This paper explores the concept of social capital and presents a case study of the early stages of its evolution on a community scale in response to a systemic environmental crisis. This paper begins with a background exploration of social capital including general discussion of its creation, evolution and function within groups and between groups, as well as recognition that its value and function are influenced by cultural norms and the history of past interactions between potential group members. As a case study for the emergence of community-level social capital, the recent (and on-going) water crisis in Flint, MI is then examined, with this paper specifically addressing the Lead and Copper Rule (LCR), the regulation that governs requirements for intervention, communication and action in response to demonstrations of drinking water contamination and resultant threats to health via exposure to lead (Pb) and/or copper (Cu). Of principal concern regarding the LCR is that it is currently written and implemented as an emergency-response rule rather than as a rule focused on the protection of public health.

Following a discussion of the timeline of the crisis in Flint, MI and a brief overview of relevant technical aspects of Pb contamination issues in municipal drinking water lines, this paper then explores the evolution of social capital through our cultural relationship to concepts of “trust” and “authority”, and the re-framing of these relationships that is needed to support broader and more authentic community participation in issues pertaining to data access and the understanding and communication of health risk. This paper ends with a discussion of strategies for re-focusing the regulatory framework toward a public health perspective that would demand greater data transparency from agencies, as well as accountability from regulators and utility

personnel. As a component of this discussion, the Internet (including social media) is presented as a powerful tool for actively and purposefully redistributing social capital through broadening access to previously inaccessible information and encouraging community-level participation in the discussion of how data are used in the assessment of drinking water quality and implementation (if required) of measures to protect human health in response to determination of drinking water contamination. This paper suggests that the long-term, big-picture solution to crises such as what has occurred in Flint, MI is a necessary re-focusing of regulatory effort toward direct and integrated public health protection. To achieve this goal, improved risk communication is required such that the public is ultimately involved as a cooperating partner in the understanding and management of exposure risks.

As described in Portes (1998), the first comprehensive analysis of social capital was presented by Bourdieu (1985) who defined the idea as "*the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition*." As paraphrased more recently in Chen et al. (2009), social capital can be considered as the sum of inter-connections that an individual and/or their community possess. Inter-connections or networks in question may be economic, educational, or political or can be described in terms of social status or standing. In general, and on the personal level, social capital may be defined in terms of assets and support accrued through participation in activities that increase stable links between an individual and others (Chen et al. 2009). On the community level, and with relevance to issues that involve larger-scale dynamics - such as the city-wide water crisis in Flint, MI - social capital would be conceived as the summed or integrated capital of all members of a population, depending on how that population is defined (i.e., in terms of geography, demographics, ethnicity, or socio-economic status, as examples).

In further exploration of social capital, Chen et al. (2009) highlight the difference between distinct structural forms of social capital, including bonding capital, bridging capital, and linking capital. As summarized in Chen et al. (2009), bonding capital suggests linkages between similar types of individuals. That is, bonding capital corresponds to linkages between individuals with similar attractions and interests. Bridging capital, in contrast, refers to connections between individuals whose similarities are more a function of the groups or organizations to which they belong. In this case, the organization in common, such as a church or a citizen action group, may provide a social linkage that otherwise might not exist between disparate individuals. Linking capital, in further contrast, can be conceptualized as the joining or uniting of individuals across social stratification and power gradients. Relevant power gradients can include structural hierarchies (such as within the military or corporations) and perceived hierarchies (such as between groups with different educational levels or with different access to regulatory decision-makers). The goals of creating purposeful vertically-oriented linkages will vary, and can include, as example and as relevant to exploration of the water crisis in Flint, MI, the desire to increase public visibility of an issue in which impacts are disproportionately affecting individuals and communities that lack the ability to advocate effectively for their own health protection.

Of significance in consideration of the creation and functioning of bridging and/or linking capital is an an implicit assumed willingness for external engagement by individuals. That is, the networks that are created by increasing social capital must be created purposefully in recognition of the potential benefits involved. In regard to issues that involve the collection, interpretation, dissemination, and response to information such as water quality data, relevant benefits of working to increase bridging and/or linking social capital may therefore include the ability to gain access to the data themselves, as well as access to the tools required to both

understand the data and to act in a health-protective manner on that understanding. In this context, it is also important to consider that while acting to increase social capital is generally considered a net positive activity, there are potentially negative consequences to that action that should not be overlooked. As examples, Portes (1998) identifies what he perceives as four potentially negative aspects of social capital: (1) that the creation of networks may either explicitly or implicitly exclude non-members; (2) that membership in a social network may place societal and/or economic pressures on network members; (3) that membership always comes at the cost of some degree of personal autonomy; and (4) that if a strong component of shared hardship, oppression or "outsider status" is the cement that binds the community, there may be limited encouragement for upward mobility or "insider success" for members of the community attempting to transcend a shared cultural background of hardship.

Although these categorizations of social capital (both positive and potentially negative) help describe what social capital *is*, they do not always provide clear demonstration of what social capital *does*. That is, if one defines social capital in terms of an asset, what does having this asset afford an individual or a community? Chen et al. (2009) states that "*individuals who possess adequate social capital can effectively obtain informational, instrumental and emotional support*" as well as help create a community context of *perceived* social capital effectiveness. Drawing on the asset - that is, accessing one's social capital - could therefore include drawing on the assistance of friends, family members, neighbors and organizational groups including those groups with political and/or public health focus. In this context, what is occurring in Flint, MI, is an example of the "real time" on-going emergence of community-level social capital resulting from active organizational linkages between academic researchers, non-profit organizations and community groups. These organizational linkages are focused on (1) monitoring water quality; (2) improving the public's access to the data that are generated and

that, importantly, the public rightfully owns; and (3) providing a platform for broad demonstration of the extent to which the public have not previously been included in discussion of water quality and regulatory risk management. Although this evolutionary arc is not perfect and is far from complete in the sense of creating sustained/sustainable individual empowerment in Flint, MI (or elsewhere), what is occurring in Flint, MI is arguably unprecedented in the extent to which the enfranchised (i.e., municipal utility personnel and regulatory risk managers) are being held publicly and legally accountable for their disregard of the disenfranchised members of the wider community they had been charged with both providing services for and protecting.

With respect to the water crisis in Flint, MI, an additional cautionary note regarding the health-related value of social connectivity and social capital is explored by Whitley (2008). In this critical review of recent (2000 - 2006) qualitative research on the value of social capital, the study of Campbell and McClean (2002) is discussed. Campbell and McClean (2002) observe that while multi-ethnic communities might represent strong starting points for building bridging-style social capital within (or between) neighborhoods, historical attitudes regarding discrimination (and resulting feelings of disenfranchisement) may ultimately limit the extent to which minority groups are inclined to participate in community activities. Without the participation of historically disenfranchised community members, Campbell and McClean (2002) suggest that the net result of efforts to build bridging social capital might unfortunately be that those members of a community who already hold personal or economic power might see their representation further increase within the created network. If the goal of the network is to improve broad community access to health-related information, however, under-representation by those individuals already lacking access would likely result in their needs being even less heard; a situation that would create a downward arc from the perspective of attempts to broaden individual access to positive health outcomes via community networking. This concern is highly

pertinent for on-going and emerging efforts to more actively involve the public in discussion of personal risk awareness and public risk management because even the very nature of regulatory language - full of acronyms, abbreviations, and technical terminology - is not welcoming or easily accessible to those without relevant academic training.

With respect to a timeline for the water crisis in Flint, MI, events have been well covered by the press (including National Public Radio, National Geographic News, Michigan Radio, Detroit Free Press, and Michigan Live)[1]. In summary, the first critical action in the current crisis occurred on April 25, 2014 when the city of Flint switched their source of drinking water from Lake Huron (as provided by the Detroit Water and Sewerage Department [DWSD]) to the Flint River. The switch had been seen as an interim measure - returning the city to the source of its pre-1970 drinking water while completing a pipeline intended to shift current sourcing away from Detroit. At the time, Michigan Department of Environmental Quality (MDEQ) confirmed that Flint River water met Michigan state drinking water standards. Importantly, MDEQ did not conduct testing to confirm whether switching to Flint River water could result in corrosion, or chemical weathering, of municipal water lines, and, in fact, a year would pass before MDEQ would notify the United States Environmental Protection Agency (USEPA) that, throughout this interval, a corrosion control plan (CCP) had not been implemented as a component of the switch in city drinking water supply.

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[1] Timeline details as provided by:

National Public Radio [http://www.npr.org/sections/thetwo-way/2016/04/20/465545378/lead-laced-water-in-flint-a-step-by-step-look-at-the-makings-of-a-crisis]
National Geographic News [http://news.nationalgeographic.com/2016/01/160125-flint-michigan-water-crisis-lead-poisoning/]
Detroit Free Press [http://www.freep.com/pages/interactives/flint-water-crisis-timeline/]
Michigan Radio [http://michiganradio.org/term/flint-water-crisis#stream/0]
Michigan Live [http://www.mlive.com/news/flint/index.ssf/2015/10/how_the_flint_water_crisis_eme.html]

In August 2014, microbiological sampling of Flint River water revealed the presence of fecal coliform in water samples, resulting in the city issuing boil advisories to homeowners and increasing chlorination of drinking water for treatment. In January 2015, routine water sampling revealed elevated concentrations of trihalomethane, a potentially carcinogenic compound found in waters that contain elevated concentrations of both organic matter and chlorine-based disinfectants. In February 2015, water test results began to indicate elevated concentrations of lead (Pb) in homeowner's water taps. By summer of 2015, while MDEQ continued to state that Flint city drinking water was safe and in compliance with the Federal Safe Drinking Water Act, independent water testing by an academic laboratory had begun to generate results suggesting significant and widespread Pb contamination in city drinking water. With relevance to the question of water chemistry and the impact of water treatment methods on the physical stability of the drinking water distribution pipes themselves, Dr. Marc Edwards, an investigator at Virginia Polytechnic Institute and State University (Virginia Tech), and an authority on the chemistry of drinking water treatment, stated that, to his knowledge, Flint, MI was the only U.S. city of its size that did not have a corrosion control plan (CCP) in place (as reported by National Public Radio on 04/20/16)[1]. By late September 2015, the city of Flint, MI had issued a city-wide Pb advisory and offered to provide all citizens with Pb testing and point-of-use water filters. In October 2015, the decision was made to switch the city water supply from the Flint River back to Lake Huron water as provided by DWSD.

In dealing with drinking water, there is no way to separate the water engineering from the water chemistry. In general, when a city relies on distribution pipes that contain Pb in the pipes themselves, strategies - both active and passive - are undertaken to prevent Pb from leaching from those pipes. For Flint, MI, changes to the source of the city's water supply resulted in both the *active* requirement to add chlorine for microbiological control as well as the *passive*

elimination of a water treatment chemical (orthophosphate) that was routinely added to the Detroit water supply as a corrosion control measure. Both these changes in water chemistry resulted in an increase in the concentration of Pb that began to leach from distribution pipes. It is in recognition of this potential for Pb to leach from pipes that the Federal Lead and Copper Rule (LCR)[2] mandates that municipalities have corrosion control plans (CCP) in place. For municipalities of fewer than 30,000 individuals, the LCR states that *if water samples reveal elevated Pb concentrations, the municipality is required to "optimize" the CCP so as to lower measurable Pb concentrations*. The LCR also states, however, and of significance for Flint, MI, that for municipalities of greater than 50,000 individuals, *a CCP must be in place and operational during all water testing such as would follow a change in water supply*. That is, as per Federal regulation under the LCR, there is no situation in which a city the size of Flint, MI would be permitted to operate a water treatment system without an operational CCP. And yet they were.

Separating the chemistry from the assessment of the chemistry is also complicated. The key component of the Safe Drinking Water Act that is specifically relevant to the question of prioritizing the protection of public health, is the question of what type of action is required in response to what type of elevated chemical concentration. With respect to Pb and copper (Cu) in drinking water, the LCR mandates that public drinking water utilities are required to monitor for these metals at homeowners' taps. For Pb, if concentrations in tap water exceed 15 parts per billion (ppb) - defined as the Lead Action Level (LAL) - in greater than 10% of collected samples,

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[2] The Lead and Copper Rule (LCR) is delineated in the Code of Federal Regulations (CFR) as **40 CFR Part 141 Subpart I**, with 40 CFR defining **Protection of the Environment,** Part 141 defining **National Primary Drinking Water Regulations** and Subpart I specifically defining **Control of Lead and Copper in Drinking Water**. Federal regulations regarding drinking water quality are codified under the Safe Drinking Water Act (SDWA) which protects public drinking water supplies.
LCR: http://www.ecfr.gov/cgi-bin/text-idx?SID=531617f923c3de2cbf5d12ae4663f56d&mc=true&node=sp40.23.141.i&rgn=div6:

the utility bears a responsibility to undertake corrective action. Because Pb (and Cu) enter drinking water principally through corrosion of plumbing materials themselves, corrective action is most commonly in the form of corrosion control, although, as previously noted, the *if/then* scenario described herein (i.e., *if* Pb concentrations exceed the LAL in >10% of sampled taps, *then* corrosion control must be undertaken), is superseded for municipalities greater than 50,000 individuals by the requirement for continuous and ongoing corrosion control measures. With respect to the LCR, public health, and municipal requirements following documented exceedance of the LAL, the public utility is also required to inform the public of elevated Pb (or Cu) concentration and may bear the responsibility to replace the lead-bearing service lines.

While many issues became apparent with respect how the LCR was implemented in Flint, MI, (including how water sampling was conducted, how statistical analysis of results was performed, and the extent to which city demographics influenced the initial distribution of water testing), one key aspect of the LCR that stands out from a public health perspective is this: if fewer than 10% of water samples demonstrate Pb concentrations exceeding the LAL, the utility (and therefore the municipality) is under no legal obligation to enact measures to educate and protect the public. That is, if 1000 taps are sampled and *only* 99 samples contain Pb concentrations in exceedance of the LAL, the public utility is providing “safe” drinking water, although those 99 samples may represent 99 homes in which individuals are at potential neurological and developmental risk from Pb exposure. Whereas elevated Pb concentrations in that number of water samples would certainly raise an ethical obligation to act in the public interest, the public utility would be correct in stating that the city’s drinking water met state and federal drinking water standards without further intervention. This distinction between ethical versus legal obligation is not made as a condemnation of MDEQ or the city of Flint, MI public utilities per se (although, as has become increasingly apparent, there was a systemic - and

likely socioeconomically and racially motivated - failure to protect the health of city residents, and, as of August 2016, nine individuals have been charged with criminal wrongdoing as the result of their handling of this crisis), but as a critical observation that, as written, the LCR is focused reactively on crisis response, rather than proactively on the protection of public health.

Recognizing that the long-term, big-picture solution to crises such as what has occurred in Flint, MI is a necessary re-focusing of regulatory effort toward direct and integrated public health protection, the route toward this solution requires, in the vocabulary of Paolo Freire, a re-negotiation of the terms of the historically dichotomized contract regarding communication of risks. As explored by Sandman and Covello (2001), the history of risk communication in this country has evolved (and crisis-by-crisis continues to evolve) through four stages: (1) ignore the public; (2) explain the risk data; (3) dialogue with the community; and (4) involve the public as a cooperating partner. For every environmental and social justice crisis that occurs, the arc of the progression through these stages is both local - in terms of the discovery, comprehension and personal and community reaction to the crisis - and larger - in terms of the action, protection, and (at times) litigation that occurs in response to local awareness and demands for response.

Moreover, while this evolution is also temporal and external in the sense that it describes the arc that risk management and regulation are traversing since the inception of coordinated environmental and social justice movements in this country, it is <u>also</u> internal in the sense that it describes the process by which scientists, engineers, policy makers and public health professionals must come to understand the context for their work as "teachers". In *Pedagogy of the Oppressed*, Paulo Freire (2006) writes:

> "Indeed, problem-posing education, while breaking with the vertical patterns characteristic of banking education, can fulfill its function as the practice of freedom only if it can overcome [the above] contradictions. Through dialogue, the teacher-of-the-

> students and the students-of-the-teacher cease to exist and a new term emerges: teacher-student with students-teacher….In this process, arguments based on "authority" are no longer valid: in order to function, authority must be *on the side* of freedom, not *against* it." (p.80)

In this context, data - conceptualized here initially as "banked" information - may be generated by scientists and engineers and interpreted by policy makers and public health professionals, but must ultimately be owned by the public. And in being owned by the public, many questions should arise in support of this ownership, including: how are data best disseminated? How is the resultant problem-posing (and solution-oriented) information that arises from data sharing best distributed? How is trust created in a positive technical sense of a *praxis*: information (reflection) - intervention (action) - information (reflection), such that community members feel heard and policy makers are held accountable for timely data dissemination as well as intervention AND follow-up on the efficacy of that intervention? How does the process of data-sharing and cooperative response create the foundation whereby regulatory guidelines can be re-written and re-focused away from a crisis response model and toward a model with the explicit goals of integrated public health protection? From the vantage of the "teachers" then, the arc of increasing community involvement in risk management decision making must describe a process in which individuals who generate and interpret data begin to ask of themselves (and each other) questions regarding the "ownership" of those data. And again here, many questions should arise, including: to whom do household-generated data belong? How is the sharing of data best managed? Is the concept of "managing" data-sharing still an exercise in exerting control? How are "risk" and "harm" defined, both in terms of physical damage (through chemical exposure) and in terms of integrity (through breach of trust, de-humanization of community and/ or willful misinterpretation of the purpose of regulation)?

With respect to the issue of cooperative response and shared decision-making authority, a further question of equal (and from a perspective of social justice, even *greater*) importance must be posed: what is the process whereby those affected by environmental and social justice concerns - i.e., the “students” - become active, integrated stakeholders with a belief in their rights to voice and protection under the law? For communities affected by environmental crises, this arc of increasing involvement in risk management commonly involves a situation-by-situation response to, first, discovering their own lack of inclusion in the decision making process and then beginning the social agitation required to force inclusion in the discussion. This effort of active enfranchisement may be aided by the scientists, engineers, policy makers, and/or public health professionals - i.e., by the “teachers” - such as it has been in Flint, MI, or it may not, but with each instance in which the concept of “authority” is successfully challenged, the background cultural context around the specific issues changes and we move collectively along the arc of active community participation and cooperation in the risk management process. This is not to say that an environmental crisis such as has occurred in Flint, MI will not happen again in the technical sense of drinking water contamination resulting from aging infrastructure and/or changing water chemistry, but that as has now been demonstrated (and witnessed) via criminal charges and active citizen participation in drinking water monitoring, it is significantly less likely that public concerns will be so widely and initially ignored as they have been previously (in Flint, MI as well as elsewhere).

Returning specifically to the discussion of Flint, MI, it is possible to create additional timelines that focus on how and when information was disseminated to the public; timelines that are focused on the legal requirement for public reporting as detailed in the LCR, as well as on ethical responsibilities for alerting the public to health-related concerns that had not yet risen to the statistical level of mandatory action. It is also possible to create a parallel timeline from the

perspective of the public that focuses on their frustration at the way data were being collected and managed and their anger at the way information and resources were being distributed (or not). With respect to these timelines, there comes a point at which the intersection of what is being told and what is being experienced is so dissonant that demands for truth, inclusion and response become heard. In the case of Flint, MI, that point occurred in the summer of 2015 when researchers from Virginia Tech began to generate and disseminate data that directly contradicted the city's contention of continued drinking water safety. At this point, the municipality and the public utility lost control of the dynamic that had allowed them to dictate the terms of the public dialog regarding water quality and public safety. Whereas previously the terms of the dialog were constrained by data *inaccess* and there had been to place for visible dissent, now, as the level of dissonance surrounding the perception of "truth" increased, the terms of the discussion shifted, and in forcing their way (rightfully) into the discussion, the citizens of Flint, MI created the space for public regulatory critique.

Moreover (and as has also been witnessed in Flint, MI), in the context of environmental crises and the public's right to both understand and participate in the discussion of what is happening around them, one key tool for removing constraints on data availability and encouraging the growth of community social capital has become the Internet. This is not to say that the Internet (or the resultant platform that is on-line social media) is the solution to all social justice and environmental problems, nor that it is necessarily readily and consistently available to all communities, but rather, that if we are to continue to function within a *reactive*, emergency response-driven regulatory framework rather than a *pro-active*, community health-driven framework, the Internet - through the ability of non-profit organizations, community groups and academic laboratories to generate, access, organize, and disseminate data, has, and will increasingly, function as a powerful level for forcing accountability onto regulators and public

utility personnel.[3] While it is also undeniably true that broad data sharing can lead to an increased potential for the dissemination of misinformation (as even a cursory reading of back-and-forth postings between two websites devoted to data dissemination in Flint, MI has demonstrated[3]), the USEPA has also clearly stated that the first rule of Risk Communication is to accept and involve the public as a legitimate partner in decision-making (Lin and Peterson, 2007). That is, the goal of risk communication "is not to diffuse public concern, but to create an informed public" (Lin and Peterson, 2007). An informed public is better able to protect itself, a quality of community involvement that is the essence of enfranchisement. To paraphrase a former U.S. Secretary of Defense, if we recognize that data regarding the regulatory aspects of environmental issues generally falls into all four information quadrants: *the known knowns, the known unknowns, the unknown knowns, and the unknown unknowns*, then the more broadly and readily accessible the data are, the more honest the collective conversation can become regarding both the content of each quadrant and the strategies that become relevant for mitigating and managing risks. From the perspective of public health professionals, the application of this four quadrant approach toward the provision of support and management tools for affected communities should be the paradigm for community-centered, risk-aware communication. Moreover, it is also hoped that this paradigm may eventually change the current emergency response-driven regulatory framework itself.

This paper explored the concept of social capital and presented a case study of the early stages of its evolution on the community scale in response to a systemic environmental crisis. In

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[3] Examples of websites currently devoted to the collection and dissemination of household water quality data in Flint, MI include:
Water You Fighting For? https://www.facebook.com/WaterYouFightingFor/ - a "for the people, by the people" community Facebook page for those in Flint, MI affected by drinking water contamination.
www.flintwaterstudy.org - based at Virginia Tech University and posting updates via social media on Facebook: https://www.facebook.com/flintstudyupdates/
www.waterdefense.org - a non-profit focused on technological solutions to water contamination issues

this paper, social capital was considered as the sum of the economic, educational, political and societal inter-connections that an individual and/or their community possess. Distinct forms of social capital were reviewed, including personal social capital (defined as the assets and support accrued to individuals via the formation of stable links), community social capital (defined as the integrated capital of all members of a geographic, demographic, ethnic, and/or socio-economic population), bonding social capital (defined as linkages between individuals with similar attractions and interests), bridging capital (defined as connections between individuals whose similarities are a function of the groups or organizations to which they belong) and linking capital (defined as the joining or uniting of individuals across social stratification and power gradients). This paper considered that for all forms or categorizations of social capital, the goals of purposefully creating social linkages or networks likely vary, and can include, as example - and as relevant to exploration of the case study presented herein - the desire to increase public visibility of an issue in which impacts are disproportionately affecting individuals and communities that lack the ability to advocate for their own health protection.

As an aspect of the discussion of social capital, this paper also briefly reviewed potentially negative consequences to social linkages, including the potential for exclusion, applied economic pressure, loss of personal autonomy, and limited encouragement for social advancement in situations where social cohesion may have arisen through shared disenfranchisement or oppression. As noted, the concept of social cohesiveness has also, in instances, been correlated with potentially health-negative behaviors, including an unwillingness within minority groups to participate in community-level endeavors based on past experiences of exclusion or discrimination. As even the language of regulatory compliance often initially proves inaccessible to those without relevant academic training, this concern is highly pertinent for on-

going and emerging efforts to more actively involve disenfranchised communities in discussion of personal risk awareness and public risk management.

In the context of emerging community social capital, this paper then presented the on-going water crisis in Flint, MI as a case study. This case study specifically addressed the Lead and Copper Rule (LCR), the regulation that governs requirements for intervention, communication and action in response to demonstrations of drinking water contamination and resultant threats to health via exposure to Pb (and Cu). As has been witnessed in Flint, MI, whereas elevated Pb concentrations in a small fraction of homeowner's water samples could (and should) have raised ethical obligations to act in the public interest, the public utility contended that the city's drinking water consistently met drinking water standards. In this instance, intervention and sustained attention from academic researchers, non-profit organizations, and community groups was required to successfully amplify the public's increasingly vocal contention of impaired water quality and to force both compliance and accountability from utility personnel and regulatory risk managers.

This paper argued that the specific issues that occurred (and continue to occur) in Flint, MI resonate with the overall history of risk communication and related growth in community social capital in this country, namely that we are collectively evolving through a process of increasing public participation in the dialog concerning risk mitigation and risk management. For every environmental and social justice crisis that occurs, it can be argued that the arc of evolution in participatory risk management is both local - in terms of the discovery, comprehension and personal and community reaction to a crisis - and larger - in terms of the action, protection, and (at times) litigation that occurs in response to increasing local awareness and demands for response. With each instance in which the concept of "authority" is

successfully challenged - as it has been in Flint, MI - the background cultural context around that specific environmental or social justice issues changes and we move collectively and progressively toward an expectation that communities are active cooperating partners in local risk management. As noted in the introduction to this paper, although this evolutionary arc is not perfect and is far from complete in the sense of creating sustained/sustainable individual empowerment in Flint, MI (or elsewhere), what is occurring in Flint, MI is arguably unprecedented in the extent to which the enfranchised (i.e., municipal utility personnel and regulatory risk managers) are being held publicly and legally accountable for their disregard of the disenfranchised members of the wider community that they had been charged with both providing services for and protecting.

This paper concluded with a discussion of strategies for re-focusing the regulatory framework toward a perspective that centers on community-level social capital and demands greater data transparency from agencies, as well as accountability from regulators. For issues of transparency and accountability, the Internet and social media are increasingly valuable tools for public access and engagement. Moreover, through the ability of non-profit organizations, community groups and academic laboratories to generate, access, organize, and disseminate community health data - as has occurred (and continues to occur) in Flint, MI - the Internet and social media are also proving valuable for facilitating the public's right to understand and participate in the discussion of what is happening around and within their communities. From a public health perspective, it is hoped that the more readily accessible data are, the more honest the collective conversation will become regarding strategies for mitigating and managing risks. It is further hoped that a paradigm of community-centered risk-aware communication may someday change the current emergency response driven regulatory framework itself.

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