

Strategy Proposal

In phase I of this project, our project team chose to focus on the community of Martinsville, Indiana, and its history of Tetrachloroethylene (PCE) and other chlorinated volatile organic compounds (VOCs) contamination. We collaborated with the Martinsville Indiana Superfund Site Association (MISSA) and looked into the environmental justice aspect of the contamination where we identified two key issues:

1.) Participation by families living within the contaminated plume areas of the city is observed to be low by members of the community. With the data collected last year, the superfund site in Martinsville can be characterized as an area of lower socioeconomic standing given the high poverty rate and a high percentage of the population fulfilling less education than a high school degree

2.) There seems to be a disconnect when distributing information related to PCE contamination to the general public. In interviews, community members reported that some people had never heard of the issue, had difficulty finding resources such as having their homes tested, and later some reported that they knew of the water pollution issue, but not about the vapor intrusion risk in homes.

To address these concerns, we have developed a proposed strategy consisting of three specific actions.

- 1.) Identify barriers to participation by conducting a student-led research project with intercept interviews
- 2.) Develop a targeted informational campaign focused solely on vapor intrusion and what it means in the home
- 3.) Host free family-friendly events in the community (with a focus on the contamination areas) to encourage participation and provide informational resources

Student-led Intercept Interviews

Throughout the previous projects conducted in Martinsville, researchers noticed populations were missing from the sample such as renters, populations of lower socioeconomic status, and populations living within the areas of contamination. It is hypothesized that these groups may be harder to reach because of a variety of issues that place a burden on individuals' time like experiencing food insecurity, struggling to provide or obtain child care, and working long hours. The goal of conducting qualitative research is to identify reasons why people are (un)willing to participate and any barriers that hinder participation. In addition, this proposed project will identify if there is any relationship between an individual's choice to participate and their socioeconomic status, which will help determine how we will target and counter barriers that hinder participation.

The main method of the research is conducting intercept interviews in different areas of Martinsville with the intent of trying to reach as many diverse populations as possible. We will construct a semi-structured interview featuring two core questions with a couple of follow-up questions if necessary. Demographic data will also be collected through surveys to record. The analysis will consist of creating these categories of answers and looking for any associations between participation and socioeconomic status. The sample size will be based on the point at which we reach saturation, the condition where responses become repeated and no new responses would provide additional information.

The main benefit of this research project is to help researchers understand what if there are any challenges or barriers in the community, and how they can reframe recruitment methods to be more representative of the community. In addition, feedback would be important in future research projects to make the information more accessible and to make the process more enjoyable for participants.

Vapor Intrusion Informational Campaign

In discussions with community members, we learned that most people in Martinsville have heard about PCE in the water. Although, less is known about PCE in indoor air. PCE and other related chlorinated VOCs are able to volatilize into vapor and enter homes and businesses similar to radon. In homes without proper ventilation and mitigation systems installed, the vapor can accumulate and be inhaled by people living and working within these buildings. From the CompTox Chemical Dashboard and the ATSDR toxicological profile on PCE, we know that there are health risks associated with PCE exposure primarily from occupational studies. There is little known about environmental, long-term, and low-level exposure. The observed health risks included changes in neurocognitive functions such as mood, memory, attention, reaction time, and even vision. The CompTox Chemical Dashboard has even listed PCE as a probable human carcinogen. For all of these reasons, we believe that developing an informational, multimedia campaign targeted at vapor intrusion may help to spread more awareness about the issue, and promote more homes to be tested.

One approach is to develop a short 30-second to 1-minute cartoon that shows how PCE can volatilize into “small clouds” and enter homes like how radon typically does. This little cartoon could include a jingle that encourages homeowners and business owners to have their indoor air tested for PCE. This type of public service announcement (PSA) can be aired on local television and listened to on radio stations without the animated visual. This idea is derived from famous PSAs that encouraged everyday people to stop smoking, pick up trash, and keep dangerous household chemicals out of reach of children. With enough resources, we could even advertise this message to test indoor air for PCE on billboards within the city and include advertisements in local newspapers.

Community Events Aimed at Increasing Participation

In the Phase I submission, the community partners who we interviewed mentioned concerns about families who live within the contaminated areas of the city. When asked about how we could possibly reach out to these groups, one of our community partners suggested using food as a resource, similar to hosting free dinners or lunches both for community organizations and the general public. At these meal events, we could provide a presentation about the contamination issue, provide resources on how to get involved, and have their homes tested. We can also get their feedback on how to improve outreach efforts and host events they're interested in seeing.

Two more examples of community events would be hosting bingo/game nights and hosting a family festival night in the city. For the bingo event, we could gather certificates and gift cards from local businesses as prizes and play a couple rounds of classic bingo and/or musical bingo. This event would encourage families to come and have some refreshments and snacks. To add the educational aspect, there could be flyers provided that detail the PCE contamination and encourage them to have their homes and businesses tested. In between rounds, someone could also be a representative and discuss why we are hosting the event, and point out the resources available. The last major event described is the family festival night. One of our community partners has local connections to an event planner and marketer who could help sponsor an event that features live music, bounce houses for kids, and food vendors. To incorporate the educational piece, there could be vendors from local health agencies and consulting companies that could help deliver resources related to PCE contamination and how to get involved and have their buildings tested.

The critical component for any of these suggested events is that they offer free admission to the public to attract families who might not otherwise be able to attend; we would need significant funding sources which are detailed in the resources section of the proposal.

Descriptions of Community Partner Collaboration

Each week, a team of researchers, including members of this project team, meet with an engagement group from Martinsville that has been heavily involved in the contamination issue. Many of these members are a part of MISSA, a public Facebook group that focuses on spreading awareness and education about the PCE contamination sites with an emphasis on the Pike and Mulberry Streets' EPA Superfund Site. In these weekly meetings, our community partners share their engagement ideas and strategies on how to reach a greater audience within Martinsville.

In addition, our group also collaborated with a Community Action Board (CAB) which was formed as a part of an NIH-funded research project. This CAB includes many stakeholders such as residents, business owners, healthcare workers, renters, school educators, a retired pediatrician, members of the Morgan County Board of Health, and representatives of the City Council. This group plans to meet on a quarterly basis and will collaborate with researchers on how to distribute information and how to recruit participants for this NIH study. This group was another source of information about the public perception of the contamination, and how other residents perceive participation within the contaminated plume areas.

Description of the Use of Publicly Available Data/Tools

In Phase I of this project, we used publicly available tools and data to first understand and investigate the environmental pollution and associated health risks that are present in this community. We then used some other tools to understand if this situation could be understood as an environmental justice issue, which provided us with insight into how we could begin to remedy the problem.

For the first task, our team explored the EPA's page on Pike and Mulberry Streets' PCE Plume in Martinsville. Here we found that there are hazardous chemical agents present in this area. We also collected additional information about this Superfund site from other publicly available EPA materials, such as key documents such as the Heath Consultation Report done on the Pike and Mulberry site by the ATSDR. We then used the EPA's CompTox Chemicals Dashboard to understand the neurological health risks associated with PCE exposure, and its status as a possible human carcinogen.

Next, we sought out additional publicly available data to identify this as an environmental justice issue. Specifically, we turned to Census Reporter. We found that in this specific community, the census showed that a much higher proportion of residents in Martinsville were living below the poverty line, compared to state averages. This percentage only increased for respondents who lived closer to the Plumes. The same held true of educational attainment, with approximately 7 percent fewer census respondents living in the census tract near the plume holding a Bachelor's degree than residents living in other areas of Martinsville. Taken together, this data shows a clear distributive environmental justice issue.

By working with the community, we specifically found that recognitional and participatory environmental injustices are also a significant issue in this community. While town meetings have been held about these environmental issues, turnout has continually declined since the initial town hall meeting (participatory injustice). And though MISSA has been able to serve as a community voice, some community members say that many impacted residents don't participate in anything involving the PCE contamination (recognitional injustice), in part because they do not have the time, resources nor knowledge to do so. This inaccessibility extends to residents' difficulty navigating the EPA website to request PCE testing in their homes.

Thus, with the identification of these distributive, recognitional, and participatory environmental injustices, we came to the conclusion that engaging community members and increasing their knowledge and agency to confront these issues would be the best place to start. Publicly available tools pointed us to acknowledge a distributive injustice in how PCE contamination is experienced, but upon further engagement with the community, we understand that the unequal distribution of environmental burdens cannot be fixed until community members are actively recognized and have the space and resources to participate in decision-making surrounding these issues. Therefore, this has shaped our strategy of implementing some community engagement activities to inform and take steps to allow the public to be involved in these issues.

Resource Needs for Strategy Implementation

Student-led Intercept Interviews

For this project, the IRB protocol we have written states the resources required, include an iPad to administer the questionnaire, a laptop to type the responses from the interviews, and a table with chairs to set up. Given that our group already has access to many of these materials, what we would request in this proposal is funding to pay for gas mileage to and from Martinsville.

Vapor Intrusion Informational Campaign

For the campaign, the main resource we would be looking into are funds to support the services needed to accomplish our objectives. Some of the services we have in mind are animation to help bring our vision to life, a music composer to help write a jingle, a marketing expert to assist with the distribution of materials into different media, possible rental of a billboard, and a local vendor to help create marketing materials such as stickers and flyers. In addition, another resource we would require help with is forming connections with local media such as TV and radio stations to air this proposed public service announcement and local newspapers to show the advertisement.

Community Events Aimed at Increasing Participation

For community events, there are multiple resources that would be needed. One of our community partners has connections to a local marketer who has experience putting together large-scale events such as the proposed outdoor concert and resource fair. He would take care of the marketing, band arrangements, and set up while we would reach out to the vendors. The estimated cost of this large-scale free community festival and resource fair would be between \$20-25,000. In addition, we would likely need volunteers to help run the event, and an area to hold the event such as the local county fairgrounds within the city. For smaller events such as the dinner/lunch presentations and bingo night, funds would be need to include space rental and prizes from local establishments and vendors.

Barriers to Strategy Implementation

While each action may have its own unique barriers, there are some general barriers to implementation excluding costs. One of these barriers is distance. Members of this project team are all students from Purdue University which is located about 90 minutes North of Martinsville. Most communication between the research team and our community partners takes place over email and Zoom, however, we have to plan ahead if we want to make any trips to Martinsville. This can be challenging for frequent visits such as for the Intercept Interview Project. The best recommendation would be to try and conduct these interviews on the weekend in Spring, and then look into more frequent visits during the Summer when classes are not in session.

A second barrier is time considerations for our community partners and community residents. Most people have a day job Monday through Friday, and some likely work over the weekend given their area

of work. For interviews, we also learned that many members of the community work outside of Martinsville and have a long commute. These are some things to keep in mind, especially when planning family-centered events. A possible solution would be to host events on different days and times to try and target different groups. In a post-survey, we can also ask for feedback on time and location to see if there were any other days that worked better for attendees.

A third barrier is the difference in educational level between researchers and community members. A challenge that many researchers have is finding alternative explanations for concepts that are easy to understand while still being accurate. On top of that, many members of the community have an educational level below a bachelor's degree and a high school diploma. Our community partners have been a big asset in helping us to gauge people's perception of the contamination issue and helping to check our language when things start to become too complicated. This is a fault that many researchers have when thinking something is straightforward, but to the general public, it could easily be too complicated or even misinterpreted.

A fourth barrier is the attendance factor. Since one of the main things we are addressing is participation, we want that people to show up to events. From discussions with community partners, they make observations that the same families who decline to participate are the same ones who don't come to school functions and other common areas of involvement. There is a concern that if people have not been receptive to participation in the past, then how likely are they to engage now? A helpful comment from our partners has been to offer a meal to engage more families. Also, offering gas cards and local prizes is another way of encouraging involvement. Additionally, local members report that people love their community and often aim to buy locally as possible.

Measures of Successful Strategy Implementation

Based on the three different actions planned each item has different measurements of successful program implementation.

For the Student-led Intercept Interview project, the main measurement of a successful implementation is the number of responses collected, and if we achieve saturation. Once we have the responses and are able to identify common barriers, we can work to share our results with other researchers and members of the community so that they can adjust their recruitment and/or engagement activities.

For the Vapor Intrusion Campaign, the main measurement is seeing if there is an increase in the amount homes being tested for vapor intrusion testing. This is the goal of this project to raise awareness about the risk of vapor intrusion and to promote services already available for residents in Martinsville. We would need to cooperate with both the EPA and other local state agencies and consulting companies to get these numbers and look for any increases.

For Free Community Events, there can be multiple measurements. The first is attendance numbers for these events where we would need someone at the entrance to count people as they come in. Another form of measurement would be qualitative data collected from survey responses. These surveys would ask questions about their thoughts of the event i.e. did you enjoy the event?, how many people came with you?, how effective were the teaching methods/information provided?, was there something new you learned?, and how likely are you to come to future planned events?. These surveys would be the most helpful in seeing how effective these types of events are, and also we can accept recommendations on how to improve for future events.