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Liquidity Loss and Delayed Transactions with Leaking Underground Storage Tanks

When redeveloping previously used urban lands, developers may encounter environmental contamination caused by leaking underground storage tanks (LUST). The discovery of a LUST hinders the sale and financing of a property. Empirical evidence from this study addresses the extent to which private markets transact and finance LUST sites in various stages of remediation. Results show that properties with tanks were less than half as likely to be sold than otherwise comparable uncontaminated commercial properties. Further, properties with tanks remaining were less likely to obtain mortgages upon sale, while cleaned sites with tanks removed were financed at rates similar to other commercial properties.

Urban developers often encounter brownfield-related costs, expense required to clean up environmental contamination from prior land uses. Parties redeveloping brownfield sites also face uncertainty about the degree of remediation, the financial responsibility of polluters and owners, and potential lender uncertainty. This puts urban brownfield developments at a disadvantage when compared with greenfield sites that have not been previously used.

Discovery of potential contamination from leaky underground storage tanks is a common

brownfield problem encountered in virtually all jurisdictions in the United States. In 1982, about 6% of the estimated 1.2 million known steel tanks were believed to be leaking.¹ Another estimate from the U.S. Environmental Protection Agency (EPA) places the number of USTs containing petroleum in the millions, with the leak rates as high as 25%.² While many releases of toxic liquids from USTs result in modest amounts of contaminated soil confined on site, a substantial portion of cases are more severe and involve groundwater contamination, both on site and off site.

1. Darrel Kost and Walter Parish, "Petroleum Recovery Operations in an Urban Area," *Journal of Water Resources Planning and Management*, v. 112, no. 1 (1986): 548.

2. William Page and Harvey Rabinowitz, "Potential for Redevelopment of Contaminated Brownfield Sites," *Economic Development Quarterly*, v. 8, no. 4 (1994): 353.

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Underground storage tank sites are among the most common types of brownfield. They are more numerous than Superfund or toxic release inventory sites. For example, in Cuyahoga County, the core urban county in the Cleveland primary metropolitan statistical area (PMSA), there were under 30 potential Superfund sites, almost 300 toxic release inventory (TRI) sites, and over 1,300 leaking tank sites known in late 1994.

Many USTs are located in obvious places, including operating or former gas stations, transportation service facilities, industrial plants, government-operated service yards, and along major traffic arteries. Hence, they often have otherwise favorable locations at strategic intersections, making them attractive as fast-food sites or key corner parcels in a larger-site assembly.

When leaking underground storage tanks are encountered by developers, the project may become delayed or abandoned because of the associated costs necessary for remediation. Depending on what is found, parcels may undergo several months or years of environmental remediation to remove contamination from the site. This potential for additional costs raises several questions about LUST sites under remediation. Can they be sold or financed? Does removing functionally obsolete tanks from a site help? Does the perception of possible leaks stigmatize registered nonleaking tanks (RUST)?

This study augments the growing body of research on redevelopment in lieu of environmental regulation, and extends the recent work of Page and Rabinowitz³ on groundwater contamination and its effect on property values by examining the relationship between on-site soil and groundwater contamination, property transactions and financing for non-leaking (RUST) and leaking (LUST) sites. It also provides indirect empirical evidence related to Patchin's notion of stigma.⁴

This paper presents evidence from Cuyahoga County on the transaction rates of commercial property, including LUST sites. Once leaks are detected, property owners are expected to cooperate voluntarily with state regulators in mitigating environ-

mental contamination. In Ohio, the regulating agency is the Bureau of Underground Storage Tank Regulations (BUSTR). Its activities include maintaining lists of registered and leaking tank sites, assisting property owners with soil and water testing, engaging consultants, and removing the contaminated soil.

The detection of environmental contamination should depress property value, and there is no assurance that these "sunk" remediation costs would be recaptured upon sale. Known contamination may also have a spillover effect on nearby properties. This uncertainty may prevent the completion of a transaction until the environmental problems are addressed through mitigation, litigation, or both.

In Cuyahoga County, most of the drinking water is provided by the City of Cleveland Water Department directly from Lake Erie. Over 98% of the LUST sites analyzed have municipal drinking water rather than wells, minimizing the potential health risks of LUST incidents in this research. The presence of tanks or documented leak incidents are expected to impede an owner's ability to finance or sell the property. Stigma associated with known contamination could mean that sales activity would not rebound quickly to the levels of uncontaminated properties.⁵

Results based on 77 sales of tank sites indicate that only 4.9% of properties with nonleaking tanks completed transactions over a four-year period compared with 10.4% of comparable, otherwise uncontaminated commercial properties. Only 3.8% of leaking UST sites were sold over the study period, a figure also significantly smaller than for uncontaminated commercial sites. Lower sales volume is considered an indicator of stigma because of the potential loss to the owner's liquidity in the property.

Financing rates and loan-to-value ratios differed for UST sites. While 32.6% of commercial properties without tanks obtained mortgage financing when sold, only 9.3% of sales with nonleaking tanks on site were mortgaged. However, 29.4% of those sites with reported leaks, many of them with tanks removed, received mortgages. Further, loan-to-value ratios for sites with nonleaking

3. William Page and Harvey Rabinowitz, "Groundwater Contamination: Its Effects on Property Values and Cities," *Journal of the American Planning Association* (Autumn 1993): 473-487.

4. Peter Patchin, "Contaminated Properties and the Sales Comparison Approach," *The Appraisal Journal* (July 1994): 402-409.

5. *Ibid.*

tanks were lower. Hence, the presence of tanks on site, with or without a leak, appears to stigmatize properties, impeding access to mortgage capital.

RELEVANT LITERATURE

Owners wishing to transact contaminated properties face several obstacles, including environmental regulation, real estate market pricing, and financing considerations. Combined, risk and uncertainty about contaminated sites add to sluggish real estate markets that make selling tainted sites difficult.

Real estate transactions occur only when a buyer and a seller agree on a price. A buyer's offer for a property should reflect the present value of the discounted net cash flow stream over time, including remediation, adjusted for risk. In addition to business risk, uncertainty about environmental matters may be substantial enough to kill a transaction. The stigma that potential buyers attach to previously contaminated lands may interfere with the pricing and the time frame of the sale. The risk may also include liability concerns about impact on nearby properties. Lender liability in property financing may be another reason for reduced transaction activity. Potential sellers may have incomplete information about new regulation and may face voluntary compliance for cleanup costs. If they do not fully realize the sunk costs of remediation, they may try to recover cleanup expense by setting a sales price higher than the market can bear. For example, state-mandated environmental regulations on buried construction and demolition debris substantially affected market activity by imposing cleanup costs on the seller/owner.⁶

Page and Rabinowitz support the notion that changing environmental rules themselves can hinder development.⁷ They assert that potential liability may affect property

value more than actual contamination and that parties are deterred by the threat of delays and potential cleanup costs that could arise while waiting for a relaxation of remediation criteria. Page and Rabinowitz cover two issues pertaining to environmentally contaminated sites in general and leaking USTs in particular. Because property owners could be held accountable for off-site effects resulting from contamination originating from their properties, it is important to consider these situations.

Contamination of Nearby Properties

Known contamination can affect the value of nearby properties. Fear of lawsuits may prevent new buyers from acquiring property with tanks. Proximity to toxic waste sites,⁸ landfills,⁹ and petrochemical refineries¹⁰ has been known to affect residential property values negatively, diminishing with distance from the subject property. However, when Page and Rabinowitz¹¹ used a case study design, they found no diminution of value for nearby residential sites attributable to groundwater contamination. Their small sample size (two contaminated homes and five uncontaminated), research design (not all other factors were controlled), and use of assessed value rather than sales price as the value indicator may explain the counter-intuitive result. Further, it's possible that the local assessor did not recognize contamination when setting sales prices.

In another study we conducted, we found that close proximity (in the same city block or within 300 feet) to a registered, leaking underground storage tank reduced residential property values by about 17% of value. Some but not all of these leaking sites had offsite groundwater contamination. Overall, evidence supports the notion that known contamination has a negative effect on nearby properties.

Underground storage tank sites are among the most common types of brownfield, and are more numerous than Superfund or toxic release inventory sites.

6. Robert Simons, "How Clean is Clean? The Effect of Proposed Governmental Regulations on Vacant and Underutilized Inner-City Land Being Recycled in the Residential Market," *The Appraisal Journal* (July 1994): 424-438.

7. *Economic Development Quarterly*, 354.

8. Katherine Kiel, "Measuring the Impact of the Discovery and Cleaning of Identified Hazardous Waste Sites on House Values," *Land Economics* (November 1995): 428-435. See also: J. J. Kohlhasse, "The Impact of Toxic Waste Sites on Housing Values," *Journal of Urban Economics*, v. 30 (1991): 1-26; and R. Michaels and V. Smith, "Market Segmentation and Valuing Amenities with Hedonic Models: The Case of Hazardous Waste Sites," *Journal of Urban Economics*, v. 28 (1990): 223-242.

9. Nelson A. Chris, J. Genereux, and M. Genereux, "Price Effects of Landfills on House Values," *Land Economics* (November 1992): 359-365. See also Alan Reichert, M. Small, and S. Mohanty, "The Impact of Landfills on Residential Property Value," *Journal of Real Estate Research*, v. 7, no. 3 (1992): 297-314.

10. David Clark and Leslie Nieves, "An Interregional Hedonic Analysis of Noxious Facility Impacts on Local Wages and Property Values," Working Paper, Marquette University, Milwaukee, Wisconsin, 1993. See also Patrick Flower and Wade Ragas, "The Effects of Refineries on Neighborhood Property Values," *Journal of Real Estate Research*, v. 9, no. 3 (1994): 319-338.

11. *Journal of the American Planning Association*, 473-487.

Even with known cleanup costs, contaminated properties are difficult to transact. The prices of the subject and nearby sites may be reduced.

Uncertainty, Risk, and Stigma

Even with known cleanup costs, contaminated properties are difficult to transact. The prices of the subject and nearby sites may be reduced. Further, the publicizing of contamination on Superfund sites has a negative effect on residential property in the vicinity.¹²

Austrian and Eichler's¹³ survey on brownfields found that of the 46 midwestern respondents, 61% indicated that contaminated sites would only sell at a discount equal to or greater than the cleanup costs. Presumably, part of the discount that is in excess of the cleanup costs would dissipate when a formal assessment of the cleanup costs is done. If not, then the property is likely to incur additional price-reducing stigma. Although real estate markets have been reluctant to recognize the sale of contaminated properties, they are becoming more accustomed to them, with sales usually occurring slowly and with severe discounts.¹⁴

Lenders may be reluctant to finance properties with USTs, leaking or not. While lenders have long been considered potentially responsible parties (PRPs) under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), lender safe harbor legislation from UST liabilities has recently been proposed by the EPA. This might make UST properties easier to finance.¹⁵ However, Ohio law did not hold lenders exempt from liability from environmental contamination during the study period.

Given these issues, research investigating if and when contaminated UST properties sell, along with their ability to get financing, are clearly warranted. This study focuses on properties during and after the completion of government-sanctioned remedial procedures.

RUST AND LUST DATABASE

The properties used in this research were drawn from registered lists for LUST and RUST incidents in Cuyahoga County, Ohio, dating back to 1988. Of the 1,362 total incidents reported through January 1, 1993, 1,000

incidents having useable street addresses with a unique permanent parcel number (property tax number) were examined. Approximately 120 incidents reported in 1993 or later were excluded. The resulting available information included in this paper was based on 889 LUST sites, 882 RUST sites, and a baseline of 23,700 comparable commercial properties. The ratio of this sample to the overall population of contaminated sites with useable addresses initiated in 1992 or earlier is just under 50%.

TRANSACTIONS AND FINANCING

The crux of the empirical portion of this research is, what effect does the presence of tanks and a known leak have on transaction activity? The statistical technique used to evaluate this relationship is to compare the sale probabilities of nontank (baseline) commercial properties with commercial properties with RUST properties and contaminated LUST sites.

The decision to use a comparison of the sale probabilities instead of a hedonic pricing model was based, in part, on our other study concerning residential sales near contaminated UST sites. In that study, which employed a hedonic price model, a smaller-than-expected number of sales were found, raising the issue that lower transaction rates could be present near contaminated sites. Thus, that study focuses on the transaction rates rather than the effect of contamination on sales price. It is acknowledged that certain site attributes may affect the sale price of commercial property.

However, a brief evaluation of selected sites and locational characteristics supports the notion that property attributes do not play a main factor in transaction rate differences between the populations studied in this research. Baseline commercial and tank sites are scattered throughout the county, with tank sites often located along major traffic arteries. With respect to key site attributes, the mean square footage of RUST and LUST properties was 3,964, compared with 4,203 for baseline commercial parcels without tanks.

12. Kiel, 428-435.

13. Ziona Austrian and Henning Eichler, "1993 Urban Brownfields Site Survey: Preliminary Analysis," Working Paper, Cleveland State University, Ohio, April 1993.

14. Patchin, 402-409.

15. Jeremy Gibson, "Lender Safe Harbor for Underground Storage Tank Liabilities Proposed by EPA," *Environmental Insights* (June 1994).

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The results of a difference-of-means test were not significant at a significance level of 0.1. Differences between baseline and UST means for lot depth and legal frontage were likewise found not to be statistically significant. Thus, site attributes of the baseline and tank groups do not seem to be significantly different.

In the Cuyahoga County study, the number of transactions, quality of title transfer (number of weaker quitclaim deeds), and presence of mortgage financing were considered. Loan-to-value ratios for those properties receiving financing were noted. The study identified the baseline population of all applicable commercial sales in Cuyahoga County over the period 1989–1992, which had the county auditor’s land use classification of similar commercial property. This baseline group excludes those properties with known USTs or incidents, properties containing multifamily residences or condominiums, and hotel and office buildings. A total of 23,714 properties was considered. The desired unit of analysis is the site rather than the parcel because some properties have multiple parcels. The “lead” or main parcel of each transaction was chosen, thus avoiding the possibility of double-counting sales. Over the four-year period, 2,472 transactions occurred, a rate of 10.4%.

Expected Outcomes

Because contaminated properties under active mitigation are expected to have lower transaction levels, the percentage that sell should be lower than for the baseline. Fewer mortgage originations and lower loan-to-value ratios are also anticipated.

These hypotheses are tested by comparing each category with the baseline to see if the percentages are different from one another. A binomial probability model was used to test

if the transaction levels for LUST and RUST properties are significantly different from those of the baseline population of commercial properties.

Results

A total of 43 properties with registered non-leaking tanks (4.9%) were sold (see Table 1). A total of 34 LUST sites (3.8%) were transacted during the four-year study period. As expected, these percentages are lower than for the baseline commercial population, and this difference is statistically significant at a confidence level of 0.05.

Among baseline properties, 248 sales (10.0%) had quitclaim deeds. The number of quitclaim deeds for tank and leak incident transactions was very small: Only four tank properties sold had this weak form of deed upon transfer (4.7% for RUST sales and 5.9% for LUST). Both UST rates are lower than the baseline, suggesting that sellers and buyers recognize that quitclaim deeds do not provide adequate protection from potential liability for site cleanup expenses, especially for owner-operators.

With respect to financing, 32.6% of the baseline properties sold had registered mortgages (secured by the property) that were originated on or around the sale date. However, only four RUST properties (9.3%), and 10 LUST sales (29.4%) obtained financing. This demonstrates a statistically significant difference in financing for RUST properties, but not for LUST. Thus, properties with registered tanks appear less likely to receive a mortgage than clean commercial sales or sites with known contamination.

The low rate of mortgage financing for RUST sites may be attributed to financial institutions for fear of potential liability after the sale. It is possible that sales with tanks obtain unsecured financing instead of secured mortgage loans. But LUST sites with ongoing mitigation may have had tanks removed. The small number of such sites appears to be obtaining financing at a similar rate

TABLE 1 Incidence of Transactions, “Weak” Deed Transfers and Mortgage Financing for Selected Commercial and UST Sites, 1989–1992 (Properties Sold)

Category	Sample Number	Sale Transactions	Sale Percentage	Quitclaim Deeds	Quitclaim Percentage	Mortgage Financing	Mortgage Percentage
Baseline							
Commercial Properties ^a	23,714	2,472	10.4%	248	10.3%	805	32.6%
RUST List ^b	882	43	4.9%	2	4.7%	4	9.3%
LUST List ^c	889	34	3.8%	2	5.9%	10	29.4%

Sources: Bureau of Underground Storage Tank Regulations, Cuyahoga County Auditor, and Simons and Sementelli.

(a) Commercial and industrial properties (not on RUST and LUST lists) in Cuyahoga County, less multifamily, residential condominiums, hotels, and office buildings.

(b) List of RUSTs that have not leaked.

(c) List of LUSTs exclusive of those which have received “no further action” letters.

as baseline properties. Recent case law on lender liability may substantially ease the financing problem.¹⁶ Private environmental liability insurance partially addresses the issue of uncertainty, reducing lender concerns and increasing the property's marketability. Some states, such as Michigan and Illinois, are also moving toward a lender liability exemption for brownfield properties.

Average loan-to-value ratios (LTV) for all nontank commercial properties in Cuyahoga County have decreased from over 0.95 to 0.80 during the 1989-1992 period (average LTV is 0.96), consistent with national financial trends. With these high LTVs, it is plausible that some are seller financed. For the sites with tanks, the loan-to-value ratios were substantially less (0.51 for the four RUST sales). The loan-to-value ratios for sites where incidents occurred were more consistent with current financial trends (0.84 for LUST sales). This reinforces the assertion that lenders are more concerned with uncertainty concerning potential liability than with known liability.

CONCLUSION

This paper addressed the presence of both leaking and nonleaking underground storage tanks and their effect on property transactions. Properties with tanks, contaminated or not, are transacting in the marketplace. However, these properties transacted at significantly reduced rates (less than half as often) than did baseline commercial properties. Properties that still had tanks on site are also much less likely to obtain secured mortgage financing than properties with no tanks. Also, loan-to-value ratios were substantially lower for properties with nonleaking tanks.

The cumulative reduction of financial liquidity for owners of sites where leak incidents have occurred is substantial. Multiplying the relative proportion of transactions (0.038/0.104) by the likelihood of obtaining secured financing (0.294/0.326) yields 0.33,

implying that property owner assets in contaminated sites are less than one half as liquid than for clean commercial sites. (LTV ratios were not considered because the sample size for LUST and RUST sales was very small. There would have been further reduction in liquidity if LTVs had been included.) The figures are even lower for sites with tanks remaining on site, which were only 0.13 as liquid as comparable commercial properties without tanks. These reductions are evidence of the stigma associated with contaminated sites or those tank sites where there is potential for a future environmental event.¹⁷

The reduction in sales activity can be a problem for appraisers seeking to identify comparable sales for environmentally tainted properties. Having only a few comparables available tends to invalidate traditional market approaches to determining value. This indicates that appraisers should stratify comparables by known versus unknown contamination to get a better idea about arm's length financing for otherwise desirable RUST or LUST sites. By stratifying comparables by known or unknown contamination, appraisers can better differentiate between high- and low-quality sites, limiting the possibility of poor appraisals and their consequences.¹⁸

Property owners who cannot avoid dealing with or owning a UST site should consider removing tanks not needed for business purposes and then obtain a covenant not to sue (CNTS), if possible. Ideally, this should remove some of the associated stigma, and enable properties to be financed more readily through conventional sources after tank removal. For development properties with tanks still on site, nonsecured financing may be the rule rather than the exception. Since there appears to be reluctance in capital markets to financing contaminated sites, a risk-reducing role for the public sector may be appropriate. If environmental insurance is available, it may be worth while to pursue it.

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16. Ibid.

17. Patchin, 402-409.

18. Patricia Rudolph, "Will Bad Appraisals Drive Out Good?," *The Appraisal Journal* (July 1994): 363-366.