

Risk Communication and Risk Management at Vapor Intrusion Sites – Ignore at Your Own Risk

Paper #

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ABSTRACT

Communication with residents impacted by a vapor intrusion site and the community as a whole, early and often, is essential to a successful, long-term, vapor intrusion project. It is also good risk management. A comparison of the different strategies applied at two VI sites and their outcomes, illustrates the common principles and pitfalls for consultants.

Site 1: Communication with residents began with the start of the vapor intrusion investigation. Since the start of the project, more than 60 homes have been investigated and new homes continue to be targeted. As part of the communications strategy, regular meetings are scheduled with both individual residents and the community as a whole in close collaboration with regulatory officials. No lawsuit has been filed five years into the project.

Site 2. Outreach began several years into an investigation when residents' distrust of the responsible party was well established. The original risk communication goal was simply to meet state guidelines for outreach. The neighborhood consists of 15 homes; only three were investigated. Two of the three homeowners have filed lawsuits against the responsible party. As a result of the distrust between the parties, it is difficult to gain access to new homes for an expanded investigation. No effort has been made to collaborate with public officials or to go beyond initial communication goals with residents.

Risk communication goals include the following:

Establish trust and credibility

Provide information to enable residents to make decisions regarding vapor intrusion impacts, and

Create open and ongoing lines of communication.

Risk communication is an integral part of a successful, long-term vapor intrusion project. Without risk communication, one cannot build trust with individual homeowners or the greater community, or create the opportunity for ongoing access to homes or access to new homes. Expensive litigation becomes more likely. A good risk communication strategy is good risk management.

INTRODUCTION

Risk communication has been defined as “actions, words, and other messages, responsive to the concerns and values of the information recipients, intended to help people make more informed decisions about threats to their health and safety”¹. How does risk communication apply to vapor intrusion sites? Why is risk communication necessary when many states have community outreach resources as part of their contaminated sites programs?

Anderson Mulholland & Associates, Inc. (AMAI) has developed a risk communication/risk management strategy for vapor intrusion sites based on the principles of risk perception and risk communication developed over the last decades by Slovic², Fishhoff³, Sandman⁴ and others. Vapor intrusion sites require a different approach than an average contaminated site for several reasons. A vapor intrusion investigation requires interaction with residents to gain access to the home and to conduct sub-slab sampling. Sub-slab sampling is an invasive procedure and long-term monitoring is intrusive. Consultants are not generally trained to deal with residents, or taught preferred outcomes and ways of managing communications with the goal of building relationship and a sense of trust with the homeowner. In fact, consultants represent the party who may have caused the contamination and therefore should expect very little in the way of initial trust or openness on the part of the homeowner. The risk communications/risk management program goals are: (1) develop trust and dialogue; (2) secure continued access for investigation and monitoring; and (3) limit the risk to clients of potential lawsuits. The program’s strategy consists of four main components. These are: Transparency, Dialogue, Work with Regulators, Good Housekeeping.

We¹ had an opportunity to work at two vapor intrusion sites within the same state program where one client approved the risk communication/risk management strategy and the other chose to apply the state mandated outreach program with more limited goals. This presentation provides a description of risk communication concepts, an introduction to the risk communication/risk management strategy, including how success is measured, along with a comparison of the approaches and outcomes at the two sites. Overall, we found that by consistently following a risk communication/ risk management

¹ “We” refers to AMAI in this article.

approach, we have been able to meet our goals of developing trust and dialogue, securing access, and limiting risk to the client for the first five years.

PART I: THE RISK COMMUNICATION CONCEPT

Risk communication has been defined as “actions, words, and other messages, responsive to the concerns and values of the information recipients, intended to help people make more informed decisions about threats to their health and safety. “

Studies consistently show that trust and credibility are essential for risk communication to be successful⁵. People do not believe information from sources they don't trust. Trust is difficult to gain and easy to lose⁶. Once lost, it is frequently impossible to reestablish at either the individual or community level. As consultants representing the alleged contaminating party, we cannot expect that the community will want to trust us. Indeed, in the current business climate, there is very little trust in big industry – think of BP. (According to newspaper articles, online blogs, and television reports, the assumption from the perspective of the land or business owner, is that BP is dishonest, hiding information about the facts of the contamination, and only concerned about the bottom line).

In the vapor intrusion universe, the DuPont site in Pompton Lakes, New Jersey is an example of a community where no trust exists between industry and the community. In fact, the lack of trust is so severe that residents don't want DuPont's contractors installing mitigation systems because they don't believe contractors hired by DuPont will do a good job. As this incident demonstrates, trust must be built from day one based on communication and a strategy that aims to build a sense of relationship established by listening (the consultant) and being heard (the community). We must recognize that ultimately, trust is the consultant's capital and must be deliberately aimed for and worked towards as an objective; not squandered once obtained. As described by Dr. Fischhoff:

“For any of its potential to be realized, risk communication must be taken seriously. One cannot rely on undisciplined speculation about the beliefs or motivations of other people. One cannot expect to quiet a raging controversy with a few hastily prepared messages. One cannot assume that expensively produced communications will work without technically competent evaluations. Those who ignore these issues may be the problem as much as the risk is. The price of their ignorance is borne by everyone concerned. The public is demeaned by the experts as being hysterical, while the experts are vilified as being evil.”⁷

$$\text{RISK} = \text{HAZARD} + \text{OUTRAGE}$$

How we perceive a risk has nothing to do with a quantitative assessment of that particular risk. In studies the test subjects assign very high risk numbers to activities with a low statistical risk such as nuclear power and conversely low risk numbers to activities with a

high statistical risk⁸. Why? Because we process the information based on social, psychological, or emotional factors based on personal experience and not based on scientific studies or actuarial tables. Risk perception includes both the hazard – smoking, air travel, perchloroethylene- and the psychological and social factors presented as “outrage”. The “outrage” is reinforced by media coverage of risks as illustrated by the extended and exhausting coverage of plane crashed versus automobile accidents. Stories of mass death and destruction sell, the so-called “kill size”; ordinary events don’t. Statistically the probability of dying in a plane crash is 1 in 5,862 and the probability of dying in an automobile accident is 1 in 85⁹, yet we all feel safer in our cars. Why? Our perception of risk relies heavily on whether or not exposure to risk is perceived as voluntary and how much control we have¹⁰.

The human brain uses different psychological and social factors, the so- called “outrage factors”, to evaluate new information including risk information and determine a response, i.e. fear or anger or ‘no big deal’. At least twenty different outrage factors have been identified¹¹. Our brain applies these identified outrage factors in the evaluation of environmental risks, such as vapor intrusion, as well as every day risks such as texting while driving. Factors typically present themselves in opposing pairs of a positive and negative interpretation of the information. Positive factors will minimize the outrage and accordingly, the perception of the risk. Negative factors will increase the sense of outrage and heighten the perception of the risk.

These are some of the factors that apply to vapor intrusion sites.

Voluntary	In-voluntary
Natural	Man-made
Control	No control
Familiar	Unfamiliar
Trust	No trust
No effect on children	Effects on children

How does vapor intrusion fit in the framework of outrage factors? For starters, vapor intrusion occurs in the home which is where most of us feel safe.

- Vapor intrusion threatens our core of the sense of safety.
- Vapor intrusion is an involuntary risk. Clearly, the communities did not volunteer to be located within a contaminant plume.
- Vapor intrusion cannot be controlled. Most of the contaminants can be detected in indoor air samples at levels significantly below the odor threshold and mitigation systems are required at levels significantly below the odor threshold or any other manifestation of a physical response. In other words, you can’t see, smell, feel, or control the contaminant that is migrating into your home,

- Vapor intrusion is caused by man-made chemicals. It is easy to accept natural risks such as lightning strikes or floods, they are acts of God. A man-made chemical is immediately assumed to be riskier, more dangerous than anything nature can provide.
- The contamination originates from industrial activities and industry typically is less trusted than government.
- Children may be at risk because they are closer to the ground and spend more time playing in family rooms or play rooms which are often located in the basement.

From the analysis above, the outrage factors are high and accordingly the risk associated with vapor intrusion will be perceived as high.

Experience has shown that even if one can scientifically project that the risk from the hazard at hand- PCE or benzene for instance – is limited or within what would be an expected range in an urbanized area, a client’s message will be drowned out by the many contradicting “outrage” factors experienced by individuals. In this scenario, documenting numbers that prove the risk is insignificant compared to risks in everyday life may in fact be futile¹². Vapor intrusion is involuntary, uncontrollable and allegedly originated from a historically low trusted source, such as industry. It is possible, however, once we understand the community’s concerns and some of the outrage factors to address the factors in an effort to balance the perception. The goal of risk communication is to provide information to help a resident or community make decisions; the goal is never to make the decision for the resident or the community.

PART II: RISK COMMUNICATION RISK MANAGEMENT STRATEGY

We formulated our strategy for vapor intrusion sites based on the EPA’s seven cardinal rules of risk communication; work done at other sites in Colorado and New York, and the theory briefly outlined above. There is a real concern about health effects as well as real estate values at vapor intrusion sites and those concerns have to be taken seriously and addressed. The risk communication/risk management strategy is a step in that direction.

EPA’s seven cardinal rules of risk communication are:

- Accept and involve the public as a legitimate partner
- Listen to the audience
- Be honest, frank and open
- Coordinate and collaborate with credible sources
- Meet the needs of the media
- Speak clearly and with compassion
- Plan carefully and evaluate performance

The seven cardinal rules were developed in the early 1980s and still apply. We have summarized the information into four main points relevant to vapor intrusion sites.

- Transparency
- Dialogue
- Work with regulators
- Good housekeeping

Each main point will be addressed individually followed by a brief discussion on the metrics we used to determine a successful implementation of the strategy.

Transparency: Transparency must be established before the first sample is taken. Transparency is openness, honesty, and availability as well as the ability to say what you don't know, that there is uncertainty involved, that we may not know for awhile, or if you don't know but the information is available you will find out and get back to them. I include local document repositories under the transparency heading as well. Distance can be a barrier to transparency- All states have public access laws at this point, but the State Capital may be quite far from where the site is located which makes access to the documents theoretical rather than actual. Costs can be a barrier to transparency – Many states will copy the reports and mail the copies to you at a cost. Investigation reports can be voluminous and it is expensive to copy a remedial investigation report or site assessment. If the reports are available at a local library a resident can go and read or look at maps at his or her convenience. In my experience, most reference librarians are willing to dedicate a shelf or a cart to local site reports.

Dialogue: The dialogue with the community must begin before the first sample is taken. Good dialogue builds relationships and relationships can build trust. All communities are different, we cannot presume to know how a community will respond and what issues are critical for that particular community. We cannot build an effective risk communication strategy until we know the issues. The only way to find out is to establish the venue for an ongoing long-term dialogue.

Appoint a contact person or coordinator who will be responsible for all communication with the community. The contact information for the coordinator can then be included in all correspondence from the consultant as well as from the regulatory agency. To the extent possible, the contact person should remain the same throughout the project, or at least the important early years when the trust building is initiated to ensure a consistent message and a consistent approach. Likewise, have a dedicated email account, 1-800 number, and maybe a website from the beginning to ensure a technical feedback loop.

Public meetings are a great way to provide overview information to a large number of people, but as the panel or presenter usually speaks down to the audience from a podium they are not great dialogue builders. The public meetings do provide an opportunity to

learn about the big issues of concern in the community. The public meetings I run also have a time afterwards for one on one interaction between the residents, the town government, the state regulator, local health officer, and the consultant which is invaluable. In addition, a public meeting is a good venue for outside experts to come and present information on certain aspects of the site.

Information sessions are meetings we have with a smaller group of residents for instance at the beginning of a new investigation phase. The smaller informal setting without any top down presentations facilitates a dialogue. We introduce field staff in these settings, explain how we sample, why, when, where, discuss access issues, etc. These information sessions allow the residents to get to know us and allow us to get to know the residents. It is much easier to allow someone you have already met into your home.

The most fruitful dialogue in my experience is the one on one interactions we have with residents when we are at their homes to take the samples. We try to schedule enough time in the sampling schedule to have an opportunity to listen and to talk, because listening is just as important as talking in a successful dialogue.

Other broad reach communication tools such as press releases, newsletter, site updates may also be required based on site specific conditions. This can be coordinated with the state agency if they have a community outreach person assigned who may want to write factsheets and other updates. At every single point listed here there is an opportunity to listen to the residents and to communicate your message based on their needs.

Work with regulators: We have made an effort to include both state and local regulators in our public meetings and information sessions, including the site project manager for the lead state agency and the local health officer. There are several reasons why working with the regulators is beneficial to a project. The government is still perceived as more trust worthy than industry even though there is an overall decline in the public trust of government¹³. Some of that trust can be reflected onto the consultant. The ongoing communication with the regulators will allow for a consistent response to community concerns.

Good Housekeeping: Good housekeeping may seem like an odd concept in a communication and management strategy. It is, however, a very important part of the overall approach to building trust. If a resident is angry, fearful, or annoyed about the invasiveness of the work, a truck blocking a driveway, dirty footprints on the stairs, or waiting around for a field tech who is running late can do tremendous damage to whatever trust you have built with that resident. We have two rules of thumb:

1. We are not the cable company. Appointments are made to meet the residents schedule and if we are running late, we call.
2. Behave as if you are at your grandmother's house – be respectful.

A little politeness and consideration can go a long way. The residents are inconvenienced by us; they have a right to be upset and annoyed. We need to make the experience of the very invasive sub-slab sampling and the annoying long-term monitoring as painless as possible. Once we have worked our way through the initial pain threshold and proven that we are on time, polite, don't block driveways, and take off dirty shoes, there is rarely a problem scheduling an appointment.

Effectiveness: We needed a metric to measure the effectiveness of the strategy and began by calculating four response rates:

- % of letters received by resident
- % contact
- % initial access
 - Government
 - Consultant
- % continued access

The sample size is small, a total of 67 homes have been evaluated, but the preliminary data shows the strategy is effective.

% of letters received: All initial correspondence is sent certified mail return receipt requested. We track if the letter is picked up at the post office. Our current rate is 97% with the 3% accounting for vacant homes.

% contact: How many residents we talk to after the initial letter has been received. Our current overall rate is 91%; site 1 is at 97%, and site 2 at 20%.

% initial access: How many homes allow us access to conduct the initial sample out of the total number of homes contacted. This category has two subcategories: (1) Initial contact made by the government, i.e., the Department of Environmental Protection and (2) initial contact made by consultant. We have seen a difference in the access rate based on who sent the initial letter.

Over all access 82%. If a governmental agency sent the initial letter the access rate is 92%. If the consultant sent the initial letter the access rate is 53%.

% ongoing access: The number of homes with a sub-slab sample we have access to for ongoing monitoring. The current rate is 95%.

PART III: SITE DISCUSSIONS

Site 1: Site 1 is a drycleaner in a neighborhood of single family homes with a very strong homeowners association. The site is located along the main street, next to a soccer field and across the tracks from the commuter railroad station. A PCE plume has migrated off-site and underneath a large residential area. The figure shows the location of the site and

the homes we have investigated. At this point, the interim source remediation has been successfully completed and the plume almost delineated. A total of 62 homes have been contacted in several phases over five years and our access rate is 89% over all. At this site, the state sent the introductory letter to the first phases and we had an access rate of 92%. During one phase, we sent the introductory letter and the access rate was 75%.



Site 1

Transparency: The name and phone number of the contact person was made available in the introductory letter.

We established a document repository from the beginning at the local library.

We are open, frank, and honest in our interactions with the residents and have no problem saying we don't know the answer to a particular questions but will find out and get back to them.

Dialogue: We had an information session with the phase 1 residents before we started scheduling sub-slab sampling appointments. The state project manager and the local health officer joined us as did the staff that would do the sampling. The same approach is followed for each subsequent phase.

We have annual public meetings for the entire town, where community groups, local legislators, etc., attend.

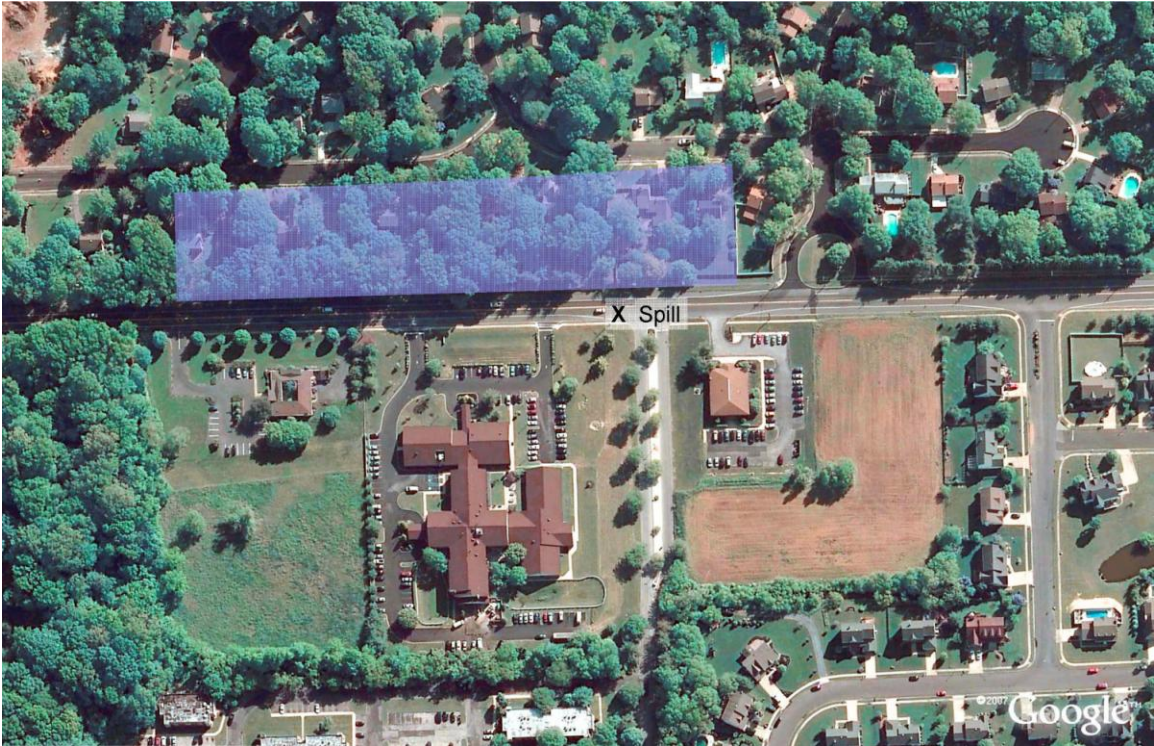
We are available when the residents call with questions and will listen. It is important that we hear and understand their concerns. We listen and talk when we schedule the appointments, and we listen and talk when we conduct the sampling. The sampling events are very fruitful in terms of building trust and learning what is important. What information is getting through? What are the concerns? How can we assist in solving the problems? Or how can we minimize the annoyance?

Regulators: The state and local regulators are present at all public meetings and information session and we talk constantly to make sure that community concerns are addressed.

Housekeeping: Scheduling sampling, monitoring appointments and being punctual turned out to be the most important housekeeping rule at this site where people commuted to work. We had to make appointments around homeowners' schedule, not ours. If we were running late, we would call. We also kept all formal paper work to a minimum and used a one-page access agreement for the initial sampling. Using a single-page agreement speaks to transparency factors as well. Using longer and more complex documents becomes legalese, facilitating the perception that we, as consultants, were on the defensive.

Our access rate is 89% and the ongoing access rate 96%. We have built a level of trust in the community that allows us to continue monitoring and to gain access to new homes as the investigation expands. We have developed working relationships with the town government and health officials that allow us to work together when problems or concerns arise.

Site 2: Site 2 is a small gasoline pipeline spill with MTBE as the main residual contaminant. The client made a corporate decision to implement current state guidance which at this point included sending a factsheet to all addresses within a certain distance of the site in September 2009 when the new outreach rules went into effect and no communications since then. Prior to September 2009, the interaction had been between the client and the homeowners closest to the spill whose properties housed the remediation system. The interactions included access agreements for sampling of monitoring wells in the backyards and maintenance of the remediation system. The technical reports issued as result of the work were sent to the homeowners as well. Over a period of several years there was no effort to communicate with the rest of the neighborhood and there was no effort to make information available in general. Because of the limited size, the site was not high profile and did not receive significant regulatory interest.



Site 2

We were called in to take over the groundwater investigation after the source remediation was underway and to handle access and potential vapor issues. Our task was to do only what was state mandated. Accordingly, a factsheet explaining site status was filed as a baseline document.

Transparency: The factsheet gave the name and contact information for the appointed contact person and did result in a few phone calls asking general questions and one upset office manager who wanted to know if the office should be evacuated.

Dialogue: We will talk about the site with any resident who calls, but there is no effort towards public meetings or information sessions or periodical information sharing apart from the information required in the state guidance. The approach is reactive rather than proactive; it does not allow for feedback, and the tools only allow for one-way communication.

Regulators: As there have been no public meetings or information sessions there has been no opportunity to establish a relationship with the state project manager.

Housekeeping: We schedule appointments with the homeowners who have monitoring wells on the properties and we are on time. We don't park in certain areas where we have been asked not to park, our field people are polite and considerate.

A few months after the factsheet was issued we needed access to additional residential properties for soil grab samples in preparation for a vapor intrusion investigation. Based on our strategy we recommended that the state project manager write the letter of introduction after which we would contact the homeowners. We were trying to borrow some trust from the regulators since no effort had been made to build trust in the community. The client wasn't interested and we sent our introductory letter with a draft access agreement via certified mail to a number of homes regarding a one time soil sampling event. The letters were all picked up, so 100% response rate for getting the letter to the intended recipient. The response rate for establishing contact was 20% and the rate for actually gaining access to conduct the sampling was 0%. Clearly the more limited strategy failed.

At this point, we, as consultants, continue to have no credibility or trust in the community. What little credibility we had initially with the factsheet publication was lost in light of the lack of follow up and dialogue. At least one lawsuit has been filed and residents continue to express grave concerns about home values and their families' health.

SUMMARY

Risk communication is an integral part of a successful, long-term vapor intrusion project. Risk communication facilitates trust building in the community, helps us maintain trust, secures ongoing access to homes or access to new homes, and may limit lawsuits. We developed a risk communication/risk management strategy based on four principles: Transparency, dialogue, work with regulators, and good housekeeping. The strategy has been implemented at vapor intrusion sites and a preliminary effectiveness evaluation metric developed. The sampling size is still limited, but even with the small sample size we see a measurable difference when the strategy is implemented at a site as compared to a site where the strategy was not used. Good risk communication is good risk management. It is a tool that should be applied at vapor intrusion sites to facilitate the long-term relationships required for a successful outcome.

Additional work is required to expand the sample size for an in depth analysis and validation of the response metric.

REFERENCES

- ¹ Fischhoff, B. *Risk Perception and Communication*; Environmental and Occupational Health Sciences February 2009
- ² Slovic, P.; *Science* **1987**, 236 , 236.

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- ³ Fischhoff, B. Watson, S & Hope, C. *Acceptable Risk*; Cambridge University Press, New York, 1984.
- ⁴ Covello, V. and Sandman, P, in *Solutions to an Environment in Peril*, Wolbarts, A.;Ed. John Hopkins University Press, Baltimore, 2001
- ⁵ Lofstedt, R. *Energy Policy*, **1996**, *24*, 689 – 696.
- ⁶ Lofstedt, R. *Journal of Hazardous Materials*; **2002**, *93*, 47 – 66.
- ⁷ Fischhoff, B. *Risk Analysis*, **1995**, *15*, no 2
- ⁸ Fischhoff, B. *Risk Perception and Communication*, Environmental and Occupational Health Sciences February 2009
- ⁹ National Safety Council see <http://www.NSC.org> (accessed May 2010)
- ¹⁰ Fischhoff, B. *Risk Analysis*, **1995**, *15*, no 2
- ¹¹ Covello, V. and Sandman, P, in *Solutions to an Environment in Peril*, Wolbarts, A.;Ed. John Hopkins University Press, Baltimore, 2001
- ¹² Fischhoff, B. *Risk Analysis*, **1995**, *15*, no 2
- ¹³ Lofstedt, R. in *The Earthscan Reader on Risk*, Lofstedt, R. and Boholm, Aa., Ed. Earthscan, London, 2009.

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