Settlement of an Oil Pipeline Leak with Contaminated Residential Property: A Case Study

by Robert A. Simons

Introduction

Petroleum pipelines transport natural gas, crude oil, and partly and fully refined petroleum products from sea ports and domestic oil production areas throughout the United States. According to the Federal Department of Transportation Office of Pipeline Safety (OPS), there were about 2,000 natural gas firms and 300 companies operating petroleum distribution pipelines in 1997, with over two million miles of moderate-to-large (e.g., diameter 8-40 inches) pipelines in service.[1] Unfortunately some pipelines have experienced a chronic weakness in line integrity resulting in pipeline ruptures which have released petroleum product into the environment. Some leaks may be abrupt, while others may go undetected for a long period of time. Under these circumstances, a plume of petroleum product may infiltrate the groundwater, and contaminate drinking water wells. Once contamination has been detected, property values of affected residences can decrease markedly. The pipeline leaks described in this case study went undetected for several decades.

Because appraisers always consider the arms length of transaction (favorable terms, etc.) the sales in this case study, like any which have inducements or are sold or bought with one party under duress, would normally be discarded. However, the information about the properties in this case study neighborhood reflects the discounted cost of contamination to the responsible party. Thus, it would set an upper boundary on what a free market discount would be.

This study examines how much a negotiated settlement package affects the sales price, under various scenarios, and thus reveals a corporate policy of discounting sales. The case setting considers the effect of petroleum groundwater contamination on the value of rural/ex-urban residential properties on well water, with full information, where a district-wide area is affected.

ABOUT THE AUTHOR

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LITERATURE REVIEW

Several studies address the effects of petroleum contamination on residential property. A recent investigation regarding residential property value decreases along pipeline easements in suburban Virginia found losses of one percent to two percent for townhouses and up to four percent to five percent for single family detached homes. These properties were on municipal drinking water and, due to extensive publicity, the market perceived the eventuality of possible repeated discharges.[2] Registered LUST (leaking underground storage tanks) sites in greater Cleveland, Ohio, experienced losses of between 14 percent and 17 percent. Virtually all of these units were on municipal drinking water systems, and all were within 300 feet of a known LUST and/or had actual groundwater contamination.[3]

Page and Rabinowitz found that groundwater contamination had no measurable effect on residential sales price, but their research design was a relatively weak case study approach. Dotzour also found no negative effect on residential property values from groundwater contamination in the Wichita, Kansas, area. However, both of the last two studies mentioned did find negative effects on commercial property.[4]

Des Rosiers et al found a five percent to eight percent decrease of residential property values resulting from persistent groundwater contamination in the province of Quebec.[5]

Abdala, Roach, and Epp looked at averting expenditures on the part of the owners of contaminated property as a way to estimate value loss. They concluded that this technique was a "conceptually valid estimate" of the cost to the property owner, and can be easily quantified.[6] The expenses they considered included filtration, bottled water, etc. This last study is germane to the research at hand because this research also evaluates non-market inducements (although they are positive rather than negative), and considers their effect on property value.

BP PIPELINE CASE STUDY

The following case study examines the effects of a British Petroleum (BP) pipeline rupture on residential property in Franklin Township, Summit County, Ohio, a suburb of Akron. The case provides a good indication of the extent of property damage that a pipeline leak can have on rural, residential property that is actually contaminated, and where a considerable amount of contamination lingers until the present.

Case Background

Inland Corp. owns a pipeline in northeast Ohio that carries petroleum products. The pipeline is operated by BP. It is a 12-inch line, which replaced a smaller line installed around 1940. The smaller line apparently leaked several times between 1948 and 1962, and attracted the attention of the Ohio EPA and Summit County health department, who were actively working on the case in 1990. Of the 100 homes in the study area that were tested, 13 had detectable levels of hydrocarbon contamination, and six of these had benzene levels above federal standards for municipal water systems. At the time the incident was discovered, all these homes were on well water.

A consent order with the Ohio EPA was signed in 1991, and BP conducted testing to determine the extent of contamination. About this time, local property owners filed lawsuits. The testing proceeded through 1993, with 19 or more monitoring wells. A more recent OEPA document shows that environmental testing continued through late 1998. An inspection of the site in late 1998 revealed that a number of large green water testing trailers were in place.

Data Gathering Procedures and Analysis

A data set of Summit County property transactions was acquired from the Amerestate Corporation. Based on these actual transaction data, it could be verified that BP Oil Pipeline Co. acquired 41 parcels in the impact area, nearly all since 1993. According to public records, BP still retains ownership of 18 of these homes, and has subsequently sold 23 of them. After deleting double counts, these parcels represent 35 residential properties.

Analysis of BP's Direct Real Estate Transactions in Franklin Township

Figure 1 shows a sale/resale analysis of the 23 properties acquired and resold by BP in the market. Sales data were available for 21 of these residential properties. Before adjusting for carrying costs, market inducements to buyers or appreciation over a holding period averaging 36 months, 19 of these properties decreased in value, and two increased. The two that increased were for properties acquired in the mid-1980s. The average decrease in value was 20.4 percent (between –13.4 percent and –27.2 percent, based on a 95 percent level of confidence). The weighted average decrease was larger, at 27.2 percent. These figures represent the direct loss associated with an oil pipeline leak with groundwater contamination in an area on well water, before

accounting for the time value of money. Overall, a reasonable discount for these properties would be 25 percent. These figures should represent market forces on the buyers' side during the most recent round of sales, and a loss-minimizing discounted sales policy on behalf of the seller.

Present Value Analysis of Sales

The sale/resale analysis understates the actual loss because it does not account for the time value of money in holding the properties prior to resale, including those that have not yet been resold. This present value analysis considers the 21 bought and resold properties presented in *Figure 1*, as well as the remaining 14 houses BP has acquired in the impact area, for a total of 35 residential units. It extends the sales experience of the 21 sold units (the best available information) to the 14 unsold ones, and puts all 35 in the context of time. Including previously unsold units is important because their sales revenues would be included in the analysis, thereby avoiding overstating the loss. Because remediation is still underway, it is assumed that these remaining 14 properties would also be held for three more years, and then resold at a 25 percent discount. For selection of a discount rate, BP's discount rate was assumed to be 12 percent, which reflects the firm's published return on equity over the past nine years.[7]

Figure 2 examines the present value of the loss experienced by BP in these real estate transactions. Based on these assumptions, the present value of the loss would be $1.9 million on a property base value of $4.7 million. This represents a present value loss to BP of just over 40 percent.[8]

Figure 1

BP Pipeline Leak Sale/Resale Analysis
Summit County, Ohio

PARCEL*	RESALE AMT	RESALE DATE	PURCHASE	PURCHASE DATE	DIFF	% DIFF
1	$100,000	3/19/96	$125,000	7/20/93	-$25,000	-20.0%
2	$104,000	4/25/97	$130,000	8/24/93	-$26,000	-20.0%
3	$108,000	5/31/96	$160,000	8/31/93	-$52,000	-32.5%
4	$100,000	4/26/96	$135,000	4/22/94	-$35,000	-25.9%
5	$88,000	5/13/96	$110,000	10/28/93	-$22,000	-20.0%
6	$122,000	4/23/96	$153,000	4/3/93	-$31,000	-20.3%
7	$90,000	7/18/96	$116,000	10/31/95	-$26,000	-22.4%
8	$75,000	11/26/96	$111,750	5/2/95	-$36,750	-32.9%
9	$80,000	12/1/95	$100,000	12/15/92	-$20,000	-20.0%
10	$75,000	11/22/95	$72,500	10/15/86	$2,500	3.4%
11	$75,000	11//22/95	$93,500	8/23/94	-$18,500	-19.8%
12	$72,000	2/16/96	$90,000	12/15/92	-$18,000	-20.0%
13	$96,000	5/31/96	$120,000	8/24/93	-$24,000	-20.0%
14	$136,000	2/28/96	$460,000	8/9/93	-$324,000	-70.4%
15	$65,500	6/26/96	$82,000	8/22/94	-$16,500	-20.1%
16	$128,000	2/29/96	$160,000	11/17/93	-$32,000	-20.0%
17	$186,000	10/31/95	$240,000	10/22/93	-$54,000	-22.5%
18	$186,000	10/31/95	$240,000	10/22/93	-$54,000	-22.5%
19	$116,000	7/26/96	$145,000	8/31/93	-$29,000	-20.0%
20	$120,000	4/17/96	$87,000	10/29/86	$33,000	37.9%
21	$136,000	3/18/96	$170,000	8/24/93	-$34,000	-20.0%
					(ave. loss)	**-20.4%**
TOTAL	**$2,258,500**		**$3,100,750**		**-$842,250** (weighted ave. loss)	**-27.16%**

* IN SUMMIT COUNTY TAX BOOK PAGE 23

Figure 2

SUMMARY: BP FRANKLIN TOWNSHIP CASE STUDY: PRESENT VALUE OF DIRECT REAL ESTATE TRANSACTIONS ONLY

ITEM	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
BUY 35 UNITS	-$350	-$3,178	-$852	-$228	-$87						
RESELL 35 UNITS*				$602	$1,553	$104			$1,200		
TOTAL	-$350	-$3,178	-$852	$374	$1,466	$104	$0	$0	$1,200	$0	$0
DISC FAC@12%	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404	0.361	0.322	0.287
PV/YR	-$313	-$2,533	-$607	$238	$832	$53	$0	$0	$433	$0	$0
SUM OF PV	-$1,896										
BASE VALUE (35 UNITS)	$4,694										
LOSS	**-40.43%**										

ASSUMPTIONS

ALL DOLLARS IN THOUSANDS

	NUMBER OF UNITS	AVERAGE VALUE	TIME/YEARS DURATION
UNITS IN STUDY AREA	100	***$111.94***	
UNBOUGHT UNITS*	65	***$100.00***	
BP BOUGHT THEN RESOLD	21	$147.65	
BP BOUGHT /HELD	14	$113.84	

ITEMS EXCLUDED FROM ANALYSIS

RENTAL INCOME
REMEDIATION COSTS
RELOCATION EXPENSE

DISCOUNT RATE 0.12 BASED ON BP'S RETURN ON EQUITY (9 YEAR AVERAGE) OF 12%

* AVERAGE SALES PRICE $100,000
NOTE $1.2 MILLION IN SALES IN THE YEAR 2000 IS AN ASSUMPTION, SEE TEXT

Figure 3

SUMMARY: BP FRANKLIN TOWNSHIP CASE STUDY. PRESENT VALUE OF MARKET SUPPORTS TO ALL 100 UNITS

ITEM	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
BUY 35 UNITS	-$350	-$3,178	-$852	-$228	-$87						
RESELL 35 UNITS				$602	$1,553	$104			$1,200		
MAINT. GRANTS-65 UNITS		-$130	-$130	-$130	-$130	-$130					
PRICE GUARANTEES-65 UNITS		-$130	-$130	-$130	-$130	-$130	-$130	-$130	-$130	-$130	-$130
TOTAL	-$350	-$3,438	-$1,112	$114	$1,206	-$156	-$130	-$130	$1,070	-$130	-$130
DISC FAC@12%	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404	0.361	0.322	0.287
PV/YR	-$313	-$2,741	-$792	$73	$684	-$79	-$59	-$53	$386	-$42	-$37
SUM OF PV	-$2,972										
BASE VALUE (100 UNITS)	$11,194										
LOSS	-26.55%										

ASSUMPTIONS

ALL DOLLARS IN THOUSANDS

	NUMBER OF UNITS	AVERAGE VALUE	TIME/YEARS DURATION
UNITS IN STUDY AREA	100	***$111.94***	
UNBOUGHT UNITS*	65	***$100.00***	
BP BOUGHT THEN RESOLD	21	$147.65	
BP BOUGHT /HELD	14	$113.84	
MAINTENANCE GRANTS	65	$2.00	5
PRICE GUARANTEE**	65	$2.00	10

ITEMS EXCLUDED FROM ANALYSIS

RENTAL INCOME
REMEDIATION COSTS
RELOCATION EXPENSE

DISCOUNT RATE 0.12 BASED ON BP'S RETURN ON EQUITY (9 YEAR AVERAGE) OF 12%

* AVERAGE SALES PRICE $100,000
** PRICE GUARANTEE BASED ON A 20% LOSS, SALE EVERY TEN YEARS. $100,000 * .20* 1 = $2,000/UNIT/YR

Negotiated Settlement

Beyond the direct sale and resale of units, there were another 65 units affected by the pipeline leak. According to a public presentation by BP staff, there was a negotiated settlement between BP and the residents in a specific study area (approximately 100 homes). The deal was facilitated by the Urban Center at the Levin College of Urban Affairs at Cleveland State University.[9] In addition to paying for remediation of contamination:

- BP offered to buy out, relocate, and compensate those households who wanted to leave for their " pain and suffering." BP was free to resell these homes (the 35 units referred to above).
- BP also offered to give each household a $2,000 grant per year for five years for home improvements (all but three made use of these).
- BP also offered to give each household an indemnification against declining property values for 10 years.

Because this was a negotiated settlement, it helped the residents get on with their lives, and appeared to be well-received. The next section analyzes the present value of these market-supporting strategies.

Present Value Analysis of Settlement Package

An analysis of the present value of the overall settlement package between BP and the residents is shown in *Figure 3*. These figures are assumed to be net to BP, and exclude remediation costs, or any payments to residents for relocation or personal matters. They also exclude rental income to BP from the houses they own and hold. The figures are based on the 35 units presented above, as well as the 65 additional units which BP did not buy, but which received a $2,000 annual maintenance grant for five years, and a guaranteed sales price for 10 years. It was assumed that the 35 homes sold did not receive these non-market supports.[10]

When these other non-market factors are included, the present value of the loss to BP for all 100 units in the study area (a combination of those directly impacted and within the impact area but not contaminated) would be just under $3.0 million on a property base of $11.2 million. Thus, the present value of the direct real estate losses and other non-market support activities to BP for the study area in this case, exclusive of remediation, would be -26.5 percent. Because this figure reflects a blend where one-third of the units were directly acquired by the responsible party, and the rest were offered market supports, it is not generalizable beyond this case.

However, those 65 properties in the impact area but not bought by BP received non-market price supports with a present value of $1.1 million, on a property base of $6.5 million. This represents just under 17 percent of the value of these properties, which may be generalizable if a similar settlement package is offered.

CONCLUSIONS

This case has analyzed residential sales contaminated by a known pipeline leak where remediation is being undertaken, and the houses are on well water. The case study reveals that single-family homes contaminated by a well-publicized pipeline rupture experienced a loss in real estate value of approximately 25 percent, after the rupture and when remediation is underway. The motivation of the responsible party was an important factor in this analysis. The present value of this reduction in value to the responsible party (exclusive of remediation costs) was 35 percent to 40 percent, depending on the assumptions used.

Secondly, neighboring residential properties within a designated impact area that were not acquired by the responsible party (within the study area but not shown to be directly contaminated) received an array of price supports with a present value equivalent to 17 percent of their market value.

This latter figure is a substantial amount. Further, the settlement terms are not generally available using conventional real estate research methods (e.g., no lien, no responsible party seller, not on a deed registration document). If and when these homes are resold, and if remaining time on these price supports are transferable to new owners, they should be capitalized into the sales price value of the properties. REI

NOTES

1. U.S. Department of Transportation, Office of Pipeline Safety (OPS) 1996 Colonial Pipeline Task Force, Final Report January 10, 1997.
2. Robert Simons. (1999). The Effect of Pipeline Ruptures on Non-Contaminated Easement Holding Property. *Appraisal Journal* July 1999.
3. Robert A. Simons, William Bowen and Arthur Sementelli. (1997). The Effect of Leaking Underground Storage Tanks on Residential Property Value. *Journal Of Real Estate Research*, Vol. 14 no. 1/2 p.29-42; and Robert A. Simons, William Bowen and Arthur Sementelli. (1999) The Effect of LUSTS from Gas Stations on Residential and Commercial Property that is Actually Contaminated, *Appraisal Journal*, April 1999 p.186-194.

4. William Page and Harvey Rabinowitz (1993). Groundwater Contamination: Its Effects on property Values and Cities. *Journal of the American Planning Association*. Vol 59, no 4. pp 473-481, and Mark Dotzour (1997). Groundwater Contamination and Residential Property Values. *Appraisal Journal*, vol. 65 no 3. pp 279-290.
5. Francois Des Rosiers, Alain Bolduc and Marius Theriault (1997). Environment and Value: Does Drinking Water Affect House Prices. Presentation at the 1997 Meeting of the American Real Estate Society in Sarasota FL.
6. C.W. Abdala, B.A. Roach and D.J. Epp. (1992) Valuing Environmental Quality Changes Using Averting Expenditures. *Land Economics*. Vol. 68, no. 2 p 163-175.
7. It was decided to use the published return on equity rather than the firm's hurdle rate or target rate because these are not available. The return on equity is an adequate measure of the opportunity cost of capital.
8. This figure was subjected to sensitivity analysis. If the properties were resold faster, in the second year, at only a 10 percent discount, and assuming a discount rate of 18 percent (well above the return to stockholders), the resulting loss is 39 percent, about the same at the figure derived above. If the same sale assumptions are kept, but if BP's discount rate is assumed to be 8 percent, consistent with financing the costs with corporate debt, the overall loss would be 35 percent.
9. Bill Hollis, BP Corp. Public Meeting, Levin College of Urban Affairs, Cleveland State University, April 1997.
10. If a property is sold every ten years, and if there is a 20 percent loss upon sale, then for an average sales price of $100,000, the annual expected expense to cover the losses would be $2,000.