Delta	**$4,000,000** 2006	26.31	I-2 & I-6 Industrial	**$152,033**	Sale of two adjacent parcels located on both sides of a rail corridor with 14.50 acres north of rail line and 11.81 acres to the south. There is no crossing agreement. At the time of sale, the land north of rail line was being used by several small businesses while land south was undeveloped and part of a former landfill site that is up to 20 metres high. It was stated that there was no indemnity agreement from former owners and purchaser knew southern land was contaminated and they would be liable for cleanup. The southern land was determined to be a contaminated site under the old Waste Management Act in June 2002, prior to sale. Land north of rail line was subsequently filled, compacted and gravelled with some of the existing fill removed. The reported cost to prepare the northern land was $2.1 million or about $145,000 per acre. This was a court ordered sale.
3	Delta	**$4,078,000** 2014 **$3,900,000** 2006 Listing	7.71	I-2 Industrial	**$528,923**	Property forms part of a former landfill site. As of the date of sale, the property was being closed and remediated. Subsequent to the date of sale the property was approved under the Delta DLC Landfill Site Tax Exemption Program. The property was listed in 2006 for $3,900,000. At the time, the site was only partially filled, with no closure plan or environmental studies completed. The agent reported two offers, however they were subject to a satisfactory environmental audit and did not proceed further. Agent considered asking price to be above market expectations at that time. Property was previously listed for sale in 2003 for $1,816,730 with two other lots totalling 13.02 acres indicating an asking price of $139,533 per acre.
4	Delta	**$975,000** 2003	17.765	I-2 & I-6 Industrial	**$54,883**	Purchase of a filled site with soil treatment facility currently on land north and south of the rail line and occupying two thirds of the property. The 'front' lands of the westernmost parcel is currently leased and the 'rear' lands remain vacant and unused. Prior to the sale fill was also placed on this parcel but without a permit. There is a small portion located north of River Road on the Fraser River and approximately 6.895 acres located south of the rail line. No crossing agreement for access to southern land. Land had been filled for several years and DeltaMap indicates the front land (between tracks and River Road) of 2 to 8 metres and rear land at 8 metres to 13.5 metres. MLS sale date is December 2003 and sale closed in April 2004.
5	Delta	**$36,700** 2000	3.432	I2 Industrial	**$10,693**	Vacant, narrow parcel that is part of a Landfill. No constructed road access and is located south of the rail corridor and unconstructed River Way road allowance. Lands east and west are owned by the Corporation of Delta. The northern portion of the site (about 25%) is relatively level while the remainder has been filled and rises to 20 metres near the centre of the landfill. Tax sale through September 2000 public auction with sale closing about one year after annual tax sale auction. Property owners have one year following the bid to pay outstanding charges (taxes) and interest.

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Sales of Clean Land

#	Location	Sale Price Sale Date	Site Size (Acres)	Zoning OCP	Price / Acre	Comments
1	Delta	**$7,660,000** 2008	9.045	I-2 & I-6 Industrial	**$846,876.73**	Three legal parcels located on both sides of River Road and extending south as far as the CN/BNSF rail line. No land included south of rail line. Approximately 0.12 acres located on north side of River Road on waterfront. The site has approximately 300 feet of frontage along River Road. Property has been filled and is level and gravel surfaced and fenced. No further improvements. Property is used for truck parking.
2	Delta	$4,300,000 less: $400,000 (improvements) **$3,900,000** 2007 $2,700,000 2006	6.56	I-2 Heavy Industrial	**$594,512** **$411,585**	Included in the July 2006 sale is an agreement enabling the seller to either lease or purchase the portions of land comprising those narrow strips on the north side of River Road for a consideration of $1.00. In early 2007, lengthy negotiations were undertaken to resell the site to a trucking company. Second sale declared at $3,500,000 and we have been advised there was reportedly an assignment fee paid of $800,000, which brings the price up to $4,300,000. The property was improved with various detached sheds and outbuildings that are estimated at a total value of $400,000. Other details of the assignment cannot be disclosed at this time. We have not adjusted for this aspect due to the uncertainty of such a clause. All the land is located north of the CN rail line. There is a small waterfront portion that is north of River Road on both lots.
3	Delta	**$3,600,000** 2008	3.273	I-2 Heavy Industrial	**$1,099,908**	Rectangular parcel located in Tilbury a few parcels north along the east side of Brown Street. Sale negotiated at the beginning of January 2008 and closed January 31st 2008. Fully serviced and preloaded site, improved with a 1,000 sq. ft. office building, steel shed buildings and fully paved and fenced lot. Purchaser proposes to lease out the premises for a short term. Estimated value of improvements is approximately $300,000 indicating a land residual of $3,300,000 or approximately $1,008,249 per acre.
4	Delta	**$1,000,000** 2007	1.22	I-2 & I-6 Industrial	**$819,672**	This property comprises 1.22 acres located north and south of River Road in a generally rectangular shape. The area north of River Road, abutting the Fraser River comprises 0.13 acres of upland and is extended by a filled and paved waterlot that id actively used and improved with an industrial building. The remainder of the site, 1.09 acres is located on the south side of River Road. The site is located two parcels west of Webster Road.
5	Delta	**$5,254,751** 2009	4.463	I-2	**$1,177,403**	Corner parcel, access through adjacent parcel to east. Improvements include stacker, kilns, silo, cooling area and portion of green chain and new planer. Exposure and frontage to Nordel Way and River Road.

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Articles and Publications on Valuing Contaminated Land

1. Valuation of Contaminated Properties: A Canadian Perspective

By: Gordon E. MacNair (AACI) Published in: Canadian Appraiser, Winter 2004

Summary: The article was an overview on common techniques used for valuing contaminated land and associated terminology.

Topics discussed: include contamination's effect on highest and best use, Value in Exchange vs Value in Use, (i.e. even if the cost to remediate is higher than the value of the land, the property may still have value to the owner in its continuing use), sources of liability, stigma. Referenced IV = UV – CE – UE – RE (impaired value = unimpaired value – cost effects – use effects – risk effects).

Valuation techniques: gives brief descriptions for the methods Thomas O. Jackson listed in *Methods and Techniques for Contaminated Property Valuation*.

Notable quotes:

- Causes of stigma include: fear, lack of marketability, ignorance, safety, uncertainty and liability.
- When loans are made on contaminated properties, respondent lenders generally punish the property. This is the result of a combination of higher interest rates, lower loan-value ratios and shorter amortization periods.
- Although there is little information available regarding the temporal pattern of recovery, anecdotal evidence indicates that recovery is faster for commercial than for residential properties. (Residential properties are often held to a higher standard for remediation.) Potential liability appears to be the most influential determinant of recovery time.
- The theory behind environmental stigma is that, typically, stigma is considered to be at its highest during the first stage of the remediation cycle, when the contamination has been first discovered and uncertainty is at its greatest. With the next stage, the remediation stage, the stigma starts to lessen because the problem becomes more understood. During the last stage, post-remediation, the stigma lessens even more since there is little to no uncertainty.

About Author: Currently the Director of Real Estate Partnerships & Development Office for the City of Ottawa. Also wrote "Real Property Challenges with Ottawa's LRT Project" presentation for the AIC in May 2014.

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2. Appraisal Standards and Contaminated Property Valuation

By: Thomas O. Jackson (PhD, MAI, CRE) Published in: The Appraisal Journal, April 2003

Summary: The article discusses, interprets and analyzes USPAP Advisory Opinion 9 (AO-9). Many of the articles we use reference/quote it.

Notable Quotes:

Impaired Value = Unimpaired value
– Cost Effects (remediation and related costs)
– Use Effects (effects on site usability)
– Risk Effects (environmental risk/stigma)

About Author: (current designation PhD, AICP, MAI, CRE, FRICS) Specializes in analysing real estate that may be impacted by environmental contamination. Has published many papers and served on appraisal advisory boards. Also wrote the environmental issues section in appraisal textbooks. www.real-analytics.com/vita.pdf

3. Methods and Techniques for Contaminated Property Valuation

By: Thomas O. Jackson Published in: The Appraisal Journal, October 2003

Summary: The purpose of the article is to "provide an overview of professionally accepted methods and techniques for valuing contaminated properties or estimated the effects of environmental contamination of the market value of real property". Discusses/references AO-9 and many articles/literature. Basically a follow-up to the April 2003 article (see previous).

Notable Quotes:

- In measuring the three potential effects on value (cost, use, and risk), cost effects are derived from remediation costs, which typically are estimated by environmental specialists. Assuming the market recognizes these costs, the appraiser can usually deduct them as a lump sum from the unimpaired value in a similar manner to a capital expenditure for deferred maintenance.
- Uncertainty regarding cost estimates, projection, and timing would be reflected in the environmental risk premium added to the unimpaired property or equity yield rate (risk effect).

Valuation techniques: Detailed descriptions include analysis of case studies, paired sales, multiple regression, market interviews, adjustment of cap rate.

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4. Appraisal of Contaminated Property in the United States

By: John A Kilpatrick (PhD, MAI) and Bill Mundy (PhD, MAI, CRE) of Mundy Associates LLC

Published in: Journal of the Japan Real Estate Institute, October 2003

Summary: The article outlines the methodology dictated by Advisory Opinion 9 (AO-9) and how it has evolved and is applied to the appraisal of contaminated property. Starts with the history of examining the impact of contamination on value in 1982, and follows the evolution of appraising contaminated property up to the date of publishing.

Notable Quotes:

- The cost of remediation is not, by itself, a sufficient proxy for the diminution in market value, since at equilibrium contaminated properties sell for less than the difference between unimpaired value and the cost of remediation. This difference is called "stigma." 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.

Valuation methodologies listed include: Use of a control area, case and academic studies, survey research, hedonic modeling, depreciation analysis (improved properties only).

About Authors: John A Kilpatrick (current designation is PhD, MAI, FRICS), currently managing director at Greenfield Advisors. Bill Mundy (PhD, MAI, CRE), founded Greenfield Advisors LLC in 1976. Have their own Wikipedia page and were hired to evaluate the value impacts of the Exxon Valdez oil spill in Alaska.

5. Environmental Remediation Costs: The Legal Perspective for Appraisers

By: Frank J. Sperduti and Christel Higgs of Borden Ladner Gervais LLP

Presented to the Appraisal Institute of Canada in June 2012

Summary: The article discusses environmental contamination in an expropriation context. References cases and court decisions in Canada, particularly Ontario. Discusses two BC cases – "*Pay Less Gas Co. et al v. Her Majesty the Queen in Right of the Province*" and "*Baines et al v. Ministry of Transportation*". The article also discusses the challenge of demonstrating how parking participants would view the contamination as of the valuation date, and how factors such as type of property (industrial, residential, etc), proposed use and anticipated timing to clean up must be accounted for. References IV = UV-CE-UE-RE.

Provides good references to expropriation court cases in Canada with contamination issues, and other topics.

About Authors: Frank Sperduti – former president of the Ontario Expropriation Association, lawyer, AIC lecturer. Christel Higgs, expropriation and environmental lawyer.

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6. Environmental Contamination: An Analysis in the Context of the DC Matrix

By: Orell C. Anderson, MAI

Published in: The Appraisal Journal, July 2001

Summary: The article explains in depth the Detrimental Conditions Matrix, which is a way of charting/correlating assessment, repair and ongoing stages of contamination with the cost, use, and risk issues involved. Provides a good breakdown on the use, risk and cost effects over the 3 phases of the remediation cycle.

Notable Quotes:

- A significant reduction in the sale price of a property that is not fully characterized, but highly suspect or known to be contaminated is consistent with the increase in risk due to uncertainty about the level of contamination, remediation, costs, and future ongoing issues.

About Author: Currently president of Strategic Property Analytics Inc. Has consulted on Hurricane Katrina, Bikini Atoll Nuclear Test Sites, World Trade Centre and Flight 93 Crash Site. Associate member of the American Bar Association.

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7. Contaminated Properties and the Sales Comparison Approach

By: Peter J. Patchin, MAI

Published in: The Appraisal Journal, July 1994

Summary: The article/author is referenced many times by the other articles used. Topics discussed include how to find market data on contaminated properties, and how to analyse said market data. Also demonstrates how to put together a case study and provides several examples. Finally, discusses how to analyse case studies and apply them to the appraisal and valuation.

Notable Quote:

- If the seller or other responsible party is under a consent order or indemnity agreement to pay for [remediation and associated costs], the decline in value may be attributable to stigma factors alone.

About the author: Had been an appraiser for 32 years at the time of article (1994). Considered a pioneer in the appraisal of contaminated properties and often quoted/referenced in articles.

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8. USPAP Advisory Opinion 9

By: The Appraisal Standards Board

Based on the 2003 Edition of USPAP

Subject: **The Appraisal of Real Property That May Be Impacted by Environmental Contamination**

Summary: Discusses the appraisal of contaminated property in the context of USPAP, including ethics, assumptions, highest and best use issues, etc.

Definitions quoted on page 1 of this handout.

Additional Terms and Definitions:

Diminution in Value (Property Value Diminution): The difference between the unimpaired and impaired values of the property being appraised. This difference can be due to the increased risk and/or costs attributable to the property's environmental condition.

Remediation Cost: The cost to cleanup (or remediate) a contaminated property to the appropriate regulatory standards. These costs can be for the cleanup of on-site contamination as well as mitigation of off-site impacts due to migrating contamination.

Remediation Lifecycle: A cycle consisting of three stages of cleanup of a contaminated site: before remediation or cleanup; during remediation; and after remediation. A contaminated property's remediation lifecycle stage is an important determinant of the risk associated with environmental contamination. Environmental risk can be expected to vary with the remediation lifecycle stage of the property.

Source, Non-source, Adjacent and Proximate Sites: Source sites are the sites on which contamination is, or has been, generated. Non-source sites are sites onto which contamination, generated from a source site, has migrated. An adjacent site is not contaminated, but shares a common property line with a source site. Proximate sites are not contaminated and not adjacent to a source site, but are in close proximity to the source site.

Unimpaired Value: The market value of a contaminated property developed under the hypothetical condition that the property is not contaminated.

<u>Excerpt most commonly referenced/quoted in other articles:</u>

When the appraiser addresses the diminution in value of a contaminated property and/or its impaired value, the appraiser must recognize that the value of an interest in impacted or contaminated real estate may not be measurable simply by deducting the remediation or compliance cost estimate from the opinion of the value as if unaffected (unimpaired value). Rather, cost, use and risk effects can potentially impact the value of contaminated property. *Cost effects* primarily represent deductions for costs to remediate a contaminated property.

These costs are usually estimated by someone other than the appraiser, and should include consideration of any increased operating costs due to property remediation. The appraiser should also be aware that not all estimated costs may be recognized by the market as having an effect on value. *Use effects* reflect impacts on the utility of the site as a result of the contamination. If the contamination and/or its cleanup rendered a portion of the site unusable, or limited the future highest and best use of the property, then there could be a use effect on value. *Risk effects* are typically estimated by the appraiser and often represent the most challenging part of the appraisal assignment.

These effects are derived from the market's perception of increased environmental risk and uncertainty. The analysis of the effects of increased environmental risk and uncertainty on property value (environmental stigma) must be based on market data, rather than unsupported opinion or judgment.

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