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Risk Communication: Lessons Learned from Stakeholders in the United States

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Abstract

This manuscript describes risk communication in brownfields communities and features two case studies. The first case study highlights a former air force base, K. I. (Kevin Ingalls) Sawyer, in the Upper Peninsula of Michigan in the Lake Superior basin. The base closed in 1995 and the re-branded town of K. I. Sawyer struggles to find its image and purpose as a community. The primarily low-income community was concerned about a plume of per- and polyfluoroalkyl substances (PFAS) in groundwater, potentially contaminated soil in their baseball fields, and lead paint on the interior and exterior of vacant residential buildings which were brownfields. The second case study features the City of Benton Harbor, Michigan. Once a thriving harbor city, it currently is navigating a burden of multiple brownfields, vacant properties, and the aftermath of a lead water crisis. In 2016, lead-lined water service lines began to fail, releasing lead into drinking water, leading to community outrage and concern from 2019 – 2023. The city’s lead water crisis made national news. By 2023, the community felt the need to build their capacity to navigate conversations with local government and to obtain funding for community revitalization.

Keywords

Brownfields; Environmental Health; Risk; Risk Communication; Contamination; Communities; Lead; Per- and Polyfluoroalkyl Substances

1 Background: Risk Communication in Brownfields Communities

The Agency for Toxic Substances and Disease Registry (ATSDR) describes risk communication as how we talk to the public about substances or behaviors that can be harmful. In communities with brownfields that may have known or unknown contamination, it is especially important to listen to community concerns. Such concerns include contaminated groundwater, drinking water, or air; landfill leakage; and soil or groundwater plume spread or movement. In addition, communities may have concerns about blighted properties in general, such as mold, methamphetamine residues, lead exposures, and safety and security. Communities typically want to know how contamination may affect themselves and their families.

How we talk to the public about risk may be critical to building trust and transparent, multi-directional communication. As public and environmental health professionals, our role in communicating risks is to be open, honest, and calm to help build trust. It is critical to put the community’s needs first, to be compassionate, and to be genuine. These qualities

make us human, believable, and approachable. If we don't know an answer to a community member's question, we say so and offer to find out the answer. This is part of being accountable and meaningfully listening to community concerns.

In addition, we try to learn as much as possible about the community before our first visit. Here are some examples of information we collect in advance:

- Demographic information, such as education and income level, age, and languages spoken/read.
- Religious/faith beliefs, diversity of the community, geography, and cultural background and norms.
- Community organizations and local leaders that can or will be invited to the meeting and may be willing to partner on information communication and understanding.
- Room set-up for the meeting. For example, we may prefer to be sitting in a large round formation with the audience instead of up above them on a stage or at a podium. This encourages a "level playing field" and may increase trust and comfort.
- Language translators and written language translations (if needed).

An important aspect of risk communication is how we get our messages about environmental and health risks to our communities. To communicate risks, we can create written, spoken, or visual statements and use them to create messages for our community of concern. Messages are generally simple, one-sentence statements, such as:

- Reduce, reuse, recycle
- Three tests before age three (for blood lead screening)
- Boil water for five minutes
- Think green
- Shop local

If we know the environmental issues of concern, we can prepare key messages to frame our discussion and to alleviate fears or concerns the community may have specific to one or more issues. We may use a message map to convey key messages, such as the one shown in Figure 1. This message map was adapted from the ATSDR Communication Toolkit (Agency for Toxic Substances and Disease Registry, 2018). You can download the message map template for your own use here: https://www.atsdr.cdc.gov/communications-toolkit/documents/12_Message-Mapping-Tool-final-111015_508.pdf

The message map includes the community or partner (the "stakeholder") and the key question of concern, such as, will my children get sick from playing in soil with high levels of arsenic? Then, we may use 1, 2, or 3 supporting facts. A completed message map is provided in the Benton Harbor case example, below.

In the two case examples featured below, ATSDR practiced risk communication that was tailored to each community. In both communities, ATSDR was an invited guest to provide technical assistance on environmental issues.

1.1 Case Example: K. I. Sawyer Airforce Base, Marquette County, Upper Peninsula of Michigan

K.I. (Kenneth Ingalls) Sawyer Air Force Base was located in the state of Michigan's Upper Peninsula, a peninsula of land in the Great Lakes. The Upper Peninsula is bordered to the south by Lake Michigan, to the north by Lake Superior, and to the east by Lake Huron. Originally, the base began as the K.I. Sawyer County Airport in the mid-1930s and operated until 1955, with the establishment of the K.I. Sawyer Air Force Base. The airport then functioned primarily as a jet base with about 300 civilian flight landings per month. The K.I. Sawyer Air Force Base operated from 1955 until its closure in 1995 (Witanen, 2017). The base closure devastated the Marquette County area. The base closure led to the loss of as many as 3,000 jobs, loss of businesses, and impacts on local schools and Northern Michigan University. The town of K.I. Sawyer suffered an economic decline, from which it did not recover. By 2016, the poverty rate was as high as 46% and unemployment reached as high as 24%. In addition, the area was perceived as a "drug den" (Witanen, 2017).

From 2013 – 2019, ATSDR was engaged with a local community group, Sawyer Community Alliance (SCA). ATSDR was asked to expand community engagement and risk communication activities. For several years, the Marquette County Commissioner, planner, and brownfields redevelopment experts had been discussing environmental concerns and redevelopment plans with Sawyer Community Alliance. The SCA vision was, "From Base to Place: Building a Healthy Sawyer." Their primary goals are to improve health, economy, and social disparities by establishing a stronger sense of community. They focus on remediating blighted buildings, providing community services, and improving public services (water, transportation, etc.) (Agency for Toxic Substances and Disease Registry, 2021). By 2018, SCA had enjoyed several successes:

- Two former military members established a volunteer "community watch," which grew to over 30 members within 2–3 years of its inception. The community watch:
 - coordinated their volunteer services with the local police
 - hosted several community events with bicycle and school supplies raffles
 - worked with the state environmental agency to limit illegal garbage dumping by supplying dumpsters for community clean-up
 - worked with the Sault [pronounced "Soo"] Tribe, who owned many rental properties on-site, to improve garbage service
- The K. I. Sawyer population began to increase, and large businesses began to open on-site

- The County used brownfields funding to safely demolish 200 residential apartment units, removing lead and asbestos hazards
- The local school hosted a community needs assessment survey to focus on assets and improvements
- Local residents worked with SCA to obtain funding to clean up and re-open two baseball fields connected to the elementary school by an all-terrain trail. The local health clinic helped expand the community garden, which relocated to the school grounds.

While focusing on small wins and positive successes, the SCA and partners continuously address and communicate risks during regularly scheduled SCA meetings (see Figure 2). For example, the baseball fields were filled with stamp sands, a coarse sand formed from processing metal ore in a stamping mill, which crushes material to remove ore. Residents were concerned about metal contamination in the stamp sands. The ball fields were in disrepair and not usable without the correct fill. Local residents obtained funding to have the stamp sands sampled and then removed. Ultimately, metal contamination was not a concern. The ball fields were updated with clean fill and reopened. In addition, 200 apartment housing units were vacant and abutted the school property. The harsh winter conditions had led to peeling, lead-based paint hanging in long strips on the exterior of the units. The units were an attractive nuisance to local teens, who trespassed in the units. The deteriorated buildings posed a risk of injury to the teens. The teens also risked bringing lead dust home on their clothing, potentially impacting younger siblings. The units were demolished and the soil that encapsulated the demolished remains was tested for lead. While lead was present, it was below regulatory limits. The County continuously discussed with SCA and the community the demolition risks as well as the levels of lead in soil.

One ongoing concern at K.I. Sawyer is a plume of per- and polyfluoroalkyl substances (PFAS) in groundwater. PFAS were often used on military bases in firefighting foam used for training and response. The County coordinated continuous delineation and monitoring of the plume area. In 2016, the Air Force detected PFAS at 13 of 15 sites. A former fire training area has the highest levels of PFAS. The drinking water at K. I. Sawyer is continuously monitored. Testing of 28 residential wells were non-detect for PFAS. Multiple agencies and partners inform the community about monitoring and PFAS risks. There is ongoing risk communication, using plain language and a website designated to provide information about PFAS and monitoring activities (Michigan PFAS Action Response Team, 2022).

1.2 Case Example: Benton Harbor, Berrien County, Michigan

Benton Harbor is in Berrien County, Michigan, a largely agricultural area of rural towns and small cities. The City of Benton Harbor was once a thriving harbor city on the St. Joseph River, which empties into nearby Lake Michigan. The City of Benton Harbor is 87% African American (Black), with a median household income in the city of \$26,592 and 44% of the population in poverty. The United States Census Bureau defines poverty as a status when the family's total income is less than the family's money income threshold (pre-determined by the Census Bureau). Then the family and every individual in it is considered in poverty (United States Census Bureau, 2023, June 15). In comparison, Berrien County overall

is 80% White and 14% African American, and the poverty level is 15% (United States Census, 2023). Figure 3 indicates 43 brownfields in Berrien County that have received federal funding, primarily for site assessment. A high density of these sites are clustered in the lower income areas, including Benton Harbor (United States Environmental Protection Agency, 2024, January 19). State-funded brownfields projects in Benton Harbor include 10 site assessments and more than 10 redevelopment grants and loans (Michigan Department of Environment, Great Lakes, and Energy, 2023).

In September of 2019, ATSDR was invited by local organizations to hold a soilSHOP – soil screening, health outreach, and partnerships – event during a weekly farmers market in downtown Benton Harbor. The community had been going through a lead water crisis attributed to failing, lead-lined water services lines. Partners from the local healthcare organization offered blood lead screening for children and environmental health education. Community members were concerned that soil lead levels may have increased from watering lawns and gardens with household water. Using an X-ray Fluorescence machine, ATSDR screened over 80 soil samples for lead. None of the samples were of concern in terms of exceeding regulatory levels of lead in soil. However, lead pipe replacement at the time was only slowly progressing.

In 2019, Benton Harbor residents were using bottled water, largely distributed by churches and volunteer organizations. The Berrien County Health Department was distributing faucet water filters. While the County Health Department had a statement on their website regarding distribution of water filters, they had not implemented concentrated risk communication efforts, such as partnering with the local faith-based leaders or going door-to-door to conduct outreach. In addition, if lead levels are very high, water filters may not function effectively. The water crisis made national news, and residents, the Mayor, and one City Commissioner (i.e., a role within the Mayor's office that is part of the legislative and policy-making body) were interviewed. People were, in general, confused and outraged. By 2023, over 99% of lead service lines (about 4,500) in Benton Harbor were replaced, and the remaining lines were scheduled for replacement. In addition, the state established a lead home assessment program in which inspectors would identify any sources of lead in homes, such as windows or paint, and repair and replace the items at no cost to the home owner.

In early 2023, a City Commissioner reached out to ATSDR with a specific request to help the City and residents increase their capacity to understand environmental and health risks. The Commissioner relayed that residents had feelings of distrust in their own city government and a need to understand chemical contamination. In response, we offered a 4-hour training in Communicating Environmental and Health Risks. The training offered four continuing education units and a certificate of completion from our partner, National Environmental Health Association (NEHA). In March, we facilitated a 2-day event, with the training on Day 1 and a soilSHOP and community environmental education event on Day 2.

Knowing that the community might still be outraged and distrustful of government, our first goal was to establish trust early. We did so by holding the event at a local Boys and Girls Club. We ensured that the City Commissioner and a strong, well-known community advocate within the City government designed flyers for the training, conducted outreach,

and introduced the training team from ATSDR and NEHA. We also included a guest lecturer from the Michigan Department of Environment, Great Lakes, and Energy, who described multiple brownfields projects and successes funded by the state specific to assessment and remediation in Benton Harbor. We opened the training with, “what is a part per billion (ppb)?” demonstration, using images of one billion particles of soil with one white particle, a flask filled with one million particles of water and a drop of blue dye, and a bucket filled with one million particles of water and one red bead (i.e., one part red bead per million parts water, or 1 ppm), shown in Figure 4. We tailored the training around interactive exercises associated with lead in water and soil. Practice sessions included developing key risk messages with the participants, specifically regarding lead in water and soil. The key messages included links to resources for information, such as water quality updates or to sign up for the home assessment program. An example message map for concerns about lead in water is provided in Figure 5.

In total, 35 participants attended the training. The participants included residents, local non-profits, city personnel, partners from the United States Environmental Protection Agency (EPA) who also hosted the soilSHOP event on Day 2, and a class of eight students and one professor from nearby Andrews University. Several participants attended Day 2 of the event and had a chance to observe risk communication and environmental health education through the soilSHOP activity (see Figure 6). The EPA partners screened over 20 soil samples for lead, and none of the samples exceeded regulatory limits. During the event, the Berrien County Health Department provided free water filters and radon test kits. The State of Michigan also provided information about and a sign-up sheet for free home lead assessments.

2 Conclusion

The K.I. Sawyer and Benton Harbor case studies demonstrate the importance of community engagement and effective risk communication in two very different communities with very different concerns about contamination. In K.I. Sawyer, risk communication was coordinated through the County’s municipal entities and happened frequently, helping to build trust within the community. In turn, this motivated SCA to attain small successes to achieve a sense of place and community pride. In Benton Harbor, a City Commissioner led the charge to build the capacity of the community to navigate complex issues associated with lead contamination concerns in water and soil. By participating in a 2-day training and community event, Benton Harbor changed from a community in distrust of their government over a water crisis to a community with skills to understand chemical contamination. They learned how to access resources, such as water quality data or lead home assessment. In addition, the community had new partners to guide them on State-led brownfields remediation in Benton Harbor.

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Message Map Template		
Stakeholder:		
Question or concern:		
Key Message 1	Key Message 2	Key Message 3
Supporting Fact 1.1	Supporting Fact 2.1	Supporting Fact 3.1
Supporting Fact 1.2	Supporting Fact 2.2	Supporting Fact 3.2
Supporting Fact 1.3	Supporting Fact 2.3	Supporting Fact 3.3

Figure 1.
Message Map Template (adapted from ATSDR Communication Toolkit (Agency for Toxic Substances and Disease Registry, 2018)).



Figure 2.

Left: SCA members received funding for community projects. Image taken by Lloyd DeGrane, 2014, and used with permission. Right: SCA members used funding to clean up and re-open two baseball fields. Image taken by ATSDR, 2018. ATSDR maintains photo releases on file.

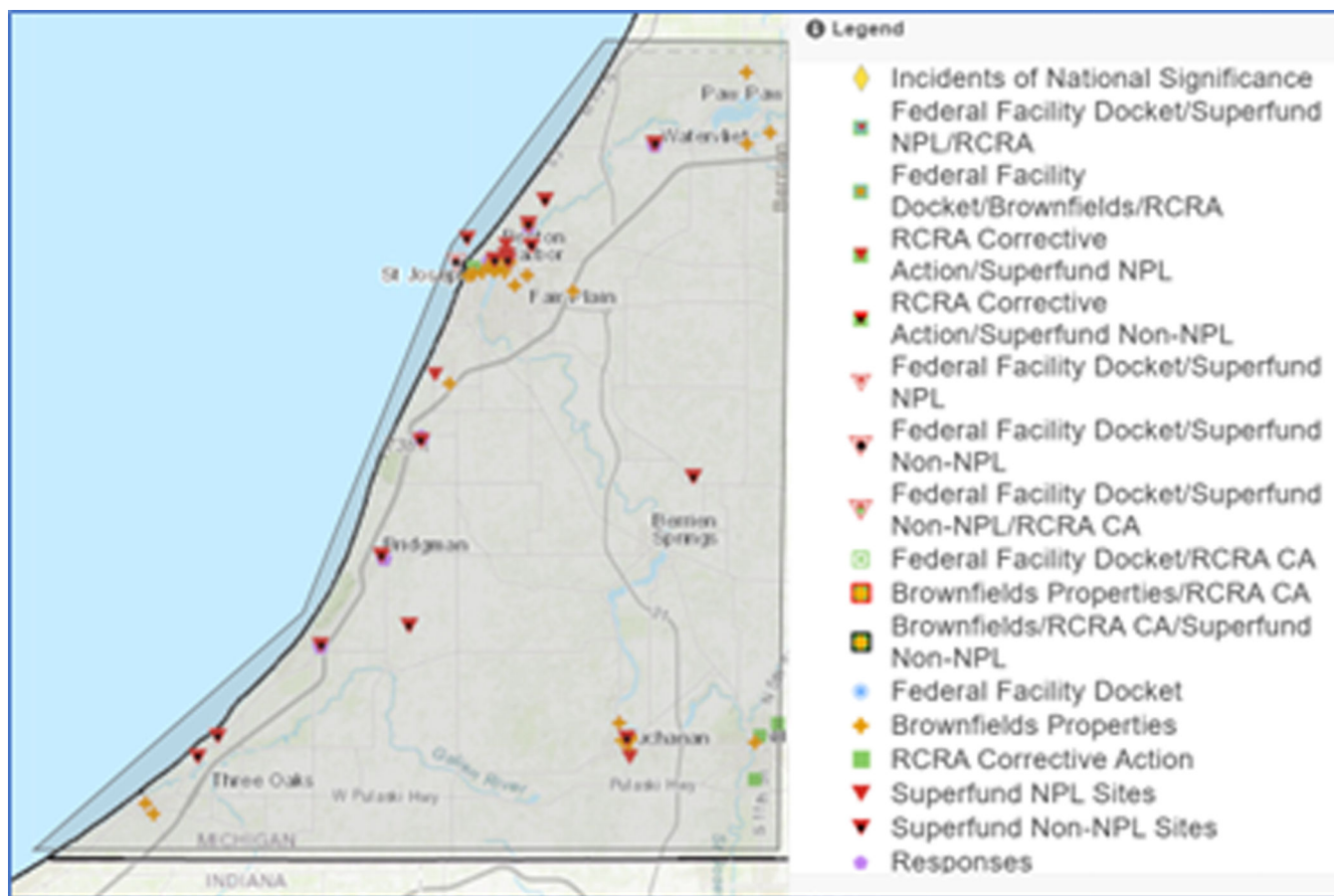


Figure 3.
Land Reuse Sites in Berrien County: Map and Legend (United States Environmental Protection Agency, 2024, January 19).

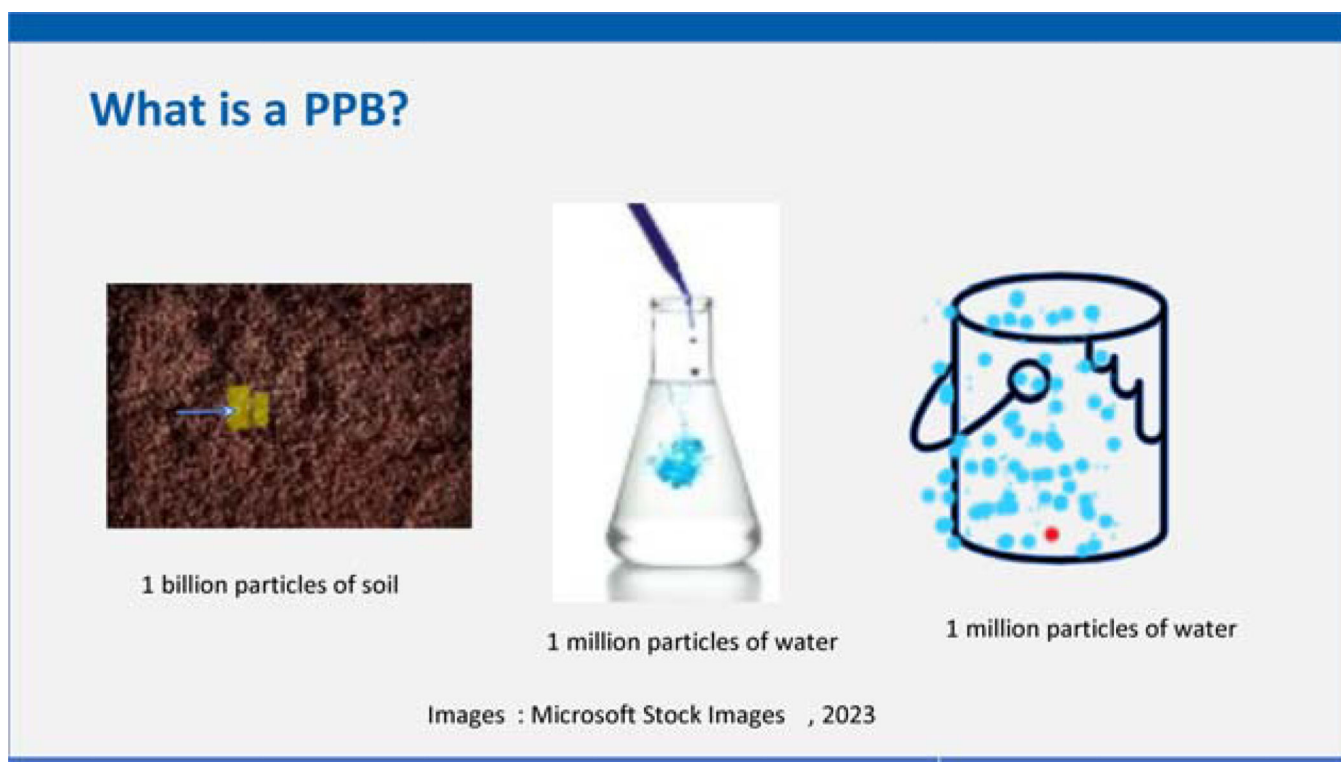


Figure 4.

What is a PPB? Image created by the Agency for Toxic Substances and Disease Registry Land Reuse Program, using Microsoft Stock images, 2023.

Message Map 1: Water Crisis in Benton Harbor (example only)

Stakeholder: Benton Harbor Citizens		
Question or concern: Is there lead in our water?		
Key Message 1	Key Message 2	Key Message 3
Before the water pipes were replaced, lead in water was found to be above the action level of 15 parts lead per 1 billion parts of water (15 ppb)	The water is safe to drink	The state (EGLE) is offering free whole home lead assessments
Lead in water above the action level can lead to lead poisoning in small children and some effects in adults	Over 99% of lead water lines were replaced and water tested was below the action level in June (14 ppb) and December (9 ppb)	EGLE will replace any sources of lead in your home
Berrien County Health Department reviewed children's blood lead data from 2010 – 2021+ and did not find significant increases in lead poisoning*	If you need more time to feel safe, you can drink bottled water or obtain a free water filter. Information is here: https://www.michigan.gov/egle/newsroom/press-releases/2022/11/28/bh-water	Removal of lead sources should reduce potential lead exposures
You can get free blood lead screening for kids ages 0 - 6 at: (March 11 community event, TBD)	Every six months EGLE will post water quality updates on this website: https://www.michigan.gov/egle/about/featured/benton-harbor	There is no charge for the home assessments or repairs. You can sign up here: Lead Safe Home Program ALE application , or call 866-691-5323.

*Lead data depends on number of children tested, who is tested, and other factors

Figure 5.
Example training exercise message map related to concerns about lead in water (ATSDR, 2023).



Figure 6.

Left: An EPA representative with a community member, scanning a soil sample for lead. Right: Risk communication and environmental health education activities during the soilSHOP event (ATSDR, 2023). ATSDR maintains photo releases on file.