Negotiating Community Engagement and Science in Federal Environmental Public Health Sector

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In this case study, I use ethnographic data to explore how community engagement and science are deployed at the U.S. Agency for Toxic Substances and Disease Registry, with the goal of formulating an understanding of the personalized meanings of science–community relations for key environmental public health experts. In focus is the cultural discourse circulating in the agency that exposes the real concerns, beliefs, and attitudes of these scientists and experts vis-à-vis their community engagement experiences. Finally, I propose that critical attention to the place of power relations, knowledge politics, and environmental justice are fundamental to studies of toxic contamination where commitments to community engagement and quality science are joined to form a positive research goal and where attempts are made to improve the conditions of quality environmental public health service.

Keywords: [science studies, environmental public health, community–institutional relations, ethnography of science and expertise]

It just so happens that the Greeks, who invented both Science and democracy, bequeathed us a problem that no one has yet been able to solve.

—Bruno Latour, 2004

Community engagement, community involvement, and community partnerships are familiar concepts and practices in many government institutions, and these are cardinal principles in federal environmental public health agencies like the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). For the past 20 years the public health sector has experienced greater pressure from the public to further democratize scientific research, practice, and policy. This demand for greater public participation reflects the moral political aims of more global civil society movements exemplified by the efforts (or struggles) of grassroots advocacy groups, NGOs, and other special interest groups. All of these sociopolitical formations tend to share an ongoing demand for the improvement of participatory models of democracy and development. ATSDR is one federal environmental public health agency that struggles to negotiate public or community engagement politics, in addition to...
developing quality scientific knowledge. This intersection of commitments to science and community engagement is still an understudied area in the loosely defined and emerging anthropological focus on environmental health problems and the sociopolitics of toxic exposure in particular (Checker 2005; Fortun 2001; Fortun and Fortun 2005; Guillette et al. 1998; Petryna 2002; Spears 2006). I foresee an anthropological perspective that can be added to these important studies; this article, this small and admittedly “thin” ethnographic account, is an example of this effort. The primary goal is to study agency discourse as it circulates among a group of environmental health experts. No doubt, people’s practices don’t always match up with what they say about their practices, but studying discourse—what scientists say about their trade and their community engagement experience, is meaningful in its own right. The late modern era calls for perspectives on environmental health science that don’t only critique science and the broader political and epistemological demarcation of the “lay” and the “expert”; we also need to develop more responsible critiques of both the environmental health sciences and the democratization of science if we wish to better understand the role of science in citizen struggles.

ASTDR is performing a juggling act with Science in one hand and a community involvement strategy in the other, and this idea of community involvement is based on a democratic principle of participation. The critical questions that serve as the focus for this article are: How do these experts at ATSDR view the dual mandates of quality science and positive community involvement practice? Is their coproduction viewed as a fateful pursuit? What benefits and challenges are believed to surface in the midst of such a synthesis of commitments or institutional values? Who are the people who uphold late modern mandates of community involvement in tandem with values of quality objective science? What follows is an attempt to better understand personal reason or personal sense making amid moral institutional constraints. I realize a very real challenge this route of investigation confronts is a challenge derived from the institutional displacement of the “the personal equation” in late modern technoscience (Shapin 2008:10). Sociology and anthropology of science research, even amid a diversity of theoretical commitments, continue to support the idea that people matter in the study of science and that, because people matter, sustaining the impersonality of modern reason is missing what really matters most about science and how it develops and operates in our world today. Ultimately, this study looks at how scientists working in a federal agency think of themselves and the residents of contaminated communities with which they come in contact.

Aside from these guiding research questions, this article is inspired by recent work in science and technology studies concerning the contentious interface of science and citizenship (Leach et al. 2005).

The projections of modern policy and scientific institutions of the “public” as typically vacuous in epistemic terms can be understood instead as the projections of insecure institutions unable to adopt more self-reflexive orientations towards their own social relations and cultural parochialism. Such a lack of open self-reflexivity can, of course, be seen as a means of power. [Leach et al. 2005:8]
I focus here on the cultural information circulating in the agency that exposes the real concerns and attitudes of these scientists and experts vis-à-vis their community engagement experiences. In a sense, if it is true that government agencies are in fact constrained by policies and mandates that impede their ability to be publicly self-reflexive, this article is an attempt to make exposure more compassionate and grounded in an ethnography of expertise and power that “studies up” (Nader 1969, 2001). Here I am concerned with offering a thematic exploration of the community in science and the culture of science for key environmental public health experts. I review ATSDR perspectives on the relationship between science and community and perceptions of the benefits and challenges of incorporating communities in ATSDR scientific research.

The ATSDR is an Atlanta-based federal agency with about 430 employees with expertise in a range of fields including epidemiology, medicine, toxicology, engineering, and health education. The ATSDR is one of many agencies within the U.S. Department of Health and Human Services (DHHS) and was created with the passage of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. This act is generally referred to as CERCLA or the Superfund law. Following its congressional mandate, ATSDR was formally organized in 1985 to become the first federal public health agency responsible for evaluating the human health effects of exposure to hazardous substances. Under the Superfund law, Section 104(i), ATSDR was charged with many responsibilities in the broader area of environmental public health. Aside from conducting site investigations and health studies in communities located near sources of environmental contamination or emissions, ATSDR also provides funding, training, and technical assistance to local, state, and other federal health and environmental agencies, tribal governments, community residents, community organizations, and other interest groups.

ATSDR health investigations are done at the request of, or in collaboration with, state or local authorities, in response to citizen petitions, or because the site of contamination is a federal facility. The ATSDR approach to health studies is also conditioned by the Superfund law. To fulfill its congressional mandate, the agency has developed programs and activities that identify people at health risk, evaluate relationships between exposures and adverse health effects, recommend actions to eliminate exposures, and mitigate adverse health outcomes. Some examples of these programs and activities are: public health assessments, health consultations, health advisories, health education activities, exposure investigations, health surveys, case-control and cohort studies, surveillance activities, and exposure registries. Thinking of ATSDR health studies as examples of “mandated science” (Salter 1988), we see more clearly the institutional constrictions and guidelines that shape and influence the organization of environmental health science in the government sector. The primary mission of ATSDR is: “to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and disease related to toxic substances.” Mission statements tell very little about the actual people working in the agency and their experiences with community engagement and scientific investigation. Ethnographic detail intensifies our understanding of government agency culture and how and in what ways its culture of science and expertise is internally defended, contested, adapted, and reconfigured.
This article is organized as follows. First, the methods of data collection and analysis are described. Next, the ethnographic findings are presented and organized around salient themes that emerged in interviews with informants, with particular emphasis on “community engagement” and “science” themes. The article concludes with a discussion of the study results vis-à-vis theoretical and applied considerations for anthropological investigations of environmental public health debates attending to environmental justice struggles in general and science–public relations in particular.

Data Collection

The data analyzed for this article were collected while I was an intern in Atlanta, Georgia, with the Health Investigations Branch (HIB) in the Division of Health Studies at ATSDR between May and August 2004. The primary data collection methods included a total of 13 semidirected, open-ended interviews with agency scientists and staff (e.g., epidemiologists–environmental health scientists \( n = 3 \), physicians \( n = 2 \), public health educators \( n = 3 \), medical officers \( n = 2 \), health communications specialists \( n = 3 \)) from various divisions and departments across the agency (e.g., Health Investigations Branch, Department of Health Education and Promotion, Office of Science, Department of Health Assessment and Consultation, and the Community Involvement Branch). Each interview averaged between 45 and 90 minutes in length. With the permission of my informants, I tape recorded all interviews and later transcribed them. I also attended weekly HIB meetings where participant observations and note taking took place. Because I had relatively easy access to informants as a summer ATSDR intern, on several occasions I had the privilege of following up on interviews with informants willing to clarify or expand on selected topics. Additionally, I held one focus group with two environmental epidemiologists, two public health educators, one physician, and one communications specialist. With the permission of all focus group participants, I tape recorded the focus group discussion and later transcribed it.

Data collection methods also included continuous participant observation on a weekly basis, with each workday concluding with a journal-writing session averaging between one and two hours in length. The material presented here also draws from secondary research, including government documents and my informants’ published or unpublished research reports, which were obtained during the internship. This ethnographic research project was approved by Northern Arizona University’s Human Subjects Committee.

Engaging Community Engagement and Scientific Expertise at ATSDR

To understand the ways in which community engagement and science are negotiated among ATSDR staff, the concept of “community” needs some attention. Community is a rather open concept that can be deployed to mean a contaminated community, a community of stakeholders, or, as one informant put, “Community can mean anybody with an interest in the pollution issue.” ATSDR employs a dynamic and flexible concept of community heavily influenced by social psychology and the interplay between individual motives and social interaction (Center for
Disease Control and Prevention, and the Agency for Toxic Substances and Disease Registry [CDC–ATSDR] 1997; Chavis and Wandersman 1990). For the purposes of this article, community refers to a cluster of scientists and other experts working within a mandate-driven federal agency composed of compatible and, at times, conflicting technoscientific expertise, morals, and virtues. In general, I consider “community” or community culture a concept that attempts to grasp the familiarity that operates in discourse and practice among a group of people. Contaminated communities, much like the community of scientists at ATSDR, are conditioned by complexities deriving from temporally specific and site-specific challenges. Furthermore, toxic contamination events or disasters, in many ways, create community (Fortun 2001:10). Or, as one environmental health scientist in the Division of Health Studies told me, “the community is different for every site.” Some informants even expressed caution in adopting too rigid of a concept of community. “I am not someone who sees community as a geographical unit. I mean it makes sense in terms of exposure, but I think we have to be careful about being too rigid with our definitions of community in the work we do,” said one physician working in the Department of Health Education and Promotion.

Community Engagement as Agency Struggle

All my informants spoke proudly about ATSDR’s community engagement or involvement model. On several occasions they even compared it to other federal environmental agencies that attend to the health and environment relationship, including the U.S. EPA and CDC, both strong partners of ATSDR. Several informants stated that ATSDR has a community involvement focus that is far more developed than the CDC National Center for Environmental Health. Because ATSDR developed out of the EPA Superfund Act as its health investigations agency, ATSDR has a unique historical relationship with contaminated communities that has spanned nearly 25 years. ATSDR scientists are quick to point out that the agency has experienced its share of unsuccessful public engagements, including extreme community hostility and distrust. In other words, they have experience with what some of my informants refer to as “agency bashing.” One physician and health educator told me that social conflict and community hostility have been a common experience for ATSDR researchers and educators. She says that this in turn has made easygoing community involvement hard to come by when communities are faced with a chemical contamination problem:

Social conflict is a very prominent problem in hazardous waste sites and it is just the nature of the beast. It makes it a very difficult situation to go in and do community involvement. I think that is why ATSDR has been involved in a unique style of that, because if you come in and you are like “we are from the government,” they start throwing tomatoes and things like that. So, you are dealing with, at times, but not all times, hostile communities. But the majority of our communities can be hostile and we really have to learn to collaborate and build bridges in order to just get our basic scientific and educational work done.
I inquired about the challenges that surface when the “public” is brought into environmental public health science and practice. A major challenge for my informants was the broader problem of communication:

I think sometimes that the practice of community involvement has not been as strong as it could be on communicating with communities and explaining risk. From that there is conflict in the relationships that are built, because we are not communicating well. [Epidemiologist, Health Investigations Branch (HIB)]

I don’t know that it is so helpful sometimes, in terms of communications, that we say to the community, for example, that there is no apparent public health hazard. I mean I can understand the science behind that conclusion, but there is no doubt in my mind that that is a waffling position. So that is a problem. [Community psychologist, DHEP]

Other major challenges—or “risks” as one of my informants puts it—include time and money:

There are risks that you take when you engage the community. One is, for sure, you will lengthen the process, because it will require consensus building and interaction, and this kind of stuff, which is something we don’t normally plan for. So most timelines are doubled I would say in involving communities in studies and investigations. [Epidemiologist, HIB]

It can be a struggle at times when there is no money. The agency is restricted by its funding levels. [Physician and public health educator, DHEP]

A limitation on the science side is time. The more you get them involved, the more you have to keep in touch with them and keep them up to speed. Getting their ideas and views and suggestions that might be useful for scientists just takes more time. You can’t just throw together a study and go with it, you have to tweak it here and there, and that just lengthens the process . . . People here have to work fast. [Environmental health scientist, Division of Health Studies (DHS)]

Several of my informants pointed out that many communities they interact with lack a general trust in government and government-based research, adding that this was a major challenge that ATSDR has attempted to improve over the years. Two informants alluded to the fact that this public distrust or “mistrust” is related to the agency’s lack of real proactive engagement—the institutional role of regulatory agencies like the EPA:

We are not proactively engaging communities, it isn’t in our mandate, so because of that there are trust issues that develop, you know, like we are hiding things, or that we are not telling them the truth. [Physician and public health educator, DHEP]

There is that mistrust thing. There is the mistrust of, you know, is the government coming in to do good, or does it have its own agenda. That is
true of any time you deal with the community dealing with the federal government. [Physician and public health educator, DHEP]

This informant went on to add that scientists and government-based scientific research are resisted by communities, because the community claims the science is exploitative. When looking at her added comments below, one might even wonder how the problem of trust is directly or indirectly related to the broader exploitative nature of “research” itself:

Over the years there has been, at least in some communities, a desire to not be researched in anything connected with hazardous waste and disease, whether it is mental or political effects of it, simply because they feel like they are being used as guinea pigs for the government, that they have already been placed in a situation of material disadvantage because of being sited near a hazardous waste site, their health is at risk, and then the government comes and says “Hey, we are here to research you,” and they are like “get out,” you know. So there is that mistrust thing. There is the mistrust of, you know, is ATSDR coming in to do good, or does it have its own agenda. That is true of any time you deal with the community dealing with the federal government. It is different in different regions. [Physician and public health educator, DHEP]

One research initiative at ATSDR has focused on the relationship between community contamination problems and psychosocial stress. This particular research, argued one of my informants, introduces a certain community involvement challenge that is more related to a problem of stigmatization common to communities dealing with environmental risks (Gregory and Satterfield 2002):

Stigma. People feel like they are going to be stigmatized as having a psychological disorder when they object politically to the presence of toxic waste in their communities, that they will be labeled as crazy housewives. That does happen to activists. I think that they feel like their political decisions would be invalidated. For some of the more professional community activists, that was their stance and there was a lot of pressure to abandon the project because of that. On the other side, there is just the standard community resistance to mental health initiatives. People don’t want the stigma. [Physician and public health educator, DHEP]

Several ATSDR scientists told me that another challenge of community engagement, or more particularly a challenge presented when scientists and community work together, is that the community often misinterprets the actual ability of environmental health science to create clean, useful, and evidence-based theories of causation. Scientists in my ethnographic study, some of whom were involved in this work group, mentioned that community involvement creates problems because the community has certain expectations regarding the science—“they want a clear answer about cause and effect”—and, furthermore, that scientists themselves have a difficult time doing “science” in a public context. There are perceived challenges to
science that are believed to result directly from community engagement. For example, the community’s ability—intentional or unintentional—to manipulate research data is a real concern for environmental epidemiologists in the agency:

The downside for me as an epidemiologist is just that to the extent that the people understand the study they either may be able to or may think that they are able to manipulate the outcomes. As an epidemiologist, I understand the need to engage them, but I am still bothered by the potential conflicts. [Epidemiologist, HIB]

I was also told that the public’s expectations of the science can also lead to their mistrust in the agency, but that this sense of mistrust is conditioned by the fact that the “public” is not “professional” like ATSDR scientists are:

There is still mistrust because of the public’s expectation. You know. They do not understand science as we do, or the scientists here do. Scientists are more professional. They will tell what they found, what has been studied, and study what has been the findings. At least scientists here try to do it professionally and stay on the truth part of the research study. But truth doesn’t go well all the time with people who are affected. People who are affected, they would like to see that we find somebody who is responsible for their poor health, if there is any. They will want some compensation or something done, you know, for the health of their community. So there is always a mismatch. There is always a mistrust. I think by working with the community, in our study, we were able to minimize that a great deal. Still there have been some people who have not been completely happy, but in the research I have been involved in we have not seen that a whole lot. The public’s expectation is that you find a culprit. You tell us who it is so we can go get after them. So there is always a public’s expectation versus what do you find in doing these [scientific] studies that might not be what they had expected. [Epidemiologist and medical officer, HIB]

Perhaps the most interesting, and even humorous, interview experience I had was when I was told that part of the difficulty a scientist faces when doing research in the public sphere stems from the fact that “mice don’t have any questions. They are just research animals. It is hard for some scientists to make that jump from the controlled research to the public.” Others mentioned ideas that reflect concerns with problems of scientific ambiguity and community expectations discussed earlier:

Communities have an expectation of the science community as it applies to environmental health and environmental issues that quite frankly we can’t fully meet yet. For example we go to a community and say “this is toxicologist so and so, and this is epidemiologist whatever,” and you can just see the community kind of rubbing their hands expecting to get all of their questions answered. Well, of course, that’s not true. By and large, and this is from Maine to California, people want a cause–effect relationship. [Health communications specialist, Community Involvement Branch (CIB)]
These agency-based narratives reflect how ATSDR scientists really talk about and show concern for the consequences and problems they face when they do community involvement. Community involvement is thought to build honesty and trust between the agency and the community, but many scientists at ATSDR know that this is not easy to do. What seems to be most important to these scientists and public health educators is that “it takes a long time to gain a community’s trust and you really have to do that by being very honest with them and being straightforward about what you can and can’t do.” In fact, the Community Involvement Branch (CIB) of the agency, according to one of my informants, was strictly about building better communication strategies to improve understandings between scientists and communities: “In a nutshell, community involvement [according to the CIB] is about building communication strategies and developing trust and credibility between the community and our scientists.”

Many of the scientists I interviewed share this understanding of community involvement. At the same time, though, several scientists informed me that the CIB was just a “public relations arm” of the agency that had “really little to do with actual research and science.” So, if following Leach et al.’s (2005) suggestion that the interrelationship between science and citizen rights are not only emerging but also are in fact forming new forms of engagement, the question arises for experts working at a federal agency like ATSDR: how and in what ways can nonscientists contribute to environmental health science and knowledge? What are the benefits of this form of engagement, this citizenization and democratization of science?

Community Engagement as Beneficial Practice

Many scientists at ATSDR believe that communities help the scientific research process by providing investigators with useful information about the site’s contamination history. In many ways, there was a sense among these scientists that communities have their own valuable expertise when it comes to understanding the local specifics of environmental contamination problems. I was told that this local expertise informs the scientific investigation:

We are very much into upfront involvement in the community because they in turn can provide some useful input on control groups, or which areas to focus on in the community for different types of exposures, which groups of people they are aware of, or how to contact people that might have moved out of the community, or whatever. There is certainly benefit in the involvement. [Epidemiologist, Office of Science]

Definitely it is a focus of ATSDR to work closely with the community. It has been working with Superfund sites and our job is the health of the people that are around Superfund sites. So, it is very important to include them in the process. Since I joined, I was involved in a research project or exposure investigation study done by the Health Investigations Branch and we had a very strong community involvement plan. We had a community working group that we participated with on a regular bases to get their inputs, starting from the idea of the study, and even including the development of
our protocol. So all those steps, we got their inputs. So, from that experience I know I have learned that getting the community involved is very important, you know, in our kind of research. [Epidemiologist and medical officer, HIB]

One informant felt that ATSDR is really a good example of an agency that takes community involvement seriously and practices an open engagement strategy. This informant also shares her feeling about a power differential that exists when it comes to ATSDR–community engagements and the role that empowerment plays in community involvement efforts:

I think that ATSDR’s strength has been a willingness to really share and collaborate and have open stakeholder partnerships with communities. We do it through things like Community Involvement Panels or Community Advisory Panels. If you have a [toxic waste] site where you are going to go and do a large intervention, a lot of times we would set up a citizen advisory panel. There are certain public privacy and openness requirements when you do that, but you invite people in from the community, who you hope are coming in on a representative basis, to really advise the agency about what it is that should be done at the site and to get the community’s input. Obviously, they don’t share equal power, because an agency is bound by its law and its own policy to make decisions and at times they are going to do what the citizens want to do or they are not going to come up with a report that the citizens agree with, but there is a greater openness at this agency, I think, for citizen input, than a lot of other places. EPA has a good community involvement system too. I think that it is just that need to openly engage with communities that are very mistrustful. In terms of my own research, I think the benefits of it have been returning a sense of control. [Physician and public health educator, DHEP]

Even though this informant says her own research has benefited from “returning a sense of control” to the community, she also argued: “I think it’s a real issue, the empowerment issues of community. I think the process, the bureaucracy, serves to disempower communities. I have always said that. We come in, we take their power away, and then we give it back to them and then go, ‘Oh look, we empowered you,’ as if that was a healthy thing to do.” Much like my informants who said that the “community can define itself,” the community, as this informant argues, does not need an ATSDR expert to tell them that they have power. From this perspective, a beneficial community involvement strategy is one devoid of an effort to inject power into the community to get them to participate and become interested in the problem. This informant was not the only individual to frame the benefits of community involvement in terms of giving the community a “sense of control.” “The benefits are tremendous, because if you include them in the process, they consider this their thing, instead of the federal agency coming in and doing something,” was the opinion of another informant.

Some ATSDR scientists are more careful about how they discuss the benefits of community involvement. For example, scientists still wish to conduct good, “valid” science, despite their interests in community involvement, and this can make their
perspectives seem ambiguous, and at times even contradictory. This was the best example of this perspective:

As far as science in the community, certainly it is critical to know what they know, like the plant releases at night so you will see the smoke. Other times, the science is limited. You know, we have to be a little bit limited in what we can do, via what prejudice that we introduce into an investigation. For example, communities often want to give us a list of people with some health outcome and that is not very useable to us, most of the time, because we have to collect to make comparisons. We have to compare it to something and the information that they have has to be collected sort of the same way before a comparison is legitimate. So, you have to be really careful with the information that they give, in terms of validating it. But, even if it is valid, if you are going to have to compare it to something that was collected a different way. For example, asthma collected in a survey and asthma detected by examining a group of children, you may get some strikingly different results, and it is sort of hard to be sure that difference is in the populations and not in the methods. [Epidemiologist, HIB]

When I asked scientists and public health educators to explain the benefits of community involvement, the discussion often quickly turned to the problems community involvement brings to the “science” of environmental health research. Nonetheless, my ethnographic research shows that together these perspectives on community involvement rest somewhere in a gray area between the good and the beneficial, the challenging and, perhaps most importantly, the domain of the Scientific.

ATSDR scientists in the Health Investigations Branch where I interned suggested often that I talk to people in the Community Involvement Branch to explore my community engagement interests. Whenever this suggestion would surface lay, I would explain that I was interested in how the scientists in the agency themselves thought about community involvement, and not necessarily how it was perceived from the perspective of communications specialists, or what one epidemiologist called “the public relations folks.” What was ironic about these responses was the fact that there are a number of scientists in the HIB who not only had community involvement experience but also had published articles in peer-reviewed journals concerning the very community engagement challenges I was interested in (Inserra et al. 2002; Health Investigations Communications Work Group 2004; White et al. 2002). These publications reveal, as my own ethnographic research does, elements of reflexive science at work in the environmental public health sector, or what I call “preferential pathways of reflexive science.” This work group has published its perspectives on the problems scientists face when communicating results of health investigations back to communities. One of the problems that this group focused on was how to best mitigate community expectations of environmental epidemiology and its ability to create useful and scientifically valid cause–effect relationships (Health Investigations Communications Work Group 2004).

Although research on the public’s understanding of science is nothing new (e.g., Collins and Pinch 1993; Wynne 1993, 1995), it is an emerging area of interest
for ATSDR scientists. They are beginning to “go public”—or beyond ATSDR—with these concerns. The ethnographic data presented in this article sheds light on these emerging concerns and their exposure. What lies ahead is a greater attempt to understand how these concerns can—on the ground—improve science–community relations. Despite these new attempts to improve these relations, a basic problem or challenge to engagement that still exists for these scientists is maintaining the integrity of science and its epistemological stronghold in the realm of environmental health research.

Negotiating Science at ATSDR

It might be argued that ATSDR scientists are reluctant, like most practitioners of “hard” science, to “move on anecdotal information,” as one epidemiologist put it, and that this attitude is a marker of scientific control. I say ‘scientific control’ because scientific evidence is often perceived as more than just a cause for action; it is also considered the real grounds for concern. Scientists locate and control what constitutes the problem(s) in focus, and then the chemical contamination problems are measured by way of statistical probability. This is a standard practice of public health toxicological risk assessment that is not likely to bend to changes in community engagement strategies any time soon. This epidemiologist in the HIB compares what the “community thinks” to the “statistical evidence”:

I generally find that we will be asked to go in to do an investigation because the community thinks there are increased rates of cancer and they are convinced that it is related to a specific exposure. Well, more often than not, we can’t find statistical evidence that there are elevated rates for whatever the outcome of interest is.

I don’t intend to use this quote to devalue the role of statistics or quantification in helping ATSDR scientists and contaminated communities understand the problems they face. I would agree that communities—as is the case with any group of human beings—can have misguided judgments or perceptions of risk (see Slovic et al. 2000). However, elements of this quote showcase subtle forms of power. This epidemiologist states that the community is “convinced” and the “community thinks” that there is an exposure problem. But aren’t scientists themselves “convinced” of certain things? They are certainly convinced of and subscribing, however implicitly or explicitly, to a scientific epistemology. ATSDR science in particular, and science more generally, is organized and structured around a particular vision of what constitutes knowledge and real concern. A quick gander at just some of the historical and social scientific literature investigating science will reveal similar conclusions (e.g., Franklin 1994; Gusterson 1996; Haraway 1997; Harding 1991; Jasanoff 2004; Knorr-Cetina 1999; Latour and Woogler 1979; Rabinow 1999). Both publics and scientists can be convinced of this or that, both have functional epistemic agency: the difference seems to be that the scientists have the tools to test the hypothesis that the public brings to them (e.g., public anecdotal beliefs about disease rates vs. scientists’ access to public health records; public beliefs about toxicology vs. scientific beliefs about toxicology). Scientists and nonscientists are citizens
of the same society, even though scientists are more likely to police the boundaries of science and thereby defend the autonomy of their trade and expertise (see Gieryn 1983). Residents of contaminated communities typically adopt scientific approaches to toxic pollution conflicts (Corburn 2005), which of course complicates assumptions that “laypeople” and “experts” have clearly partitioned epistemic cultures. What matters now is a commitment to the reconfiguration of the citizen–knowledge interface, whereby “the tacit division of labour between an expert who produces knowledge and a citizen who consumes it has to be rendered less asymmetrical by understanding the citizen as a person of knowledge” (Visvanathan 2005:91). Moreover, one might even argue that residents encourage and call on agencies such as the ATSDR precisely because they already have a shared concern, a similar and compatible epistemic commitment.

Despite these apodictic critiques of the lay–expert divide, my findings show that scientists continue to control the boundaries of science by defending objectivity and sustaining the development of a science devoid of subjective “filters”:

People aren’t always delivering accurate and precise information. You probably know that as well as I as an anthropologist. Things get flavored. People use all kinds of filters, so you just kind of have to be aware of that. We want to be engaged in science that collects the right information in an objective way so that we can make sense of what we find.

This informant is referring to the “people” of the contaminated community in this case, and notice how he explains these peoples’ knowledge and information as if it is “flavored” and influenced by a “filter.” As my data show, scientists are in fact people who also have their “flavors,” theories and “filters,” much like the community “people” alluded to in the above quote. But what is different about the “people” of science in this informant’s formulation is that they are the ones who are “engaged” in an effort to “collect the right information.” As we saw earlier, many ATSDR scientists believe that the community can help researcher scientists locate local sources of contamination and provide other information that is useful to an epidemiological investigation. However, we have a clear view of scientific control when we are told that science collects “the right information,” and that this is the information that can be used to “make sense” of environmental health problems.

Even if ATSDR scientists wish to give greater attention to community concerns and interests, committing to this position can be interrupted by their inability to manipulate the direction of a particular investigation. This is another example of scientific control. Although scientists may have their criticisms and willingly share their scientific reflexivity, as we will see in more detail later, protecting scientific power and autonomy tends to endure despite the shifting circumstances of agency–community relations:

Scientifically, you should stand by your study design. People should be picked at random to make sure the science is, you know, the correct science. This way the results are more accurate. I have mixed feelings. If somebody really wanted to know their results, should they be allowed to or not? I was new at the agency, so I didn’t say anything. Some people said, “well you
could have done that. You could have kept their request and kept it separate and give them the result.” But, for the study’s sake, I was not the PI. I was number two. The PI had decided that we needed to protect the study for scientific scrutiny and make it really random true samples. [Epidemiologist and medical officer, HIB]

Several informants believed that good science is important to maintain and that controlling the “traditional scientific paradigm” is important for understanding environmental health problems. They tend to agree that there is an important distinction between data generated by community and data generated by a scientist:

I think it important to keep with the traditional scientific paradigm and not to allow some of the data collected by communities to be called science. However, that doesn’t to me mean that that data should not be as legitimized in looking at an issue. It is not science to me, because it doesn’t follow those rules that we grew up with, that we were schooled in issues of reliability, validity, replication, precision, etc. That isn’t to say it is more valued than what the community brings. It is different and to me it will remain so. [Epidemiologist, HIB]

This informant highlights her educational background, explaining that this education is what determines the constitution of science. As she puts it, science is about being “schooled in issues of reliability, validity, replication, [and] precision.” This process of education or enculturation is what makes scientists scientists. They learn to believe in reliability, validity, repeatability, and anything else that falls under the scope of scientific reasoning. These are the lessons that help keep science in check and that help control the boundaries and borders of Science. Perhaps most important, these lessons help structure ideas about what constitutes scientific knowledge within the agency culture of ATSDR.

Scientific control can surface in interesting and subtle ways. For example, an agency scientist’s personal experience with a chemical exposure, I was told, can even be used to help legitimize an environmental health concern and therefore move a scientific investigation forward. One epidemiologist in the Health Investigations Branch told me that environmental public health problems are often considered more real or factual when ATSDR scientists themselves feel the effects of the chemicals they are investigating:

Personally, I have seen more of the other things, where we were really reluctant, as an agency, to move on anecdotal information. Like we wouldn’t move until our own people would be there, and would essentially be coughing and complaining, as opposed to just believing people in the community.

This was the last and only informant in the study to share this perspective, and his comments made me wonder just how many other agency scientists might perceive the risks of a contamination problem based on their own personal reactions to chemical exposures in the field. This interview, this anecdotal moment, left me with a burning question that calls for further investigation: Is science controlled
or maintained by an ongoing commitment to objectivity, by the communication of intersubjective experience, or both? My own study found that ASTDR scientists tend to negotiate their vision of science and respect for science in a way that reflects the latter. It is the combination of their commitment to science and their personal experiences as ATSDR scientists in contaminated communities nationwide that shapes their implicit and explicit perceptions of scientific control. As Steven Shapin (2008) recently put it, “The closer you get to the heart of technoscience, and the closer you get to the scenes in which technoscientific futures are made, the greater is the acknowledged role of the personal, the familiar, and even the charismatic” (Shapin 2008:5).

Hints of Scientific Reflexivity?

Contesting Scientific Authority/Rigidity

ATSDR scientists are defenders of their trade and the integrity of science, but they also have their reservations about science and its ability to capture the complexities of environmental health problems. An epidemiologist in the Health Investigations Branch was open about her feelings about scientific authority and rigidity. For her, it is a problem when scientists wear their expertise on their shoulders, so to speak. It creates problems because then they “don’t necessarily see the context” or they are not attentive to the “social aspect” of science:

I think that sometimes people that come from the physical sciences are kind of rigid in their thinking. They don’t necessarily see the context. They don’t necessarily look at a different viewpoint. I think sometimes there is the perspective that we are the scientists, we know what we are doing, we know what needs to get done, we know what is best for them, and sometimes that other piece gets lost, that social aspect.

This informant, like others I interviewed, was also critical of the so-called blinders that some scientists have:

I guess my view for a scientist is fairly radical because I do give a lot of credence to the community and the validity of their own opinions. I don’t see the lay–science gap as huge as some scientists do. Some scientists are very much like, “We have to follow the scientific method. This is how we approach things,” and all that. They aren’t necessarily opposing the community viewpoint, but their view is so different than that of a community that they don’t hardly see the difference, which I think is a pretty funny way of looking at things.

She argued that although these “other” perspectives or “viewpoints” don’t necessarily come with the territory of environmental health science, “responsibility changes with the site.” In the following passage, another informant describes her view of the importance of the social sciences in ATSDR investigations, making note of the fact that much of this reluctance and aversion is a problem simply because agency scientists are not familiar with the benefits of other sciences:
My perception of it is that there is awareness, but maybe some hesitation by scientists who are not familiar with the social sciences and the benefit of doing needs assessments and getting information from the community about what it is they need and what it is they want in the relationship to whatever the hazardous situation is. [Epidemiologist, HIB]

Aside from her defense of the importance of the social sciences at ATSDR, she told me, “there are times when the questionnaire is so long and the behavioral stuff is really interesting, but most of the time we really need to just know whether or not they had x, y, or z.” She also explained that certain issues, like time and money, create “bumps, and not necessarily a block,” meaning that although the social sciences are important, ATSDR scientists face real challenges that interfere with the incorporation of any new ideas and new methodological approaches to research.

Scientific Ambiguity, “Gut Feelings,” and Passion

Ambiguity is a common challenge for environmental epidemiologists. One physician working in the Department of Health Education and Promotion (DHEP) even emphasized that because the field of environmental health is a fairly recent development, its scientific base is very “ambiguous.” This scientific ambiguity can even be “an embarrassment”:

The science is considered an uncertain baby science. The science of environmental health, in terms of chemicals, is a baby science. It has only been around since the 1970s. It is trying to use the traditional scientific method to prove things that are very difficult to find because they are so multifactorial. … So, a lot of times it is not so easy. I think that is why ATSDR has had a difficult road for many years. We get dinged and it is an embarrassment because we can’t scientifically prove linkages most of the time.

This informant told me that environmental health scientists have even tried to bring chaos theory into investigations to make sense of causality, adding that this focus on complexity theory and making sense of complexity is not something most ATSDR scientists are willing to engage because “it is hard with that kind of model to get clear answers, even when using very pure science.” In addition to this, she mentioned that this focus on multifactorial models only lengthens the investigation, which in turn costs more money for the agency in general, and the Division of Health Studies in particular.

After listening to her concerns about scientific ambiguity, I then asked, “How do you deal with the ambiguities of environmental health science? In other words, you want to tell the communities that you have good science and scientists, but at the same time, as you have made clear, that science is known to be quite ambiguous. How do you deal with this?” She answered with the following:
Oh, it is frustrating, because you would love to be able to give people a clear answer. I mean I am used to, as a physician, speaking from tradition, you know, that when you pull out your medical textbook or your latest article, you can usually say to people “you have an illness that is caused by this germ. If I give this antibiotic you are going to get well.” You don’t have that luxury in environmental science. You can’t say “Gee, I am absolutely convinced that your cancer was caused by the site,” because you don’t know. That would be a disservice. It might comfort a person if you agree with them, but you wouldn’t be right. You know, it is very hard to find the truth out with most chemicals. You know, for example we know that lead causes bio effects in the brain and mental retardation, and we are still finding out the other effects of lead. There is other research finding out that lead has impacts on hypertension, it has impacts on the kidneys, and things like that. Most of the time though, you really can’t do that. Uncertainty is horrible, because you can’t give a clear answer.

This was the only informant I interviewed to say explicitly that the environmental health sciences lack the “luxury” of being able to provide “clear answers.” In other words, she alluded to what might be termed the epistemological disabilities of environmental health science or epistemic impairments that often derive from a lack of critical exposure information (e.g., past exposures, dose–response relationship, etiological uncertainty, and diagnostic uncertainty). For sure, this was the only informant to suggest that certainty talk is a disservice to the public because it misrepresents the actual epistemic reality of environmental health science. But still, many others agreed that environmental health science is ambiguous. In fact, most ATSDR scientists freely admit that the science is ambiguous, and they also told me that the research setting in which ATSDR scientists work is what tends to contribute most to this scientific ambiguity. A physician in DHEP describes this public research sphere—the territory or “environment” that lies outside of the agency’s walls—as an important contributor to scientific ambiguity:

We are really out there in a situation that is very uncertain and ambiguous. Not that public health practice traditionally, like infectious disease or restaurant inspections or the draining of the swamps, doesn’t have the same ambiguities, but not as much. So we are really an agency that has evolved in this uncertain environment.

I interviewed another scientist who works with an ATSDR agency partner, the National Center for Environmental Health (NCEH). A specialist in GIS applications, this informant shared with me not only her feelings about scientific ambiguity and the role that “heightened” emotions play in contaminated community contexts but also her “gut feeling” that remains even when a science-based etiology is not available:

In environmental health I think it is tough because there is a lot of heightened emotion. The scientific uncertainty is huge in environmental health. The ability to control statistically, you know, through science, the factors that
you need to, is difficult. Much of the exposure pathways are incomplete. But there is still that kind of gut feeling that something has gotta be going on.

This “gut feeling” sensation surfaced again in an interview I had with a health communications specialist in the Community Involvement Branch. Here a “gut feeling” sensation is evoked when this informant discusses her perception of science:

You know there are sites that we deal with that you say, “something has to be going here.” Your gut is telling you something has to be. But, from a scientific perspective the evidence is not there to say it is or it isn’t. So, I think from a science perspective it is making sure that we provide, and I go back to the CIB mission, the best available scientific data and information that we possibly can. State the facts. If the facts do not present or indicate this, we really can’t go in and inform a community and say “I really think there is an issue, but the facts are just not there.”

Although not a research scientist—as is the case with most, if not all, of the staff working in the ATSDR Community Involvement Branch—I draw attention to this quote because it illustrates a strong belief in science and using scientific facts as a base for understanding environmental health concerns. Her “gut feeling” is demarcated from the world of “facts,” or the domain of scientific evidence, making her feelings seem less important than the scientific results. This mixture of personal feelings and perspectives on science—as shown in the two previous narratives—reminds us of the fact that scientists and nonscientists, working even in a federal agency like ATSDR, attend to their own subjectivity and experience when communicating their feelings and emotions regarding Science. I draw on this health communications specialists’ perspective in particular to highlight the fact that although “hard” empirical data is the stronghold of the agency’s health investigations, it is not just ATSDR scientists who hold this ideology close to their hearts. Nonscientists can have convictions about science that are often just as strong as those of a veteran environmental epidemiologist (Couch and Kroll-Smith 2000).7 From this example then, we can see that science remains a powerful and rhetorical epistemology for ATSDR staff, despite a more general perception of environmental health as a science filled with ambiguity and etiological glitches.

In three different interviews, I experienced ATSDR scientists demarcating the science of infectious disease and environmental health when they discussed this theme of ambiguity. All argued that the findings generated from studies of infectious disease are far more reliable than the data generated from an environmental epidemiological study. As one informant put it, infectious disease research “does have its share of ambiguities, but not as much as environmental health research.” Another epidemiologist in the HIB told me that, “Unlike infectious disease, environmental health is very vague in terms of cause and effect. This is what makes it so complex.” Because of this problem of “complexity” or ambiguity, environmental health scientists see little room for the formulation of satisfactory conclusions,8 because the data are often unreliable and not generalizable. It is not just insufficient data that contributes to the ambiguities of environmental health science. One informant shared with me a joke that is often used to explain not just the complexity
problem in environmental epidemiology, but the complexity that arises from different scientists having different positions and perspectives on the same contamination problem:

Within the agency, the scientists will argue persistently with each other. There is a joke: You get one epidemiologist in a room, and you get three theories. You get two in the room, and you get twenty theories. In other words, they are all at each other. The same for the toxicologists. They argue back and forth for hours, and you are just sitting back going “Ahhh.”

Intersubjective contention goes with the territory of scientific practice in an agency like ATSDR. In many ways, it is the very problem of ambiguity and complexity in environmental epidemiology that creates the conditions for these scientific disputes. Although this informant was quite open about the impact of these internal scientific disputes on building a trustworthy etiological theory, she also explained how ATSDR is a very “tight group” as a result of all the criticism ATSDR has faced over the years. She went on to add,

It is about passion, you know. It is a desire for exactitude that I really admire about the people around here. It really kind of gripes my bug to be criticized about not knowing what we are doing, but in fact we are dealing with a situation where it is very difficult to obtain certainty. It is sort of like putting all of us scientists in a gray blob of Jell-O and saying “Ok. Define this.”

My goal in exploring these science narratives is not to portray ATSDR as a homogenous agency of experts. My data show that ATSDR scientists’ attitudes about the meaning and state of environmental health science today are filled with concerns about scientific ambiguity and critiques of scientific control over the production of environmental public health knowledge and concern. The material analyzed demonstrates how these scientists are presented with a number of challenges that in turn weaken their ability to formulate scientifically valid conclusions about causation. We also find that scientists at ATSDR express concerns about the use of anecdotal or community “beliefs” when conducting their health investigations. Although inconsistent and contradictory, this cultural information can have implications for ATSDR’s ongoing community involvement practices and its more recent attempts to build stronger relationships between scientists and publics. If community members are closed off from scientists’ perspectives on the inability of their science to create reliable answers, they are denied a view of the actual culture of “expertise” they are engaging and collaborating with. The distinctions that ATSDR scientists make between community knowledge and scientific knowledge will continue to present community involvement challenges.

As an anthropologist studying the “culture of science” or the “heart of technoscience” (Shapin 2008:5) at ATSDR, I believe that “science always occurs in a cultural context; its conceptual categories, its rule of evidence, its distinction between appropriate and inappropriate subjects for investigation all reflect the society within which scientists work. But constructivism has never made a big splash in government” (Tesh 2000:101). Despite this final warning, small ripple effects can
begin to accrue when engaging critically applied anthropology questions aimed at reframing the terms of debates regarding science–community relations: What is so important about studying ATSDR science from an anthropological perspective? How can this research teach us something important about the ATSDR culture of expertise? Furthermore, what can the contaminated communities that ATSDR serves learn from these anthropological investigations? The following insight can help us think through these important questions and help clarify why an anthropologist might want to both “study up” and study science at an agency like ATSDR: “The point of this work [the anthropology of science] is not to ‘put scientists in their place’ (although one might want to). … The point is to open up people’s minds to other ways of looking and questioning to change attitudes about knowledge, to reframe the organization of science” (Nader 1996:23). Or, as Bruno Latour (2003:228) has rightfully asked: “The world is young, the sciences are recent, history has barely begun, and as for ecology [and environmental health science], it is barely in its infancy: Why should we have finished exploring the institutions of public life?”

Conclusion

The science narratives presented in this article provide a descriptive example of how community engagement is framed and made meaningful at the ATSDR. If nothing else, exposing the personal experience of agency scientists casts a more in-depth qualitative light on ATSDR discussions of the complexities of the interrelationship between scientific expertise and community engagement, and perhaps even science and democracy within environmental health debates. Contaminated communities need access to these agency-based perspectives, because these perspectives reveal critical agency-based information about key scientists’ ideas regarding community and community engagement. Throughout the internship and after leaving ATSDR, a rhetorical question stuck in my mind and remains today: If you were a member of a contaminated community,9 wouldn’t you want to know how your collaborating public health agency thinks of your community, and your community’s role in the development of environmental health knowledge? Maybe direct interests in the advancement of science are not explicit interests for some community members, but surely contaminated communities are communities of knowledge with critical understandings of local environmental contamination problems and their possible public health impacts. These communities already know this, and they don’t need yet another ATSDR scientist or an anthropologist telling them that they “have valuable knowledge.”

To conclude, this article raises questions to be used to advance anthropological studies of environmental justice struggles (Checker 2005, 2007) and aims to offer yet another starting point and pathway connecting science studies, medical anthropology, and environmental public health. We know there are scientists who actually do attend to community interests and concerns, but what do we know about their subjective views on community engagement or involvement vis-à-vis their own scientific expertise? Do we know enough about science and citizen alliances to comfortably say which directions we ought to go and how best to democratize science? Moreover, can communities facing environmental justice struggles gain anything from
ethnographic projects that “study up” (Nader 1969) in the environmental public health sector? The possible answers are many. Ethnography of science is one approach that can help illustrate the paradoxical nature of science, expertise, and democratization operating in the federal environmental public health sector.

Medical sociologist Phil Brown (2003) contends that “even when quantitative data are needed to determine the existence of environmental health effects, qualitative data are necessary to understand how people and communities experience and act on these problems” (Brown 2003:1789). This methodological shift has critical import for rethinking approaches to the investigation of environmental public health problems. We might add to this call for qualitative methods in environmental health the need for in-depth ethnographies of science emphasizing the knowledge politics dwelling in the social space where scientists and citizens interact.

Several ethnographic studies of environmental health problems attend to the tensions among science–expertise and community–lay perception (Balshem 1993; Clarke 1989; Edelstein 1988; Erickson 1976; Kroll-Smith and Couch 1989; Levine 1982; Picou 1990), and this article makes only a small contribution to this stream of scholarship. Raising awareness about the experience of scientists, their commitments, and their struggles is one of many efforts to inform discussions of citizen–science alliance, environmental justice, and their likely reconfiguration in the years to come. Just as the audibility of community concerns is important to anthropologies of toxic struggle, we need to increase the audibility of the scientific reflexivity circulating among key environmental public health experts, especially their attitudes about science and the strengths and challenges of community engagement. It is my view that these research efforts can improve the cross-cultural communications that are needed to make science–community partnerships more effective in a time when social and environmental justice struggles—“the environment of justice,” as David Harvey would put it (1996:366–402)—are getting more exposure. Moreover, we ought to continue to remind ourselves, with the guidance of Latour (1998:233), that neither medical anthropologists, political ecologists, environmental epidemiologists, nor concerned residents living in contaminated communities really know “what is interconnected and woven together. We are feeling our way, experimenting, trying things out. [Neither] knows what an environment is capable.”

Notes

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1. Throughout the article, I use either community engagement or community involvement, both of which my informants used interchangeably. I favor the word engagement.
because, although it generally emphasizes a promise or agreement between different parties, it can also mean a hostile or challenging encounter between different parties.

2. It wasn’t until the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA) that ATSDR received additional responsibilities. This act broadened the agency’s responsibilities in the areas of public health assessments, establishment and maintenance of toxicological databases, information dissemination, and medical education.


4. One scientist I interviewed actually said, “I have a problem with the lay–expert model. It assumes the community is not an expert also.” This was the only interview where my informant was explicit about the value of treating the community as an expert, but other informants did hint at the value of local knowledge.

5. In 2003, ATSDR developed the Social and Behavioral Science in Environmental Health (SBEH) Work Group to “advance the application of social science theory to environmental public health practice.” The ultimate goal of this 2004–10 research initiative is “to enhance the agency’s public health activities while building social and behavioral science capacity in the agency.”

6. The 2004 budget of ATSDR was $63 million, with the Division of Health Studies (DHS) receiving only $7.5 million. I learned this budget information by attending a DHS presentation to the CDC Foundation on August 13, 2004. As the EPA “Superfund” is dwindling, the ATSDR has sought out other funding sources, with the CDC Foundation being a relatively new source.

7. My perspective is in line with Couch and Kroll-Smith’s argument that a plethora of environmental disasters, and threats of countless more, some literally global in scope, are changing the relationships of ordinary people to experts and expert knowledge. Citizens now know that environmental dangers require technical solutions, but they are increasingly distrustful of the experts. In response to this gap between knowing a problem requiring a rational, technical solution and a decreasing readiness to trust in the good intentions and know-how of experts, groups and organizations are unhinging the languages of expertise from expert systems. They are, then, taking these attributes of expertise into their communal worlds. [2000:385]

8. See Lewis et al. (1991) for a critique of the “inconclusiveness” of federal research. Many of my informants point out that this work misrepresented the agency and the work they do.

9. Communities faced with toxic chemical contamination are often referred to in the literature as “contaminated communities” (Brown 2003; Edelstein 1988).

References Cited

Balshem, Martha

Brown, Phil
Center for Disease Control and Prevention, and the Agency for Toxic Substances and Disease Registry (CDC–ATSDR)
Chavis, D. M., and A. Wandersman

Checker, Melissa

Clark, Lee

Collins, Harry, and Trevor Pinch

Corburn, Jason
2005 Street Science: Community Knowledge and Environmental Health Justice. Cambridge, MA: MIT Press.

Couch, Stephan R., and Steve Kroll-Smith

Edelstein, Michael

Erickson, Kai

Fortun, Kim

Fortun, Mike, and Kim Fortun

Franklin, Sarah

Gieryn, Thomas

Gregory, R. S., and T. A. Satterfield

Guillette, Elizabeth A., Maria Mercedes Meza, Maria Guadalupe Aquilar, Alma Delia Soto, and Idalia Enedina Garcia

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Kroll-Smith, J. S., and S. Couch

Latour, Bruno


Latour, Bruno, and Steve Woolgar

Leach, Melissa, Ian Scoones, and Brian Wynne

Levine, Adeline

Lewis, Stanford, Dick Russell, and Brian Keating

Nader, Laura


Petryna, Adriana
Picou, Steven
1990 Social Disruption and Psychological Stress in an Alaskan Fishing Community: The Impact of the Exxon Valdez Oil Spill. Boulder: University of Colorado Natural Hazards Center.

Rabinow, Paul

Salter, Liora

Shapin, Steven

Slovic, Paul, Baruch Fischhoff, and Sarah Lichtenstein

Spears Griffith, Ellen

Tesh, Sylvia Noble

Tucker, Pamela

Visvanathan, Shiv

White, Mary C., S. A. Berger-Frank, D. C. Middleton, and H. Falk
2001 Addressing Community Concerns about Asthma and Air Toxics. Environmental Health Perspectives 100(Supp. 4):561–564.

Wynne, Brian