Preliminary Stated-Preference Research on the Impact of LUST Sites on Property Values: Focus Group Results

Anna Alberini and Dennis Guignet

Working Paper Series

Working Paper # 10-09
August, 2010

U.S. Environmental Protection Agency
National Center for Environmental Economics
1200 Pennsylvania Avenue, NW (MC 1809)
Washington, DC 20460
http://www.epa.gov/economics

Preliminary Stated-Preference Research on the Impact of LUST Sites on Property Values: Focus Group Results

Anna Alberini and Dennis Guignet

NCEE Working Paper Series
Working Paper # 10-09
August, 2010

Preliminary Stated-Preference Research on the Impact of LUST Sites on Property Values: Focus Group Results[1]

Anna Alberini
and
Dennis Guignet
Department of Agricultural and Resource Economics
University of Maryland

KEY WORDS: leaking underground storage tanks, groundwater, remediation benefits, stated preference, focus groups

Abstract

The purpose of this research effort is to examine the feasibility of designing a stated preference instrument to elicit the public's willingness-to-pay (WTP) for remediation of leaking underground storage tank (LUST) sites (or perhaps prevention of releases). Nearly 500,000 releases have been documented from the over 600,000 USTs nationwide. Approximately 80 percent of these sites have been cleaned up. In the three Maryland counties that are the focus of this and the companion hedonic property value study there have been nearly 400 documented releases in the last 10 years. We report the results from four focus groups and four three-on-one interviews conducted in Maryland. The results of this focus group research provide a foundation for development of a stated preference study of the benefits of EPA's UST program.

[1] This research was funded under a contract between the U.S. EPA, National Center for Environmental Economics and Industrial Economics, Inc. (contract # GS-10F-0224J). The views in this paper are those of the authors and do not reflect official U.S. EPA policy.

This report describes the results of research conducted to investigate the feasibility of estimating the benefits of the U.S. Environmental Protection Agency's Underground Storage Tank program via stated-preference techniques. The results of a parallel hedonic property value analysis are described in Zabel and Guignet (2010).

1. INTRODUCTION

The purpose of this research effort is to examine the feasibility of designing a stated-preference instrument to elicit the public's willingness-to-pay (WTP) for remediation of leaking underground storage tank (LUST) sites (or perhaps prevention of releases). Nearly 500,000 releases have been documented from the over 600,000 USTs nationwide. Approximately 80 percent of these sites have been cleaned up.[2] In the three Maryland counties that are the focus of this and the companion hedonic property value study there have been nearly 400 documented releases in the last 10 years.

APPROACH

In our initial proposal to EPA, we discussed a number of alternative stated-preference approaches that could be used to estimate benefits (e.g., at a programmatic level or focusing on specific health risk changes). We agreed to focus on one where homeowners are asked directly how much the presence of contamination from LUSTs impacts the prices of their properties, to facilitate direct comparison to results of the hedonic analysis. A particular advantage of the stated preference approach in this context is that survey respondents can illuminate the reasons behind effects of contamination and cleanup on property values. For example, a survey can be

[2] US Environmental Protection Agency (EPA), http://www.epa.gov/oust/faqs/faq9a.htm, accessed April 23, 2010.

used to determine if impacts on property values are related to ecosystem risks, human health risks, or something else.

BACKGROUND

Despite potential advantages offered by stated-preference approaches, few studies have relied on this method to measure benefits of contaminated site remediation. There are, however, several earlier studies that queried people about their property values when environmental quality is varied in their neighborhood.

For example, Chattopadhyay et al. (2005) conduct choice experiments and a hedonic property pricing study on the same sample of homes/homeowners in the Waukegan Harbor area of Lake Michigan, a Superfund site with sediments contaminated by PCBs. The authors find good correspondence between the two approaches in terms of marginal prices for attributes, and comparable aggregate benefit estimates of site remediation. Earnhart (2001) adopts a similar approach, but links hedonic property pricing and conjoint choice experiment responses in estimation, finding that the null hypothesis of common coefficients is generally rejected. In a related study in Switzerland, Banfi et al. (2007) use an internet-based questionnaire and conjoint choice experiments. The conjoint choice experiments hold the structural characteristics of the dwelling at current levels, but alter the levels of the three environmental attributes: air pollution, street noise level, presence of mobile phone antennae (which implies potential exposure to electromagnetic fields) and whether the respondent has a view of these antennae (aesthetic impact).

Jenkins et al. (2002) choose a somewhat different approach in a telephone survey of residents of Corpus Christi, Texas living in the neighborhoods affected by an ASARCO smelter, which left the soil contaminated with heavy metals. Respondents were asked whether they would be

willing to purchase a home, or accept an offer at levels ranging from $2,000 to $65,000. The authors believe that the approach worked well, that it gives evidence of a significant contamination discount, and warn the reader that some people would simply refuse to buy (sell) the property at any price once they know there is a contamination problem.

Simons and Winson-Geideman (2005) implemented telephone surveys in several states over a period of three years. To our knowledge, this is the only stated-preference study that focuses specifically on LUSTs. Respondents were asked to imagine that a job change forces them to move and look for a new home, and that the home they have found is similar in all respects but is located next to a recently remodeled, attractive gas station, which has leaking tanks.[3] The leaking tanks have been fixed, but no remediation has been conducted yet, and it is not known whether the plume has reached the home in question because there has been no environmental testing yet. Respondents were then asked how much they would offer for the home? The description of the sampling plan ("over 100 counties") suggests that people were selected from a list of residents, but the paper makes no mention of any stratification of the sample for groundwater use, geography or other characteristics that would capture different degrees of exposure. The total sample size was roughly 1100 completed surveys, and there is evidence of a significant discount on WTP bids due to the presence of contamination. More specifically, the results show that LUST activity reduces the likelihood that a respondent will bid on a hypothetical home, bids are on average 31% lower when the groundwater is contaminated, and this discount was fairly consistent across states, ranging from 25 to 33%.

[3] Describing the station as "attractive" is an attempt to control for aesthetic disamenities that might be confounded with health risk or other concerns.

These studies do not report any information about the development of the survey instrument and peoples' understanding of the risks associated with contamination. In this paper we discuss the early development of a survey on homes values. This survey instrument is meant to elicit peoples' WTP for remediation of LUST sites (or perhaps the prevention of a leak). We analyze individuals' knowledge and perceptions of LUSTs and associated health and environmental risks. Previous stated preference studies have encouraged respondents to value structural characteristics of their home and neighborhood, as well as environmental attributes such as open space and pollution. In this paper we discuss individuals' ability to assess how changes in structural and neighborhood characteristics of their home affect its value, and how this ability compares when assessing the price effects of a nearby LUST and groundwater contamination.

2. STUDY DESIGN

We initially planned to conduct a total of six focus groups: three evenings of two consecutive groups. However, following the second set of focus groups we determined that altering the format to three-on-one interviews would be advantageous. Therefore we have a total of four focus groups and four three-on-one interviews. All groups and interviews were led by Lisa Dropkin of Edge Research in Arlington, VA, a moderator with experience in environmental and public policy issues. All groups were recorded on DVD and observed personally by the authors.

The following criteria were used to recruit respondents:

- All participants are 21 or older and speak English
- Approximately half of the participants should be male and half female

- Participants should be diverse with respect to age, education, ethnicity, and income (although no specific distribution was established in advance).
- None of the participants have participated in a focus group within the last year

And of specific relevance to this research:

- Half of the focus groups and three-on-one interviews consist of individuals that rely on municipal water in their place of residence and half consist of individuals that rely on private wells
- All participants have experience with the purchase or sale of a home in the last 10 years

The purpose of stratifying groups based on household water source is that the potential risks associated with LUST sites are very different between these two groups. Consumption and contact with contaminated groundwater is the primary exposure path of concern when it comes to LUSTs. Therefore residents that rely on private groundwater wells face higher health risks than those at homes that are connected to the public water system. In addition, previous unpublished research by study team members suggests that these two groups may have very different perceptions and levels of knowledge regarding groundwater contamination issues. This approach parallels the design of the hedonic study (Zabel and Guignet, 2010), which also distinguishes between homes that rely on private wells versus the public water system. The purpose of the homeownership requirement is to restrict participation to individuals that have some relatively recent experience in the housing market.[4]

[4] A limitation of this homeownership requirement is that we focus on only part of the total population, but this focus is inherently made in most hedonic analyses.

For each of the focus groups the facilities were instructed to recruit such that 8 to 10 participants would attend each group, and three participants were recruited for each of the three-on-one interviews.[5] The facilities were provided a telephone screener with specific language regarding the above criteria. All potential participants were told that the subject of the group was "a current public policy issue." No further information was provided.

3. SUMMARY OF FINDINGS

The four focus groups are divided into two sets, and the third set is composed of the three-on-one interviews. Each set follows a similar script that builds on the lessons learned from the earlier set of groups. The first set of focus groups was conducted at the Maryland Marketing Source, Inc. facility in Randallstown. The second set was conducted at Assistance in Marketing (AIM) facility in Towson. All four focus groups had nine participants. The final set of four three-on-one interviews was also conducted at the AIM facility.[6]

The parallel hedonic analysis by Zabel and Guignet (2010) focuses on three Maryland Counties: Baltimore, Baltimore City, and Frederick. These facilities were chosen because of their location in Baltimore County, which made it easier to recruit homeowners from the same three Counties. Distributed materials, moderator scripts, and detailed observer notes are provided by group in Appendices A, B and C.

[5] In compliance with Paperwork Reduction Act requirements, we received approval of focus group design and implementation procedures from the Office of Management and Budget.

6 We returned to the AIM facility for the interviews based on our previous positive experience with the facility and recruit.

Exhibit 1 below provides a demographic overview of participants. A total of 50 individuals participated in the focus groups and interviews. Participants were roughly evenly divided male and female, predominantly white, and most had at least some college education.

EXHIBIT 1. DEMOGRAPHIC PROFILE OF FOCUS GROUP & INTERVIEW PARTICIPANTS

	GROUP 1 PRIVATE	GROUP 2 PUBLIC	GROUP 3 PUBLIC	GROUP 4 PRIVATE	3-ON-1 INTERVIEWS 6 PUBLIC / 6 PRIVATE
GENDER					
Male	5	5	6	5	7
Female	5	4	4	4	5
AGE					
21-34	1	2	4	1	2
35-44	3	3	3	4	4
45-54	2	1	3	3	3
55-64 65+	4	2 1		1	3
EDUCATION					
High School		2	1	2	2
Some College	4	2	1	2	4
College Degree	5	4	6	2	5
Grad or Prof.	1	1	2	3	

Degree					1
ETHNICITY					
Caucasian	9	5	8	8	9
African-American	1	3	2	1	3
INCOME					
$15K-$25K		1			1
$25K-$35K		2			
$35K-$50K	1	1	2		6
$50K-$62K	1	2		1	
$62K-$75K	3	2	1	1	
$75K-$100K	2		4	3	2
$100K-$150K	1		3	3	2
$150K+	2	1		1	1

SET ONE

The first set of focus groups was recruited from the areas described above and stratified by water source. Materials used in these groups are attached at page A-1. The moderator script and observer notes are attached at pages B-1 and C-1, respectively.

Earlier efforts that used stated-preference methods (discussed above) to place a value on LUST contamination and cleanup fail to report information about the development of their survey instruments and people's understanding of the risks of USTs and their leaks. Similarly, previous studies that have encouraged individuals to value attributes of their home (both structural attributes as well as open space, environmental quality and other neighborhood quality attributes) are likewise silent about people's ability to assess how structural features of their homes affect its value, and how this ability compares when assessing the effect of changes in neighborhood wide characteristics.

For these reasons, the goals of our first two focus groups were to understand whether people:

- are capable of estimating the value of their home;
- are capable of identifying which changes in their neighborhood and which upgrades to their own home they believe will increase or decrease its value;
- regard gas stations as positive or negative additions to a neighborhood
- are able to convert above changes into impacts on property values;
- are aware of the risks from LUSTs and understand the exposure pathways;
- are aware of cleanup activities; and
- recognize any impacts of LUST risks and cleanup on property values.

Focusing on the last two points, we were also interested in determining whether people believe that there is a stigma associated with LUST contamination, and, if property values rebound after cleanup, how long that might take.

We further decided that the first two questions would be best addressed via written questions to be handed out at the beginning of the focus groups or even while the participants were waiting for the focus group to start. Briefly, they inquire about homeownership, the price of the home when it was first bought and in the current market, and the effect on property values of a variety of structures that might be present in the neighborhood (within ½ mile of the respondent's home), including "a school," "a supermarket," and "a water tower." We asked whether the respondents believed each of these features would increase, decrease, or have no effect whatsoever on the value of the respondent's home. The respondents were not asked to estimate how much these neighborhood features contribute or detract from the value of their home.

We then inquired about the participant's satisfaction with the drinking water at his or her home, experience with having the water tested, and the results of such tests (if any). The remainder of our research questions would be best served by the group discussion itself. We instructed our moderator to start the discussion by briefly reviewing the respondents' answers to the written questions, and to inquire specifically on what changes in the neighborhood increase/decrease property values and why. She was also instructed to inquire about gas stations in general, about any environmental issues that concern the respondents (to see if LUSTs were brought up spontaneously), and issues and concerns with the drinking water. Absent any mention of LUSTs on the part of the participants, our moderator was then to inquire about familiarity with USTs, leaks from USTs, related concerns and effects on property values.

The two focus groups based on these protocols confirmed that people are capable and willing to estimate the value of their home in the current market, and that they are capable and willing to tell whether various facilities or structures in the neighborhood increases property values or detract from them.

Focus Group 1 Results

The first group was comprised of homeowners on private wells. These persons seemed comfortable estimating the current value of their home. Similarly, 9 out of the 10 respondents were able to estimate how much their home would have sold for a few years ago when the housing market was strong. The mean sale price given was about $450,000 (median price was $500,000). The respondents also seemed comfortable answering question 4, which asked them whether they had certain features within one-half mile of their home, and whether these amenities and disamenities affect the value of their home, and in what direction. The responses are summarized in Exhibit 2.

EXHIBIT 2. EFFECTS OF NEIGHBORHOOD AMENITIES/DISAMENITIES ON HOME VALUES. (FOCUS GROUPS 1 AND 2, N=19)

	PERCENT OF RESPONDENTS ANSWERING:			
FEATURE	INCREASE	DECREASE	NO EFFECT	NONE WITHIN ½ MILE OF HOME
Supermarket	47%	5%	11%	37%
School	58%	5%	0%	37%
Church	37%	0%	32%	32%
Small Factory	0%	32%	5%	63%
Public Park	68%	0%	5%	21%
Bank	32%	5%	16%	47%
Water Tower	0%	21%	11%	68%
Radio Antenna	0%	26%	11%	63%

These persons seemed to be attuned to various issues associated with the use of groundwater (e.g., effects on their children's teeth because the groundwater is not fluoridated) and all of them had their water tested at least once, and most on a regular basis, usually for pathogens and metals. They tended, however, to rely on their contractors for guidance on what the water should be tested for, and did not mention petroleum products.

When asked about the pros and the cons of living close to a gas station, this group listed convenience as an advantage, and traffic, noise, and crime as disadvantages. Leaks were mentioned, but this group altogether felt that on the whole the presence of a gas station did not affect property values.

When we queried them about LUSTs, at least one person brought up the notorious Exxon class action lawsuit in Jacksonville.[7] People associated LUSTs with carcinogens, explosions, but also "skin and eye irritation." Wildlife was mentioned only to the extent that the substances from a LUST could find their way into the Chesapeake Bay or other surface water. Concern was also expressed for crops and vegetable gardens and anything that grows in the soil.

At this point, one respondent mentioned that if the land is contaminated it would be difficult to sell it (or the home that comes with it), and another participant mentioned the fact that if a home is on a well, and the groundwater is contaminated, one would not be able to sell that home.

Regarding the exposure pathways, this group identified drinking contaminated groundwater as the most obvious pathway. This group also verbalized the notion that if one doesn't drink the contaminated groundwater because he is on city water or because alternate water supplies are

[7] In January 2006, over 26,000 gallons of gasoline leaked from the Jacksonville Exxon gas station in Phoenix, Baltimore County (http://www.mde.state.md.us/assets/document/oilcontrol/BaltoCo-JacksonExxonMobil_Fact_Sheet_Sept11_08.pdf, accessed April 19, 2010). The leak affected residents over a half-mile from the gas station. Traces of a former gasoline additive (MTBE) were found in 62 residential groundwater wells. This leak event was much larger than the typical LUST, received much more publicity, and there are several ongoing lawsuits (http://en.wikipedia.org/wiki/Jacksonville,_Maryland, accessed April 19, 2010).

provided, then there is no exposure to the contaminated groundwater. Children playing outside and being exposed to soil were also mentioned. One participant who seemed to have an engineering or science background also mentioned dermal exposure. This very same person mentioned his concern about "many small scale leaks and spills." Another participant ventured that one may be exposed to LUST contamination because rain would convey contamination into the sewage system.

Although people had heard of MTBE and benzene, some appeared to mistake the latter for the former, in that they thought it was an additive of gasoline, as opposed to just one of the by-products of the decomposition of petroleum and gasoline. In spite of all of the above, this group did not worry about LUST pollution on a daily basis—it is not at the top of their environmental/neighborhood concern agenda.

This group was also capable of identifying what cleanup activities might consist of, including soil excavation, enzyme injection, and natural attenuation. When asked about the effect of cleanup on property values, at least one participant mentioned "stigma" specifically. Although it was felt that property values would eventually recover with cleanup, the respondents did not really know how long it would take, and volunteered periods of time ranging from 2 to 10 years.

Focus Group 2 Results

The second focus group was comprised of individuals on city water. These persons were equally comfortable estimating the current value of their home and the desirability (or lack thereof) of certain structures and facilities in their neighborhood. All respondents in this group were able to provide an estimate of how much their home would sell for a few years ago when the market was strong (question 4). The average sale price provided was about $350,000 (median price was $300,000). Question 5 asked the respondents how various neighborhood amenities and

disamenities would affect the value of their home, the responses to this question are summarized in Exhibit 2. When probed about environmental concerns, most seemed to be of a minor nature, such as "junk in my neighbor's backyard." People were not concerned about air quality, which was judged to be good, and likewise trusted the quality of their tap water, although they did not especially like its taste.

This group's reaction to a gas station was similar to that of the previous group. A gas station is a convenience but may also bring crime, traffic, noise and fumes. No one explicitly mentioned leaks. Gas stations were not perceived to have any effects on property values, unless they are within direct sight of one's home. Our moderator queried the group about the Exxon case, and one participant gave a detailed account; all had heard about the case.

When our moderator asked the participants to tell her who would be most affected by a UST leak, the participants mentioned children, the elderly, and pets. Some individuals mentioned the possibility that pollution might make it into streams and the Chesapeake Bay, and affect its ecosystem; this may in turn further affect humans. One retired engineer in this group dismissed LUST contamination, saying that in most cases only the soil is contaminated, and this doesn't really matter. Moreover, he said that the contamination is a matter of parts per billion or per million- extremely small quantities. The other participants did not understand test results or contamination units.

The participants identified cancer readily as the effect of exposure to leaks. No one mentioned vapor intrusion, although one respondent did say that breathing the vapors when filling your tank at a gas station is harmful (another participant had previously mentioned vapors). This group did not have any specific knowledge of the contaminants typically released by a LUST. Some volunteered ethanol, no one mentioned MTBE, and the retired engineer mentioned benzene, if

anything because he had used it as paint thinner in the past. He insisted that benzene is a mutagen, and not a carcinogen.

In general, these participants felt that leaks would be harmless to them because they are on the public water system. Yet, when specifically queried about the effect of a leak on their property values, they felt that potential buyers might be deterred by the leak. Possible solutions to this problem included waiting for the situation to be resolved before the house is put on the market, selling the property at a lower price and/or providing test results to the buyer. These participants felt that beyond a few blocks to a mile, the effect of the leak would no longer be felt on property values. They also felt that most likely the property values would go up once cleanup took place, but they were unable to estimate how long it would take.

SET TWO

The second set of focus groups were recruited from the same area and similarly stratified by water source. Materials used in these groups are attached at page A-7. The moderator script and observer notes are attached at pages B-7 and C-21, respectively. The goal of these groups relative to the first set was to, through oral exercises, elicit participants' knowledge and perceptions of specific contaminants, applicable standards and testing, associated health risks, and potential impacts on property values (both from the perspective of buyer and seller).

Here participants first filled out a questionnaire that inquired about the general nature of the neighborhood (urban, suburban, rural), the type of home, its value when it was bought and now. Respondents were also asked to tell us about recent upgrades and renovations that they did, and how much they thought these changes would contribute to the value of their homes.

Our goal in this set of focus groups, after inquiring about knowledge of and concerns about LUSTs, was to discuss results of water tests for a subject property, compare these to applicable standards for benzene (an important contaminant associated with gasoline tank leaks) and estimate the effect on property values. We intended this to be a quantitative type of exercise.

Following what we had learned in the first set of focus groups, where people predicted declines in property values even if there are virtually zero health risks, we specifically posited scenarios where there are no health risks, and asked respondents what they thought would happen to property values.

Focus Group 3 Results

The first focus group in this set was comprised of people on city water. The group was able to provide the current value of their homes, and also to estimate the appreciation associated with various renovations and projects in their homes (question 6). These results are summarized in Exhibit 3. However, as soon as the conversation turned to gas stations in the neighborhood, it became apparent that this group would end up being dominated by one participant ("dominant participant"), who had been a plaintiff in a class action suit against an oil company over a LUST case.

EXHIBIT 3. EFFECT OF HOME RENOVATIONS ON PROPERTY VALUES. (FOCUS GROUPS 3 AND 4).

	# OF RESPONDENTS		
RENOVATION PROJECT	WHO UNDERTOOK RENOVATION	ABLE TO ESTIMATE INCREASE IN HOME VALUE	MEAN VALUE INCREASE
Central A/C and Heat	5	3	$8,333
New Windows	6	5	$2,900
New Kitchen	4	3	$23,333
Finished Basement	6	5	$17,500
Floor/Carpet	3	2	$5,500
New Appliances	1	1	$5,000
New Doors	2	1	$3,000
Security System	1	0	-
Roof/Siding	4	3	$3,733
Deck	7	6	$7,000
Pool	3	3	$20,000
Remodel Bathroom	2	2	$9,000
Landscape	3	2	$26,500
Paint	1	1	$5,000
Water Softener	1	0	-

New Garage	1	1	$50,000
New Additions	2	2	$135,000

No one in this group had heard of USTs or LUSTs before, but they were promptly filled in by the dominant participant, who proceeded to cite a high-profile case in Fallston, MD (also a release from an Exxon filling station that predates the Jacksonville case), and responded to virtually every question on USTs and LUSTs. When queried about risks posed by LUSTs, the dominant respondent immediately mentioned cancer, emphasizing that this will occur many years after you drink the contaminated water. Other participants brought up fertility issues, fires, explosion, and skin disorders. Other concerns included effects on pets and contamination making its way into the food chain because crops are grown in contaminated soil.

Since the majority of the people in this focus group lived relatively far from a gas station, they felt sheltered from leak events. However, one respondent brought up the issue of disclosure when one sells their home and the possibility that property prices might suffer if the leak "goes public." The importance of "disclosure" came up again in the final set of group discussions (discussed below).

Participants refused to believe that it is possible to have a leak with 100 percent certainty of no health effects (Q23 in the script). The dominant participant said she would always worry that it could happen again, while another participant questioned how anyone can guarantee that there are no health effects. As discussed below, these very same points were brought up in the final set of group discussion. Question Q24-Q26 were completely dominated by the one participant's insistence that "contaminated groundwater is the worst that can happen to you," and that "benzene is a known carcinogen and it causes birth defects."

We then tried to elicit changes in property values associated with different levels of benzene found in groundwater, having provided information that the standard for benzene in (publicly provided) drinking water is five parts per billion (ppb). Unfortunately, this exercise did not work out for several reasons. First, the moderator had difficulty facilitating the exercise without more specific knowledge of the contaminants and implications of the standards. Second, the dominant participant repeatedly interjected. Third, we should have provided additional context and displayed information with visuals. It became clear that respondents were not familiar with the measurements in "parts per billion" and needed to better understand what the legal standards meant. Fourth, we started with readings above the standards (e.g., 6.5 ppb when the standard is 5 ppb), and people may have "anchored" to a risky situation, which may have led to overreaction even when the hypothetical test results were below the standards or negligible. Briefly, at 6.5 ppb respondents indicated that they would worry, even when authorities say that the pollution is not too serious, and they would start using bottled water, and filter and test the water for the entire house. All participants worried about their drinking water, even though they are on public water. No one provided quantitative assessments on changes in property values, instead they just discussed their concerns. Only one person in this group actually tried to calculate by what percentage the test exceeded the standard. At 4.5 ppb respondents felt that they did not need to do anything about it, that one could sell their home but had to disclose the test results, would want regular updates from the authorities and would bring it up with their councilperson, or even wanted a tax break for having to put up with pollution.

It also became clear that respondents were reacting to these questions as if they were actually drinking the contaminated groundwater, whereas in reality they were all on city water. We had to instruct our moderator (the moderator's colleague slipped her a note at our request) to explain

this to them again, and even so some were confused. Others appeared to grasp the situation, but reverted back to their erroneous assumptions shortly afterwards.

Later the moderator inquired about cleanup and the possibility of property prices rebounding. People reported that values might go back up, but that it would take a long time—10 years, maybe even “decades.”

Focus Group 4 Results

The second focus group in this set (focus group 4) was comprised of individuals whose homes are on private groundwater wells. These respondents were capable of recalling how much they paid for their home when they bought it, and could estimate the current market value. The respondents were also able to assess how much they felt various home improvement projects that they had undertaken added to the value of their home (results are summarized in Exhibit 3).

As with the private well group from the first set, this group was well aware that they share their aquifer with their neighbors, and that they all affect how much groundwater is available and the quality of that water. All of the respondents tested their groundwater wells when they first bought their home, and some have their wells tested regularly (e.g., semi-annually, annually). Nonetheless, as we found previously, most people were not exactly sure what they were testing for. Some could say they were testing for pH or bacteria, but did not recall specific contaminants. One participant offered that he doesn't test for petroleum because there is no obvious reason to suspect such contamination in his well.

Not everyone in the group was familiar with the term "underground storage tanks," but they were familiar with what USTs are, and immediately linked USTs to gas stations. No one in the group had considered nearby leaks when buying their home. None of these homeowners personally worry about leaks, mainly because they live a mile or more away from a gas station. However, if they were vulnerable to exposure they would mainly worry about health consequences. They easily linked leaking tanks to groundwater contamination, and recognized that they could be exposed to these contaminants if in their well. Some were worried about contamination getting into Chesapeake Bay and their gardens. This concern for the environment was motivated by the fear that people could consume fish or vegetables, and in turn it could affect human health.

Others were concerned that local environmental amenities (e.g. trees, parks, streams) could become contaminated, which would lower neighborhood quality, and in turn lower property values.

As in previous focus groups, the notorious Jacksonville Exxon case was brought up, as well as a well publicized leak at a Shell facility in Carroll County. Throughout the conversation the role of publicity about a leak was mentioned often. People felt that this would lead to a further decline in home values, and would slow down any rebound in property values after cleanup is complete. Similarly, throughout the conversation awareness of a nearby leak was raised often. For example, one participant felt that whether home values are affected depends on whether sellers have to disclose leak information to buyers, and that it depends whether you can see the LUST from your home. Participants also noted that these tanks and leaks are underground, so visual cues (e.g., seeing a filter installed at a home you are thinking of buying, or seeing cleanup activities) that promote awareness about leaks and cleanup play a key role in how home prices are affected.

When asked how much home improvements would affect the value of their homes, most were able to assign some dollar amount. It was not as clear cut when people were asked to assess how much changes in the neighborhood would affect the value of their homes. Everyone recognized that neighborhood characteristics affect property values, and were often able to say whether prices would increase or decrease (or would not change) due to some change in the neighborhood. However, the respondents were not able to assign an actual dollar amount to these changes in prices. They either wanted more details, or the discussion wandered toward personal preferences and anecdotes. This may have been a result of the open-ended nature of the questions, and because respondents discussed their opinions as a group.

We then asked the participants to assess how much home values would be affected under different LUST scenarios. Participants questioned whether contaminated homes could be sold at all. The entire group agreed that even if the groundwater was not contaminated, prices would still decrease for homes near a LUST. Respondents were often confused by technical terms such as "parts per billion," "BTEX," "MTBE," and "benzene." They were unfamiliar with these terms, and did not know how to interpret contamination levels (e.g. 6 ppb) that we gave them. We also provided the standard simply stating, for example, "By law, benzene in groundwater must be below 5 parts per billion (ppb)." Although respondents used the standard to help them assess how severe a contamination level was, it is unclear how much the standard helped their interpretation. Participants often questioned what the legal limit means, who set it, and why at that level.

We then asked how home values would be affected by groundwater contamination from a leak. At first participants would not volunteer an actual amount. They often deemed a home unsellable, partially because in reality there are a large number of uncontaminated homes to choose from. Since respondents in previous groups seemed unwilling or unable to assign an actual amount to the change in property values, here we told respondents to imagine a hypothetical home worth $300,000, and asked how various levels of groundwater contamination would affect the value of this home. This additional structure seemed to help. Participants were willing to give a percent depreciation or actual amount. They often followed this response by stating that they would not personally buy the home. The group did not reach a consensus on how long after cleanup it would take for property values to rebound. Responses ranged from five years to a generation. The role of publicity was mentioned, in that people forget quickly, so property values will rebound more quickly if people are not reminded of the leak by the media.

To address the respondents' difficulty in assessing changes in property values we made several changes in the third set of groups (the three-on-one interviews). These changes included providing additional structure to the scenario, providing "forced choice" type of questions, and experimenting with scenarios where the respondent is the buyer, the seller, or neither and is simply giving their assessment on how property values are affected.

SET THREE

Participants in the final set of four three-on-one interviews were recruited from the same area and similarly stratified by water source. Materials used in these groups are attached at page A-8. The moderator script and observer notes are attached at pages B-13 and C-43, respectively. In the previous groups some of the exercises had been heavily influenced by one or two particularly vocal or knowledgeable participants. Given the extent and complexity of material and tasks, we decided to alter the format for the final set of groups. Here, we conducted four sets of three-on-one interviews with detailed written exercises and follow-up discussion. This strategy proved successful in eliciting more detailed and thoughtful responses from participants.

Concerned that respondents associated contaminated groundwater with adverse health effects even if they do not drink the water, we decided to develop two scenarios- one involving groundwater contamination and one involving only soil contamination. Our reasoning is that if the soil—and only the soil—is contaminated, people on wells and city water face the same exposure pathways (or lack thereof). We wish to see if their assessment of property values reflects this situation. Clearly, this reasoning works only if people do not question the mechanics of contamination that we posit to them, and do not assume that the groundwater is

contaminated if the soil is. In the valuation exercises described below, people were told to assume that the homes would be served by the same source of water as their current home.

For the three-on-one interviews we drafted a questionnaire that included several written exercises that were answered individually and then discussed, as well as open ended questions that were discussed by the group. The questionnaire was divided into seven sections. In section A, we inquire about the neighborhood the participant lives in (urban, suburban, rural) and then ask a series of questions about the respondent's home, including type, whether the respondent owns it or rents it, and the size of the home and the size of the lot. We then ask the respondent to tell us how much he thinks the home could sell for, if he were to put it on the market in the next few months. The answer to this question is important because it forms the basis of the valuation exercises later in the questionnaire.

It is important for us to understand whether people are capable of assessing the impact of various factors on home values, and so we first ask people to tell us if certain home renovations (e.g., a kitchen upgrade, installing energy-efficient windows) are likely to affect the value, and if so, by how much. We then ask people to consider changes in the neighborhood, including a new school, a new gas station, and a fast food restaurant. Since earlier groups suggested that a gas station may be an amenity and a disamenity at the same time, we asked the respondent to consider a gas station within one-half mile and one within two miles of their home.

Section B is brief- we inquire about the source of water at the participant's home, then ask whether the water at the respondent's home was ever tested, and, if so, what the results were. Since we realize that the water could be tested for several reasons and upon different parties' initiative (because test results are required when the home is bought or sold, because the state

environmental protection agency wishes to do so, or because of the respondent's concern about water quality) we simply say "Has the water at your home ever been tested?"

In section C, we wish to find out what the respondent knows about several types of water or soil contaminants. To ensure consistency across the two variants of the questionnaire, we use the same list for both the groundwater and soil versions. The list is comprised of arsenic, coliforms, benzene, cyanide, ethylbenzene, lead, toluene, and xylenes. We also ask whether people had heard of "parts per billion" (for water) or "parts per million" (for soil) before, then provide a definition for these terms and explain in which context they are used. This is followed by a table with the federal maximum contaminant levels (MCL) for benzene, toluene, ethylbenzene and xylenes in drinking water and the state limits for the same substances in soil. We use these substances because they are the by-products of the petroleum contamination at gas stations, and are regulated at the federal or state level because of their adverse effects on human health. This section concludes by asking the respondent whether he has heard of LUSTs, providing a definition of USTs, and a brief explanation about leak events.

Having informed respondents about contamination in groundwater or soil, and leaking USTs as a possible source, we begin section D by specifically inquiring about the respondent's familiarity with homes in his town or neighborhood contaminated by pollutants coming from a LUST, and proximity of these homes to his own. We then ask the respondent to tell us what they think the consequences of a leak are, and how people can get exposed to the substances from a LUST. Question D5 is very important because it asks respondents to imagine that there is a leak from an UST near his home, but there are no risks to human health or the environment. Would they still be concerned? Why? The purpose of this question is to see whether respondents' estimated effects of a leak on property values (to be elicited later in the questionnaire) reflect concern about

health or the environment, uncertainty about future events of the same type, or stigma ("I know there are no risks, but do other people know?").

We then move to the first series of valuation exercises. In earlier focus groups, we found that it was counterproductive to ask people to think about pollution at *their* home right from the beginning. In an effort to keep them focused about the effects of contamination, we showed aerial photos of a suburban neighborhood in Maryland that is not the respondent's own but is sufficiently generic-looking that it may be similar to many people's area of residence. In devising this exercise, we wished to obtain a "neutral," almost professional, assessment, without the concern and anxiety about contamination in one's home that we had observed in previous focus groups. The first photo does not contain any captions about homes or facilities and we have respondents simply compare that to their own neighborhood, so that we can get a sense for their familiarity with this "terrain."

In question D7, we identify the commercial structure in the right of the photo as a gas station, and we ask people to imagine that there has been a leak from this station, and that the groundwater (soil for the soil variant of the questionnaire) has been tested for benzene and found to have the levels displayed in the second photo. We inform the respondents that the homes shown in the photo are served by city water (if the respondent is served by the public water supply system) or private well (if the respondent's home is on a well), and that prior to this event the average home sold for $400,000. We then ask: Will the value of three homes placed at various distances from the gas station and with various test results be affected by this event? What is the effect on the value on each of these homes? Can the respondent guide us through the reasoning he followed in arriving at these assessments (question D8)? And at what distance will home values no longer be affected by this leak (question D9)? Will the values at each of these

three homes rebound if cleanup is done and the benzene contamination is removed (question D10)?

Question D11 is similar to question D7, but this time we say that the contamination is contained on-site and does not migrate to nearby homes. Since participants were willing and capable of engaging in these questions, they provided a nice warm-up to the questions in section E, where we ask people to imagine that they are putting their house on the market, and that they learn that a leak has occurred at a nearby gas station. What would be their asking price if the home is tested, and found to have concentrations of benzene in groundwater (soil): above the standard, positive but below the standard, equal to zero, or, a nearby home is tested and found to have a low but positive concentration of benzene?

While section E asks the respondent to imagine himself in the role of the seller, we ask him to imagine being the buyer in section F. We describe a scenario where the respondent has narrowed his options to two homes, home A and home B (to be described below), which are located in neighborhoods similar to the respondent's and both served by the same source of water as the respondent's current home. There has been a leak at a gas station near home B, and the test results at home B indicate that benzene is present in groundwater (soil) at a concentration of X ppb (ppm). In contrast, there is no benzene at home A. We specify levels above or below the value of the current home for home A and home B, and ask the respondent which he would choose. Here we elected to keep this a "forced choice" question (with no "would buy neither" response option). The discrete choice question is then repeated by changing the levels of the attributes describing homes A and B. In sum, we ask conjoint choice questions where the attributes describing the alternatives are the presence of a gas station near the home, the

concentration of benzene in groundwater (soil) and the difference in price with respect to the value of their current home.

Section G concludes the questionnaire with some simple sociodemographic questions and one debriefing question about specific reasons driving the responses to the valuation questions in sections E and F.

Interview Results

As in the past groups, most respondents were able to speculate whether specific changes in housing or neighborhood attributes would affect the value of a home and estimate the associated change. A summary of responses to these questions is provided in Exhibit 4 below.

EXHIBIT 4. RESPONSES TO QUESTIONS A9 & A10

CHANGE IN HOUSING ATTRIBUTE	% RESPONDING AFFIRMATIVELY	AVERAGE PREMIUM OR DISCOUNT
Structural		
Refinish Kitchen	92%	$ 10,000
Add Additional Room	75%	$9,300
Install Energy-Efficient Windows	75%	$5,700
Neighborhood		
School Opens ½ Mile Away	58%	$3,800
Gas Station Opens 2 Miles Away	33%	$1,100
Gas Station Opens ½ Mile Away	75%	($3,300)
Fast Food Restaurant Opens ½ Mile Away	75%	($3,300)

Sections B and C inquired about participants' household water supply and knowledge of groundwater contaminants. Five respondents had had water tested previously and in no case

were contaminants detected (though one respondent mentioned chlorine). Very few had heard of the variety of contaminants listed (e.g., benzene, cyanide, xylene), though most had heard of lead. Nearly all participants (ten of twelve) had heard of LUSTs.

Turning to section D, some respondents are concerned about declines in property values, but most worry mainly about health consequences from a leak. Even when we posit a leak scenario where there are no health or environmental risks (question D5), human health is still a concern. Participants worry that another leak, that could be harmful, may occur in the future. Another concern is that the contamination plume could migrate to a location where it may adversely affect human health. Uncertainty in the safety of current contamination standards, and distrust with the agency claiming that there are no health risks was also an issue for some.

The first valuation exercise (question D7) asked the respondents how the price of three $400,000 homes (shown in an aerial photo) would be affected by a nearby leak from a gas station and varying levels of groundwater or soil contamination. The post-leak house prices averaged across the three respondents in each group are shown in the Exhibit 5.

EXHIBIT 5. RESPONSES TO VALUATION QUESTION D7

CONTAMINATED MEDIUM	WATER SOURCE	HOME	CONTAMINATION (RELATIVE TO STANDARD)	AVERAGE POST-LEAK PRICE
Groundwater	Private	Home A	none	$260,000
		Home B	20% above	$223,333
		Home C	60% below	$222,333
Groundwater	Public	Home A	none	$360,000
		Home B	20% above	$275,000
		Home C	60% below	$320,000
Soil	Private	Home A	none	$380,000
		Home B	20% above	$315,000
		Home C	60% below	$371,667
Soil	Public	Home A	none	$353,333
		Home B	20% above	$296,667
		Home C	60% below	$340,000

As seen in Exhibit 5, the respondents consistently feel that house prices will be lower after a leak occurs, and that prices decline more at higher levels of contamination. This seems to hold regardless of the respondent's water source, or whether the soil or groundwater is contaminated. As one may expect, when a leak occurs and there is groundwater contamination, prices decline

more at homes served by private groundwater wells, which is where residents would be exposed to the contamination. In contrast, in the soil contamination scenario (where residents' on the public water system and private wells face similar health risks) it seems that the homes on public water are discounted more. Caution is warranted when interpreting these results. Each average post-leak house price is based on only three respondents, and the responses could be heavily influenced by the group dynamics and earlier discussion during the focus groups.

Many respondents had difficulty answering how far away a home would have to be so that a leak would not affect its value (question D9). The main reason was that there were too many unknowns and the scenario was too vague. Some expressed the need to know the topography, groundwater flows, and contaminated area. Responses ranged from 200 feet to over 5 miles.

In section E, respondents are asked how the asking price for their home (with reference to the initial value estimate provided in section A) would be affected by several different scenarios where a UST leak is discovered within a mile of the home and groundwater testing is conducted. Here again we remind them that the home is served by a public water source. Responses are summarized in Exhibit 6 below.

EXHIBIT 6. RESPONSES TO VALUATION QUESTION E1

CURRENT VALUE ESTIMATE (#A8)	ESTIMATED ASKING PRICE			
	6PPB BENZENE IN GROUNDWATER	1PPB BENZENE IN GROUNDWATER	NO GROUNDWATER CONTAMINATION	3PPB BENZENE IN NEIGHBOR'S GROUNDWATER
$230,000	$215,000	$230,000	$235,000	$230,000
$375,000	$300,000	$375,000	$375,000	$375,000
$280,000	$230,000	$250,000	$275,000	$270,000
$200,000	$150,000	$175,000	$200,000	$200,000
$510,000	$500,000	$510,000	$510,000	$510,000
$350,000	$340,000	$350,000	$350,000	$350,000
$279,000	$279,000	$279,000	$279,000	$279,000
$390,000	Could not sell	$195,000	$390,000	Could not sell
$280,000	$225,000	$280,000	$280,000	$280,000
$300,000	$265,000	$300,000	$300,000	$300,000
$210,000	$190,000	$210,000	$210,000	$200,000
One participant did not provide responses to these questions				

As shown, with only one exception respondents estimated a reduction in property value associated with detection of 6ppb benzene in groundwater on the property. This discount ranged

from two to 25%, with one effective 100% (could not be sold). Two respondents indicated a discount associated with 1ppb, one at 0ppb and two at 3ppb in adjacent property's groundwater.

The valuation exercises in E and F worked well. Respondents were willing and able to estimate the effect (in dollars) of the test results on the price of their home or of another home that they might consider buying. The exercises in E and F worked well because the first valuation exercise was framed in a manner that we feel was not threatening to the respondent—one where the effect of contamination and proximity to LUSTs were evaluated in a neighborhood that was not their own and a house that was not their own. This provides objectivity and detachment, eliminated emotional reactions, and this tone carried through to exercises E and F. It also helped to have "forced choice" questions in the exercises of section E and F, otherwise many people would have too easily chosen the "neither" option. This is especially the case for people on private wells whose scenario involved contaminated groundwater.

For the choice questions in section F nine of twelve respondents chose home A in the first scenario- a home of comparable price to their own with no nearby leaking tank. Half of the respondents chose home A in the second scenario, where A featured a more modest price reduction due to proximity to a leaking tank, but with no groundwater contamination. People seem to be split into two groups—those that would buy a home where soil is contaminated when the price discount is sufficiently large, and those that would not, no matter how large the price discount is. People that are on city water assume that they will be exposed to the contaminants by drinking the contaminated water, even though they do not actually drink the groundwater beneath their home or in their area. We noticed this problem in earlier focus groups as well. Even when our moderator tried to remind people on city water that their water comes from

someplace else, the participants continued to assume that they would be exposed to the contaminated groundwater at their home by drinking it.

Participants were less concerned about soil contamination, and the reactions from those on wells were similar to those on public water. In that sense, using the soil as an example of contamination where the exposure and threats "should" be similar for both groups worked well. People do not really know the pollutants of concern in LUST cases, and they are generally not informed about other pollutants either. Individuals who are on wells have better knowledge of these substances, but not much. The latter have sometimes had the water tested at their home, but their recollection of the results is often poor.

Due to this lack of knowledge people use the standards to judge how 'bad' contamination levels are. People are capable of using the standard to determine whether their soil is above or below it, and are capable of judgments about how close the results are to the standards. People care about the effects of contaminants on their health and on what grows in soil (plants, crops, vegetable gardens), but do not appear to be concerned about animals, ecosystems, etc. (unless somehow the contaminants find their way into surface waters).

Even if we posit a scenario with a leak but no associated human health risks, people are very skeptical that this is the case. They worry about the possibility that a leak occurs again at the same UST facility, that the pollution migrates, and that authorities deem things safe, but may discover otherwise in the future. In any case, property values seem to be a natural concern. The comments volunteered by our respondents suggest that they believe in stigma. Rebounding of property values was thought possible, but not immediately, and many people even mentioned 10 to 20 years for this recovery to occur.

4. CONCLUSIONS

Without prior information on the public's awareness and knowledge of USTs and LUSTs, relevant contaminants, concentrations and standards and other issues, the first set of groups were conducted in an open-ended format. The second set was more structured and the third set (three-on-one interviews) featured specific valuation and choice exercises. Cumulatively, several key findings emerge from this research:

- Knowledge of USTs and familiarity with LUSTs is limited. A notable exception is the extensive media coverage surrounding the Jacksonville Exxon release and subsequent class-action lawsuit (which settled for over $150 million).
- Knowledge of relevant chemicals (e.g., BTEX) and associated health risks is also limited. Not surprisingly, most individuals assume they are carcinogenic.
- Individuals understand that standards exist for contaminants in drinking water and appear to be able to appreciate the absolute magnitude of these concentrations. However, respondents are generally not aware of why regulators set the standards at a certain level.
- Individuals who rely on private wells are generally more knowledgeable regarding groundwater, groundwater contamination, water testing and treatment.
- Individuals who rely on public water sources appear incapable of evaluating LUST risks independent of concerns about consuming the contaminated water. At least in the final set of interviews, however, respondents were willing to entertain scenarios where LUSTs affect soil, but not groundwater.
- Individuals are generally capable of identifying structural and neighborhood characteristics that are likely to increase or decrease their home's value.

- When evaluating LUST impacts it is important to frame questions in a generic context. When put in terms of their own home, it appears that respondents are unable to provide reasoned opinions.
- In many cases individuals feel that proximate LUSTs may render a property unsellable altogether. Several respondents referred to "stigma" specifically, and most felt that it could take years to decades for affected properties to fully recover value.
- Respondents recognized the role of publicity. They believed that increased media attention about a LUST would lead to a further decline in property values, and would lengthen how long it takes property values to recover to the original pre-leak values.
- The principal concern regarding LUSTs is adverse health impacts. While a few respondents made reference to plants, animals, and surface water quality, ecosystem impacts are clearly of little concern.
- In the final set of three-on-one interviews, respondents successfully completed exercises where they were asked to estimate impacts to homes at varying distances from a LUST site on a map. Respondents also successfully completed simplified choice exercises where they were asked to choose between homes with different proximate LUST characteristics and associated price discounts.

NEXT STEPS

The results of this focus group research provide a foundation for development of a stated-preference study of the benefits of EPA's UST program. Valuation via a conjoint-style instrument in the context of residential housing choices appears feasible with several important

caveats identified above. Further testing would be required to fully characterize relevant LUST risks/impacts, identify all additional relevant amenities and disamenities, and develop an appropriate design and implementation strategy for the survey.

REFERENCES

Banfi, Silvia, Massimo Filippini and Andrea Horehajova (2007), "Using A Choice Experiment to Estimate the Benefits of a Reduction in Externalities in Urban Areas with Special Focus on Electrosmog," draft paper, CEPE, ETH Zurich.

Chattopadhyay, Sudip, John B. Braden, and Arianto Patunru (2005), "Benefits of Hazardous Waste Cleanup: New Evidence from Survey- and Market-based Property Value Approaches," Contemporary Economic Policy, 23(3), 357-375.

Earnhart, Dietrich (2001), "Combining Revealed and Stated Preference Methods to Value Environmental Amenities at Residential Location," *Land Economics*, 77(1): 12-29.

Jenkins-Smith, Hank C., Carol L. Silva, Robert P. Berrens, and Alok Bohara (2002), "Information Disclosure Requirements and the Effect of Soil Contamination on Property Values," Journal of Environmental Planning and Management, 45(3), 323-339.

Simons, Robert A. and Kimberly Winson-Geideman (2005), "Determining Market Perceptions on Contamination of Residential Property Buyers Using Contingent Valuation Surveys," Journal of Real Estate Research, 27(2), 193-220.

Zabel, Jeffrey and Dennis Guignet (2010), "A Hedonic Analysis of the Impact of LUST Sites on House Prices in Frederick, Baltimore, and Baltimore City Counties," NCEE Working Paper, 10-01.

APPENDIX A

MATERIALS

Focus Group I
10 November 2009
Maryland Marketing Source

Your name: _____

Section A. HOME OWNERSHIP

A. Your home

1. When did you buy your current home?

2. Do you remember how much you paid for it?

3. How much do you think your home is worth now? More/less/same- how much?

4. If you had put your home on the market, say two or three years ago, when the housing market was at its peak, how much do you think it would have sold for?

B. Neighborhood

5. Do you have any of the following within ½ mile or so of your home? If so, do you think that having the following near your home increases its value, decreases it, or has no effect on it? (*Please check one the appropriate answer for each listed item.*)

a. A supermarket:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

b. A school:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

c. A church:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

d. A small factory:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

e. A public park:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

f. A bank:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

g. A water tower:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

h. A radio station's antenna:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

Section B. HOUSEHOLD WATER

1. Are you satisfied with the quality of your water (for example taste, clarity)?

2. Do you do anything to treat your drinking water (whole-home system, tap filter, Brita-style pitcher)?

3. Have you ever had the water at your home tested?

4. What did you test it for?

5. Did anyone advise you to test your water?

6. Did you have the testing done yourself (by a specialized lab service) or did a government agency do it for you?

7. What were the test results?

8. Did you do anything differently in light of test results?

Focus Group II
10 November 2009
Maryland Marketing Source

Your name: _____

Section A. HOME OWNERSHIP

A. Your home

1. When did you buy your current home?

2. Do you remember how much you paid for it?

3. How much do you think your home is worth now? More/less/same- how much?

4. If you had put your home on the market, say two or three years ago, when the housing market was at its peak, how much do you think it would have sold for?

B. Neighborhood

5. Do you have any of the following within ½ mile or so of your home? If so, do you think that having the following near your home increases its value, decreases it, or has no effect on it? (*Please check one the appropriate answer for each listed item.*)

a. A supermarket:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

b. A school:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

c. A church:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

d. A small factory:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

e. A public park:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

f. A bank:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

g. A water tower:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

h. A radio station's antenna:

___ Increases ___ Decreases ___ No Effect ___ None within ½ mile

Section B. HOUSEHOLD WATER

1. Are you satisfied with the quality of your water (for example taste, clarity)?

2. Do you do anything to treat your drinking water (whole-home system, tap filter, Brita-style pitcher)?

3. Do you know where your water comes from?

4. Are you familiar with any tests on your water?

Focus Groups III and IV
December 1, 2009

Your name: _____

Part 1. Information about the home and change in value due to improvements

1. What kind of neighborhood do you live in? (e.g. city center, subdivision in a suburban area, rural, etc.)

2. What kind of home do you own and live in? (e.g. single family home, twin, townhome, etc.)

3. When did you buy your current home?

4. Do you remember how much you paid for it? If so, how much?

5. How much do you think your home is worth now?

6. Have you done any improvements that you think might add to the value of your home, such as additions, renovations, put in a new central A/C system, changed the windows, etc.?

   If yes, please list them below, and tell us how much you think each of these has increased the value of your home (if at all)?

   a) _____ increase in value $_____

   b) _____ increase in value $_____

   c) _____ increase in value $_____

   d) _____ increase in value $_____

   e) _____ increase in value $_____

Interviews with Homeowners – March 8, 2010
(Homeowners on public water, groundwater contamination scenario)

This research project focuses on housing and environmental quality. We are interested in your opinions about and experience with these topics. There are no right or wrong answers to the questions in this questionnaire.

Section A. Your Current Home.

A1.What county do you live in? _____

A2.Which of the following best describes your neighborhood?

1. ❒ Rural
2. ❒ Suburban
3. ❒ Urban

A3.What best describes the type of home you live in?

1. ❒ Single family, detached
2. ❒ Townhouse, or duplex
3. ❒ Apartment or condominium in a multi-family building

A4.Which of the following best describes your living situation?

1. ❒ I, or someone in my family, own my home
2. ❒ I rent my home
3. ❒ Other rental or free housing situation, please explain:_____

A5.Approximately how long have lived in this home?

_____ years

A6. How many square feet is the inside of your home? Please estimate if you are unsure.

_____ square feet

A7. How large is your lot or parcel? Please estimate if you are unsure. If you live in a multi-family building, please skip this question.

My property is: _____ acres

A8. If you were to sell your home in the next few months, how much do you think you would be able to sell it for?

$ _____

A9. Suppose you made the following improvements to your home. Do you think this would affect the price your home would sell for? If so, how much do you think this would add to its value?

Improvement	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate.
a. Refinish the kitchen	Yes	No	$
b. add an additional room	Yes	No	$
c. install energy-efficient windows	Yes	No	$

A10. Suppose the following changes occurred in your neighborhood. Do you think this would affect the price your home would sell for? If so, how much do you think this would increase or decrease its value?

Change in neighborhood	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate. Use a "+" or "-" to denote and increase or decrease.
a. A school opened a ½ mile away	Yes	No	$
b. A new gas station was opened 2 miles away	Yes	No	$
c. A new gas station was opened ½ mile away	Yes	No	$
d. A fast food restaurant is opened within ½ mile	Yes	No	$

Section B. The Water at Your Home.

B1. Where does the water at your home come from?

1. ❒ Public Water System
2. ❒ Private Groundwater Well
3. ❒ Community Groundwater Well
4. ❒ I don't know

B2. Has the drinking water at your home ever been tested?

1. ❒ Yes
2. ❒ No

B3. If you answered yes to question B.2, did the test results indicate that there was a water quality problem?

1. ❒ Yes, and the contamination was: _____
2. ❒ Yes, but I do not remember the details of the contamination problem
3. ❒ No contamination was found
4. ❒ I never had my water tested

Section C. Background Information.

C1. Have you ever heard of any of these contaminants in groundwater or drinking water?

1. Arsenic..... ❒ Yes ❒ No
2. Coliforms..... ❒ Yes ❒ No
3. Benzene..... ❒ Yes ❒ No
4. Cyanide..... ❒ Yes ❒ No
5. Ethylbenzene..... ❒ Yes ❒ No
6. Lead..... ❒ Yes ❒ No
7. Toluene..... ❒ Yes ❒ No
8. Xylene..... ❒ Yes ❒ No

C2. Have you ever heard of the term “parts per billion”?

1. ❒ Yes
2. ❒ No

"Parts per billion" (or ppb) is a measure of the concentration (or amount) of a substance in water. It is equivalent to micrograms per liter.

For many pollutants, the law specifies a standard—a concentration level that must not be exceeded in public water systems. The standards are set to protect human health with a wide margin of safety. Standards are often reported in ppb.

Here is a summary of the current standards for several contaminants.

Contaminant	**Standard (ppb)**
Benzene	5
Toluene	1,000
Ethylbenzene	700
Xylene	10,000

C3. Sometimes these contaminants leak from underground tanks. Have you ever heard of the term 'Leaking Underground Storage Tank'?

1. ❒ Yes
2. ❒ No

Underground storage tanks are used to store petroleum products, and are commonly found at gas stations. Occasionally these tanks can leak due to rusting and cracks that occur over time. When a leak does occur, it can contaminate the soil and groundwater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) are the typical pollutants when these leaks occur.

Section D. A Neighborhood in Maryland.

D1. Are you aware of any homes in your neighborhood or city/town that were contaminated by these pollutants because of a leak from an underground storage tank?

1. ❒ Yes
2. ❒ Yes, but I am not aware of the specific pollutants
3. ❒ No

D2. If yes, how close are these homes to your own home?

D3. What do you think the consequences of a leak are?

D4. How do you think people get exposed to the substances from leaking USTs?

D5. Suppose there was a leak at a UST near your home, but with 100% certainty there are no risks to human health or the environment, would it concern you? If so, why?

D6. Here is the aerial photo of a neighborhood in Maryland. Based on that photo, would you say it is this similar to the neighborhood where you live?

Fig. 1 – A Maryland Neighborhood

D7. In this neighborhood the homes are served by public water. Suppose there was a leak from the tanks of the gas station in the neighborhood as shown in this photo. The groundwater around that site has been tested for benzene and the tests results are as shown.

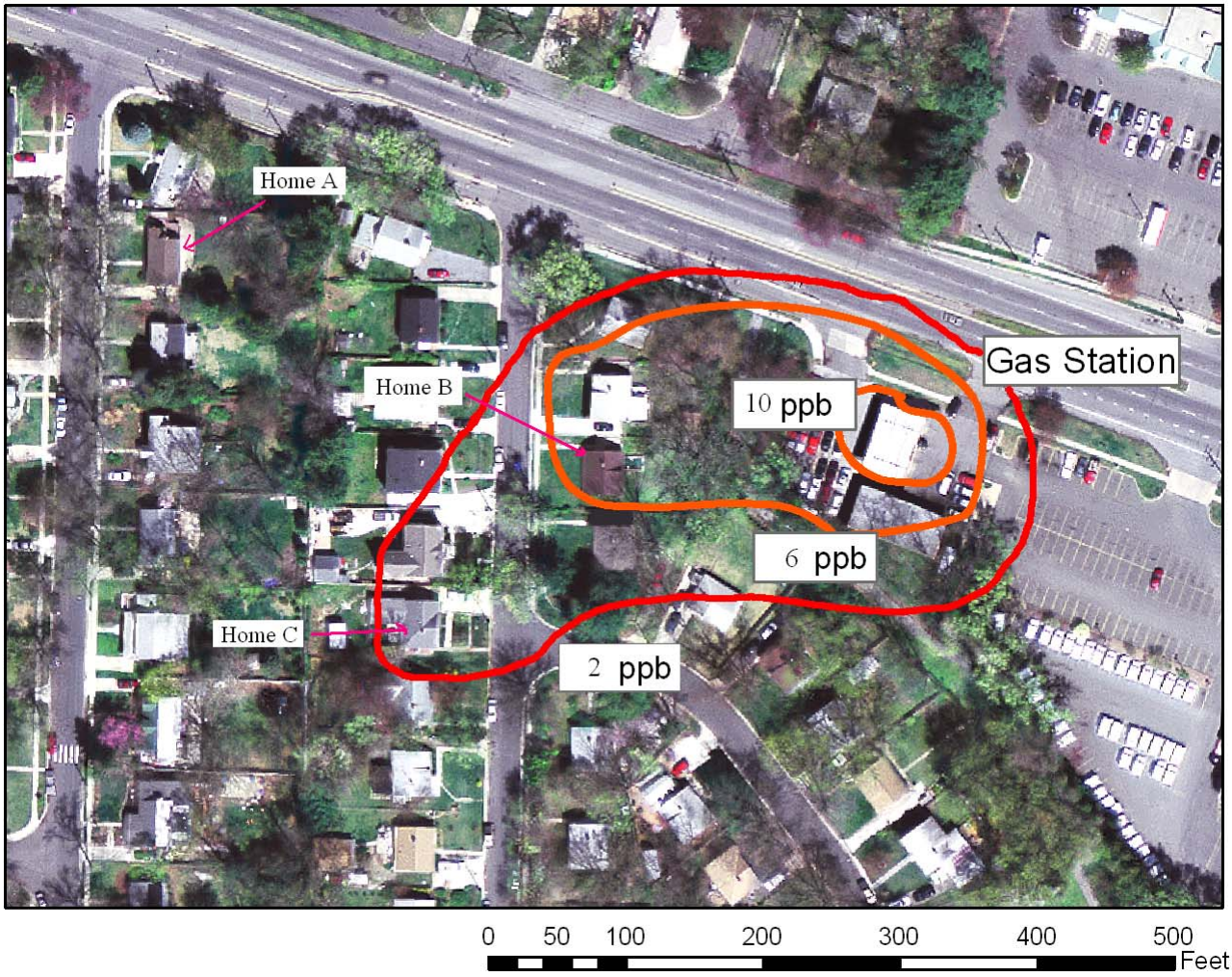
Prior to the leak, the homes in this photo were valued at $400,000 on average.

Do you think the value of home A is affected? About how much?

What about Home B?

And Home C?

Fig 2. Groundwater contamination.



D8. Why do you think the property value at each of these homes would be affected? Are your reasons the same for each home? Do your reasons differ for each home?

Home A?

Home B?

Home C?

D9. How far away would that gas station have to be for home values not to be affected by a leak?

D10. Now let's imagine that cleanup is done in this area. Cleanup is done, and it eliminates the benzene contamination. What do you think will happen to the property values at…

…Home A?

…Home B?

…Home C?

Will these property values go back to the original pre-leak levels? If so, how long would this take?

D11. Now suppose there was a leak at the below gas station, but the contamination is contained at the station and doesn't migrate to the nearby properties, as you can see in the aerial photo below. Would property values in the neighborhood still be affected at…

…Home A?

…Home B?

…Home C?

If so, by how much?

Can you tell us why?

Fig 3. Groundwater contamination.

Section E. Your home.

E1. Suppose you have decided to sell your home. As you are about to put your house on the market, you learn that a leak has been discovered at a gas station within a mile of your home. Remember your home is on public water. What will be your asking price for your home if…

…your home is tested, and there is a concentration of benzene of 6 ppb in the

groundwater ? ..... $_____

…your home is tested, and there is a concentration of 1 ppb in the

groundwater? ..... $_____

…your home is tested, and there is no trace of contaminants in the

groundwater?..... $_____

…the home next to yours is tested, and they find 3 ppb of benzene in the

groundwater, but your home is not contaminated?.... $_____

Section F. Housing Choice Questions.

Suppose you needed to move out of your current home, and are thinking about **purchasing** a similar home in a similar neighborhood. Also suppose that you were able to sell your house for the price you indicated earlier, and that you will use the proceeds from that sale to buy the new home.

You have narrowed your choices down to two homes, home A and home B (described below), that are similar to your current home and in a likewise similar neighborhood.

While you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home B, and that the groundwater at home B has been tested and found to have 4 ppb of benzene. These homes use public water. The leak has been stopped, cleanup is ongoing, and the State agency expects the water at home B to return to zero ppb of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	NO nearby tank	Leak at gas station 500 ft away
Groundwater Test Results	0 ppb benzene	4 ppb benzene
Cost to you	Pay same as the value of your current home	Pay $9,000 less than the value of your current home

F1. Which home would you choose?

1. ❒ Home A
2. ❒ Home B

F2. Now suppose that while you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home A, but the groundwater has been tested and no contamination was found. As before there is a leaking tank not too far from home B, and the groundwater at home B has been tested and found to have 4 ppb of benzene. These homes use public water. The leak has been stopped, cleanup is ongoing, and the State agency expects the water at home B to return to zero ppb of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	Leak at gas station 500 ft away	Leak at gas station 500 ft away
Groundwater Test Results	0 ppb benzene	4 ppb benzene
Cost to you	Pay $5,000 less than the value of your current home	Pay $18,000 less than the value of your current home

Which home would you choose?

1. ❒ Home A
2. ❒ Home B

Section G. Socio-demographic Questions

G1. When you were choosing a home in the previous questions, what were your concerns regarding the groundwater contamination? Please Check ALL that apply.

1. ❒ My health
2. ❒ The health of others in my household
3. ❒ Taste or clarity of my drinking water
4. ❒ Quality of the local environment
5. ❒ Property values and ability to later sell the home
6. ❒ I just prefer not to live at a home with contamination
7. ❒ Other, please explain: _____

G2. How many individuals live in your home?

_____ people (including yourself, your spouse and your children)

G3. How many children/teenagers aged 0-18 live in your home?

_____ children/teenagers

How many of these children are 0-5 years old?

_____ children

G4. We would like to know if you have bought a home, sold a home, or have been seriously looking to buy or sell a home in the last 5 years. Please check all that apply.

1. ❒ Yes, I bought a home
2. ❒ Yes, I sold a home
3. ❒ Yes, I have been seriously looking to buy/sell but did not buy/sell
4. ❒ No

Interviews with Homeowners – March 8, 2010
(Homeowners on public water, soil contamination scenario)

This research project focuses on housing and environmental quality. We are interested in your opinions about and experience with these topics. There are no right or wrong answers to the questions in this questionnaire.

Section A. Your Current Home.

A1. What county do you live in? _____

A2. Which of the following best describes your neighborhood?

1. ❒ Rural
2. ❒ Suburban
3. ❒ Urban

A3. What best describes the type of home you live in?

1. ❒ Single family, detached
2. ❒ Townhouse, or duplex
3. ❒ Apartment or condominium in a multi-family building

A4. Which of the following best describes your living situation?

1. ❒ I, or someone in my family, own my home
2. ❒ I rent my home
3. ❒ Other rental or free housing situation, please explain:_____

A5. Approximately how long have lived in this home?

_____ years

A6. How many square feet is the inside of your home? Please estimate if you are unsure.

_____ square feet

A7. How large is your lot or parcel? Please estimate if you are unsure. If you live in a multi-family building, please skip this question.

My property is: _____ acres

A8. If you were to sell your home in the next few months, how much do you think you would be able to sell it for?

$ _____

A9. Suppose you made the following improvements to your home. Do you think this would affect the price your home would sell for? If so, how much do you think this would add to its value?

Improvement	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate.
a. Refinish the kitchen	Yes	No	$
b. add an additional room	Yes	No	$
c. install energy-efficient windows	Yes	No	$

A10. Suppose the following changes occurred in your neighborhood. Do you think this would affect the price your home would sell for? If so, how much do you think this would increase or decrease its value?

Change in neighborhood	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate. Use a "+" or "-" to denote and increase or decrease.
a. A school opened a ½ mile away	Yes	No	$
b. A new gas station was opened 2 miles away	Yes	No	$
c. A new gas station was opened ½ mile away	Yes	No	$
d. A fast food restaurant is opened within ½ mile	Yes	No	$

Section B. The Water at Your Home.

B1. Where does the water at your home come from?

1. ❒ Public Water System
2. ❒ Private Groundwater Well
3. ❒ Community Groundwater Well
4. ❒ I don't know

B2. Has the drinking water at your home ever been tested?

1. ❒ Yes
2. ❒ No

B3. If you answered yes to question B.2, did the test results indicate that there was a water quality problem?

1. ❒ Yes, and the contamination was: _____
2. ❒ Yes, but I do not remember the details of the contamination problem
3. ❒ No contamination was found
4. ❒ I never had my water tested

Section C. Background Information.

C1. Have you ever heard of any of these contaminants in soil?

1. Arsenic..... ❒ Yes ❒ No
2. Coliforms..... ❒ Yes ❒ No
3. Benzene..... ❒ Yes ❒ No
4. Cyanide.....❒ Yes ❒ No
5. Ethylbenzene..... ❒ Yes ❒ No
6. Lead..... ❒ Yes ❒ No
7. Toluene..... ❒ Yes ❒ No
8. Xylene..... ❒ Yes ❒ No

C2. Have you ever heard of the term “parts per million”?

1. ❒ Yes
2. ❒ No

"Parts per million" (or ppm) is a measure of the concentration (or amount) of a substance in soil. It is equivalent to milligrams per kilogram (mg/kg).

For many pollutants, the law specifies a standard—a concentration level that must not be exceeded in soil. The standards are set to protect human health with a wide margin of safety. Standards are often reported in ppm.

Here is a summary of the current standards for several contaminants.

Contaminant	**Standard (ppm)**
Benzene	11.6
Toluene	1564
Ethylbenzene	782
Xylene	15643

C3. Sometimes these contaminants leak from underground tanks. Have you ever heard of the term 'Leaking Underground Storage Tank'?

1. ❒ Yes
2. ❒ No

Underground storage tanks are used to store petroleum products, and are commonly found at gas stations. Occasionally these tanks can leak due to rusting and cracks that occur over time. When a leak does occur, it can contaminate the soil and groundwater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) are the typical pollutants when these leaks occur.

Section D. A Neighborhood in Maryland.

D1. Are you aware of any homes in your neighborhood or city/town that were contaminated by these pollutants because of a leak from an underground storage tank?

1. ❒ Yes
2. ❒ Yes, but I am not aware of the specific pollutants
3. ❒ No

D2. If yes, how close are these homes to your own home?

D3. What do you think the consequences of a leak are?

D4. How do you think people get exposed to the substances from leaking USTs?

D5. Suppose there was a leak at a UST near your home, but with 100% certainty there are no risks to human health or the environment, would it concern you? If so, why?

D6. Here is the aerial photo of a neighborhood in Maryland. Based on that photo, would you say it is this similar to the neighborhood where you live?

Fig. 1 – A Maryland Neighborhood

D7. In this neighborhood the homes are served by public water. Suppose there was a leak from the tanks of the gas station in the neighborhood as shown in this photo. The soil around that site has been tested for benzene and the tests results are as shown.

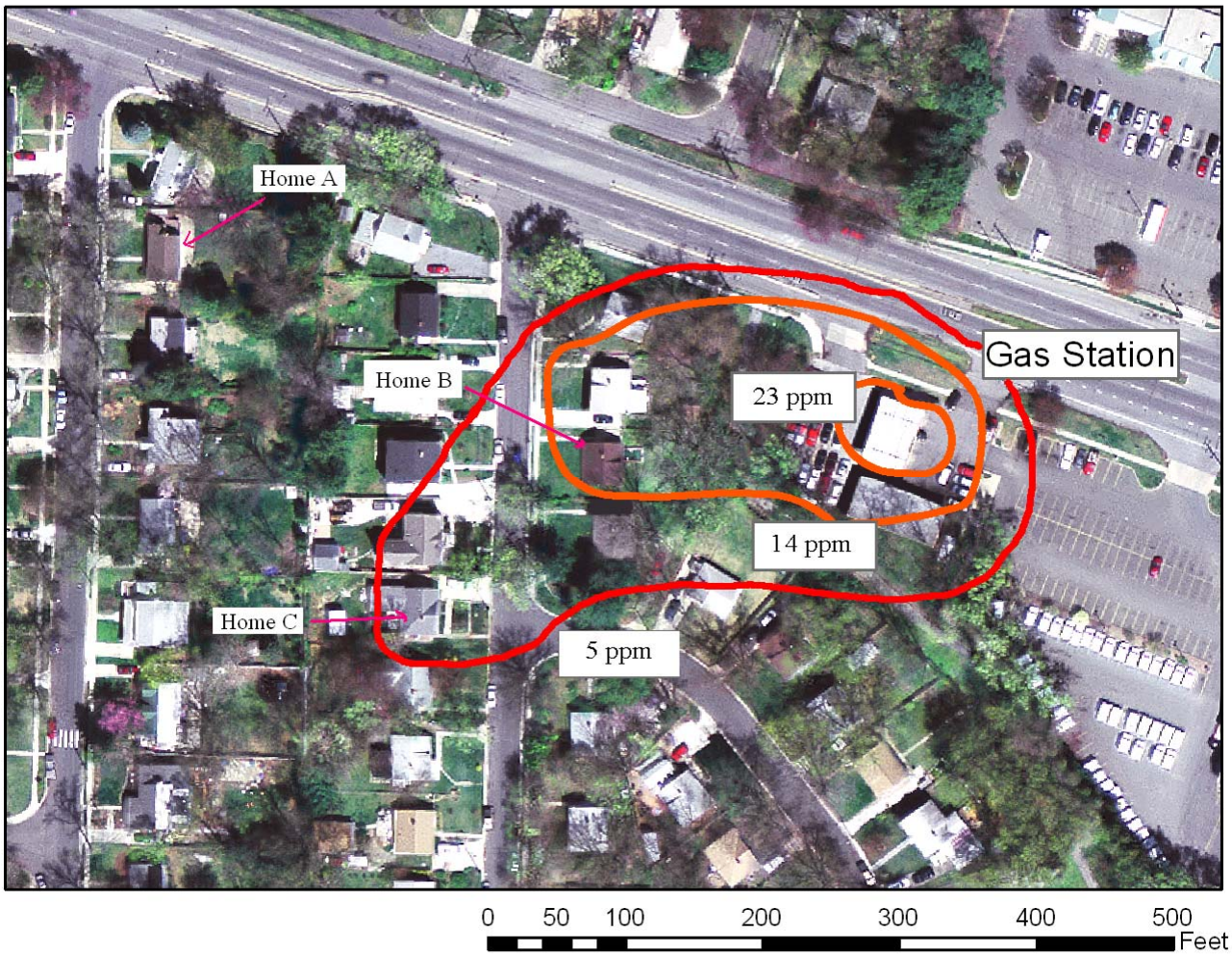
Prior to the leak, the homes in this photo were valued at $400,000 on average.

Do you think the value of home A is affected? About how much?

What about Home B?

And Home C?

Fig 2. Soil contamination.



D8. Why do you think the property value at each of these homes would be affected? Are your reasons the same for each home? Do your reasons differ for each home?

Home A?

Home B?

Home C?

D9. How far away would that gas station have to be for home values not to be affected by a leak?

D10. Now let's imagine that cleanup is done in this area. Cleanup is done, and it eliminates the benzene contamination. What do you think will happen to the property values at…

…Home A?

…Home B?

…Home C?

Will these property values go back to the original pre-leak levels? If so, how long would this take?

D11. Now suppose there was a leak at the below gas station, but the contamination is contained at the station and doesn't migrate to the nearby properties, as you can see in the aerial photo below. Would property values in the neighborhood still be affected at…

…Home A?

…Home B?

…Home C?

If so, by how much?

Can you tell us why?

Fig 3. Soil contamination.

Section E. Your home.

E1. Suppose you have decided to sell your home. As you are about to put your house on the market, you learn that a leak has been discovered at a gas station within a mile of your home. Remember your home is on public water. What will be your asking price for your home if…

…your home is tested, and there is a concentration of benzene of 14 ppm in the soil?

..... $_____

…your home is tested, and there is a concentration of 2 ppm in the soil?

..... $_____

…your home is tested, and there is no trace of contaminants in the soil?

..... $_____

…the home next to yours is tested, and they find 7 ppm of benzene in the soil, but your home is not contaminated?.... $_____

Section F. Housing Choice Questions.

Suppose you needed to move out of your current home, and are thinking about **purchasing** a similar home in a similar neighborhood. Also suppose that you were able to sell your house for the price you indicated earlier, and that you will use the proceeds from that sale to buy the new home.

You have narrowed your choices down to two homes, home A and home B (described below), that are similar to your current home and in a likewise similar neighborhood.

While you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home B, and that the soil at home B has been tested and found to have 9 ppm of benzene. These homes use public water. The groundwater is not contaminated. The leak has been stopped, cleanup is ongoing, and the State agency expects the soil at home B to return to zero ppm of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	NO nearby tank	Leak at gas station 500 ft away
Soil Test Results	0 ppm benzene	9 ppm benzene
Cost to you	Pay same as the value of your current home	Pay $9,000 less than the value of your current home

F1. Which home would you choose?

1. ❒ Home A
2. ❒ Home B

F2. Now suppose that while you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home A, but the soil has been tested and no contamination was found. As before there is a leaking tank not too far from home B, and the soil at home B has been tested and found to have 9 ppm of benzene. These homes use public water. The groundwater is not contaminated. The leak has been stopped, cleanup is ongoing, and the State agency expects the soil at home B to return to zero ppb of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	Leak at gas station 500 ft away	Leak at gas station 500 ft away
Soil Test Results	0 ppm benzene	9 ppm benzene
Cost to you	Pay $5,000 less than the value of your current home	Pay $18,000 less than the value of your current home

Which home would you choose?

1. ❒ Home A
2. ❒ Home B

Section G. Socio-demographic Questions

G1. When you were choosing a home in the previous questions, what were your concerns regarding the soil contamination? Please Check ALL that apply.

1. ❒ My health
2. ❒ The health of others in my household
3. ❒ Taste or clarity of my drinking water
4. ❒ Quality of the local environment
5. ❒ Property values and ability to later sell the home
6. ❒ I just prefer not to live at a home with contamination
7. ❒ Other, please explain: _____

G2. How many individuals live in your home?

_____ people (including yourself, your spouse and your children)

G3. How many children/teenagers aged 0-18 live in your home?

_____ children/teenagers

How many of these children are 0-5 years old?

_____ children

G4. We would like to know if you have bought a home, sold a home, or have been seriously looking to buy or sell a home in the last 5 years. Please check all that apply.

1. ❒ Yes, I bought a home
2. ❒ Yes, I sold a home
3. ❒ Yes, I have been seriously looking to buy/sell but did not buy/sell
4. ❒ No

Interviews with Homeowners – March 8, 2010
(Homeowners on private wells, groundwater contamination scenario)

This research project focuses on housing and environmental quality. We are interested in your opinions about and experience with these topics. There are no right or wrong answers to the questions in this questionnaire.

Section A. Your Current Home.

A1.What county do you live in? _____

A2.Which of the following best describes your neighborhood?

1. ❒ Rural
2. ❒ Suburban
3. ❒ Urban

A3.What best describes the type of home you live in?

1. ❒ Single family, detached
2. ❒ Townhouse, or duplex
3. ❒ Apartment or condominium in a multi-family building

A4.Which of the following best describes your living situation?

1. ❒ I, or someone in my family, own my home
2. ❒ I rent my home
3. ❒ Other rental or free housing situation, please explain:_____

A5. Approximately how long have lived in this home?

_____ years

A6. How many square feet is the inside of your home? Please estimate if you are unsure.

_____ square feet

A7. How large is your lot or parcel? Please estimate if you are unsure. If you live in a multi-family building, please skip this question.

My property is: _____ acres

A8. If you were to sell your home in the next few months, how much do you think you would be able to sell it for?

$ _____

A9. Suppose you made the following improvements to your home. Do you think this would affect the price your home would sell for? If so, how much do you think this would add to its value?

Improvement	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate.
a. Refinish the kitchen	Yes	No	$
b. add an additional room	Yes	No	$
c. install energy-efficient windows	Yes	No	$

A10. Suppose the following changes occurred in your neighborhood. Do you think this would affect the price your home would sell for? If so, how much do you think this would increase or decrease its value?

Change in neighborhood	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate. Use a "+" or "-" to denote and increase or decrease.
a. A school opened a ½ mile away	Yes	No	$
b. A new gas station was opened 2 miles away	Yes	No	$
c. A new gas station was opened ½ mile away	Yes	No	$
d. A fast food restaurant is opened within ½ mile	Yes	No	$

Section B. The Water at Your Home.

B1. Where does the water at your home come from?

1. ❒ Public Water System
2. ❒ Private Groundwater Well
3. ❒ Community Groundwater Well
4. ❒ I don't know

B2. Has the drinking water at your home ever been tested?

1. ❒ Yes
2. ❒ No

B3. If you answered yes to question B.2, did the test results indicate that there was a water quality problem?

1. ❒ Yes, and the contamination was: _____
2. ❒ Yes, but I do not remember the details of the contamination problem
3. ❒ No contamination was found
4. ❒ I never had my water tested

Section C. Background Information.

C1. Have you ever heard of any of these contaminants in groundwater or drinking water?

1. Arsenic..... ❒ Yes ❒ No
2. Coliforms..... ❒ Yes ❒ No
3. Benzene..... ❒ Yes ❒ No
4. Cyanide.....❒ Yes ❒ No
5. Ethylbenzene..... ❒ Yes ❒ No
6. Lead..... ❒ Yes ❒ No
7. Toluene..... ❒ Yes ❒ No
8. Xylene..... ❒ Yes ❒ No

C2. Have you ever heard of the term “parts per billion”?

1. ❒ Yes
2. ❒ No

"Parts per billion" (or ppb) is a measure of the concentration (or amount) of a substance in water. It is equivalent to micrograms per liter.

For many pollutants, the law specifies a standard—a concentration level that must not be exceeded in public water systems. The standards are set to protect human health with a wide margin of safety. Standards are often reported in ppb.

Here is a summary of the current standards for several contaminants.

Contaminant	Standard (ppb)
Benzene	5
Toluene	1,000
Ethylbenzene	700
Xylene	10,000

C3. Sometimes these contaminants leak from underground tanks. Have you ever heard of the term 'Leaking Underground Storage Tank'?

1. ❒ Yes
2. ❒ No

Underground storage tanks are used to store petroleum products, and are commonly found at gas stations. Occasionally these tanks can leak due to rusting and cracks that occur over time. When a leak does occur, it can contaminate the soil and groundwater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) are the typical pollutants when these leaks occur.

Section D. A Neighborhood in Maryland.

D1. Are you aware of any homes in your neighborhood or city/town that were contaminated by these pollutants because of a leak from an underground storage tank?

1. ❒ Yes
2. ❒ Yes, but I am not aware of the specific pollutants
3. ❒ No

D2. If yes, how close are these homes to your own home?

D3. What do you think the consequences of a leak are?

D4. How do you think people get exposed to the substances from leaking USTs?

D5. Suppose there was a leak at a UST near your home, but with 100% certainty there are no risks to human health or the environment, would it concern you? If so, why?

D6. Here is the aerial photo of a neighborhood in Maryland. Based on that photo, would you say it is this similar to the neighborhood where you live?

Fig. 1 – A Maryland Neighborhood

D7. In this neighborhood the homes are served by private groundwater wells. Suppose there was a leak from the tanks of the gas station in the neighborhood as shown in this photo. The groundwater around that site has been tested for benzene and the tests results are as shown.

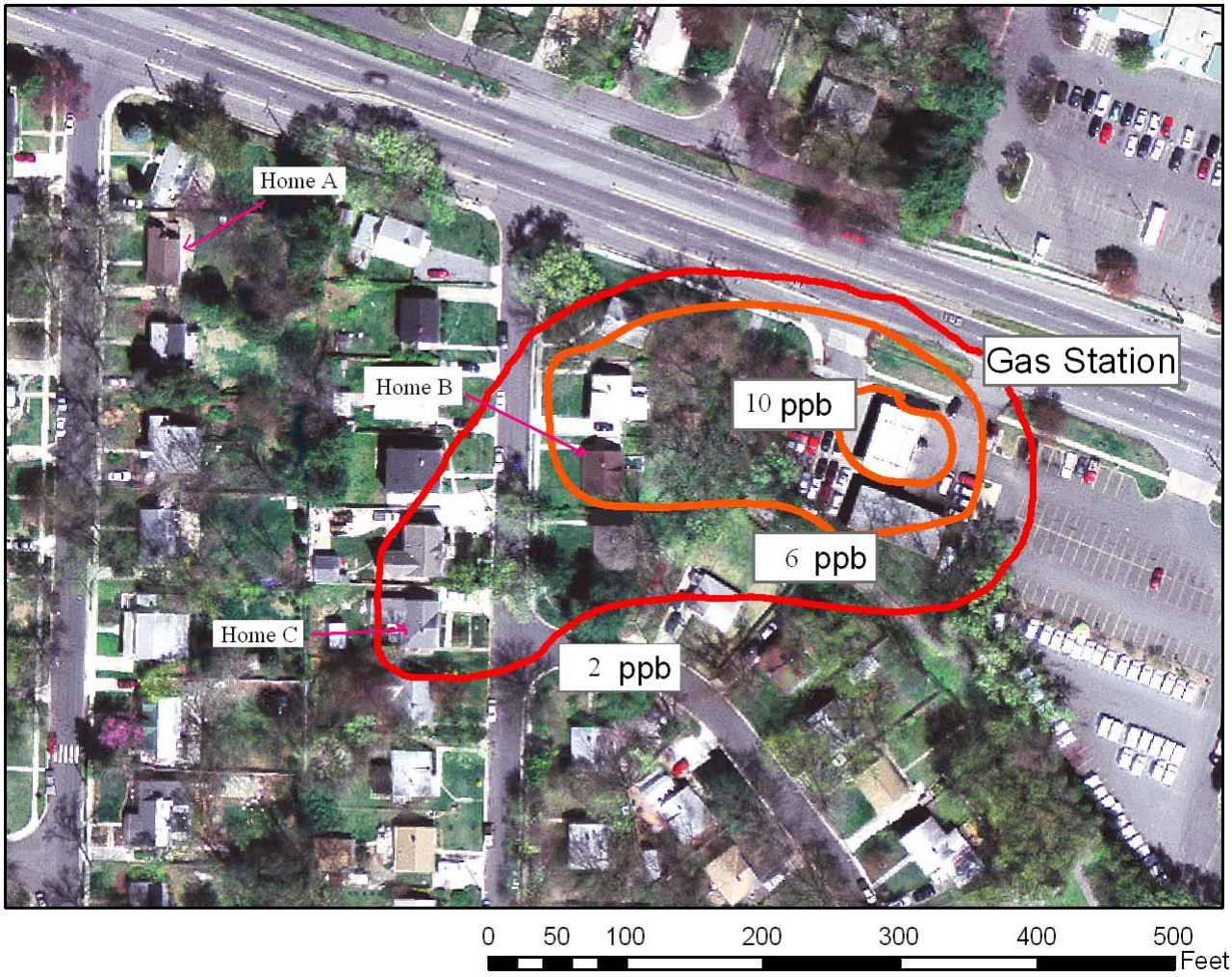
Prior to the leak, the homes in this photo were valued at $400,000 on average.

Do you think the value of home A is affected? About how much?

What about Home B?

And Home C?

Fig 2. Groundwater contamination.



D8. Why do you think the property value at each of these homes would be affected? Are your reasons the same for each home? Do your reasons differ for each home?

Home A?

Home B?

Home C?

D9. How far away would that gas station have to be for home values not to be affected by a leak?

D10. Now let's imagine that cleanup is done in this area. Cleanup is done, and it eliminates the benzene contamination. What do you think will happen to the property values at…

…Home A?

…Home B?

…Home C?

Will these property values go back to the original pre-leak levels? If so, how long would this take?

D11. Now suppose there was a leak at the below gas station, but the contamination is contained at the station and doesn't migrate to the nearby properties, as you can see in the aerial photo below. Would property values in the neighborhood still be affected at…

…Home A?

…Home B?

…Home C?

If so, by how much?

Can you tell us why?

Fig 3. Groundwater contamination.

Section E. Your home.

E1. Suppose you have decided to sell your home. As you are about to put your house on the market, you learn that a leak has been discovered at a gas station within a mile of your home. What will be your asking price for your home if…

…your home is tested, and there is a concentration of benzene of 6 ppb in the groundwater? ..... $_____

…your home is tested, and there is a concentration of 1 ppb in the groundwater? ..... $_____

…your home is tested, and there is no trace of contaminants in the groundwater?..... $_____

…the home next to yours is tested, and they find 3 ppb of benzene in the groundwater, but your home is not contaminated?.... $_____

Section F. Housing Choice Questions.

Suppose you needed to move out of your current home, and are thinking about **purchasing** a similar home in a similar neighborhood. Also suppose that you were able to sell your house for the price you indicated earlier, and that you will use the proceeds from that sale to buy the new home.

You have narrowed your choices down to two homes, home A and home B (described below), that are similar to your current home and in a likewise similar neighborhood.

While you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home B, and that the groundwater at home B has been tested and found to have 4 ppb of benzene. These homes use private groundwater wells. The leak has been stopped, cleanup is ongoing, and the State agency expects the water at home B to return to zero ppb of benzene within a year.

F1. Which home would you choose?

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	NO nearby tank	Leak at gas station 500 ft away
Groundwater Test Results	0 ppb benzene	4 ppb benzene
Cost to you	Pay same as the value of your current home	Pay $9,000 less than the value of your current home

Which home would you choose?

1. ❒ Home A
2. ❒ Home B

F2. Now suppose that while you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home A, but the groundwater has been tested and no contamination was found. As before there is a leaking tank not too far from home B, and the groundwater at home B has been tested and found to have 4 ppb of benzene. These homes use private groundwater wells. The leak has been stopped, cleanup is ongoing, and the State agency expects the water at home B to return to zero ppb of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	Leak at gas station 500 ft away	Leak at gas station 500 ft away
Groundwater Test Results	0 ppb benzene	4 ppb benzene
Cost to you	Pay $5,000 less than the value of your current home	Pay $18,000 less than the value of your current home

Which home would you choose?

1. ❒ Home A
2. ❒ Home B

Section G. Socio-demographic Questions

G1. When you were choosing a home in the previous questions, what were your concerns regarding the groundwater contamination? Please Check ALL that apply.

1. ❒ My health
2. ❒ The health of others in my household
3. ❒ Taste or clarity of my drinking water
4. ❒ Quality of the local environment
5. ❒ Property values and ability to later sell the home
6. ❒ I just prefer not to live at a home with contamination
7. ❒ Other, please explain: _____

G2. How many individuals live in your home?

_____ people (including yourself, your spouse and your children)

G3. How many children/teenagers aged 0-18 live in your home?

_____ children/teenagers

How many of these children are 0-5 years old?

_____ children

G4. We would like to know if you have bought a home, sold a home, or have been seriously looking to buy or sell a home in the last 5 years. Please check all that apply.

1. ❒ Yes, I bought a home
2. ❒ Yes, I sold a home
3. ❒ Yes, I have been seriously looking to buy/sell but did not buy/sell
4. ❒ No

Interviews with Homeowners – March 8, 2010
(Homeowners on private wells, soil contamination scenario)

This research project focuses on housing and environmental quality. We are interested in your opinions about and experience with these topics. There are no right or wrong answers to the questions in this questionnaire.

Section A. Your Current Home.

A1.What county do you live in? _____

A2.Which of the following best describes your neighborhood?

1. ❒ Rural
2. ❒ Suburban
3. ❒ Urban

A3.What best describes the type of home you live in?

1. ❒ Single family, detached
2. ❒ Townhouse, or duplex
3. ❒ Apartment or condominium in a multi-family building

A4.Which of the following best describes your living situation?

1. ❒ I, or someone in my family, own my home
2. ❒ I rent my home
3. ❒ Other rental or free housing situation, please explain:_____

A5.Approximately how long have lived in this home?

_____ years

A6. How many square feet is the inside of your home? Please estimate if you are unsure.

_____ square feet

A7. How large is your lot or parcel? Please estimate if you are unsure. If you live in a multi-family building, please skip this question.

My property is: _____ acres

A8. If you were to sell your home in the next few months, how much do you think you would be able to sell it for?

$ _____

A9. Suppose you made the following improvements to your home. Do you think this would affect the price your home would sell for? If so, how much do you think this would add to its value?

Improvement	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate.
a. Refinish the kitchen	Yes	No	$
b. add an additional room	Yes	No	$
c. install energy-efficient windows	Yes	No	$

A10. Suppose the following changes occurred in your neighborhood. Do you think this would affect the price your home would sell for? If so, how much do you think this would increase or decrease its value?

Change in neighborhood	Would it affect the value of the home? Please circle one.		If yes, by how much? Please enter your best estimate. Use a "+" or "-" to denote and increase or decrease.
a. A school opened a ½ mile away	Yes	No	$
b. A new gas station was opened 2 miles away	Yes	No	$
c. A new gas station was opened ½ mile away	Yes	No	$
d. A fast food restaurant is opened within ½ mile	Yes	No	$

Section B. The Water at Your Home.

B1. Where does the water at your home come from?

1. ❒ Public Water System
2. ❒ Private Groundwater Well
3. ❒ Community Groundwater Well
4. ❒ I don't know

B2. Has the drinking water at your home ever been tested?

1. ❒ Yes
2. ❒ No

B3. If you answered yes to question B.2, did the test results indicate that there was a water quality problem?

1. ❒ Yes, and the contamination was: _____
2. ❒ Yes, but I do not remember the details of the contamination problem
3. ❒ No contamination was found
4. ❒ I never had my water tested

Section C. Background Information.

C1. Have you ever heard of any of these contaminants in soil?

1. Arsenic..... ❒ Yes ❒ No
2. Coliforms..... ❒ Yes ❒ No
3. Benzene.....❒ Yes ❒ No
4. Cyanide.....❒ Yes ❒ No
5. Ethylbenzene..... ❒ Yes ❒ No
6. Lead..... ❒ Yes ❒ No
7. Toluene..... ❒ Yes ❒ No
8. Xylene..... ❒ Yes ❒ No

C2. Have you ever heard of the term “parts per million”?

1. ❒ Yes
2. ❒ No

"Parts per million" (or ppm) is a measure of the concentration (or amount) of a substance in soil. It is equivalent to milligrams per kilogram (mg/kg).

For many pollutants, the law specifies a standard—a concentration level that must not be exceeded in soil. The standards are set to protect human health with a wide margin of safety. Standards are often reported in ppm.

Here is a summary of the current standards for several contaminants.

Contaminant	**Standard (ppm)**
Benzene	11.6
Toluene	1564
Ethylbenzene	782
Xylene	15643

C3. Sometimes these contaminants leak from underground tanks. Have you ever heard of the term 'Leaking Underground Storage Tank'?

1. ❒ Yes
2. ❒ No

Underground storage tanks are used to store petroleum products, and are commonly found at gas stations. Occasionally these tanks can leak due to rusting and cracks that occur over time. When a leak does occur, it can contaminate the soil and groundwater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) are the typical pollutants when these leaks occur.

Section D. A Neighborhood in Maryland.

D1. Are you aware of any homes in your neighborhood or city/town that were contaminated by these pollutants because of a leak from an underground storage tank?

1. ❒ Yes
2. ❒ Yes, but I am not aware of the specific pollutants
3. ❒ No

D2. If yes, how close are these homes to your own home?

D3. What do you think the consequences of a leak are?

D4. How do you think people get exposed to the substances from leaking USTs?

D5. Suppose there was a leak at a UST near your home, but with 100% certainty there are no risks to human health or the environment, would it concern you? If so, why?

D6. Here is the aerial photo of a neighborhood in Maryland. Based on that photo, would you say it is this similar to the neighborhood where you live?

Fig. 1 – A Maryland Neighborhood

D7. In this neighborhood the homes are served by private groundwater wells. Suppose there was a leak from the tanks of the gas station in the neighborhood as shown in this photo. The soil around that site has been tested for benzene and the tests results are as shown.

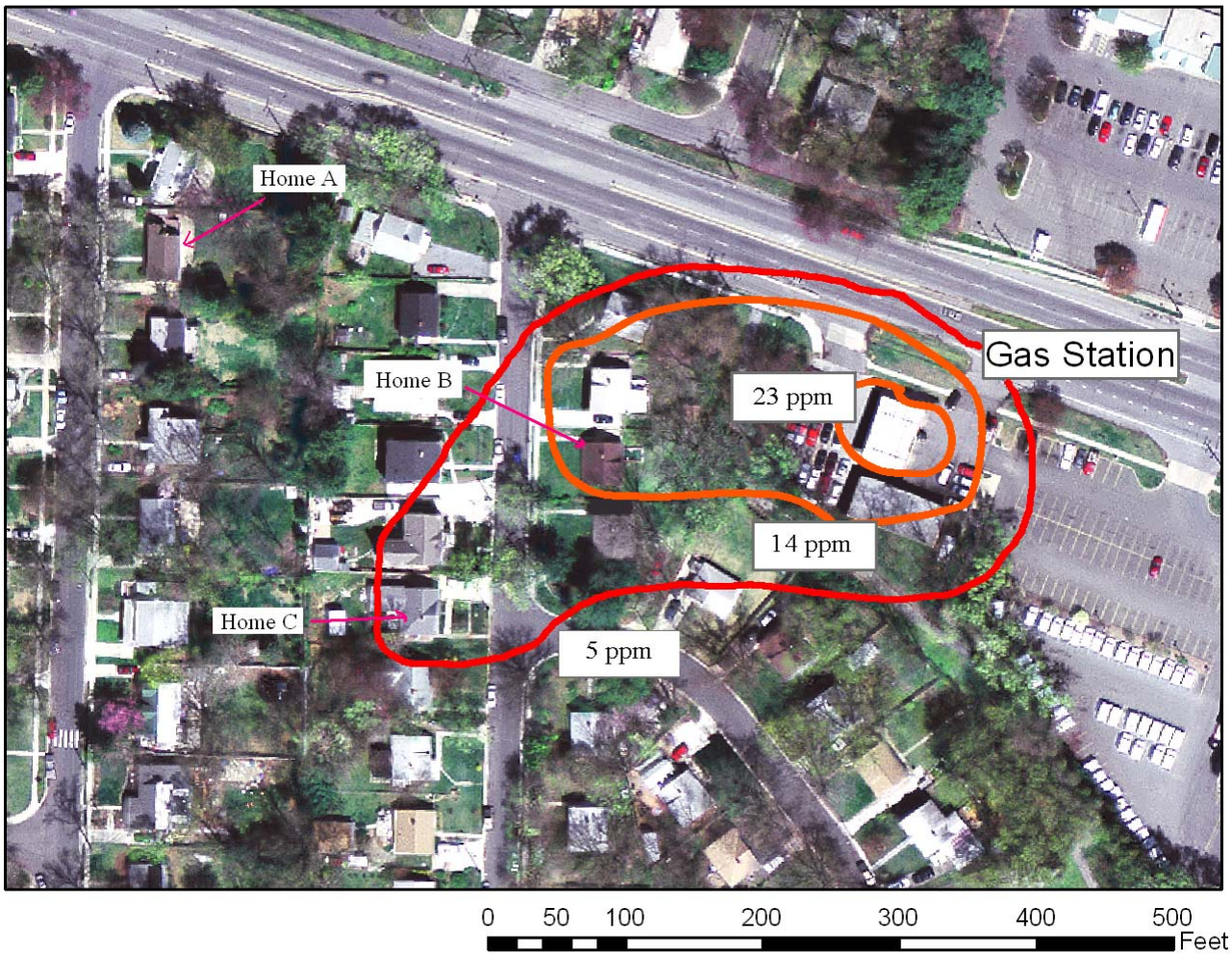
Prior to the leak, the homes in this photo were valued at $400,000 on average.

Do you think the value of home A is affected? About how much?

What about Home B?

And Home C?

Fig 2. Soil contamination.



D8. Why do you think the property value at each of these homes would be affected? Are your reasons the same for each home? Do your reasons differ for each home?

Home A?

Home B?

Home C?

D9. How far away would that gas station have to be for home values not to be affected by a leak?

D10. Now let's imagine that cleanup is done in this area. Cleanup is done, and it eliminates the benzene contamination. What do you think will happen to the property values at…

…Home A?

…Home B?

…Home C?

Will these property values go back to the original pre-leak levels? If so, how long would this take?

D11. Now suppose there was a leak at the below gas station, but the contamination is contained at the station and doesn't migrate to the nearby properties, as you can see in the aerial photo below. Would property values in the neighborhood still be affected at…

…Home A?

…Home B?

…Home C?

If so, by how much?

Can you tell us why?

Fig 3. Soil contamination.

Section E. Your home.

E1. Suppose you have decided to sell your home. As you are about to put your house on the market, you learn that a leak has been discovered at a gas station within a mile of your home. What will be your asking price for your home if…

…your home is tested, and there is a concentration of benzene of 14 ppm in the soil?

..... $_____

…your home is tested, and there is a concentration of 2 ppm in the soil?

..... $_____

…your home is tested, and there is no trace of contaminants in the soil?

..... $_____

…the home next to yours is tested, and they find 7 ppm of benzene in the soil, but your home is not contaminated?.... $_____

Section F. Housing Choice Questions.

Suppose you needed to move out of your current home, and are thinking about **purchasing** a similar home in a similar neighborhood. Also suppose that you were able to sell your house for the price you indicated earlier, and that you will use the proceeds from that sale to buy the new home.

You have narrowed your choices down to two homes, home A and home B (described below), that are similar to your current home and in a likewise similar neighborhood.

While you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home B, and that the soil at home B has been tested and found to have 9 ppm of benzene. These homes use private groundwater wells, but the groundwater is not contaminated. The leak has been stopped, cleanup is ongoing, and the State agency expects the soil at home B to return to zero ppm of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	NO nearby tank	Leak at gas station 500 ft away
Soil Test Results	0 ppm benzene	9 ppm benzene
Cost to you	Pay same as the value of your current home	Pay $9,000 less than the value of your current home

F1. Which home would you choose?

1. ❒ Home A
2. ❒ Home B

F2. Now suppose that while you are evaluating these homes, you learn that there was a leaking tank at a gas station not too far from home A, but the soil has been tested and no contamination was found. As before there is a leaking tank not too far from home B, and the soil at home B has been tested and found to have 9 ppm of benzene. These homes use private groundwater wells, but the groundwater is not contaminated. The leak has been stopped, cleanup is ongoing, and the State agency expects the soil at home B to return to zero ppb of benzene within a year.

Compared to Current Home:	**Home A**	**Home B**
Distance to Leaking Tank?	Leak at gas station 500 ft away	Leak at gas station 500 ft away
Soil Test Results	0 ppm benzene	9 ppm benzene
Cost to you	Pay $5,000 less than the value of your current home	Pay $18,000 less than the value of your current home

Which home would you choose?

1. ❒ Home A
2. ❒ Home B

Section G. Socio-demographic Questions

G1. When you were choosing a home in the previous questions, what were your concerns regarding the soil contamination? Please Check ALL that apply.

1. ❒ My health
2. ❒ The health of others in my household
3. ❒ Taste or clarity of my drinking water
4. ❒ Quality of the local environment
5. ❒ Property values and ability to later sell the home
6. ❒ I just prefer not to live at a home with contamination
7. ❒ Other, please explain: _____

G2. How many individuals live in your home?

_____ people (including yourself, your spouse and your children)

G3. How many children/teenagers aged 0-18 live in your home?

_____ children/teenagers

How many of these children are 0-5 years old?

_____ children

G4. We would like to know if you have bought a home, sold a home, or have been seriously looking to buy or sell a home in the last 5 years. Please check all that apply.

1. ❒ Yes, I bought a home
2. ❒ Yes, I sold a home
3. ❒ Yes, I have been seriously looking to buy/sell but did not buy/sell
4. ❒ No

APPENDIX B

MODERATOR SCRIPTS

FOCUS GROUP I and II SCRIPT
LUST Stated Preference Survey
10 November 2009

Last edit: Anna Alberini

I. SESSION INTRODUCTION AND GROUND RULES

A. Introductions, Purpose of Focus Group, and Ground Rules

1. Moderator is professional from local survey research firm (Lisa Dropkin).
2. Review of recruitment process - random selection among households; variation in location (e.g., urban vs. suburban/rural), and demographics (income, education, age), and type of water source (will attempt to recruit separate groups for well versus municipal water source).
3. Introductions of all participants. Please tell us your first name and town of residence, and tell us briefly about who lives in your household.
4. Purpose of focus group is to help develop a public opinion survey about how cleaning up contaminated sites may affect property values.

B. Focus Group Particulars

1. Ground Rules
    a. Session is being videotaped.
    b. Reassurance that the discussion is strictly confidential, no names will be used in the reporting, and no one will contact you regarding anything you say or follow-up with you in any way.
    c. Expect the session to last up to 2 hours
    d. Want to hear from everyone. Important that everyone contribute; there are no right or wrong answers; simply asking for honest opinion. Everyone's opinion is important.
    e. Important for people to speak one at a time; may need to interrupt periodically to make sure we can hear the responses; ask that you respect the right of others to be heard and voice opinions which may be different than yours; try not to let the group sway you in your opinion, just say what you think.
    f. Moderator's job is to keep group on task.
2. Questions
    a. Any questions or concerns before we begin

II. HOME OWNERSHIP BACKGROUND

WRITTEN EXERCISES:

A. Background

1. When did you buy your current home?
2. Do you remember how much you paid for it?
3. How much do you think your home is worth now? More/less/same- how much?
4. If you had put your home on the market, say two or three years ago, when the housing market was at its peak, how much do you think it would have sold for?

B. Neighborhood

1. Do you have any of the following within ½ mile or so of your home? If so, do you think that having the following near your home increases its value, decreases it, or has no effect?
   a. A supermarket
   b. A school
   c. A church
   d. A small factory
   e. A public park
   f. A bank
   g. A water tower
   h. A radio station's antenna

QUESTIONS FOR DISCUSSION:

1. What sorts of things do you think contribute to the value of your home (open-ended follow-ups regarding size, age, style, condition, location, etc.)
2. Suppose you wanted to sell your home soon (within 6 months). Are you expecting any changes in your neighborhood within this period that you think will increase its value? Decrease it? (think for example of road repairs, planned changes in the traffic patterns, road closures, environmental changes, opening or closing of shops and restaurants, etc.)

III. ENVIRONMENTAL QUALITY IN YOUR NEIGHBORHOOD

A. General environmental issues

1. What, if any, types of local environmental issues are you concerned about?
    a. Air pollution
    b. Contaminants in drinking water
    c. Pesticides in fruits and vegetables
    d. Harmful substances in consumer products
    e. Habitat destruction
    f. Wetland protection
    g. Other?

WRITTEN EXERCISES:

IV. HOUSEHOLD WATER (*For groups on private well water only*)

A. Water Quality

1. Are you satisfied with the quality of your water (for example taste, clarity)?
2. Do you do anything to treat your drinking water (whole-home system, tap filter, Brita-style pitcher)?
3. Have you ever had the water at your home tested?
4. What did you test it for?
5. Did anyone advise you to test your water?
6. Did you have the testing done yourself (by a specialized lab service) or did a government agency do it for you?
7. What were the test results?
8. Did you do anything differently in light of test results?

IV. HOUSEHOLD WATER (*For groups on municipal water only*)

A. Water Quality

1. Are you satisfied with the quality of your water (for example taste, clarity)?
2. Do you do anything to treat your drinking water (whole-home system, tap filter, Brita-style pitcher)?
3. Do you know where your water comes from?
4. Are you familiar with any tests on your water?

QUESTIONS FOR DISCUSSION:

V. SERVICE STATIONS- GENERAL

A. Commercial facilities in neighborhood/town

1. What types of business and services are in close proximity to your home?
2. Do you have any gas stations in your neighborhood? How far away?
3. What are the advantages of living near a gas station? (leave open ended, probe about convenience, services if nothing volunteered)
4. What are the disadvantages of living near a gas station? (leave open ended, probe about congestion, noise, leaks if nothing volunteered)
5. Do you think their presence affects your property value? How?
6. Would you expect a home exactly like yours to be worth more, less, or about the same if it were next to a gas station?
7. What about near a gas station?
8. How far away would it need to be to have no effect at all?

VI. ASPECTS OF USTs

A. General Awareness

1. Are you familiar with the term "underground storage tanks?"
2. Do you know what they are typically used for? What do you associate with them?
3. Do you think they are common? How many do you think there are in your town / county / the state of Maryland?

EXPLAIN USTs:

- Underground storage tanks used to store petroleum products (e.g. gasoline, diesel, heating oil, etc.).
- Located at gas stations and many other types of commercial and industrial facilities

B. Leaks

1. Are you aware of any incidents where gas, oil, or some other substance leaked from underground storage tanks in the state of Maryland?
2. How did you hear about this?
3. Are you aware of any cases of leaking underground storage tanks near your home?
4. About how far away were these cases?
5. If a leak occurred do you think you would hear about it?

6. If so from where/whom? (For example Maryland Department of the Environment, neighbors, newspaper, gas station owners, etc.)

VERBAL PROJECTIVE:

- Imagine a leaking UST in your neighborhood. Where might it be? What else is nearby? Who would be most affected? How? Would you be affected? How?
- What do you think would be most affected by the leaking UST? What would be less affected? Why?

C. Various Risks

1. What do you think the consequences of a leak from an underground storage tank might be?
2. What do you think are possible impacts of leaking underground storage tanks on wildlife, habitat and ecosystems?
3. How do you think wildlife, habitat and ecosystems get exposed to the substances from leaking USTs? Via air, soil, water? What kind of water? Ingestion? Inhalation?
4. What do you think are possible impacts of leaking underground storage tanks on people?
5. How do people get exposed to the substances from leaking USTs? Via air, soil, water? What kind of water? Ingestion? Inhalation?
6. Which of these are you most concerned about? Why?
7. Have you heard of any of the individual substances contained in petroleum products (i.e. Benzene, BTEX, MTBE)? Have you heard information about specific health risks or other issues associated with those chemical compounds, or petroleum in general?

D. LUST Cleanups

1. Do you think it is possible to clean up leaking UST sites? (Why, why not?)
2. Have you heard of ways in which it is done?
3. How long do you think it takes to clean up leaks?
4. What do you think the main goals of cleanup are? What do you think they should be?
5. If the agency in charge states that a LUST site has been cleaned up, do you think this means it no longer poses any concerns to:
   a. Wildlife?
   b. Habitat and ecosystems?
   c. Human health/people?

6. In some cases, agencies and scientists have found that petroleum and related substances break down naturally. If the agency deems this natural process along with ongoing monitoring a good substitute for active cleanup, is that acceptable to you?

7. What do you think this means in terms of impacts on:
   a. Wildlife?
   b. Habitat and ecosystems?
   c. Human health/people?

VII. POTENTIAL IMPACTS ON PROPERTY VALUES

A. General Questions

1. We talked earlier about the impact on home value from being near a gas station. Do you think home values would be affected if there was an underground storage tank leak at a gas station? How? How far away would a home have to be to have no effect?
2. Do you feel that after a leaking tank was cleaned up that nearby residential property prices would return to their pre-spill levels?
3. How long would that take?
4. Do you think the affect on nearby property values would be different if the site was cleaned-up and left vacant versus cleaned-up with the same gas station remaining? What if cleaned up and a new gas station is built? What if another type of new commercial facility is built?
5. Suppose you were thinking about putting your house on the market and have heard that a leak was discovered at a nearby gas station- what would you do? (Still put house on market? Wait and see if it affects nearby prices? Probe and contrast with question about X% reduction due to general market trends)

While I check in the back for any follow up questions, please write for me, what did you learn that was new tonight? How will you act on this discussion?

Focus Groups III and IV Script
LUST Stated Preference Survey
1 December 2009
Last revisions by Anna and Denny (12/1/09)

Part 1. Information about the home and change in value due to improvements [written exercise]

1. What kind of neighborhood do you live in? (e.g. city center, subdivision in a suburban area, rural, etc.)

2. What kind of home do you own and live in? (e.g. single family home, twin, townhome, etc.)

3. When did you buy your current home?

4. Do you remember how much you paid for it? If so, how much?

5. How much do you think your home is worth now?

6. Have you done any improvements that you think might add to the value of your home, such as additions, renovations, put in a new central A/C system, changed the windows, etc.?

   If yes, please list them below, and tell us how much you think each of these has increased the value of your home (if at all)?

   f) _____ increase in value $_____
   g) _____ increase in value $_____
   h) _____ increase in value $_____
   i) _____ increase in value $_____
   j) _____ increase in value $_____

Part 2. Neighborhood and environmental quality and property values [oral]

1. When you bought your current home, what types of positive features did you look for or notice in the neighborhood? What about negative features? How did they affect your decision?

   Note: if someone bought their home in 1954, it may hard for them to answer this question. An alternative way to phrase it might be "Thinking about your neighborhood, what features of the neighborhood do you think would attract potential home buyers? What are features wouldn't?"

2. Now let's go through a series of hypothetical scenarios. Let's imagine that some changes happen in your neighborhood.

   How, if at all, do you think the following changes would affect property value in your neighborhood? How much would your own property value increase or decrease?

   a. A construction project is undertaken within ¼ mile of your home, which results in a lot of dust, truck traffic and noise. Construction will be continuing for about [FILL] months.

      FILL=9 months, 1 year, 2 years.

   b. [for the group on wells] Your neighborhood is now put on the public water system.

   c. A fast food restaurant is opened within ½ mile.

   d. A new supermarket is opened within a mile.

   e. A nearby metro, light rail or train station, or highway on-ramp is permanently closed.

   f. A new gas station is opened within 1 mile of your home. Then probe: What if the new gas station was ½ mile from your home?

   g. Air traffic is re-routed over your neighborhood, resulting in airplane noise from 6:00am to 11:00pm.

   h. Suppose air or train traffic was re-routed away from your neighborhood, and the airplane and train noise stopped completely.

Part 3. Underground Storage Tanks

A. Background on USTs

1. Are you familiar with the term "underground storage tanks?"
2. Do you know what they are used for? What do they contain?
3. Do you know if there are any "underground storage tanks" in your neighborhood?
4. Do you have any concerns about "underground storage tanks?"

If necessary, explain that underground storage tanks are used at gas stations and many other types of commercial and industrial facilities to store petroleum products (e.g. gasoline, diesel, heating oil, etc.).

B. Leaks and Property Values

1. Are you aware of any incidents where gasoline, oil, or some other substance leaked from underground storage tanks in the state of Maryland?

2. How did you hear about this?

3. Are you aware of any cases of leaking underground storage tanks near your home?

4. What are the consequences of these leaks?

   (surely they will mention health risks and risks to ecological systems, e.g. the Bay. If not, probe)

5. What are the health risks from a leak?

6. How do you think people get exposed to the substances from leaking USTs?
   [probe: Via air, soil, water? What kind of water? Ingestion? Inhalation?]

7. Have you ever heard of vapor intrusion? If so, does this concern you and why?

8. What are the risks of a leaking underground storage tank to the natural environment (ecological systems, wildlife, or plants)?

9. Suppose a leak occurred at a gas station near your home. Would your property value be affected, and if so, by how much?

10. How far away would that gas station have to be for you to feel that your property value is not affected by the leak at that station?

11. Suppose there was a leak at a gas station near your home, but that there are no health risks to you and your family. Would your property value be affected, and, if so, by how much?

    [Please keep abstract and avoid issue of who determines health risks]

12. What if your home is not contaminated, but other homes and/or businesses in your neighborhood (besides the leaking UST site) are?

13. Sometimes petroleum leaks do contaminate surrounding properties and the groundwater.

    a. [Only public water group] First of all, what is groundwater? Does everyone know what I am talking about when I use that term?

[IF NEEDED: Groundwater is the water beneath the surface that can be collected with wells, tunnels, or drainage galleries, or that flows naturally to the earth's surface via seeps or springs. Groundwater is the water that is pumped by wells.

Would your property value be affected if the groundwater at your home is contaminated? If so, by how much?

14. Petroleum product leaking from a UST break down naturally into a group of compounds called BTEX. Have you heard of this before? What do you know about these compounds?

[if necessary, explain that BTEX includes benzene, toluene, ethyl-benzene, and xylene]

15. By law, benzene in groundwater must be below 5 parts per billion (ppb).

[pause here and ask: What does that mean to you? Have you heard of this expression (parts per million or per billion) before? If necessary, explain this is a unit of measurement describing the concentration or amount of these compounds in water.]

Why do you think there is a limit on how much of this compound can be in the groundwater?

Suppose there was a leak at a nearby UST. The groundwater around your home is tested and found to have [FILL] parts per billion. Other contaminants were not detected. What do you do?

FILL= 0 ppb (0% of standard), 0.5 ppb (10% of the standard), 4.5 ppb (90% of the standard), 6.5 ppb (130% of the standard).

At what percentage do you feel comfortable? Concerned?

16. By law, toluene in groundwater must be below 1,000 parts per billion (ppb). [only if time]

Suppose there was a leak at a nearby UST. The groundwater around your home is tested and found to have [FILL] parts per billion. Other contaminants were not detected. What do you do?

FILL= 0 ppb (0% of standard), 100 ppb (10% of the standard), 900 ppb (90% of the standard), 1300 ppb (130% of the standard).

At what percentage do you feel comfortable? Concerned?

17. Have you heard of a compound called MTBE?

    [if necessary, explain MTBE was previously added to gasoline to provide oxygen to improve combustion and engine performance]

18. The State of Maryland currently enforces a groundwater standard for MTBE of 20 ppb or less.

    Suppose there was a leak at a nearby UST. The groundwater around your home is tested and found to have [FILL] parts per billion. Other contaminants were not detected. What do you do?

    FILL= 0 ppb (0% of standard), 2 ppb (10% of the standard), 18 ppb (90% of the standard), 26 ppb (130% of the standard).

    At what percentage do you feel comfortable? Concerned?

19. Suppose there was a leak at a nearby UST. Your home and most of your neighborhood are not directly affected by the contamination. However, the contamination reaches a park, lake, or stream in your neighborhood. Would the property values in your neighborhood be affected? Why? Would your own property value be affected?

    [if possible, probe into concerns besides health]

C. Cleanup and Property Values

1. Have you heard of ways in which leaking UST sites are cleaned up?

2. How long do you think it takes to clean up leaks?

3. If a nearby leak was cleaned up, do you think your property values would go back to the original pre-leak values? If so, how long would this take? If not, why?

4. In some cases, agencies and scientists have found that petroleum and related substances break down naturally. Had you heard of this before?

5. Let's consider two hypothetical neighborhoods that are identical in all respects, and in both there has been a leak at a gas station. In both cases, soil and groundwater have been found to be contaminated.

[Refer to handout]

In neighborhood A, the agency in charge has announced that there will be a cleanup with excavation and removal of contaminated soil and groundwater treatment. In neighborhood B, the agency has announced that it has chosen natural attenuation.

How would just these announcements (before cleanup begins) affect the property values in these neighborhoods? Would they be affected? If so, will they be affected in the same way? If so, will property values eventually go back to the levels before the leak? If so, will they rebound in the same way in both neighborhoods?

D. Buyer versus Seller Roles [ask only if there is time left]

1. Suppose you were selling your current home, but a nearby UST leak was discovered. What would you do? (Leave open – if necessary probe into whether they'd delay the sale, discount the asking price and by how much, etc.)

2. What if your groundwater well was contaminated?

3. Suppose you were buying a home, do you think you would be aware if there was a UST leak in the neighborhood? If so, from where/whom?

4. Do you think you would hear about a leak if (besides the UST site) no other homes or business in the neighborhood were contaminated?

5. How would learning of a leak affect your decision to buy? (Leave open – probe into lower bid, would not consider buying, etc.)

6. Would this decision differ depending on whether the home was on public or private water?

HOMEOWNER INTERVIEWS (TRIADS)
LUST PROJECT
BALTIMORE, MD; MARCH 8, 2010

1) Introduction
   a) Independent researcher, not vested in your responses
   b) Small groups, very important to speak your mind – agree to disagree
   c) Viewing and recording
   d) Purpose: Review a survey instrument to be sure all questions are clear, we are capturing the full range of possible responses, and haven't left anything important out prior to conducting a larger more expensive survey with many hundreds of respondents. I am going to be asking you to complete the survey section by section and after each section we will pause and talk about some of the questions.

2) QUESTIONNAIRE SECTION A
   a) Let's begin with Section A. Take a few moments to complete that section.
   b) Was there anything unclear or confusing? Anything you weren't sure what the question was asking?
   c) Did you encounter any times where the answer categories did not fit your situation? Or where you wanted to give an answer not offered?
   d) In QA8 you were asked how much you thought you would be able to see your home for in the next few months. What factors went into determining that number? How did you come up with the selling price?
   e) In QA9 you were asked whether certain home improvements would affect the price you could sell your home for. What did you say? How did you estimate the impact?
   f) In QA10 you were asked whether certain changes in the neighborhood would affect the price you could sell your home for. What did you say? How did you estimate the impact?

3) QUESTIONNAIRE SECTION B
   a) Let's move on to section B. Take a few moments to complete that section.
   b) Was there anything unclear or confusing? Anything you weren't sure what the question was asking?
   c) Did you encounter any times where the answer categories did not fit your situation? Or where you wanted to give an answer not offered?
   d) Has anyone had the water in their home tested?
      i) IF YES: How come?
      ii) IF YES: What did the test find?

4) QUESTIONNAIRE SECTION C
   a) Let's move on to section C. Take a few moments to complete that section.
   b) Was there anything unclear or confusing? Anything you weren't sure what the question was asking?
   c) Did you encounter any times where the answer categories did not fit your situation? Or where you wanted to give an answer not offered?
   d) In QC2 you were given a definition of "parts per billion." Were you familiar with the term?
      i) If not, did the definition clarify it for you?
      ii) If you were, did the definition match with what you thought or did you get new information? What?

e) The questions also told you that the law specifies a standard for the level of pollutants in drinking water [or soil for SOIL VERSION]. If you were to explain this to someone who did not have this definition, how would you do it in your own words?
   i) [FOR WATER VERSION] How concerned are you about these contaminants in water?
   ii) [FOR SOIL VERSION] How concerned are you about these contaminants in soil?
   iii) Was there anything confusing or unclear in the definition that should be clarified?
f) QC3 asked if you had ever heard the term "Leaking Underground Storage Tank." Who was familiar with that? [CUT THEM OFF IF START SHARING STORIES ABOUT THIS]
g) They then gave you an explanation of Leaking Underground Storage Tank.
   i) If you were not familiar with LUSTs, did the definition clarify it for you?
   ii) If you were familiar with LUSTs, did the definition match with what you thought or did you get new information? What?
h) The LUST definition mentioned that "when a leak does occur, it can contaminate the soil and groundwater.
   i) What does that mean to you? What do they mean by contamination?
   ii) When they say groundwater what does mean?

5) QUESTIONNAIRE SECTION D

IN THIS SECTION THE QUESTIONNAIRE MOVES AWAY FROM BEING A CLOSED-ENDED/MULTI-CHOICE SURVEY TO ALL OPEN ENDS. I THINK WE CAN JUST USE SECTION D AS THE DISCUSSION GUIDE.

a) For Section D, we will talk about it as we move through the questions….
b) In QD1 you are asked if you were aware of any homes in your neighborhood that were contaminated as a result of a leaking underground storage tank. Has anyone heard of anything like that where they live?
   i) What did you hear?
   ii) How close where the homes to where you are?
   iii) What were the consequences of the leak, as far as you can tell?
c) How do people get exposed to contaminants when there is a leak?
   i) What would you guess is the way we are exposed?
d) QD5 asked you to imagine there was a leak near your home, but one with no risks to human health or environment. Let's assume that is true – no one will experience health impacts. Are you concerned about another other ramifications from the leak?
   i) What are they? [OPEN END THEN PROBE: reputation of neighborhood, property values assuming potential buyers learn of the leak, etc]
   ii) How much do they concern you?
e) Does it resemble the area you live in? Why or why not?
   i) Regardless of whether this looks like your neighborhood, can you relate to this picture?
f) In QD7 there has been a leak. Is the picture clear? What is going on in the picture?
   i) How do the contaminant levels shown relate to House A, B and C? [MAKE SURE PICTURE IS CONVEYING INTENDED INFORMATION]
g) [FOR WATER VERSION] How concerned are you about these levels of contaminants in water?
   i) Does it impact you differently if you are on city water as opposed to well water?
h) [FOR SOIL VERSION] How concerned are you about these levels of contaminants in soil?
i) Write down your estimates of the impact on the value of:
   i) Home A?
   ii) Home B?
   iii) Home C?

j) What were your estimates? How did you reach that determination? Why would the property value be affected from your point of view?
   i) SEE IF THEY MENTION CLEAN-UP OR LOOK TO COMPARE THE CONTAMINANT AMOUNTS TO THE STANDARDS GIVEN EARLIER
   ii) Earlier we saw the allowable limits. How if at all did those factor in to your determination of the impact on housing values?
   iii) How did you relate the difference in contaminant levels from house to house to dollar values?

k) QD9: Which if any of the homes in this photo would not be affected? What makes you say that?
   i) How far away would you say the homes have to be from the leak to not be impacted?

l) QD10: Write down your estimates of the impact on the value of the homes if there has been a clean-up: [IF PUCH BACK ON CLEAN-UP, MUST ASSUME ALL RISK ELIMINATED]
   i) Home A?
   ii) Home B?
   iii) Home C?

m) QD11 says there is a leak but all the contamination is contained at the gas station. Do you think the property values would be affected in that case? Why or why not?

n) IF YES: Write down your estimates of the impact on the value of:
   i) Home A?
   ii) Home B?
   iii) Home C?

o) What were your estimates? How did you reach that determination? Why would the property value be affected from your point of view?

6) QUESTIONNAIRE SECTION E
   a) Let's move on to section E. Take a few moments to complete that section.
   b) Was there anything unclear or confusing? Anything you weren't sure what the question was asking?
   c) Walk me through your answers? What was your reasoning behind each value you gave?

7) QUESTIONNAIRE SECTION F
   a) Let's move on to section F. Take a few moments to complete that section.
   b) Was there anything unclear or confusing? Anything you weren't sure what the question was asking?
   c) Did you encounter any times where the answer categories did not fit your situation? Or where you wanted to give an answer not offered?
   d) How did you feel about the choices you had? About the information you were given about each home?
   e) What choice did you make? Walk me through your reasoning?

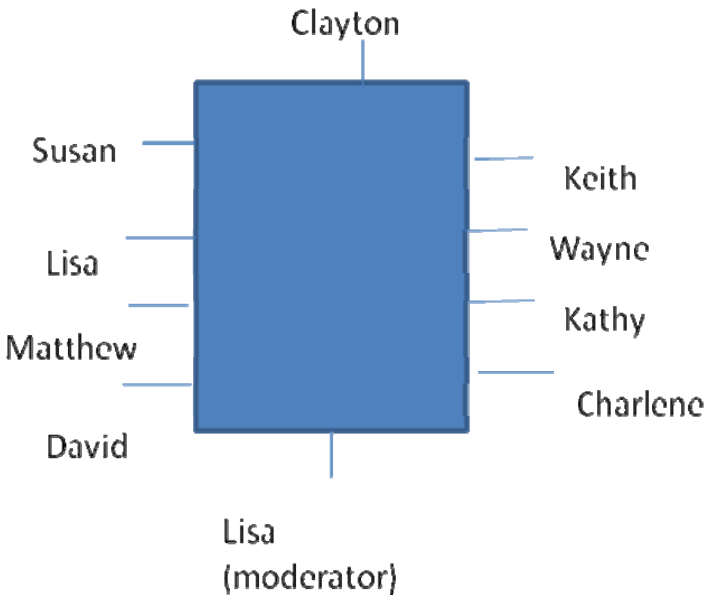
8) Wrap up
   a) Check for questions from observers.
   b) Thank and dismiss respondents.

APPENDIX C

OBSERVER NOTES

Focus group I
11 Nov 2009
Start @ 17:30

Notes by Anna Alberini, confirmed and checked with by Dennis Guignet
16 Nov 2009



***Note summary notes from written exercises are in blue text and black text denotes observations made during the focus group.**

Q. When did you buy your home?

All individuals recalled the year they bought their home.

Q. Do you remember how much you paid for your home?

All individuals recalled how much they paid for their home. Note that not all put a value because of the wording of this question.

Q. How much do you think your home is worth now?

Most respondents felt their home values have increased, one said decrease, and another said the value is about the same.

Q. If you had put your home on the market, say two or three years ago when the housing market was at its peak, how much do you think it would have sold for?

All respondents were able to give an actual amount. One respondent put a range of $25K. Based on the respondents that gave amounts, it seems most feel their home would have sold for more or the same that it is worth now, and most felt their home would sell for more than they bought it for.

Q. What adds to the value of a home?

Respondents mentioned (i) the school system, (ii) location, which includes access to main roads, parks and recreation, shopping centers, the way the neighborhood looks, good community services, safe neighborhoods, and (iii) regarding the house itself, modern upgrades.

Q. What detracts from the value of a home?

Respondents volunteered (i) unkempt properties, (ii) crime, (iii) railroad stops and stations, buses, busy streets, (iv) huge power lines, (v) polluting businesses, which to this particular participant meant primarily noise, (vi) low income housing, and (vii) a specific neighbor who is a "dump collector" and has all sorts of junk in his yard.

Q. Imagine you were thinking of selling your home in about 6 months. Is there anything happening in the neighborhood that would help increase its value?

Respondents mentioned (i) a new community center that is being built, (ii) new housing projects, (iii) two bridges being repaired, (iv) new stores coming, (v) a local bridge that is currently closed, but when it reopens it will attract people to the area.

A couple of respondents praised their location in general, saying that since they live among farms, but are close to important locations and destinations, they get the best of both worlds. One of these respondents also said that he has to drive 5 miles to get to the closest gas station.

Q. is this—that you have to drive 5 miles to the closest gas station—a plus or a minus?

The respondent commented that he now combines errands and does them all at once, rather than doing lots of little runs like he did when he lived in the city.

Another participant (David) said that he lives in an agricultural community, and that it took some getting accustomed to. One negative aspect of where he lives, he said, is that the infrastructure is not conducive to walking—there are no shoulders along the roads, no sidewalks, etc.

Q. Thinking about the list of items that can exist in a neighborhood in the first questionnaire, which of these detract from the value of a home?

A couple of participants mentioned the small factory, another was not sure about the radio antenna, and one noted that while supermarkets are generally perceived as a plus, he doesn't necessarily feel that way. Regarding water towers, he noted that they are a "monstrosity" and they point out the fact that people are on city water and his neighborhood cannot sustain

subdivision-type of development. One participant said a water tower or antenna being nearby doesn't really matter because he cannot see them from his house.

Q. What are local environmental issues that concern you?

One participant (Susan) mentioned a local river (I believe Gunpowder River, but must double check the video), which is overcrowded and the water is polluted. She said that some people even swim in it, but that it's very polluted.

Another (Wayne) said that he lives ½ mile from a tank farm—the Dorsey Junction tank farm.[8] He also said that in the summer, because of the foliage on the tree, you cannot really see it, but in the winter you do. So far, he continued, there haven't been spills or related incidents, but "there's always a chance." When queried about the substance(s) stored in the tanks, he wasn't really sure, and his guess would be gasoline.

David said he is very worried about his aquifer. He also said that he talks to the neighbor and they rely on each other for good use of the groundwater and information about its status. A spill might pollute that aquifer.

Q. Is your drinking water a concern for you?

This question elicited a variety of reactions. Some people offered various concerns, while others were relatively unconcerned.

Wayne mentioned pathogen contamination, and specifically E. Coli, which is the cause of huge expenses, and plus "you can't sell your house."

David said that newcomers to his neighborhood have a misconception that "we are all on separate water tables," but that's not the way it is in reality. One time during a drought people had to dig their wells deeper and deeper.

Matthew—who, we will later discover, has a rather extensive environmental science or possibly engineering background—noted that the house he grew up was on a well, the house he lives in is on a well, he never had any problems, and that the people on city water have other types of problems that he doesn't have. For example, a main may break, and everyone's supply is interrupted. This doesn't happen when you are on your own well.

Charlene was the first to mention concerns about carcinogens in drinking water. She said that she earlier lived in Hartford County (now lives in Monkton in Baltimore County), which has a high cancer rate. She is a breast cancer survivor, and several neighbors (in Hartford) had cancer. She does not drink the groundwater for that reason, and only drinks bottled water.

Her statement was met with surprise by another participant, Kathy, who said that she drinks the water from their well all the time, drinks lots of it, and loves it. (She later added that her children

[8] This is an aboveground tank farm or large aboveground tank.

get fluoride treatment at the dentist because of course there is no fluoride added to her well water. Another said that his water *is* fluoridated because he has small children.)

Several participants mentioned that they get their water filtered and/or tested, most often by the contractor that installed the filtering system. A couple of respondent noted that they get the water softened, in addition to filtered, because of its high content of iron and other minerals. One of these two respondents doesn't drink it anyway because of the high radon content.

Respondents were split among those who do not drink their well water, those who don't but using for cooking. Those who do drink it said they prefer the taste of their groundwater.

Based on the responses to the written exercises, half were satisfied with their groundwater and half were not. All respondents buy bottled drinking water and/or treat their water. Treatment includes whole home filters and softeners, tap filters, and filter pitchers.

Q. Let's talk about testing your water. How often do you do it? Who does it and what do you look for? Did you ever have to take action because of the results of the tests?

Here, most respondent said once a year or every six months.

Some respondents do the testing themselves, but most rely on a contractor. Most respondents did not know exactly what their water is being tested for; they just want to know that it is safe.

The tests seek to detect "bacteria," "iron," and "chlorine."

No one ever had to do anything because of the test results. However, in other parts of the focus group Clayton said he filters his water because of the acidity, and Keith had radon in his well, and thus drilled a deeper well, which tested safe, but he still doesn't drink the water.

Focusing on the written exercises, all participants have tested their water, but several were not sure exactly what for. Some respondents specifically listed iron, particulates, minerals, bacteria, and radon. The majority of respondents were not advised to have their water tested, but three respondents were, and two of these said the county advised them to (one because of a recent flood and fears of gas, oil, etc. contamination, and the other because of radon concerns). Half the respondents tested the water themselves, a few hired contractors to do it, and a couple took the sample themselves and sent it off to a lab. One participant said she was unsure of the test results, but the rest said the tests implied the water was safe for drinking. Nevertheless three respondents continue not to drink their water. Seven of the participants said they do nothing differently as a result of these tests. One participant (the flood victim) said she changed the salt and charcoal in their treatment system, drinks bottled water, and gets her hair done weekly at a salon because the water dries her hair out.

Q. What are other environmental concerns in your neighborhood?

One participant, Wayne, mentioned the farmers' practice of storing manure in tanks, adding water and bacteria, and then applying this to the fields. It smells bad and that affects you when you try to sell your home.

Matthew explained the purpose of doing this to the rest of the group, and explicitly said that the practice breaks down nitrogen and phosphorous so that they don't wind up in the Chesapeake Bay, where they would cause algae blooms. At the end of this explanation, Matthew also added that he is worried that they are building too many homes in his neighborhood.

Q. What are the businesses and services you can find close to where you live?

Several respondents said that there is not much within ½ mile, but virtually everything within a mile—churches, schools, stores, gas stations and banks. Most said there are no factories near them.

Q. Gas stations. What are the advantages of living close to them?

Everyone said "convenience!" Respondents specifically mentioned filling up the gas tank, and several agreed this is especially convenient for recreational vehicles (e.g. boats and jet skis).

Only one, David, said that, being on a well and given his concerns about benzene, he's happy that he lives 5 miles from a gas station. He spontaneously mentioned benzene.

Q. Any downsides of having gas stations in the neighborhood?

Responses included traffic, leaking tanks and contamination, and crime. Without being prompted, individuals brought up the Exxon Jacksonville LUST.

Q. To what extent does a gas station affect property values?

The general feeling was that it doesn't—you'll find gas station anywhere, and there may be some benefits associated with them.

Q. Let's talk about the gas station that is nearest to your home. Does it affect your property value, in the positive and negatives?

Most respondent felt that having a gas station nearby does not affect property values.

One, Wayne, added that having a gas station close to you is a convenience. Susan thought the same, until this focus group.

David added that he was more concerned about farmers' holding tanks. He is surrounded by farmers and hence their tanks, they are subject to little scrutiny (presumably regulated by USDA,

but loosely), and they might be a more severe threat than the Exxon station. Gas stations are more tightly regulated.

Q. A gas station having spills and leaks—is that a concern?

Answers were offered by Lisa—"nothing has happened so far and we don't worry, but maybe we should"—and Keith, who is not concerned because the gas station is downhill from him.

Q. Have you heard of the term Underground Storage Tank?

Everyone said yes, and knew they are usually used for gasoline and oil.

Q. How many do you think there are?

One participant said that each gas station probably has 4 or 5. He was not sure about the ones at farms.

Q. What do you know about leaks at USTs? What have you heard about them?

One participant, Charlene, mentioned the Exxon station in Jacksonville. Homes couldn't use their water and people had to pretty much leave their homes. This happened three years ago, and they settled the matter about a year ago. This was in the news constantly (echoed by other participants).

Wayne worries about a huge tower on Rte. 140 and the gas station there. They kept losing gas and did not report it, and when they finally got caught they received a huge fine. This was in the local news. Kathy actually lives near that LUST. She said she had heard about it, but disregarded the information.

Another participant, Susan, mentioned that she smelled oil at her house just after having her (heating) oil tank filled. It turned out it was another neighbor's heating oil which had been sucked into a sump pump.

Wayne noted that there are lots of small-quantity spills every day.

This point was picked up by Matthew, who said he was concerned about the issue of many small-quantity spills or leaks. For example, there are lots of old heating oil tanks at people's homes, and they have started leaking because they are old, but they are not as heavily regulated as gas stations. It is easier to regulate the latter than the former.

At this point, Wayne said that it is more important to regulate gas stations, and Matthew replied back that they don't allow underground tanks anymore and that all tanks are now aboveground. Wayne is more concerned with gas stations because the tanks are underground, where you may not see a leak, whereas residential heating oil tanks are often above ground or in someone's basement.

Q. Imagine that there is a leaking tank in your neighborhood. Who would be affected?

Charlene said that it would affect all the stores (presumably because the stores are near the gas station), and that the community would be affected because "we need these stores."

Lisa noted that there is a day care facility near the gas station close to her. Clayton only lives around 5 miles from Jacksonville, but is not concerned because of the distance and there are many hills and valleys between the LUST and his home.

Q. Why should we worry about leaks?

The response of the group was quite strong. Matthew mentioned immediately "carcinogens," David added that the additives in gasoline are polluting chemicals, and Clayton pointed out that the government forced the oil companies to add substances to gasoline, but MTBE turned out to be very dangerous. Charlene briefly mentioned potential explosions.

Cancer was not the only concern, though. Matthew added that we worry about cancer, but also ultimately the pollution runs off to the Chesapeake Bay and hurts the Bay ecosystem.

Lisa said that through her banking experience she learned that when the land is contaminated, it becomes unsuited for everything else and difficult to sell.

Q. How do you think you will be exposed to this pollution?

Charlene said through rain, water, and it will get into the sewage system.

Matthew said that the obvious exposure is through one's water, but also mentioned contaminated food and "cutaneous absorption."

After Kathy said that she never thought about this before, Matthew said that he thought about it before, but certainly not every day. "It's one of those things you don't see," so you minimize your perception. Kathy agreed, adding this is the case until something happens.

Other participants (Charlene, David) were encouraged by the fact that gas stations are highly regulated and inspected properly, or even by the fact that many were closed recently. Matthew and David discussed briefly testing for prevention purposes v. "reactive" testing after leaks or spills occur.

At this point Charlene said that signs should be posted about tests and leak, but Matthew was skeptical that the letter of any such obligation really means anything.

Q. What about the chemicals in gasoline?

David volunteered benzene, which is a known carcinogen with a low threshold, and said that it is one of those additives that are not present in gasoline but were added to it as per government requirement.

Matthew mentioned skin and eye irritants. Charlene said that no one really knows what the risks are.

When asked if they have heard of benzene, all participants said that they had heard of it, but they weren't really sure what it is and what it does.

Matthew brought up MTBE, saying that, even when released into the environment in small quantities, it can pollute for a long, long time, even more than benzene.

David mentioned mutagenic effects and concerns regarding future offspring.

When our moderator asked people if they had heard of MTBE before, at least 4 of them hadn't. She asked about BTEX, and no one had heard of this term before.

Q. When leaks happen, what do you do? Is it possible to clean up?

Some participants seemed to have at least a rough idea of what cleanup might entail. Several mentioned removing soil, another mentioned "cleansing the soil." David said that you first define the perimeter of the contamination, and then you work towards the inside. Wayne added that after soil is removed it is sent to a facility to be burned.

Matthew noted that some chemicals are easier to clean up than others—MTBE is hard to deal with, for example. At least two or three participants commented that cleanup is expensive.

Q. How long does clean up take?

One participant, Kathy, immediately pointed out that that would depend on the nature and severity of leak. Matthew said that cleanup can take decades, and then Kathy again asked whether one burns the soil, and whether this creates noxious emissions.

Clayton believed that Exxon Jacksonville LUST had been cleaned up. Charlene at this point mentioned that Exxon provided drinking water to the residents whose source was contaminated by the leak from their station, and David said that they got compensated the fair market value of their homes.

Q. What does clean mean?

Here, participants seemed to agree that ideally one would want to return to the pre-leak conditions, but also admitted that it might be enough to return the water or soil to an "acceptable" condition or to the legal standard. They recognize that realistically costs do become an issue.

Two participants were concerned that no one would want to buy homes where contamination was severe, and one of them specifically mentioned the word "stigma." Another individual said

she refused testing by the county because she was afraid a positive contamination result may make it difficult to sell in the future.

Q. If the agency in charge says that the site is cleaned up, do you accept that?

Here, there was some discussion around one participant's proposal that an independent entity conducts an independent review of the conditions at the site.

Q. What's your expectation of risk after cleanup?

Perhaps the most interesting point was made by Matthew, who noted that the current standards could change in the future. It would be ideal to clean up so that the environment is better than it was before the leak, but at some point it becomes too expensive to keep testing or cleaning up, and one must stop.

Q. Petroleum can break down naturally. Is that a good substitute for cleanup?

Everyone wondered how long that would take. Kathy wonders who makes the choice that this is a good substitute.

The discussion then turned to whether regulatory pressure and the cost of cleanup are good deterrents for the gas station owners and the oil companies. One participant felt that gas station owners are pretty motivated to stay on top of the situation because of regulatory pressure and potential cost of cleanup. Another—Matthew—felt that civil fines are not enough of a deterrent because one can always declare bankruptcy and get out of his obligations in this way. This would be different if criminal charges were brought on to these parties.

Matthew further stated that he understands natural breakdown because of his science background, but still wondered how long it takes. From a practical point of view, he emphasized that the easiest way to take care of contaminated drinking water for people that are on wells is to put them on city water. This way they are not exposed. In the end Matthew would be okay with natural attenuation being the main cleanup technique, but it depends on the situation and needs more details. Wayne said he is fine with natural attenuation as long as all drinking water wells are already at safe levels.

Charlene was not convinced by this argument, because she worried about children (exposed through soil or other ways) and by how deep the contamination might be able to go.

Q. Is a leaking tank not affecting the groundwater different from one that does pollute the groundwater?

Here, participants made other connections between leaking tanks and exposure—through food, for example, such as when one eats vegetables grown in a garden where the soil is contaminated. Another example was kids playing in the dirt. Wayne said if wells affected then may not be able to sell home.

Q. When you get the water tested, do you know if they are specifically looking for the chemicals associated with petroleum leaks?

No participants knew whether petroleum constituents were tested for. In general, Matthew suspects that tests look for suspended solids, pathogens, and not petroleum constituents. Wayne agreed that petroleum is likely not tested for unless there is a reason, or the homeowner requests it.

Q. If there was a leaking tank or a potential problem with your water, would you expect that someone would notify you?

Potential information sources mentioned by the group included: news, neighbors, and the fire department. Matthew said he would expect to receive notification if this were to happen, perhaps from a neighborhood organization.

Wayne suspects that he'd be notified if his house is close enough to a leak.

Q. After cleanup, what's your expectation about property values?

Several people felt that they would eventually rebound, but disagreed on the exact amount of time it would take before properties values appreciate again. Some said 2-5 years, others 10. David mentioned stigma once again, and Wayne and Charlene mentioned the disclosure requirements when you sell your home, stating that disclosure only required when your home is directly affected.

Q. Would prefer the cleaned up site to remain a gas station or turn into something else?

Opinions were varied. One participant said that a vacant lot with a past contamination problem is a bad reminder of what happened. In the course of this discussion Wayne also mentioned he'd prefer to be near double-walled tanks.

Q. If you are putting your house on the market and if you heard about a leak, what would you do?

Opinions were diverse. Some participants would want to test to know right away, others would not want to test and would not want to disclose, and many opined that it might be necessary to lower the asking price.

Q. What did you learn as a result of this focus group?

Among other things, people said that gas stations are a potential hazard, about specific contaminants in gasoline and carcinogenic gas additives, that many water tests may not test for petroleum contaminants, about natural attenuation, and that many people don't drink their well water even though it is tested once or twice a year. David said he learned that people's perceptions of well water differ.

Q. What will you do differently as a result of this focus group?

Responses included (i) doing some research on BTEX, (ii) being more aware of what is being tested in my water, and (iii) testing my well more often. One respondent said he would do nothing different.

Summary and Impressions:

- This was a group of homeowners on private wells living in various counties around Baltimore
- They seemed to be attuned with the usage of their groundwater and possible contamination risks, both by pathogens and metals or chemicals, whether or not associated with petroleum pollution
- They understood the link between polluted water and exposure through drinking that water—even if your water is contaminated, if you don't drink it you are not at risk. If you put people on city water, they are no longer at risk even if their own groundwater is contaminated.
- Only one person—who happened to be extremely attuned with environmental exposure to carcinogens and was a cancer survivor herself—brought up the possibility that people, and especially children, might be exposed in other ways to pollutants from LUSTs
- The obvious health risk from LUSTs is cancer
- Only one participant mentioned other risks, such as "skin and eye irritation"
- Everyone had heard about benzene, but some did not know the risks associated with it. One respondent had misconceptions about how benzene relates to petroleum pollution—he thought it was one of the gasoline additives required by the government for cleaner combustion.
- Other people were aware that gasoline additives are sometimes dangerous pollutants in their own right, but only one participant was able to name one such additive—MTBE.
- Virtually all participants worried about petroleum pollution winding up in the Bay
- In spite of all of the above, people don't worry about LUST pollution on a daily basis—it is not at the top of their environmental/neighborhood concern agenda
- People can name pros and cons of being close to a gas station, but the ability to buy gas and the convenience suggest that for most of them being close (within a mile or so) of a gas station is a plus
- People don't seem to associate proximity to a gas station with any particular effect on property values
- Several expressed concern in the ability to sell their home if their well was contaminated.
- Virtually everyone was aware of the big Exxon case that resulted in a suit against Exxon, but it is unclear how much of a reaction less severe or less heavily media-covered cases might elicit
- One person mentioned concern about numerous small scale leaks, such as those associated with heating oil tanks at people's homes (this type of tanks are not covered by the EPA). Another was concerned with smaller leaks from tanks at nearby farms. In

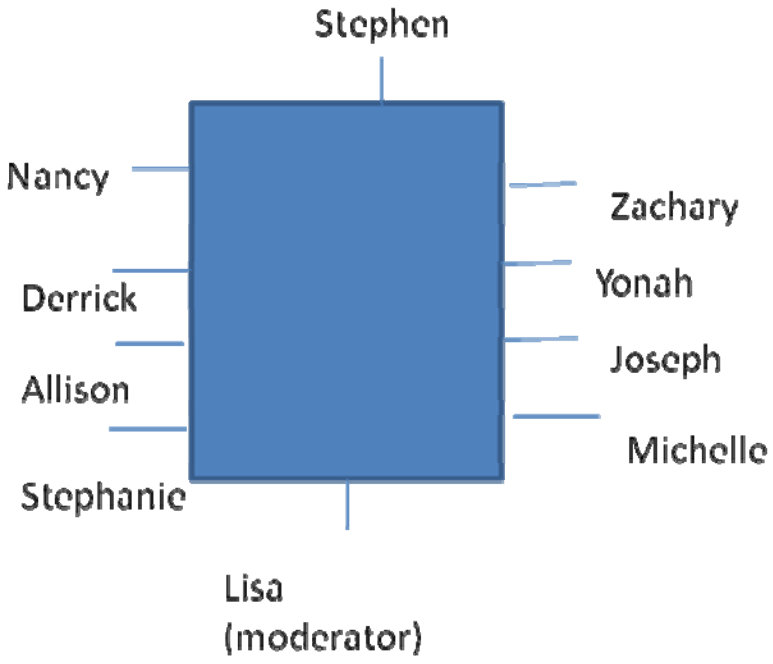
Maryland tanks at private residences and farms with less than 1,100 gallon capacity are exempt from most regulations.[9, 10]

[9] Maryland Department of Environment (MDE), www.mde.state.md.us/assets/document/OilControl/UST_COMPLIANCE_OUTLINE.pdf, accessed 11/16/09.

[10] However, under the Maryland Code of Regulations (COMAR) 26.10.14.06, the state will reimburse owners of residential heating oil tanks up to $10,000 ($20,000) less a $1,000 ($500) deductible for cleanup costs incurred on or after October 1, 2000, if applications are submitted before (after) July 1, 2005. An owner of a residential heating oil tank can apply for reimbursement up until June 30, 2010 (http://www.dsd.state.md.us/comar/, Accessed July 17, 2009).

Focus group II – Public Water Group
11 Nov 2009
Start @ 8:00 pm

Notes by Denny Guignet with checks and edits by Anna Alberini
18 Nov 2009



***Note summary notes from written exercises are in blue text and black text denotes observations made during the focus group.**

Q. When did you buy your home?

All individuals knew the year they bought their home, and about half even put the month.

Q. Do you remember how much you paid for your home?

All individuals recalled how much their home was, and most gave an actual value.

Q. How much do you think your home is worth now?

All respondents provided an actual amount. Ten respondents (including those we dismissed) believe their home values have increased. One respondent, who bought her home in 2008, thinks the value is the same.

Q. If you had put your home on the market, say two or three years ago when the housing market was at its peak, how much do you think it would have sold for?

All respondents were able to give an actual amount. One respondent put a range of $20K. All felt their home would have sold for more than it is worth now, and more than they bought it for.

Q. What adds to the value of a home?

Respondents brought up (i) schools, (ii) shopping centers, (iii) proximity and easy access to different things, (iv) size of home, (v) proximity to beltway, (vi) nearby water bodies, (vii) neighborhood quality, (viii) grass, (ix) sidewalks, (x) hospital, (xi) public parks, (x) driveway/garage.

Q. What detracts from the value of a home?

Respondents mentioned (i) crime, (ii) small factory, and (iii) cell tower. They thought of the latter two as eyesores, and did not think such things would affect prices if they are not visible from the house. The group also mentioned vacant properties as eyesores. Two respondents did not like vacant lots because they don't know what will eventually be built there.

Q. Imagine you were thinking of selling your home in about 6 months. Is there anything happening in the neighborhood that would help increase its value?

Respondents mentioned (i) a neighborhood revitalization project, (ii) repaved sidewalks and roads, (iii) new lights, (iv) new construction, (v) green homes being built nearby.

Q. Imagine you were thinking of selling your home in about 6 months. Is there anything happening in the neighborhood that would decrease its value?

Respondents brought up (i) increasing class size and school redistricting, (ii) nearby foreclosures, (iii) light rail being built, (iv) increased crime, and (vi) a road proposed to become a highway. No environmental disamenities volunteered.

Q. What local environmental issues are you concerned about?

Participants are concerned with (i) junk (including gas cans) in neighbor's backyard and nearby retention pond, (ii) deer over population, (iii) pet feces, (iv) cutting trees, and (v) residing in a nuclear fallout zone because the nearby power plant is expanding.

The moderator probed into air and water quality. A few participants concerned with air quality, but majority are not because MD has relatively good air. Some concerned about water quality because sewer pipe and water main breaks. Only two respondents aware of and look at water quality reports from city. These respondents trust the reports and feel safe. Most respondents feel safe because on city water.

Without being prompted, the discussion went towards the Exxon Jacksonville LUST. Over half of respondents heard of this case. Several agreed they would not buy or even look for homes in this area. Most felt they were safe from LUSTs because on city water.

Q. Are you satisfied with the quality of your water (for example taste, clarity)?

Most (7/9) are generally satisfied with water. Two were not because of taste. One individual mentioned clarity issues because of water main breaks and subsequent fixes.

Q. Do you do anything to treat your drinking water?

About half (5/9) use either a Brita pitcher and/or have filters on tap. Some only drink bottled water. Most say that the taste is their main motivation for treatment.

Q. Do you know where your water comes from?

Most (7/9) said yes. A few of these participants did not know any specifics, and only said from a reservoir or from the city.

Q. Are you aware of any tests on your water?

About half (4/9) are aware of tests, but only one or two knew some of the things they tested for. Half of respondents aware of water test results being sent with water bill, but only one or two actually read these results. Some said they feel the city is on top of things.

Q. Do you have any gas stations near you? How far way?

Responses ranged from a few blocks to a few miles. About half of respondents said ½-1 mile. Overall, most seemed to know right away where the closest one was.

Q. What are the advantages of living near a gas station?

Respondents stated (i) gas, (ii) auto service, and (iii) other conveniences.

One respondent said, 3 blocks is too close but 1 mile is a good distance. Another said a nearby station is desirable if clean and well lit.

Q. What are disadvantages of living near a gas station?

Responses included: (i) crime, (ii) traffic, (iii) fumes, and (iv) noise. No one explicitly mentioned potential leaks.

Q. Do you think UST presence affects your property value? How? How far would it need to be for no effect?

All agree gas station could detract from property values, but only if within sight from the home.

Q. Tell me about the Exxon spill.

Three participants volunteered an account of the event. One mentioned that they found "PTH" [sic] in the soil, and then eventually in the groundwater. One respondent even said that the leak was discovered because of complaints from residents about their well water. The contamination was traced to the Exxon station. One respondent indicated that tests are routinely done as per the regulations.

All in all, six (out of nine) respondents had heard of the Exxon Jacksonville leak. Some knew of the ongoing court case.

Q. How did you hear about this leak?

Most said that they heard about the Jacksonville case on TV and in newspapers. Regarding another potential LUST, one individual saw some "environmental stuff" going on at a nearby gas station.

Q. Are you familiar with term "underground storage tank"?

Two participants heard of USTs, but never thought about leaks or effects. The rest had previously heard about USTs and issues with leaks.

When further probed about USTs, participants indicated that those on wells must worry about leaks, and that the petroleum products leaking from USTs can eventually make it into the Bay.

One participant mentioned that there are "hundreds of thousands of leaks everywhere," but another noted that leaks are pretty rare.

The conversation then turned to legal responsibility and to the incentives of liability for the cost of cleanup on gas stations and gas companies. For example, one person said that companies regard the legal and remediation costs as any other costs of doing business.

Finally, one participant argued that in some neighborhoods (e.g. Mayberry) people may be less aware or responsible, implying that leaks are more likely.

Q. If a leak occurred would you hear about it? If so, from who?

Some trust the regulations and assume the EPA is monitoring USTs. They also believe they would be notified if a leak occurred, but recognize that realistically regulators cannot catch everything.

If a leak is not covered in the news, about half of the group said they would still hear about a leak from different sources including nosey neighbors, smaller community papers, local politicians, and visual cues at the site. The other half of the group said they may not hear about a leak if it occurred. One respondent said you wouldn't hear about leaks in the city because we do not drink the groundwater.

Q. Imagine a gas station in your area has a leaking tank. Who would it affect?

Participants mentioned children, the elderly and pets as the most vulnerable groups. Some said they only care about if they are on private wells, and the wells are contaminated. One respondent (a retired engineer) pointed out that usually just soil is contaminated, and this doesn't really matter. A few individuals were concerned with local streams and the pollution ending up in the Bay and affecting Bay ecosystems and fauna. Some were concerned about environmental effects because eventually it could get back to humans.

Later in the focus group, one respondent (the retired engineer) downplayed the effects of LUST contaminants because the concentrations are parts per million (or per billion), which in his view is a very low amount. All respondents do not understand contamination units and test results, nor how much is bad for them.

Q. let's talk about petroleum leaking into the environment. What are the concerns?

One respondent mentioned health risks, but no one mentioned specific health consequences, until another respondent brought up cancer. (This latter respondent added that he attends training courses where they talk about Mesothelioma associated with asbestos exposure, and he expects cancer to develop years after exposure.)

No one explicitly mentioned vapor intrusion, but one individual mentioned vapors when filling your gas tank are likely harmful. Earlier in the focus group a participant mentioned health concerns from breathing in vapors.

One respondent, Joseph, who had previously downplayed contamination and parts per billion, also added that he cares a lot more about industrial contaminants and the poultry industry than LUSTs.

Q. Have you heard of any individual substances in petroleum products?

Respondents volunteered ethanol, and also recognized that lead used to be in gas. After being prompted, some individuals had heard of benzene but did not know anything about it, including the potential health risks. One respondent said he used to directly come in contact with benzene all the time because it was used as paint thinner. He said this is a mutagenic compound, not carcinogenic. One participant mentioned concern about birth defects. No one had heard of MTBE.

When prompted about the health risks associated with each of these substances, no one knew what specific health risks were linked with each of the chemical compounds.

Q. Do you think it is possible to cleanup LUSTs? How?

Respondents said yes, but cleanup takes time and money. Some believe that leaks can be stopped and contained, but reversing the damage is likely difficult. One brought up injecting

chemicals to cleanup. Two individuals, without being prompted, mentioned that the environment can naturally clean itself up.

Q. What do you think the main goals of cleanup are? What should they be?

Most state that minimizing health risks should be the goal, and that cleanup should get the environment as close as possible to pre-leak condition. Some mention that it is unlikely that all contamination can be eliminated. The participants find this unacceptable, but realistic. Some respondents believe that minimizing impacts on animals should also be a goal because environmental effects could come back to human health and some (e.g. crabbers and fishermen) rely on the environment for income.

Q. If regulators deem natural attenuation and ongoing monitoring a good substitute for active cleanup, is that acceptable to you?

Many assumed EPA regulates this directly. Some respondents find natural attenuation acceptable, assuming regulators weigh the pros and cons, but others question who determines this and even proposed an assessment by an independent third party. In general, several persons felt that the EPA is doing well, others objected to the political influences within the agency.

Q. Do you think home values would be affected by a leak at a gas station? How?

Most feel that a leak would be harmless to their health because they're on public water, but they still believe home values would decrease because buyers would just go to another neighborhood where there is no leak. One individual said there is always someone willing to take advantage and get a discount on a home. One respondent questioned whether people would know about a leak.

Q. How far away would a home have to be to have no effect on home values?

Responses ranged from a few blocks to 1 mile. Some said as long as it is outside their neighborhood prices would not be affected.

One respondent said it depends on how well people know the neighborhood. If you hear about a leak in some town on the news (e.g. Exxon Jacksonville/Phoenix case), then you assume that the whole neighborhood is affected because you do not know exactly where the LUST is.

Q. Do you feel property values would return to pre-spill levels after cleanup?

Participants generally said yes, but it will take time. It depends on news coverage and other reminders. Without these reminders people will forget about a leak quickly. Some said that the court cases regarding the Exxon Jacksonville LUST serve as ongoing reminders.

Q. Do you think the affect on nearby property values after cleanup would be different if land left vacant, versus a gas station?

One respondent said a vacant property is an eyesore and would decrease neighborhood quality even more.

Q. Suppose you were thinking about putting your house on the market and have heard that a leak was discovered at a nearby gas station, what would you do?

Mixed responses, including delay sale, test to reassure buyer, and wait until situation resolves itself because don't want to sell at discount.

Q. What did you learn from this focus group?

Some participants had never thought of leaks from USTs before, did not know leaks could cause damage, nor that USTs were regulated. A few learned of benzene and its carcinogenic properties. Similarly, some had never previously heard about gasoline additives that may be harmful. One said he learned that homeowners are concerned with soil contamination, which may affect home sales.

One or two respondents said they have no new knowledge or concerns as a result of the focus group.

Q. What will you do differently as a result of this focus group?

About half the respondents said they would be a more aware homeowner, and pay more attention to the local environment. Some individuals said they would research more on how gasoline is regulated, and pay more attention to their water bill and where their water comes from.

Slightly less than half the group said they would do nothing different.

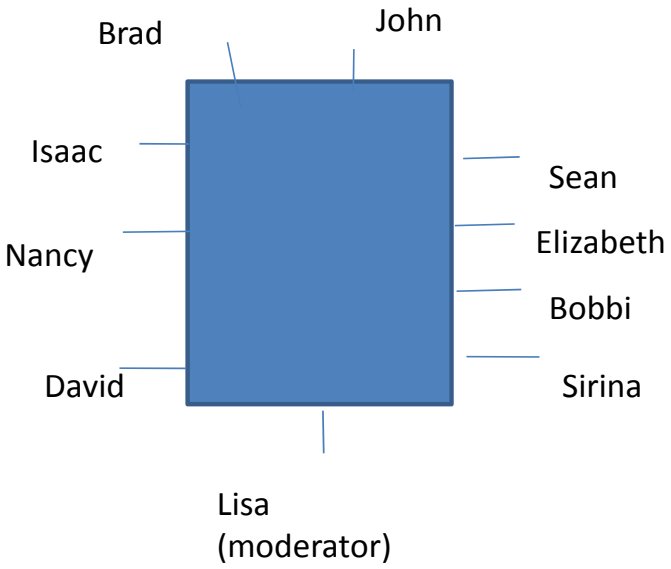
Summary and Impressions:

- These respondents are homeowners, whose homes are on public water.
- All participants seem to be able to recall when they bought their home and the sale price. They also seem to be able to give a hypothetical price if they were to sell their home now, or two years ago when the market was stronger.
- In general participants recognize that their water is relatively safe from most contaminants because they are on public water. Although there is some concern regarding sewage and water main breaks.
- Most participants do not look at the water test results from the city, but are aware of such tests. They generally trust the city. All respondents said they do not understand the test results, contamination units, nor how much contamination is bad for them.
- Participants feel relatively safe from LUSTs because they are on public water, but some were concerned about direct and indirect exposure through contaminated soils. There was also some concern regarding animals and local streams.

- Most of the participants heard of "underground storage tanks" and the potential issues from a leak.
- Over half of the respondents had heard of the Jacksonville Exxon leak, and some could give details such as contaminants, court verdicts, and that residential wells were affected.
- Respondents heard about Jacksonville through TV and newspapers. One participant learned of another LUST case by seeing activities at a gas station.
- If a nearby leak was not reported in the news, most felt they would still hear about it from nosey neighbors, community newsletters, local politicians, and/or from observed activities at the site.
- Cancer was the main health concern from a LUST.
- Some respondents had heard of benzene but knew little about it and its potential health effects. No one had heard of MTBE**.**
- Participants generally felt the goal of cleanup is to minimize health risks, but they recognize that costs are an issue.
- The general consensus was that a nearby gas station would decrease home values, but only if within sight of the home. This visual effect was also mentioned for cell towers and small factories.
- Participants believe there are minimal health risks from LUSTs since they're on public water, but believe that a leak in their neighborhood could still decrease property values.
- They feel cleanup could eventually lead to a rebound in property values, but are unsure of how long this would take. They believe news coverage and similar reminders will lengthen the time it takes for home values to recover.
- Hypothetically if respondents were trying to sell their home and a leak was discovered they would (i) delay the sale till the situation resolves itself, (ii) test for contamination to reassure buyers, and/or (iii) lower their asking price.

Focus group III
1 Dec 2009
Start @ 17:30
Owners of homes served by the public water system

Notes by Anna Alberini, checked by Denny Guignet
Last Revised: 12/8/09



Written Exercises:

Q: What kind of neighborhood do you live in? (e.g. city center, subdivision in a suburban area, rural, etc.)

Two (of the nine) respondents described their neighborhood as rural, two as urban, and the remaining majority describe their neighborhood as suburban or a subdivision.

Q: What kind of home do you own and live in? (e.g. single family home, twin, townhome, etc.)

The majority of participants live in single family homes, but three live in town or row homes.

Q: When did you buy your current home?

All but one participant listed the year (3 recalled the month) or provided how many years ago they purchased the home. All respondents purchased their homes within the last 8 years, except Bobbi purchased her home 25 years ago.

Q: Do you remember how much you paid for it? If so, how much?

All respondents provided the amount they paid for the home. Values ranged from $85,000-380,000, although the minimum value was 25 years ago.

Q: How much do you think your home is worth now?

Most participants were able to provide an exact amount. Nancy provided a range of $257,000 to 257,500. David could not give a value and just wrote a "?". Excluding David, the majority of respondents felt their homes appreciated in value, but two individuals—including one who had purchased his home in Oct. 2009)—felt that their property values were about the same.

Q: Have you done any improvements that you think might add to the value of your home, such as additions, renovations, put in a new central A/C system, changed the windows, etc.?

If yes, please list them below, and tell us how much you think each of these has increased the value of your home (if at all)?

Brad, who just bought his home in October, 2009 had not undertaken any home improvements. The rest of the group provided anywhere from 1-6 improvements; most listed three or four.

Five of the participants were able to estimate how much these improvements increased their property values. Nancy provided amounts for most of her home improvements, but was not sure how much her security system added to the value of her home. Estimates of home value increases ranged from $200 to 20,000. Three of the respondents did not provide estimates of how much the home improvements increased the value of their home.

Improvements listed included installing central air (3 respondents), new windows (4 respondents), new doors (2 respondents), new appliances (1), and a security system (1). Some repaired their roof (3) and siding/exterior paint (3), as well as refinishing hardwood floors (1), basement (1), and redoing their kitchen (2), and/or bathrooms (2). Two respondents added a deck to their home, and one installed a pool.

Oral Discussion:

Q. I'd like to hear about your home and neighborhood.

Most of the participants living in single family homes or row houses. They commented on the ethnic and/or multicultural character of their neighborhood, and many used the expression "well-established neighborhood." It is interesting that one participant—Nancy, the youngest in the group—lives in Canton, a former industrial area of Baltimore.

Q. When you looked for your home, what were "pluses" that made the neighborhood attractive?

Responses were diverse. Two respondents wanted "separation" from other people and homes. In one case, this meant that this particular participant selected the end unit of row houses. Two participants (John and Sean) paid attention to the general character of the neighborhood and considered "cars on the driveway," or "broken down cars" as telltale signs of the pride in the neighborhood (or lack thereof). One participant mentioned schools, as well as trees and parks. Another participant agreed, stating that he wanted a park because he needs it to walk the dogs. Another was looking for a Jewish neighborhood primarily because it was his wife's wish.

Other things that were mentioned included location and access to freeways, a sufficiently "broken up" [sic] neighborhood so that people cannot drive through, and a community pool.

Q: What are the negatives of a neighborhood/your neighborhood?

Nancy, the respondent who lives in Canton, mentioned that she lives near a restaurant. There is a parking lot between her house and the restaurant, but she suffers because of the garbage generated by the restaurant and rat/mice infestation. She even had to call an exterminator.

Sirina complained about children being attracted to the area just next to her house. She described this problem as a "challenge."

Isaac did not like his shared driveway, Brad complained about problems with a neighbor, Bobbi doesn't care for the speed bumps on her street and David noted that the other homes in his neighborhood are a lot older than his and not well maintained, which drives down property values.

In sum, people brought up problems that tended to be rather specific to the homes just next to theirs, and no one brought up environmental quality issues.

Q: The moderator read question 8 to the group, asking them to do the hypothetical scenario with…

…the construction project (duration of the project=9 months). People tended to ignore the dust, noise etc associated with the project itself and pay attention to (or inquire about) what was being constructed.

For example, one participant said that they are building a sports complex near her, and that she views that as bad because there will be people parking in the street. Another respondent (Nancy) said that they are proposing to build an underground metro station near her, with shops, and that she viewed this favorably until someone pointed out to her that it would attract undesirable people, noise, etc.

Bobbi thought that assisted living facilities would bring up property values, unlike what some other people said. Libraries, public parks, and schools were seen to increase property values.

…the supermarket. One respondent thought that supermarkets are good and bring up property values, but others said it depends on the type of supermarket and whether it's a chain v. another type of store. All agreed that it depends on the quality of the store. Sean added that it depends how many grocery stores are already in the area.

…gas station. All of them said "no thank you!" One respondent, Bobbi, immediately mentioned leaking tanks which contaminated the groundwater, and others mentioned traffic, noise and crime. Nancy, who lives in an urban area, mentioned gas stations may be associated with crime.

When the moderator asked whether there is a distance at which you worry (or no longer worry), respondent said that if you can see the station from your home, you worry.

…fast food restaurant. This was generally perceived as not desirable, primarily because there are already too many.

In sum, people had widely varying views of what increases/decreases property values. In this group, gas stations were perceived as disamenities and potential sources of contamination. The original intent of the question was to push people to quantify the size of the effect on property values, but our moderator did not really ask that question and did not push people for quantitative assessments.

Q: is everyone familiar with USTs?

Bobbi immediately answered this question, saying that there is a huge class action suit in Maryland, and more specifically in Harford County. (Note: at first, we thought she was referring to the Exxon case in Jacksonville, which is Baltimore County, but based on other comments she made later about "Fallston," we believe that it might be the 7-Eleven Store No. 22281/Citgo, 2400 Pleasantville Road, Fallston, Harford County, Maryland, Case No. 2005-0120HA [see http://www.mde.state.md.us/assets/document/OilControl/HarfCo_Fallston7_ElevenPleasantville_FactSheet.pdf] which has long history starting in 1989, complicated cleanup, and testing at nearby homes.)

She also added that the USTs are at gas stations but can also be found at industrial plants and other places.

All but one or two participants had heard of the term "underground storage tank" before.

Q: what have you heard/are you concerned about USTs in Maryland?

Bobbi replied immediately that you don't know that they are present until someone gets ill, they test the water and find that it is contaminated because of leaks from USTs. Elizabeth agreed that there is a lag between leak occurrence and discovery.

People said that they are concerned about contaminated water and where it's going, and about the soil.

Q: Tell me about the UST case you mentioned earlier

Bobbi volunteered that Exxon lost against residents, and that the latter were able to prove that Exxon knew about the pollution and did not do anything about it.

Q: What concerns you about leaking USTs?

People mentioned the value of the homes, and getting sick. Bobbi immediately said that they can remediate all they want, it'll never be clean. She also mentioned that contaminants could get into the Bay.

Brad—who had just recently bought his home—said there is a disclosure requirement and that you must tell the buyer, and so once someone knows about the leak, he or she certainly wouldn't want to buy the home.

Q: what types of risks are posed by LUSTs?

Most respondents worry about health risks. Bobbi said cancer, which will show up several years after you have been drinking contaminated water. Brad responded that everything causes cancer these days.

Sirina brought up fertility issues. Others mentioned fires, explosions, and skin disorders.

When prompted about risks to non-humans, people mentioned cat and dogs, and Bobbi raised the issue of contamination getting into the food chain because contaminated water makes its way into the fields.

Q: how else do you get exposed to the contamination from USTs?

Bobbi and Nancy mentioned that children who play outside may get exposed to contamination through grass and soil. David mentioned inhalation of vapors.

Q: How worried are you about gas stations in your neighborhood?

Most people felt that there was no particular reason for concern, because gas stations were 1-5 miles away. Although they are still not particularly concerned, one respondent said there was a gas station within 1 block, and another said within ½ mile.

Q: if there is a gas station near you and it has a leak, will it affect property values?

The group generally felt that this would be the case, especially if pollution migrates. Brad added that it depends if the leak "goes public."

Q: suppose that there is a leak, but that no health risk exists. Would that affect property values?

Elizabeth questioned immediately how one can guarantee that. Bobbi followed by saying that she would always worry about it happening again.

The group did NOT answer the question about the property values, and were not further pushed about it.

Q: the moderator read question Q24.

Bobbi felt that you would be affected if you frequently visit the stores near the leak or the leaking station, and Sirina said that she would go to the health department and ask them to survey the homeowners to find out if anyone is having health problems.

Q: the moderator read question 25.

Bobbi immediately replied that contaminated groundwater is the worst thing that can ever happen to you, and David said he would not buy a house with contaminated groundwater.

All respondents agreed that even if a home is on public water, contaminated groundwater would decrease the value of the home.

Q: would you try to sell your house if you found out that the groundwater is contaminated?

Bobbi said that she would try to find out who contaminated the groundwater and they must buy her house. Others said "try selling it, if you can find a buyer." Overall, all respondents said they would try to sell ASAP before the word got out, and all agreed they would not buy such a home.

Q: the moderator read Q26 (about BTEX and benzene in particular).

Bobbi immediately said that she has heard of benzene, that it is a known carcinogen, and that it causes birth defects.

Q: the moderator then tried to get the respondents to express their reactions when tests results are [various values] and the standard is 5 parts per billion.

Unfortunately, this exercise did not work out for four reasons. First, it seems to me that the moderator may have conveyed too much with her facial expressions and her difficulty pronouncing the names of the pollutant. Second, Bobbi would keep jumping up and dominating

the conversation. Third, we should have probably provided more context and displayed information with visuals. It soon became clear that respondents were not familiar with the measurements in "parts per billion" and needed to better understand what the legal standards meant. Fourth, we started with readings *above* the standards (e.g., 6.5 parts per billion when the standard is 5 parts per billion), and people may have "anchored" to a risky situation, which may have led to overreacting even when the hypothetical test results were below the standards or negligible.

Briefly, at 6.5 parts per billion people would worry about it even the authorities said that it's no big deal, and they would start using bottled water, filter and test the water for the entire house. All the participants worried about their drinking water, even though they are on public water. No one gave quantitative assessments on changes in property values, instead they just discussed their concerns.

Elizabeth was the only person in this group that actually tried to calculate by what percentage the test exceeded the standard.

At 4.5 parts per billion people felt that they did not need to do anything about it (Brad), could sell your home but had to disclose the test results (Bobbi), wanted regular updates from the authorities and would bring it up with their councilperson (Sirina), want a tax break for having to put up with pollution (Brad).

Q: Would you press for cleanup at 4.5 parts per billion?

Most respondents said yes, if this was more than the normal level one should expect in the water. Again, Elizabeth was the only person in this group that actually tried to calculate by what percentage the test was below the standard.

Q: what if the test results are 0.5 parts per billion?

Most people felt that they didn't need to worry, but Bobbi insisted that she'd want to know what the background levels in the water are. Elizabeth said she doesn't necessarily trust one measurement of 0.5 ppb because of human error, and weather and other natural fluctuations.

Q: does the background level of these pollutants matter to you?

Here, some respondents said that they did not want any excess contamination above the background levels.

Q: Will the property values be affected if the test results are 4.5 parts per billion?

One participant noted that the standards could change in the future. Two more participants pointed out that there are many other sources of exposure (e.g., fish), and that there are only so many things you can do to protect yourself from carcinogens.

Throughout this discussion, we were under the strong impression that people were answering the questions as if they were exposed to contaminated groundwater through drinking. We asked the moderator to remind them that they do not drink contaminated groundwater because they are on city water, which comes from someplace else.

Some respondents (e.g., Nancy) were admittedly confused. Others feared the potential for contamination anyway, and one respondent (Sean) noted that leaks could contaminate the city water supply.

Some respondents emphasized that while they are not affected by the contaminated groundwater, the land is contaminated, and Bobbi insisted that eventually the contamination will make its way into the water supply. Sean said even if you do not drink the water, the contamination is still there and you could potentially be exposed. David said if the contamination affects his land he would care, otherwise he would not. Nancy said that she doesn't really care, but then she doesn't have kids that could be playing outside and potentially be exposed. Isaac said that even if he is on public water, contamination would still bother him, but not as much.

Q: our moderator then turned to hypotheticals about MTBE testing results. For MTBE the standard is 20 parts per billion.

As soon as MTBE was mentioned, Elizabeth and Bobbi recognized it as the compound in the notorious Jacksonville Exxon case. Elizabeth wanted to know what MTBE stands for, and Isaac asked whether it is cancerous.

Brad pointed out that the standard for this chemical is higher than that for benzene, so either the background levels are higher or it is less dangerous than benzene.

Q: our moderator asked people to imagine that the test results are 26 parts per billion.

Elizabeth again computed the percentage above the standard.

Bobbi said that you can't drink bottled water for the rest of your life, which led us to wonder whether again she had thought of herself as being directly affected by contaminated groundwater even though she is on city water.

Sean said he does not know enough about benzene or MTBE to really tell the difference.

Q: our moderator then asked respondents to think about 18 parts per billion.

Bobbi started questioning how "they" come up with these numbers—do they pull them out of the air? Nancy questioned how people can sell their homes like this. Overall, most participants are just as concerned.

Q: our moderator asked who they think sets the standards.

Most respondents said the EPA, but Bobbi said it was "the lobbyists."

Q: our moderator queried people about test results equal to 2 parts per billion.

Elizabeth asked whether these low levels occur naturally. Bobbi and Brad started talking about radon.

In sum, people did NOT provide quantitative assessments of the effects of such tests results on property values, and they were not probed by the moderator.

Q: the moderator read question 30. At what level do you worry about your ability to sell your home?

One participant, Sean, respondent to this question. Unfortunately, our notes are conflicting. Anna wrote that he said "if the rest result is below the limit, you don't worry about the contamination for yourself, but you must disclose it." Denny took his comment to mean that you do not have to disclose if it is below the legal limit, but he would still worry about it if the word got out.

Q: the moderator read question 31.

Respondents were even more upset about a lake or stream becoming polluted than about their own groundwater. Bobbi and Elizabeth mentioned a couple of (old) Superfund sites in Baltimore plus an aluminum can plant where chromium was leaching into the Bay (note: this was a Maryland Voluntary Cleanup Program site).

In general most think this would decrease property values. David said this would be a large decrease. Sean stated that if people were looking for a home near a park, then they would just look elsewhere. Brad felt that a lot of people would be affected by a contaminated park so it would likely be cleaned up.

Q: the moderator asked question 32.

Bobbi volunteered that they take the dirt away and the contamination becomes someone else's problem.

Brad noted that it's very expensive but it must be done, and John said something about seeing gas stations pulling up tanks and replacing them every few years.

Q: do you think it is possible to totally clean up?

Brad said that it depends on how large the leak was. Bobbi said no, not completely.

Q: How long do you think it takes to clean up leaks? (Q33)

Brad said it depends on the magnitude of the leak, and Sean said that weather also plays a role. Sirina said she does not know enough to answer this question.

Q: the moderator asked question 34. If a nearby leaked was cleaned up, do you think your property would go back to the original pre-leak values? If so, how long would this take? If not, why?

Sean said that he would not buy right now, because you don't really know that it's safe, and that he would wait 10 years.

Elizabeth felt it would take decades.

Brad said that technology might tell us more about risks in the future, and Bobbi said that technology would develop better cleanup methods.

Q: the moderator read question 36, the one about active cleanup v. natural attenuation.

Some people wanted to know that everything is being done to get rid of the pollution, and so they thought that neighborhood A was better off. Some people felt it was "slightly" better off, others 110% better off.

In sum, they would all refuse to buy a home if there is a leak in the neighborhood, but concur that they or someone else would not care if the leak occurred 20 years ago.

Q: the moderator asked question 39. Suppose you were buying a home, do you think you would be aware if there was a UST leak in the neighborhood? If so, from where/whom?

Most said if it was reported in the news, then they would not hear about it.

Q: the moderator asked question 41. How would learning of a leak affect your decision to buy?

Nancy said she would not buy. Bobbi said she wouldn't personally buy but 10-20 years later someone in the market will. David said he wouldn't care about a past leak and would still buy the home if he really liked it otherwise. John made the comparison to homes built on a previous nuclear site in CA.

Sean asked the most interesting question to the group, asking who researched LUSTs when buying their home. Everyone said they did NOT research LUSTs when buying their home.

Q: Has anyone thought about LUSTs before tonight?

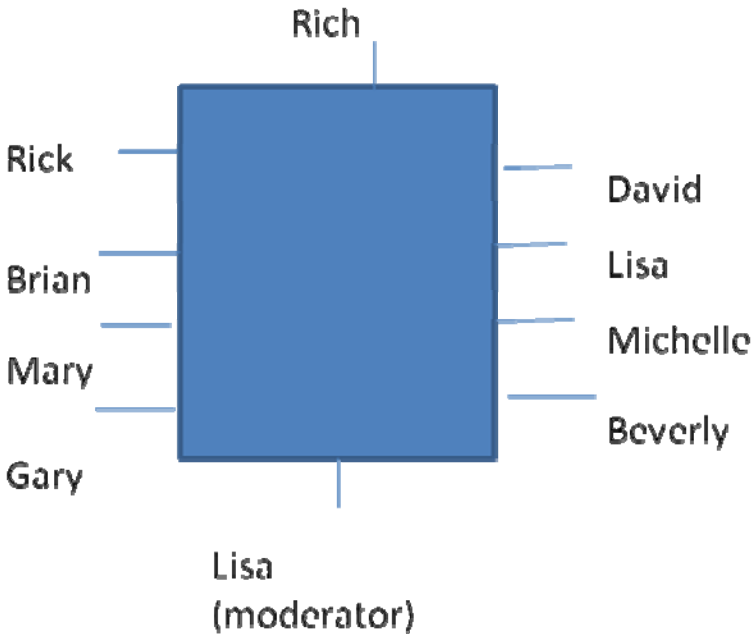
Some said yes, but the majority said they have not because they are on public water.

Summary

- The goal of the focus groups was four-fold. We wanted to 1) test if people are capable of assessing the effect of changes in the structural characteristics of the home and in characteristics of the neighborhood on their property values, 2) test risk communication language where we told them test results and gave them the legal standards (in parts per billion), 3) discuss health risks v. ecological risks, 4) investigate some of the same issues as in the previous focus groups.
- When asked to list renovations etc. and assess their effect on property values, people were capable and willing to provide dollar values. (This was done in a written exercise.)
- People got easily distracted by extraneous details when asked to assess impacts on property values of a construction project, a supermarket, etc. They were able to make a statement about the direction of the effects on property values (e.g., property values increase or decrease) but they did not volunteer the magnitude of these effects. Unfortunately our moderator did not push them enough on this one.
- The exercise on (say) benzene test results equal to X parts per billion when the standard is 5 parts per billion did not work. See comments on page 7.
- It did not help that we had one obviously dominating participant who was very overreactive on contamination issues.
- This group was very sensitized about the Exxon case. One participant also appeared to be a party in a lawsuit at another LUST site.
- This group reacted to the various questions as if their homes were served by well water, even though their homes were on city water!
- People mentioned cancer, fertility problems, skin irritation as possible consequences of exposure to benzene (and MTBE).
- People were concerned about the effects of these pollutants on the Bay, and on plants and trees.

Focus group IV – Private Water Group
01 Dec 2009
Start @ 8:00 pm

Notes by Denny Guignet with checks and edits by Anna Alberini.
08 Dec 2009



Written Exercises:

Q: What kind of neighborhood do you live in? (e.g. city center, subdivision in a suburban area, rural, etc.)

All respondents said they live in a rural or suburban area, some explicitly said they live in a subdivision.

Q: What kind of home do you own and live in? (e.g. single family home, twin, townhome, etc.)

All nine respondents live in and own a single family home.

Q: When did you buy your current home?

All participants recalled the year they purchased their home, four gave the month, and one gave the exact day (back in 1999). All respondents had purchased their home in 1999 or later, the most recent being in 2007. One exception was Gary, who purchased his home in 1982.

Q: Do you remember how much you paid for it? If so, how much?

All seemed to be able to recall how much they paid for their home. Values ranged from $75,000-780,000.

Q: How much do you think your home is worth now?

All gave an exact amount as to what they think their house is worth now, except one individual gave a range of $550,000-600,000, and another gave a lower bound, writing "$300,000+." Six of the eight respondents felt their home was worth more now, but two felt their home value decreased. Current home values ranged from $275,000-800,000.

Q: Have you done any improvements that you think might add to the value of your home, such as additions, renovations, put in a new central A/C system, changed the windows, etc.?

If yes, please list them below, and tell us how much you think each of these has increased the value of your home (if at all)?

Rick, who bought his home in 2007, said he made no improvements. Lisa listed several improvements, but did not give an estimate of how much they increased her property values. Most of the others gave at least three improvements, along with an estimated increase in property values, which ranged from $2,000-200,000.

The most common renovations mentioned were finishing basement (5 respondents), building new patio/deck (5 respondents), and treating or installing new windows (4). Several listed outdoor projects such as landscaping (3), expanding or adding a driveway or garage (2), adding a pool or hot tub (2), and one respondent built a shed. Some listed just general renovations (1) or additions (2) to the home. Others explicitly mentioned redoing their kitchen (2), and bathrooms (1). Other home improvements listed were new carpets (1), refinished hardwood floors (1), new heating system (1), water softener (1), and installing a generator (1).

Overall, based just on the written exercises it seems individuals were able to assign some value to how these familiar home improvements affected the value of their home.

Discussion:

Q: Where do you live? What do you like and dislike about your neighborhood?

Most respondents live in Carroll County, and one or two live in Baltimore and Howard County. Many said they live in rural areas, some subdivisions of 8-20 houses surrounded by farms. Several participants live near farm preservation areas. Rich mentioned he lives near the Gunpowder River.

Q: How close is nearest commercial area to your home?

Brian said a 5 to 10 minute drive. Rick said about 7 miles, about a 10 minute drive.

Q: When you bought your current home, what types of positive features did you look for or notice in the neighborhood? How did they affect your decision?

Gary looked at proximity to hospital and nearby shopping centers. Both Gary and Beverly looked at school quality. Beverly desired the seclusion of living in a rural area. Similarly, David said that price and size were the biggest factors, but he desired the quiet rural atmosphere. Michelle looked for a relatively flat parcel to build a playground and for other recreational activities.

Q: What about negative features? How did they affect your decision?

Beverly noticed the lack of sidewalks and worries about fast cars on busy roads. Brian agreed. Rick, who previously lived in Section 8 housing, now has kids and crime was a deterrent when buying a home. Rick mentioned that his wife felt the lack of walk-ability in rural areas was a negative at first, but now she is used to it.

Without being prompted, Nancy (a stay-at-home Mom), mentioned she had always had public water, and that private well water was a negative because of safety concerns, as well as scarcity and convenience issues. Rick always has had well water and said these were not a concern to him.

Q: Does anyone else have concerns with their well water?

Gary mentioned his parents had problems with their water pumps, which they have had to replace. Although he has a private well now, he would consider paying for public water to avoid these concerns. Beverly mentioned that private wells use electric pumps, so if electricity goes out you can't get water, which is not an issue for public water. Beverly also mentioned that her children needed fluoride treatments.

At one time Rick was concerned because his daughter's hair fell out. They had their water tested and it came back negative for any contaminants. He later found out the cause was unrelated to their water.

Q: Now let's go through a series of hypothetical scenarios. Let's imagine that some changes happen in your neighborhood. How, if at all, do you think the following changes would affect property value in your neighborhood? How much would your own property value increase or decrease?

A construction project is undertaken within ¼ mile of your home, which results in a lot of dust, truck traffic and noise. Construction will be continuing for about 9 months.

All said it depends on what is being built. For example, a library had been built near Brian's home, which he felt increased his property value. As a counter example, Beverly felt the widening of roads decreased her property values. Rick said it depends on the household, for example a new recreation center is being built near his home, which he feels is a positive because kids have a place to go, and would thus increase property values. However, many of his neighbors were in an uproar because the center creates light pollution and will increase traffic.

Gary mentioned that new construction projects will need to tap into the local aquifers, and worries about water scarcity.

Q: What if your neighborhood is now put on the public water system?

Many felt that a public water hook up would increase home values, but Rich was not sure because this would encourage further development. He said his neighborhood is in an ongoing fight to keep the area rural. Mary mentioned she only drinks bottled water anyway.

Q: What if a new gas station is opened within 1 mile of your home?

Without being prompted about leaks, Gary brought up a leak at a Shell station in Carroll County. He said this happened 5-6 years ago, and that people couldn't sell their homes. Brian said he is 5 miles away from that leak, and at this distance he does not think it would affect his property values. He said he knew about this leak when he bought his home, but did not make the connection at the time. Rich brought up the role of publicity and the Exxon Jacksonville case. Someone else had heard of a LUST in Virginia.

David said he would not worry about a LUST if it was 1 mile away. Rick said he wouldn't worry about because he "ran the tags" on his well and found that it taps a deep clean aquifer from Ohio.

Since the conversation went right to leaks, no one brought up any other amenities or disamenities associated with a gas station. Notice that in these cases no one gave an actual value increase and the moderator did not further probe into this.

Q: Has anyone else "ran the tags" on their well?

Everyone said no. Beverly said she recently had a new well drilled so she knew some of the specifications for the well (e.g. depth).

Q: Is everyone familiar with the term "underground storage tank"?

Some not familiar per se, but, for example, Michelle sees trucks filling USTs at gas stations so she knew there was some type of storage underground. Gary seemed somewhat aware of the precautionary design of USTs.

Rich mentioned he found out about a leak because the gas station near him was closed for a day. Apparently water had leaked into a UST causing problems to automobiles. He actually used the watered-down gas in his lawn mower and other outdoor tools. Exxon had later compensated him for damages.

Rick said he had withdrawn a bid from one home he was looking at because it had an old heating oil tank, and he worried about future liability.

Q: Did anyone consider USTs at gas stations or farms when buying their homes?

Gary said he didn't really think about it at the time. Many said they tested their water when they moved in, and left it at that.

Q: What are the consequences of UST leaks?

Water contamination was the first concern. Lisa worries about runoff into the Bay. Beverly added that she loves her big trees and gardens, and wonders whether these plants could be affected. She also mentioned that children play in small streams in her area.

The conversation then shifted to drinking water. Brian recognizes that public water comes from a separate source and would not be contaminated by a nearby LUST, but wondered whether contaminants can seep into public water pipes. Rich is concerned because this is underground, and who really knows where the water in an aquifer came from, or where it is going. Rick followed up, stating that the ground is a natural filter, and since his well taps a deep aquifer, he feels somewhat safe from local contamination.

David said he is more concerned about septic tank leaks from neighbors.

Q: When you got your well tested, what did you test for?

Roughly half of the respondents did not seem to know. Gary said he tests every 6 months for pH, bacteria, and other general things. He never asked about, but knows he does not test for, gasoline contaminants. Brian tested the acidity of his water, and speculates that gasoline would affect that (which I think is incorrect). Rich has a friend who lives near the Exxon Jacksonville leak, so he knows that they can test for gasoline-related compounds.

Q: How do you think people get exposed to the substances from a leak?

Drinking water was already discussed. Gary mentioned exposure during bathing, and Rick mentioned that people could maybe be exposed if local produce was contaminated.

Q: Suppose a leak occurred at a gas station near your home. Would your property value be affected, and if so, by how much?

Rich said his property values would not be affected because the nearest gas station is 2 miles away.

Most participants reflected this and similar questions about the amount, or even the direction, of changes in property value. Right away they went to how concerned they are.

Mary is concerned for children. Gary is not sure if he is concerned or not because there is a large lag between when a leak occurs, when it is discovered, and when he finds out about it. He recognizes it may take a long time for contaminants to migrate, and questions how long a leak may have been going on, and whether people even monitor these things. David responded that UST owners would likely find an inventory mismatch if a leak was occurring. Brian mentioned that all the stations are downhill from his home, so maybe he shouldn't be that concerned.

Q: So we have concerns, but how would property values be affected?

Rich brought up that home values around the Exxon Jacksonville case decreased significantly, and that no one would touch a house there for years. He said there are so many homes for sale out there, why bother buying a contaminated home. Gary believes that sellers would have to disclose information. Michelle again raised the role publicity plays.

All respondents agree that even if their groundwater is clean, a nearby leak would decrease property values. Gary said it all depends how close the home is to the leak, if it cannot be seen directly from the home, then there may be no effect. David responded that distance to the gas station may not matter, but distance to the closest contaminated home is more important.

Q: Someone compared LUSTs to radon in homes, what is the difference?

Brian said gas is "icky." Rich followed up stating that radon is all over the place.

Q: Has anyone heard of BTEX or benzene before? What about "parts per billion"?

No one had heard of these terms. Everyone's faces went blank when BTEX, ppb, and other technical terms were brought up.

Q: By law benzene must be below 5 ppb. Suppose there is a $300,000 home, how would the price be affected if the groundwater had 6.5 ppb benzene?

Brian expressed that 5 ppb is so small, and thus the contaminant must be really bad. He then volunteered a 20% decrease. Rich said a 25% discount. Beverly said that even if you don't consume the water, the property is still contaminated.

Mary believes that you couldn't sell this home. Rich sort of agreed, questioning who would buy this home. Michelle said she wouldn't buy. Beverly questioned whether the bank would even get involved with such a purchase.

Some said it is hard to answer without more structure and information. For example, David needed more info in this hypothetical situation. Beverly wanted to know whether the pollution concentrations were increasing or decreasing over time.

Q: How would the price be affected if the groundwater had 4.5 ppb benzene?

Even though this is below the regulatory threshold, Gary and Beverly felt prices would still decrease. Gary followed up saying that he needs more info, and if experts said there were no health risks then maybe the price would go down to $250,000. David sort of agreed, saying that there may be a simple solution like spending a few hundred to drill a new well. Beverly sort of jumped on board. She compared this to lead, mold, and asbestos in homes. There are laws regulating these things to make them safe. If LUSTs can be resolved in the same fashion then people will buy these homes as they did with homes that had/have these problems. Brian disagreed, saying he would never consider buying because health concerns for his children.

Overall, it seems to me that providing a benchmark amount (here, $300,000) helps individuals volunteer some amount of depreciation, whereas in the previous public water focus group (where no hypothetical home value was given), everyone just said the home is unsellable.

Q: What if LUSTs is an addressable issue and this 4.5ppb will decrease over time?

Prices should then rebound according to Beverly, but the contamination needs to get below the 5 ppb legal limit. Gary said it depends on how much it costs to address the issue and who incurs this cost. This will affect his bid on the house.

Lisa said that leaking tanks are a new issue to her, whereas asbestos has been studied for awhile, so she does not trust the benzene standards as much. Rick agreed, stating that he does not understand what this limit means. He also said if you can just install a filter to eliminate contamination, then neither 4.5 nor 6.5 ppb matter much.

Q: How would the price be affected if the groundwater had 0.5 ppb benzene?

Brian said if there are any other homes with zero contamination, then he would take those. Rich agreed, saying he would rather have zero pollution because of future uncertainty. According to Gary, even at these low contamination levels the TV and news could deter buyers, making these properties unsellable.

One interesting point regarding the standards and different water concentrations is that no one mentioned cancer, whereas this dominated the previous group discussions.

Q: Have you heard of a compound called MTBE?

David knew that this was in some of the contaminated wells around the Jacksonville Exxon leak. He thought that these additives corroded the tank and caused the leak (which is incorrect).

Q: MTBE has a bad taste and smell, like turpentine. How does this affect your answers relative to benzene?

Beverly and others agreed that nasty smell and tastes makes a difference

Q: Suppose there was a leak at a nearby UST. Your home and most of your neighborhood are not directly affected by the contamination. However, the contamination reaches a park, lake, or stream in your neighborhood. Would the property values in your neighborhood be affected? Why? Would your own property value be affected?

Michelle said that this degrades neighborhood quality, and thus prices will decrease. Again mentioned the role of "bad press." Gary said that if you're looking to buy in a neighborhood with a park, then you'd rather buy in one with a clean park.

Q: After cleanup, how long do you think it would take for property values to rebound?

A few said a generation. Gary volunteered 20 years. Rick disagreed saying that the public loses attention quick, and people will move in from other areas. He speculates 5 years. Rich disagreed, saying that it has been 5 years since the Jacksonville Exxon leak, and he is not aware of any sales. He recognizes that this is partially because the case is still publicized and court activity is still ongoing.

Q: Have you heard of ways in which leaking UST sites are cleaned up?

All participants said no. Beverly said the tanks are removed. She compared to large tanker oil spills, saying UST leaks are underground and we cannot see whether it is being cleaned up. Rich agreed, stating that you never see any evidence. He then asked if it can be cleaned, and many participants believe it can't.

David said nature will eventually cleanup the contamination. He mentioned that stations are everywhere, and we don't know if a leak occurs or not, we only hear about a few.

Q: Recall the $300,000 hypothetical home, how would prices be affected after cleanup?

Gary said selling may not be an issue because people from out of town will move in. However, he would not buy. Mary stated that you may still lose value on the home, especially if visual cues (e.g. big filtration system in home) are present.

Q: Let's consider two hypothetical neighborhoods that are identical in all respects, and in both there has been a leak at a gas station. In both cases, soil and groundwater have been found to be contaminated.

In neighborhood A, the agency in charge has announced that there will be a cleanup with excavation and removal of contaminated soil and groundwater treatment. In neighborhood B, the agency has announced that it has chosen natural attenuation.

How would just these announcements (before cleanup begins) affect the property values in these neighborhoods? Would they be affected? If so, will they be affected in the same way? If so, will property values eventually go back to the levels before the leak? If so, will they rebound in the same way in both neighborhoods?

All participants agree that the announcements will decrease prices in both neighborhoods. Brian said that prices in neighborhood A will drop more because the active cleanup makes the issue seem more pressing. Rick argued that a more active cleanup may be desirable, because it reassures him that the situation is being taken care of. Michelle agrees, she wants to see cleanup occurring.

Lisa said she wouldn't want either neighborhood. She perceives natural attenuation as slacking off.

Beverly again would like to know the contamination trends over time. For example, are the contaminants reduced at same rate? Are these methods comparable?

Summary:

- This was a discussion with homeowners in private groundwater well areas in Baltimore, Carroll, and Howard County. These residents live in rural or rural/suburban areas.
- All participants could recall when they bought their home, and for how much. They could also provide an estimate of the current worth of their home.
- All respondents who made improvements to their home could list these improvements. All but one could state how much each improvement increased their property value. It is reassuring that most could do this exercise for incremental changes in home structure characteristics, because these attributes are likely more familiar than neighborhood attributes (including environmental ones, such as LUSTs), which may be more difficult to assign a value to.
- All respondents have at least tested their groundwater wells when they first moved in, and some test regularly. Most were not sure what exactly they were testing for, but likely not petroleum contamination.
- The participants understand that they share their aquifer with neighbors and others in the area. Scarcity and quality issues were sometimes mentioned.
- Not everyone had heard of the term "underground storage tank," but they did immediately recognize the concept and could link it to gas stations.
- The entire group admitted that LUSTs were not something they explicitly considered when buying a home.

- In general most do not personally worry about leaks because most live a mile or more away from a gas station. This demonstrates that people recognize the localized nature of this disamenity.
- Most of group, but not all, had heard of Jacksonville Exxon leak. A well publicized leak at a Shell in Carroll County was also known by many, and often mentioned. The role of the media was mentioned periodically by different respondents throughout the discussion.
- Although this is not something they are concerned with on a regular basis, participants would mainly worry about health effects. When probed about other concerns, some said they were concerned about environmental effects to their gardens, trees, and streams, as well as eventual contamination of the Bay. Some of these environmental concerns stem from indirect exposure to humans (e.g. consuming contaminated plants or animals, exposure to surface water). Participants were also concerned with contamination to local environmental amenities (e.g. parks, lakes, streams) because these contribute to neighborhood quality, which affects house prices.
- This group could easily link leaking tanks, to groundwater contamination, and hence exposure to humans via contaminated drinking water.
- The participants recognize the connection between neighborhood characteristics and property values, and that such changes could be perceived as both a positive and/or negative. Reflecting this, respondents were sometimes able to say whether prices would increase or decrease, but when asked to give an actual amount, the conversation often shifted to what concerns them and personal stories.
- Similarly, participants struggled with giving an actual amount as to how different LUST situations would affect their property values. Whether such homes could be sold to begin with was often debated. The entire group agreed that even if the groundwater was not contaminated, prices would still decrease for homes near a LUST.
- Technical terms like “parts per billion,” “BTEX,” “MTBE,” “benzene,” etc. seem to be difficult for individuals to grasp. It is unclear whether providing the regulatory threshold (e.g. MCL) helped participants in interpreting groundwater concentration test results. They questioned what the legal limit means, who set it, and why at that amount? Trust and future uncertainty, as well as a large option of non-contaminated homes in the actual market, led individuals to prefer zero contamination, or deem a home as unsellable. They were thus often unable to make the tradeoff between contamination and price.
- Near the end of the discussion people started to relax their unsellable position. Some agreed that if the problem can be addressed, then the house could be sold, but at a discount. Respondents often followed such comments by saying they would not personally buy the home, but someone would.
- Providing a hypothetical home value (e.g. $300,000) along with groundwater contamination concentrations, and the regulatory limit, seemed to slightly help people make this tradeoff. For example, some participants could give a percent depreciation or an actual amount. However, many expressed the need for more information. Perhaps a more structured choice question could give some additional information, but also force them to make a tradeoff with the information provided.
- Notice from the written exercises that most participants had no problem providing estimates of how much home improvements increase their property values. This is likely because people are more familiar with these attributes, relative to LUSTs and other neighborhood characteristics. It may be easier for individuals to map attributes of the

actual property to its value, than it is to map attributes of the surrounding area to property values.

- The group did not reach a consensus on how long after cleanup it would take for property values to rebound. Responses ranged from 5 years to a generation. The role of publicity was mentioned.
- Periodically throughout the conversation it was mentioned that these leaks are underground and we cannot really see what is going on. The effect of visual cues (such as cleanup activities, filters in homes, and gas stations) on public concerns and property values was sometimes discussed.

LUST Three-on-ones 8 March 2010

By Anna Alberini and Denny Guignet

12 March 2010

This report is organized as follows. We describe the questionnaire used in the three-on-one discussion groups and the experiment "treatments" in section A. The actual notes can be found in sections B-E. Section F provides a summary of findings.

A. Structure of the questionnaire used for the 8 March 2010 three-on-ones

Concerned about the fact that in the second round of focus groups people associated contaminated groundwater with adverse health effects even if they do not drink the groundwater, we decided to interview both people on private wells and on city water, and to ask them to consider either groundwater contamination or soil contamination. Assignment to this treatment is random. Our reasoning is that if the soil—and only the soil—is contaminated, people on wells and city water face the same exposure pathways (or lack thereof). We wish to see if their assessment of property values reflects this situation. (Clearly, this reasoning works if people do not question the mechanics of contamination that we posit to them, and do not assume that the groundwater is contaminated if the soil is.)

In the valuation exercises described below, people were told to assume that the homes would be served by the same source of water as their current home.

The questionnaire was structured into seven sections. In section A, we inquire about the neighborhood the participant lives in (urban, suburban, rural) and then ask a series of questions about the respondent's home, including type, whether the respondent owns it or rents it, and the size of the home and the size of the lot. We then ask the respondent to tell us how much he thinks the home could sell for, if he were to put it on the market in the next few months. The answer to this question is important because it forms the basis of the assessment the respondent is asked to make in sections E and F of the questionnaire.

It is important for us to understand whether people are capable of assessing the impact of various factors on home values, and so we first ask people to tell us if certain home renovations (e.g., kitchen, energy-efficient windows) are likely to affect the value, and if so, by how much. We then ask people to consider changes in the neighborhood, including a new school, a new gas station, and a fast food restaurant. Since earlier focus groups pointed to the possibility that a gas station may be an amenity and a disamenity at the same time, we asked the respondent to consider a gas station within ½ mile and one within 2 miles of their home.

Section B is short and to the point. We inquire about the source of water at the participant's home, then ask whether the water at the respondent's home was ever tested, and, if so, what the results were. Since we realize that the water could be tested for several reasons and upon different parties' initiative—because test results are required when the home is bought or sold, because the state environmental protection agency wishes to do so, or because of the respondent's concern about water quality—we simply say "Has the water at your home ever been tested?"

In section C, we wish to find out what the respondent knows about several types of water or soil contaminants. To ensure consistency across the two variants of the questionnaire, we use the same list for both the contaminated groundwater and contaminated soil versions. The list is comprised of arsenic, coliforms, benzene, cyanide, ethylbenzene, lead, toluene, xylene.

Many respondents had heard about at least one or two of these contaminants, but they did not necessarily associate it with the water or soil context.

We also ask whether people had heard of "parts per billion" (for water) or "parts per million" (for soil) before, then provide a definition for these terms and explain in which context they are used. This is followed by a table with the federal MCL for benzene, toluene, ethylbenzene and xylenes in drinking water and the state limits for the same substances in soil. We use these substances because they are the by-products of the petroleum contamination of concern at gas stations, and are regulated at the federal or state level because of their adverse effects on human health.

This section ends by asking the respondent whether he has heard of leaking underground storage tanks, providing a definition of USTs, and a brief explanation about leak events.

Having informed respondents about contamination in groundwater or soil, and leaking USTs as a possible source of them, we begin section D by specifically inquiring about the respondent's familiarity with homes in his town or neighborhood contaminated by pollutants coming from a LUST, and proximity of these homes to his own. We then ask the respondent to tell us what they think the consequences of a leak are, and how people can get exposed to the substances from a leaking UST.

Question D5 is very important because it asks people to imagine that there is a leak from a UST near his home, but there are no risks to human health or the environment. Would they still be concerned? Why? The purpose of this question is to see whether people's estimated effects of leak on property values (to be elicited later in the questionnaire) reflect concern about health or the environment, uncertainty about future events of the same type, or stigma ("I know there are no risks, but do other people know?").

We then move to the first series of valuation exercises. In earlier focus groups, we found that it was counterproductive to ask people to think about pollution at their home right from the beginning, so in an effort to keep them clear-headed about the effects of contamination, we showed aerial photos of a suburban neighborhood in Maryland that is not the respondent's own but is sufficiently generic-looking that it may be similar to many people's area of residence. In devising this exercise, we wished to obtain a "neutral," almost professional, assessment, without the outrage and anxiety about contamination in one's home that we had observed in previous focus groups. The first photo does not contain any captions about homes, facilities, etc. and we have respondent simply compare that to their neighborhood, so that we can get a sense for their familiarity with this "terrain."

In question D7, we identify the commercial structure in the right of the photo as a gas station, and we ask people to imagine that there has been a leak from this station, and that the groundwater (soil for the soil variant of the questionnaire) has been tested for benzene and found to have the levels displayed in the second photo. We inform the respondents that the homes shown in the photo are served by city water (if the respondent is served by the public water

supply system) or private well (if the respondent's home is on a well), and that prior to this even the average home sold for $400,000.

Will the value of three homes placed at various distances from the gas station and with various test results be affected by this event? What is the effect on the value on each of these homes?

Can the respondent guide us through the reasoning he followed in arriving at these assessments (question D8)? And at what distance will home no longer be affected by this leak (question D9)?

Will the values at each of these three homes rebound if cleanup is done and the benzene contamination is removed (question D10)?

Question D11 is similar to question D7, but this time we say that the contamination is contained within the gas station and does not migrate to nearby homes.

Since participants were willing and capable of engaging in these questions, they provided a nice warm-up to the questions in section E, where we ask people to imagine that they are putting their house on the market, and that they learn that a leak has occurred at a nearby gas station. What would be their asking price if the home is tested, and found to have concentrations of benzene in groundwater (soil) (ii) above the standard, (ii) positive but below the standard, (iii) equal to zero, and (iv) a nearby home is tested and found to have a low but positive concentration of benzene?

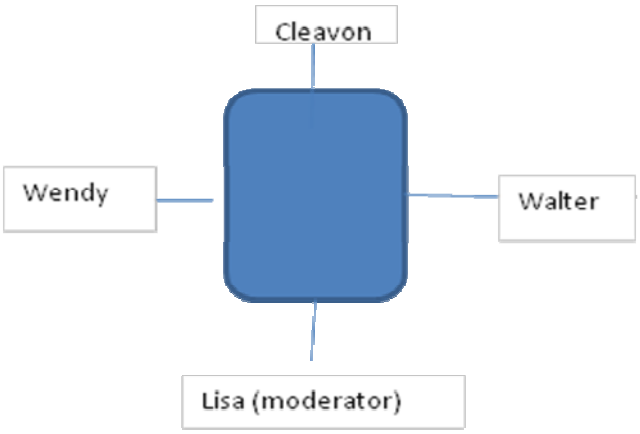
While section E ask the respondent to imagine himself in the role of the seller, in section F we ask him to imagine being the buyer of a home. We provide a scenario where the respondent has narrowed his options to two homes, home A and home B (to be described below), which are located in neighborhoods similar to the respondent's and both served by the same source of water as the respondent's current home. There has been a leak at a gas station near home B, and the test results at home B indicate that benzene is present in groundwater (soil) at a concentration of X ppb (ppm). In contrast, there is no benzene at home A. We specify amounts above or below the value of the current home for each of home A and home B, and ask the respondent which he would choose between these two. At this time, we elected to keep this a "forced choice" question (with no "would buy neither" response option).

The discrete choice question is then repeated by changing the levels of the attributes describing homes A and B. In sum, we ask conjoint choice questions where the attributes describing the alternatives are (i) the presence of a gas station near the home, (ii) the concentration of benzene in groundwater (soil) and (iii) difference in price with respect to the value of their current home.

Section G concludes the questionnaire with some simple sociodemographic questions and one debriefing question about specific reasons driving the responses to the valuation questions in sections E and F.

B. Notes on Interview Group 1 (public water supply, groundwater contamination)

start 17:00



- Wendy lives in Baltimore County, has a 22 year old daughter, and works for Baltimore County police (but is not an officer). She lives in a condo.
- Cleavon has a 15 year old daughter, and lives in a town home.
- Walter is retired, has a 36 yr old son, and lives in a 2 story home.

Section A.

- It took all respondents about 4-5 minutes to complete this section.
- All respondents agree that the section was pretty easy.
- Walter had trouble recalling and estimating the interior square footage of his home.
- QA8: When estimating how much their home would sell for, Wendy accounted for improvements in her neighborhood, Cleavon used information from past assessments of his home, and Walter recalled how much he had bought his home for.
- QA9: Wendy realistically knew she couldn't add a room to her condo, but still partook in this hypothetical exercise as if she could. She perceived all home changes as positives, and actually did install energy-efficient windows. Cleavon assumed that his home value would go up by about half of the cost for each improvement. Walter agreed, and said you the price would not reflect the full cost of the home improvements.
- QA10: Cleavon said a nearby school is convenient and if it is a good school then home prices should increase. He was not sure about the effect of gas stations, but decided this and a fast food restaurant would not affect home values. Walter said that none of these things would affect home values, but this may depend on the neighborhood. Wendy said both Fast food and gas stations could decrease home prices.

Section B.

- Took about 1 minute for respondents to complete section.
- All three participants never had their water tested. None of the participants brought up (and perhaps were unaware) that the public water system is tested and they should receive testing reports periodically from the water authority.

- B3: Walter pointed out that option 4 “I never had my water tested” is redundant because of wording in this question.

Section C.

- Took respondents about 3 minutes to answer
- Everyone said they understood the questions
- QC1: Walter had heard of benzene and lead. Cleavon heard of many of these contaminants, but not in water. Wendy was not sure if she had previously heard of these contaminants, and said ‘no’ to all of the contaminants listed, but she later thought that she has heard of arsenic.
- Everyone seemed okay with the ‘parts per billion’ and groundwater standards definitions. Walter now brought up that he assumes his water is tested since he is on public water. Cleavon does not know the effect of these contaminants, but worries more if levels are above the standard. He considers levels above the standard as ‘contaminated’.
- QC3: Wendy and Walter are familiar with the term “underground storage tanks”, and the definition in the script matched their previous knowledge.

Section D.

- Wendy brought up the Exxon case in Jacksonville. Walter had heard of this case, and Cleavon was vaguely familiar with it.
- QD3: Several consequences of a leak were discussed, all of which focused on home values and human health. The environment was not mentioned. Walter said people can get sick and die from LUST contamination. Wendy felt that it may weaken the immune system but she was not really sure. She added that the elderly and young children are more susceptible. Cleavon said home values might be affected. Wendy added that it may affect the ability to sell your home. She expects that people would have to disclose such information.
- QD4: Wendy said drinking water is one exposure path to human, but was unsure if bathing mattered. She also said that food could be contaminated if the soil is also polluted. Cleavon added that this is especially an issue for farmers.
- In QD4, we need to spell out UST acronym.
- QD5: Overall people do not accept the claim that there are no human or environmental risks with 100% certainty. Wendy worries about a leak happening again in the future, even if there are no risks associated with a leak today, the next leak could be harmful. Cleavon said the same thing, that next time may not be 100%. Wendy brought up Erin Brockovich, and said she is still concerned because of uncertainty around this 100% claim.
- D7: In general respondents used the contamination iso-contours and contamination standards to make judgments on how property values change. Wendy and Walter said home A (which is outside the contamination plume) would depreciate from $400k to $250k. Cleavon said home A may decrease because other homes in the neighborhood depreciate in value. He said the contaminated homes could decrease by $20k-$30k.
- We need to label gas stations, and pollution contours better. One participant suggested arrows. Group found it confusing and misinterpreted the pollution levels corresponding to each contour.

- Lisa (the moderator) reminded individuals that they are on public water, and the aerial photo shows groundwater pollution. Walter insisted that petroleum contamination is lighter than water and could therefore get into water pipes. Even after the reminder that the public water does not come from the local groundwater beneath the home, Wendy still did not make the connection. She continued to assume that the contamination contours correspond to her public drinking water, and even said it doesn't matter where the water comes from because the aerial photo shows it is contaminated.

  Denny's note: In general, I think that people see a home within a contaminated area and assume exposure, it is not natural for them to add the extra complexity of an exposure pathway (i.e. their water is public and they aren't generally exposed to the groundwater beneath their home).

- QD9: Wendy said home values may not be affected if the home is 5 miles away from the leaking gas station, and Cleavon said 3 to 5 miles. Walter said he would still worry at these distances if the contamination gets into the pipes.
- QD10: Wendy said it would take years after cleanup for property values to rebound (over 5 years).

Section E.

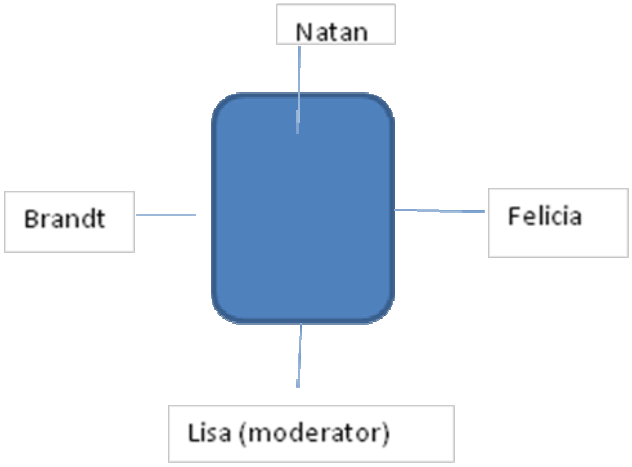
- All three respondents understood the questions in this section. Participants were able to come up with actual values for their asking price. Wendy mentioned that people may do their own research. Walter, knowing he was on public water, did not believe the scenario where his neighbor's groundwater had 3 ppb benzene, but his groundwater was not contaminated. He said that both he and his neighbor use the same drinking water so this doesn't make sense. This again implies that participants, even after being reminded, associate groundwater contamination with contaminants in their public drinking water. This finding was also found in previous rounds of focus groups.

Section F.

- There was not enough time for the respondents in this set of interviews to do section F.

C. Notes on Discussion group 2 (people on city water, contaminated soil).

Start 18:10.



The participants are Brandt (bank manager, 2 children, SF home and a wife that seems very concerned about environmental health issues), Natan (occupational therapist, 2 children, SF home) and Felicia (dental hygienist, "happily divorced," two teen-aged daughters, townhouse).

Section A. No particular problems reported in doing this section. Felicia knows her property has decreased in value, but notes that it's hard for her to nail down by how much exactly her house has gone down in value—maybe $20,000 or $30,000?

Given the current issues with the housing market, in answering question A9 Brandt assumed that the market was "normal." Felicia said she was not sure how much these home improvements would affect the price of her home, her logic was to just add the cost to her asking price.

Natan notes that in question A10 (effect of neighborhood changes on property values), he answered "no effect" because there are already plenty of these things in his neighborhood. The effects on property value would be noticed in a more rural area, where the opening of a gas station, school or fast food changes significantly the neighborhood. Felicia said she wouldn't want some of these facilities near her home, but she had trouble assigning the amount in which her property values would change.

Section B. All was clear. One respondent suggested that in B2 we offer the option "don't know." Brandt assumed that his home was tested during the inspection when he bought his home. Natan notes that he bought his home about 1 ½ years ago, and there was no water testing.

Section C. All was clear. One participant says that the only contaminant he has heard of is lead, but he did not hear it in the soil contamination context. Natan had only heard of lead in paint. Felicia says she heard of arsenic, coliforms and lead, but again, not necessarily in the soil context. Nevertheless Felicia said yes to the questions in C1 because she assumed that since she heard of these contaminants, they could contaminate anything, including soil.

Re: ppm, Felicia heard of the term because of her children's science homework. Brandt has heard of the term before, but has never really used it. He finds the definition clear.

The others concur that the definition of ppm reinforces what they know already. Natan adds that he did not previously know the connection to mg/kg.

When asked if they have heard of standards before, Felicia says she has for lead, and Natan for other things, such as radon. Brandt added that he is concerned about pollution but does not know the actual measurements in his neighborhood. He also mentioned that he has filters on practically everything at home, including tap water.

Two participants had heard of USTs and leaks before. Natan had not, but said the term is pretty self-explanatory. The definition further clarified this what USTs are.

Moving to section D of the questionnaire, Brandt brought up the Four Corners/Jarrettsville case and the fact that the home values were ruined (this is the same intersection as the Jacksonville Exxon case). He said he lives about 5-10 miles away.

In answer to D1-D2, no one is aware of homes nearby with contamination problems. Re: D3, Natan spontaneously brings up the fact that if there is soil contamination this will bring down the property values (this is in contrast to what he says in the valuation exercises). He is echoed by Brandt who emphasizes that this will be so especially in the immediate vicinity of the leak. He also said that even if things are safe the neighborhood could be stigmatized, maybe for up to 10 years.

Felicia says she has radon at her house, and she worries that if the soil is contaminated, it will leach into the house. If it is in the soil, she says, it affects the house.

Natan mentioned effects on grasses, bushes and shrubs, i.e., the landscaping.

Re: D4, Brandt says via the drinking water. The others don't know, but no one mentions getting sick or cancer or other adverse health effects here.

Re: D5, Felicia doesn't believe the 100% certainty—the leak could happen again, the contamination may migrate, etc. Brandt doesn't trust the local politicians—it's regarded as safe now but this determination may change in the future. Natan says it's OK now, but it may get worse in the future.

D6. Natan and Brandt consider this similar to their neighborhood. Felicia says she is in a townhouse subdivision and so her neighborhood has a different density, distance from major road, etc. All the participants said they can relate to this neighborhood.

D7. Results were interesting and surprising. For home A, Felicia estimated it would sell at $300,000. Brandt says it would sell at a 10% discount—at $360,000 because the test results will be available at the time of the sale. Natan says there would be no effect on home A because he has never heard of soil testing at a home and A is outside of the less heavily polluted area.

For home B, Felicia says the home would lose 50% of the value (down to $200,000), Brandt estimates a 25% loss (to $300,000) and Natan a loss of $10,000.

For home C, Felicia says it will sell for $300,000, Brandt for $300,000 and Natan says no loss, max a small hit. Brandt estimates the loss to be at least $80,000 because the proximity to homes above the standard will scare people.

In estimating the value of these homes Brandt and Natan compared the contamination levels to the standards. Brandt also considered proximity to the gas station (independent of contamination).

Anna's note: No one questioned the mechanics of contamination, no one mentioned health effects. Other comments: 1) Natan suggests adding arrows to the label for the gas station and the test results (for consistency, since all of the homes are identified by arrows), and 2) Felicia looked at the declining test results as the distance increases, and not at the numbers per se.

D9. Brandt says ½ - 1 mile, and notes that soil does get carried by the stormwater, and eventually into groundwater.

Felicia struggled with the scale of the photo. Natan says 200-400 ft based on the distances of these homes from the gas station, and the distance to the contamination boundary.

D10. Felicia feels that cleanup won't change things because the leak could happen again. "Get rid of the gas station."

Brandt also said it depends whether the station remains open. He thinks that the property values will recover, maybe in 10 years, and Natan in 5, but even that's difficult to say because in some neighborhoods values change so fast.

Section E. All was clear. Both Natan and Brandt compared the contamination levels with the standard. Natan's responses (based on property value of $350,000) are $340,000, no change, no change, no change. He feels the effects are small or none because of the low test results and the fact that he is not aware that soil ever gets tested.

Brandt would "research what the safe values are" and he would take a loss of $10,000 in the first exercise, no loss in the others.

Felicia repeats verbatim what Brandt says about research and would take losses of $50,000, $25,000, no loss, no loss. She basically wanted to know what exactly the standard means, is there a health effect, and how do these effects relate to the standard?

Section F. All clear. In F1, Brandt and Felicia would always choose home A, and Brandt says that if the option "neither" has been offered, he would have chosen that option. He chose home A because there is no tank or leak nearby.

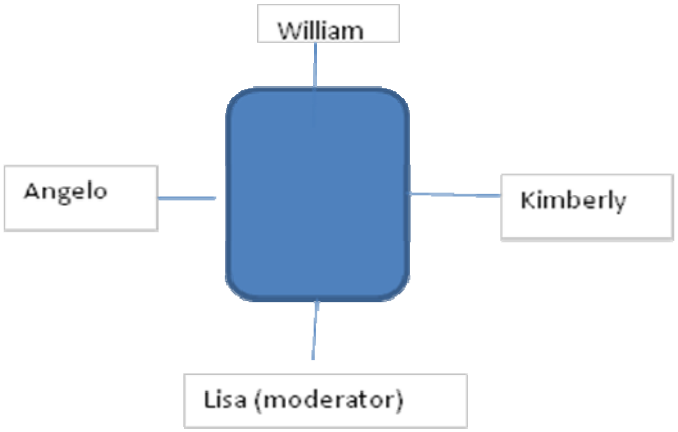
Natan would choose home B in both F1 and F2—he saves money and there is cleanup. Felicia also chose home B in F2 because of the large discount. Brandt chose home A because the contamination is more contained.

Brandt questioned why there is a legal standard if the county is going to clean up so that contamination is back down to zero. Felecia said this came across her mind too. In the future we may want to consider this point in framing the question and choosing attribute levels.

The discussion ends with Felicia noting that she doesn't know what benzene is, and Natan asks if benzene is radon.

D. Notes on Interview Group 3 (private wells, groundwater contamination)

Started 19:30



- Angelo lives in Fallston in a multi-level ranch, and works at Towson University. He has a family of four. He was originally trained as a plumber, and has some knowledge of contaminants in water, parts-per-billion, etc.
- Kimberly lives in a tri-level home in Fallston. She works for the Baltimore County Library system.
- William lives in a flat ranch, and works at Towson University. He has 3 kids (ages 15, 10, and 6)

Section A.

- It took respondents about 6 minutes to complete.
- QA8: Lisa (moderator) asked what factors went into estimating how much your home would currently sell for. William did not think of his home as is, he instead imagined that he had done several needed upgrades before selling, and thus accounted for these improvements. Kimberly follows home values and sales in her neighborhood, and therefore had a good idea of how much her home is worth. Angelo also did this, and added that he had some estimates from when he refinanced his home.
- QA9: Angelo said that all of the listed home improvements would positively affect home values. To break the ice and get people to voice any difficulties with this exercise, Lisa (the moderator) asked the group if they were able to answer the yes/no question right away, but struggled with assigning a dollar amount to how much home prices would change.
- QA10: Kimberly and Angelo noted that gas stations are a touchy subject in Fallston.
  - LUST case number 2005-0120HA involves a leak at a 7-11 in Fallston, in Harford County. The leak related activities go back to 1989. Several private wells at surrounding businesses were contaminated, and several wells at private homes were tested (although contamination at the latter was non-detect or minimal).

- Angelo said that gas stations would definitely affect home values, but not sure how much. He also mentioned the Exxon Jacksonville leak. Kimberly said that whether these different things (school, gas station, etc.) affect property values depends on a household's preferences. For example, she doesn't want to live near a school, but others likely find this desirable.

Section B.

- Everyone said the questions are clear.
- QB1: William is on a community groundwater well, and Kimberly and Angelo have private wells.
- QB2: Everyone had their water tested, but no contaminants were found. Angelo said he does have high iron which leaves marks in his toilets. Kimberly said she really likes her well water.

Section C.

- It took participants a bit over 5 minutes to complete this section.
- Everyone felt that all the questions in this section were clear.
- QC1: Everyone had heard of lead. Angelo and Kimberly also heard of arsenic, and Angelo (the former plumber working at Towson) was pretty familiar with benzene and xylene. No one had heard of coliforms.
- All participants heard of the term "parts per billion." Angelo said that the term "micrograms per liter" did not add anything because you cannot visualize this; he knows it is pretty small but it doesn't add any info. William said the definition box provided him with some new information, for example he learned (or interpreted) that these contaminants could be damaging and even deadly. Angelo added that the government determines the standards. Kimberly did not know what micrograms per liter were.
- QC3: Both Angelo and Kimberly had heard of USTs. The text box on USTs was all new information to William. He said most people won't know about this unless it happens to them. Angelo said that the specific pollutants from USTs were new information.

Section D.

- QD1: Angelo and Kimberly were both aware of the Exxon Jacksonville case. Kimberly lives two miles away, and Angelo lives 1 mile away from the LUST (and has a cousin that lives ½ mile away). Angelo actually fought with County officials to pay to have his water tested, but in the end they refused.
- QD3: The participants did not volunteer any consequences of a leak to ecological systems. William said that contamination could maybe kill crops. Kimberly said that house prices could decrease due to a leak. The rest of the consequences mentioned dealt with health. Kimberly worries that pregnant women and their baby are more vulnerable, and is generally concerned because there may be health effects that are currently unknown. Angelo pointed out that these contaminants may not hurt you right away; the health consequences are more long-term. He also said you cannot necessarily limit the extent of contamination.

  Denny's note: These comments are in line with "environmental" concerns from past focus groups. Any environmental concerns were not really for the well being of

ecological systems, but rather the fear that contamination could eventually impact human health through consumption of plants and animals from the contaminated ecosystems.

- QD4: Kimberly said you can be exposed to contamination in groundwater. She is concerned about drinking contaminated water, and questioned if you can be affected by bathing in contaminated water. Angelo said you can be affected by direct contact with these contaminants. He also asked if you can be exposed to these contaminants in the atmosphere. And then questioned whether changing wind direction mattered.
- QD5: All respondents said even if there are no environmental or health effects they would still be concerned. Namely because they refused to accept the "with 100% certainty" of no health and environmental consequences claim. Angelo said that the EPA allows so many ppb of contaminants in water, and you can never get your water completely clean. He would need more of a guarantee to not be concerned. William said he would still not necessarily trust that things are completely safe. Kimberly said even if things are 100% safe now, another leak could happen in the future, and there is no guarantee on the potential consequences of the next leak.
- QD6: Kimberly said the neighborhood in Fig. 1 is pretty similar to her neighborhood. She pointed out the major roads, commercial areas, and residential streets. Angelo said there are no commercial parking lots in his neighborhood, which is a lot more open and rural. William said he does actually live near a gas station.
- QD7: Overall the private groundwater well people believed in very high discounts due to groundwater contamination, and questioned the ability to even sell the homes in the aerial photo. Angelo said home A (which is outside the contamination plume) would depreciate by at least 50%, if you could sell it at all. He said even though this home is outside the contamination plume, people don't believe in guarantees, and you never know if the contamination plume could spread. William also said the value of home A would decrease by 50%, but his reasoning was that this would occur because home values of other, contaminated, homes in neighborhood would decrease. Kimberly thought through this exercise as if she was buying the home, and also felt home A would decrease by 50%. Even though Home A was not contaminated, she felt it was too close and that is why her bid would be that much lower. Angelo said he would not even look for a home in this neighborhood. If he was forced to buy a home here, he would bid less than half, and would also assume that someone would provide him with bottled water.
- QD9: Respondents all had trouble answering how far a home would have to be from a leak for prices not to be affected. Kimberly said there are too many unknowns and it depends on the neighborhood. Angelo added that the question is too vague. He said it is tough because we don't know the topography and groundwater flows. He then referred to the Jacksonville Exxon case stating that he is 1 mile away, and was not made aware of the past leaks that had occurred at the four corners area when he bought his home (around and at the Jacksonville Exxon site there is a history of leaks going back to the 1980s).
- QD10: William said even after cleanup, house prices would not rebound. Kimberly guessed that it would take several years for house values to rebound, but said she wasn't sure. She tentatively mentioned 10 years. She tried to compare the homes in the aerial photo to homes around Jacksonville. Angelo discussed cleanup activity around Jacksonville, and that there are fences around the site that you can't see through, so no

one knows what is really going on back there. He brought up that property prices would definitely not start to rebound until at least there is clean potable water.

Section E.

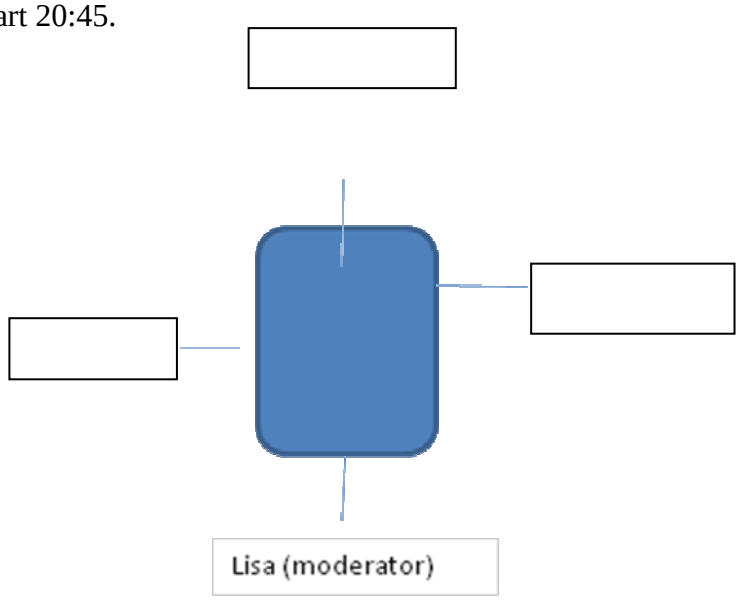
- Whereas the other 3-on-1 groups seemed fine with this section, this group thought that you could not sell home your home if the groundwater is contaminated. Realistically this could be the case since sales are conditional on potable water, and this is the group of individuals who rely on private groundwater wells. Recall that in Maryland all sales of homes on private wells are contingent on acceptable water test results.
- Kimberly said that for most of the situations in Section E, she would ask her original asking price, but would subsequently lower if she really needed to sell. Depending on her written answers we may consider revising the question to account for this.
- Angelo said that even if the groundwater at his home was clean, but the neighbor's water was contaminated, he still didn't think he could sell the home.

Section F.

- Overall respondents were able to answer these questions, and it seems they accepted the framing of the questions with no difficulties.
- Other groups compared contamination levels to the standard, but this group did not mention the standard at all.
- QF1: Angelo and William chose home A because there is no tank nearby, and so they have nothing to worry about now or in the future.
- QF2: All respondents would choose home A, which has zero contamination. William said that money doesn't matter when you are dealing with your health. Kimberly said that there could be a lot of unknown effects from benzene. Angelo who is a former plumber and now does some work at Towson University (possibly with the water system) told the group that benzene is very cancerous in low doses and you can be exposed through vapor inhalation, dermal contact, or drinking contaminated water. All participants were fine with making a choice between two homes near a leak when forced to (as in this question), but if given the option they all said they would not buy either home.

E. Notes on Discussion group 4 (people on private wells, contaminated soil).

Start 20:45.



The participants are Mia (teacher/singer, two children, just got back from Paris, bought a detached ranch home from her grandmother, lives in Anne Arundel Co.), Thomas (just retired, lives in Hartford county with wife, daughter + 2 grandchildren, and a handicapped son) and Beth (who also bought her grandmother's farmhouse and has two children).

Section A. All was clear. When queried about the specific factors that were used to set the price of their home, the participants indicated that they considered their recent financing, the state of the economy, the turnover in the neighborhood, and remembering the price when they bought the home. One of them came to the conclusion that her home may have depreciated by $5000-10,000.

Regarding the renovation projects, the participants found that all of them (with the exception of adding a room, according to Thomas) add to the value of a home. Beth pointed out that her home is old and in such bad shape, it would take many more other projects before those indicated in the questionnaire.

When asked about the "arrivals" in the neighborhood in question A10, Thomas noted that a gas station is not a good thing, but that it would not affect home prices if it is 2 miles away. Beth notes that a gas station 2 miles away adds a little (but not much) to a home's value because of the convenience, but it would be no good if the station was ½ mile away. Thomas agreed, and also said that a school within a ½ mile is a positive.

Regarding section B, participants were all on private wells, and were not sure of the difference between a private well and a community well. Two participants had their water tested: Beth, who couldn't really remember the test results and seemed to think that the problem with her water was chlorine, and Thomas, whose problem was that the water has a lot of iron (and stained sinks, toilets, etc.) and has "high acidity." He questioned whether this qualified as "contamination."

Section C. Nothing unclear. The participants had heard about some but not all of these contaminants but not specifically for soil. One participant heard of “coliforms” because of being a science teacher but appeared to be confused as to their exact nature. Beth said even though she heard of some of these contaminants she did not necessarily hear of them in soil.

The standards were well explained, the participants noted, but this was new information to them.

Overall, this group had no familiarity with the contaminants discussed in the instrument.

The participants had, however, heard of leaking USTs and Thomas mentioned the Jacksonville case. He too received a letter from another UST facility which said that they had one tests and there was no evidence of “anything bad.”

Section D. InD1, Mia expressed concern about her daughters playing outside, the water in the house, pets, and her vegetable garden. Thomas immediately voiced that prospective buyers would be discouraged from buying the home, besides his obvious concern for the health effects.

Our participants did not believe the 100% certainty of no health effects in D5. One was concerned about short- v. long-term consequences, and the possibility that officials might be wrong about the fact that there are no risks. Beth said she wouldn’t be concerned.

Thomas trusts the government officials, but the possibility that they are wrong would still be in the back of his mind.

Regarding the photo of the neighborhood, Beth and Thomas felt that theirs was more rural, whereas Mia stated that it was pretty similar to hers, except for the shopping mall (parking lot) shown in the right of the photo.

In question D7, Beth said that house A would lose about $5000 to $10000, and house B for $325,000. She said that the effects would generally be small for the homes less directly affected by the pollution, and only if the word got out. New homebuyers are paranoid about this, she said, especially because they are young families with small children, and they don’t know the area anyway.

Mia said that home A would not be affected, because it is the farthest away and the pollution level is only 5 ppm or less, and home B would sell for $370,000.

Thomas said that you wouldn’t be able to sell home B, and if you could it would take a huge hit. He also mentioned disclosures, and wonders whether this information is common knowledge when you buy a home, in which case the property price would be affected.

Beth said that $400,000 is a lot of money, and these buyers would be able to afford a home in an uncontaminated neighborhood and would likely do so.

When asked about how far away you need to be from the gas station for the leak not to affect prices anymore (question D9), Beth suggested 5-10 miles, and then brought up the Jacksonville case, but she wasn’t sure how large the affected area was for that case. Thomas said he heard some homes around the Jacksonville case were now worthless. He felt that a home would have to be at least 500 feet away, and probably outside the area covered in the aerial photo.

Finally, when asked whether property prices will go back up after cleanup, they all thought that they would, with estimates of the time needed for this to happen ranging from 2 to 10 years. Beth said 5-10 years, and Thomas added that people have short-term memories.

When answering the questions of section E, all respondents compared the test levels with the standards. At the highest test level, Mia stated that it would probably reduce her home value by $15,000, Beth from $280,000 to $230,000, and Thomas thought that the impact would be larger than that. By 2ppm there would be no loss in price by Mia and Thomas, and the value would be $250,000 for Beth.

Beth re-iterated again that at this price range, which is typical of young families with young children, no one wants to deal with contamination and the "hype" (the news stories) will drive the effect. Mia mentioned that people may be still paying off their home, and therefore could not sell because they may not be able to afford to sell their home for a loss.

In section F, where they were asked to behave as buyers, Mia selected home B (the one with positive test results but lower prices) in both cases, and the other two choose home A.

F. Overall summary of the findings:

- The valuation exercises in E and F worked. People were willing and capable to estimate the effect (in dollars) of the test results on the price of their home or of another home that they might consider buying.
- The valuation exercises in E and F worked because they were preceded by a valuation exercise that we feel was not threatening to the respondent—one where the effect of contamination and proximity to LUSTs were evaluated in a neighborhood that was not their own and a house that was not their own. This provides objectivity and detachment, eliminated emotional reactions, and this tone carried through to exercises E and F.
- It helped to have "forced choice" questions in the exercises of section E and F, otherwise many people would have too easily chosen the "neither" option. This is especially the case for people on private wells whose scenario involved contaminated groundwater.
- People seem to be split into two groups—those that would buy a home where soil is contaminated when the price discount is sufficiently large, and those that would not, no matter how large the price is.
- People that are on city water assume that they will be exposed to the contaminants by drinking the contaminated water, even though they do not actually drink the groundwater beneath their home or in their area. We noticed this problem in earlier focus groups as well.

  Even when our moderator tried to remind people on city water that their water comes from someplace else, the participants continued to assume that they would be exposed to the contaminated groundwater at their home by drinking it.

- People are less alarmed about soil contamination, and the reactions from people on wells were similar to those on public water. In that sense, using the soil as an example of contamination where the exposure and threats “should” be similar for both groups worked well.
- People don’t really know the pollutants of concern in LUST cases, and they are generally not informed about other pollutants either. People who are on wells are a little more attuned to these substances, but not much. The latter have sometimes had the water tested at their home, but their recollection of the results is fuzzy.
- Due to this lack of knowledge people use the standards to judge how ‘bad’ contamination levels are. People are capable of using the standards to determine whether their soil is above or below it, and are capable of judgments about how close the results are to the standards.
- People care about the effects of contaminants on their health, on what grows in soil (plants, crops, vegetable gardens) but don’t really think about animals, ecosystems, etc. (unless somehow the contaminants make it into surface waters).
- People worry about migration of contamination (someone even mentioned soil being transported by stormwater)
- Even if we posit a scenario with a leak but not human health risks, people are very skeptical that this is the case. They worry about the possibility that a leak occurs again at the same UST facility, that the pollution migrates, and that authorities deem things safe now, but may discover otherwise in the future. In any case, property values seem to be a natural concern.
- The comments volunteered by our respondents suggest that they believe in stigma. Rebounding of property values was judged possible, but not immediately, and many people even talked about 10-20 years for this recovery to occur.