5 RISK KNOWLEDGE AND RISK COMMUNICATION: THE RHETORICAL CHALLENGE OF PUBLIC DIALOGUE

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In 2001, the Ontario government released a soil survey report that defined levels of metal and arsenic contamination caused by mining activities in the Sudbury community of Northern Ontario. According to this report, "emissions from over 100 years of mining, smelting and refining have resulted in elevated levels of metals and arsenic in the soil over a large area" (Ontario Ministry of the Environment, 2003). Based on this report, a Human Health and Ecological Risk Assessment was initiated in 2003 to determine whether the levels of metals in the soil pose an unacceptable health risk to people or the environment. Although the risk assessment phase of the Sudbury Soils Study is nearing completion, final results have not yet been released to the public.

From our perspective as science communication and rhetoric researchers, the Sudbury Soils Study offers a valuable opportunity to examine the processes of public communication and dialogue at work within a community-based risk assessment. This chapter represents a first step in a larger case study of public communication in the soils study. Our purpose in this chapter is to develop a preliminary critical analysis of the main rhetorical processes and challenges involved in the study's public communication mandate and activities. To accomplish this purpose, we will begin with a selective literature review of relevant theory from the fields of science communication and risk communication; we will then apply key concepts from this theoretical review in an initial analysis of the study's main public communication activities and assumptions.

To date, the Sudbury Soils Study's risk assessment process has been shaped by a complex combination of public sector, private sector, scientific, and com-

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munity interests and involvement. The "partners" (Ontario Ministry of the Environment, 2003) in the study include the provincial Ministry of the Environment, the regional health unit, the municipality, the federal health ministry's First Nations and Inuit Health Branch, and the two large mining companies that operate in the region. At the recommendation of the Ministry of the Environment, the assessment has been funded voluntarily by the two mining companies. Decision-making, however, rests with the Technical Committee, which was formed at the start of the risk assessment phase of the study "to provide overall management of the process" (Overview, n.d.). This committee includes representatives from each of the six partner organizations listed above. A primary responsibility of the Technical Committee has been to ensure the scientific validity and credibility of the study by making decisions about who is best qualified to undertake scientific and technical activities and by making sure that results are scrutinized through legitimate and respected processes of peer review.

Attending to the scientific credibility of the study's process is not the only priority of the Technical Committee. From the outset, public transparency, public involvement, and public communication have been stated priorities as well. On the Sudbury Soils Study's Web site, for example, prominent headers such as "The Sudbury Soils Study—An Open, Public Process" and "Public Input Part of an Open Process" (Overview, n.d.) emphasize this objective, while details on the public communication activities that have occurred demonstrate tangible ways in which this objective is being put into practice. We are told, for instance, that

> The Sudbury Soils Study is the most comprehensive assessment of its kind ever conducted in Ontario. The community will be kept informed of any possible risks these metals may pose to human health and/or the health of the environment. The study has already held three workshops and two public open houses, and released two community newsletters, as well as several news releases. In addition, there is a project Web site, and quarterly reports from the Independent Process Observer. (Overview, n.d.)

To date, the study's public communication and community dialogue activities have been diverse, frequent, and explicitly recognized as an important dimension of the study. Beyond the fairly typical modes and strategies of public communication listed above (e.g., open houses, newsletters, news releases, the Web site), the study has also attempted to integrate public participation and dialogue into the risk assessment process in a more central, structural way through

the establishment of a Public Advisory Committee and an Independent Process Observer position.

Indeed, because of the apparent success of its efforts to create an "open, public" process, the Sudbury Soils Study is now being presented as a model for "community-based risk assessment" applicable to other places and other risk issues. In its description of community-based risk assessment, a recent federal report on "Non-Renewable Resource Development and Community Infrastructure in the Northwest Territories" identifies the Sudbury Soils Study as one of the best examples of this participatory process:

> Community-based participatory risk assessment is meant to influence the actions of local government, the private sector or others in order to address identified risks. The assessments use qualitative data collection and analysis, including consultations with those at risk, and mechanisms for self-reflection and community empowerment.... In Canada, the Sudbury Soils Study is one of the most interesting initiatives of this kind. (Infrastructure Canada, 2005, p. 2)

Given the Canadian government's identification of the Sudbury Soils Study as a leading model for community-based participatory risk assessment, as well as the study's own stated priorities, we want to look at its strategies for public communication and engagement from the perspective of recent discussions in science communication and risk communication scholarship. In particular, we are interested in the assumptions about communication and the role of the community in the study's public participation and dialogue efforts. To what extent have these efforts been successful in developing a truly dialogic, interactive process that foregrounds local knowledges and facilitates a meaningful exchange between expert and public perspectives?

Drawing on the theoretical framework established by a selective review of relevant scholarship on public participation and dialogue in the fields of science communication and risk communication, we explore several dimensions of public participation and dialogue within the study's risk assessment process to illustrate both the possibilities and limits of its approach to public communication and community engagement. This includes looking at the multi-faceted cluster of public communication activities that have been undertaken, the roles of the Public Advisory Committee and the Independent Process Observer within the study's organizational structure, as well as the preliminary plans for communicating risk assessment results to the public. Working from recent discussions of "consensus conferences" and "citizens juries" in science communication, in

closing we suggest a possible future direction for constructing more meaningful modes of public engagement.

SCIENCE COMMUNICATION AND RISK COMMUNICATION THEORY: CONCEPTS OF PUBLIC ENGAGEMENT AND DIALOGUE

Science communication is an emerging field that focuses primarily on the public communication of science. Bryant (n.d.) defines science communication as "the processes by which the scientific culture and its knowledge become incorporated into the common culture" (para. 1) and further describes the Public Understanding of Science as "the comprehension of scientific facts, ideas and policies, combined with a knowledge of the impact such facts, ideas and policies have on the personal, social and economic well-being of the community" (para. 3). Burns, O'Connor, and Stocklmayer (2003) provide a good review of the evolving definitions and objectives of science communication, while Gross (1994) addresses the relationship between the fields of rhetoric and science communication. Journals in the field include *Science Communication, Public Understanding of Science,* and *SciDev.Net* (a web-based journal).

Risk communication, as Trumbo (2000) points out, can refer both to a field of research and a field of practice. As a field of research, risk communication covers a diverse and broad range of topics, including psychology-based research into risk perception, the cognitive processing of risk information, and the social amplification of risk; critical-cultural and sociological theories of the role of risk discourse in society; rhetorical criticism and theories of risk communication; and studies of risk communication as a mode of professional communication. Notably, those engaged in the study of risk communication include both scholars from a wide range of disciplines (e.g., psychology, sociology, rhetoric, professional communication, anthropology, policy studies) and professional researchers-practitioners from outside academe (e.g., those who work in government agencies, in public health, or as independent consultants to government and industry). Plough and Krimsky's (1987) review of the emergence of recent risk communication studies is still very helpful for understanding dominant tendencies in the field. They identify environmental issues and public health as two primary areas of focus, and they distinguish between "quantitative," and "technocratic" approaches to understanding risk communication and "cultural," socially contextualized approaches which they present as preferable (p. 8).

In recent years, public participation and dialogue have been increasingly valorized in the science communication field. This contrasts with earlier assump-

tions about science communication as primarily a one-way, top-down process of conveying pre-established scientific knowledge and information to the public in order to increase lay people's scientific literacy. Similarly, within the field of risk communication, researchers and practitioners are increasingly talking about the importance of public participation and dialogue, as opposed to previous transfer models of risk knowledge and communication.

What exactly do public participation and dialogue mean in the context of risk knowledge and communication? It is one thing to develop dialogue initiatives in the context of museums, science centres, or other informal educational venues where the public is a willing, non-adversarial participant in the science communication process; it is another to engage the public substantively and meaningfully in the potentially adversarial, highly charged contexts of making and communicating risk knowledge. As Plough and Krimsky (1987) note, "The communication of information about risks usually occurs within a context of fear and uncertainty" (p. 5).

SCIENCE COMMUNICATION: CONTEXTUAL-DIALOGUE MODEL

Within the past decade or so, "context" and "dialogue" have become central terms in science communication research and theory. This contextual-dialogue model of science communication counters assumptions and methods found within the earlier Public Understanding of Science movement. From the perspective of dialogue model proponents, this movement was limited in its assumption that lay people simply need to "learn the facts" about a scientific issue in order to understand, accept, and appreciate it. The improvement of scientific literacy was a primary goal of the Public Understanding of Science movement, a goal typically based on survey research indicating the general population's lack of knowledge of basic scientific facts (Miller, 2001a). Given this lack, the main purpose of public science communication was to convey or transmit expert, scientific knowledge to non-experts who did not possess this knowledge:

> Together, the name 'public understanding of science,' and the interpretation of early surveys of scientific literacy resulted in the so-called deficit model of public understanding of science. This model characterized the public as having inadequate knowledge, and science as having all the required knowledge. (Burnset al., 2003, p. 189)

The deficit model, as Gross (1994) states, "is asymmetrical: it depicts communication as a one-way flow from science to its publics" (p. 6). For Irwin and Wynne (1996), the epistemological-ideological assumptions about science and scientific knowledge that underlie the Public Understanding of Science movement's deficit model are especially problematic. These include the assumptions that "understanding" means faithful assimilation of the available scientific knowledges, including their framing assumptions and commitments; that public controversy over technical/scientific issues is created by inadequate public understandings rather than by the operation of science itself; that science offers a privileged view of the world that necessarily contributes to human improvement; and that science is a value-free and neutral activity (pp. 7-8).

Spurred by the critique of the Public Understanding of Science movement's deficit model, science communication scholars have more recently embraced the concept of a contextual, dialogic model of communication. This model is consonant with a rhetorical rather than transmission view of communication. As Burns and colleagues (2003) explain, this model accounts much better than simple linear or diffusion models do for the complex social negotiations of meaning that characterize all occasions of public science communication (pp. 195-96). For Gross (1994), the advantages of the "contextual model" are that it "depicts communication as a two-way flow between science and its publics. The contextual model implies an active public: it requires a rhetoric of reconstruction in which public understanding is the joint creation of scientific and local knowledge" (p. 6). The contextual approach, then, introduces a much more nuanced and rhetorically sound approach to the public communication of science, an approach that acknowledges the role of language and communication in creating, not simply conveying, scientific knowledge. This approach, claims Miller (2001b), is preferable to the Public Understanding of Science approach because it "sees the generation of new public knowledge about science much more as a dialogue in which, while scientists may have the scientific facts at their disposal, the members of the public concerned have local knowledge of, and interest in, the problems to be solved" (p. 117).

Not only science communication researchers, but likewise politicians and policy-makers are increasingly acknowledging the social, political, and ethical dimensions of scientific knowledge and the importance, therefore, of facilitating public participation and dialogue on scientific questions. In the words of the European Commission's 2005 Science and Society Forum,

> We need to recognise that the public is a key part of the thinking society, with particular interests, concerns and questions about science and technological innovations and how these

> will shape the future of societies.... To address the new public of science the idea of a one-dimensional flow of information should be replaced by dialogue, engagement and participation. (Gaskell, 2005)

RISK COMMUNICATION: VIEWS OF PUBLIC INTERACTION

Like the field of science communication, studies in risk communication in recent years have begun to emphasize the importance of an interactive, dialogic approach to communicating with the public. The challenges for implementing this objective in potentially volatile, adversarial risk communication contexts may be greater than those in, for instance, contexts of informal, voluntary science learning. However, the importance of public engagement on ethically and politically charged issues of scientific research and policy (e.g., genetically modified foods, reproductive technologies, and climate change) is already being recognized, and strategies for facilitating this engagement in meaningful, effective ways have begun to be developed, as we shall discuss further at the end of this chapter.

The recent emphasis on dialogue and public participation in risk communication differs from earlier approaches whose assumptions aligned closely with those of the Public Understanding of Science movement and a linear model of communication. According to Bradbury (1994), "the focus of the linear model is the effect of communication on the receiver—essentially the goal is persuasion." In the context of risk communication, "the risk management agency is viewed as the communicator and groups of the public are the audiences" (p. 360). Implicitly, this model assumes a basic asymmetry between those who possess expert scientific knowledge and the lay public to whom this knowledge needs to be communicated. As Katz and Miller (1996) explain, in risk communication contexts,

> parties are often characterized as 'experts' on the one hand and citizens, laypeople, or the general public on the other. In decision-making contexts, risk communication developed as an attempt to overcome these differences by 'correcting' the public's 'risk perceptions' so that they would better match the 'risk analyses' made by the experts. The public's perceptions of risk are generally understood to be subjective, mistaken, emotional, and even irrational, whereas expert assessments are based on facts, knowledge, probabilities, and calculations. In this con-

> ception, then, experts engage in risk communication to inform and educate the public, to improve and correct their perceptions, and to persuade them to change their behavior. (p. 116)

The growing critique of the assumptions that underlie the transfer-deficit model of risk communication has led rhetoric and communication researchers to develop more dialogic and participatory conceptualizations of the risk communication process. These conceptualizations foreground the principle that expert and lay perspectives should inform each other as part of a two-way process (Bennett, 1999). Waddell (1996), for example, proposes a "Social Constructionist Model" of environmental communication that understands information and knowledge as flowing in both directions, thus blurring the distinction between "expert" and "public," or "rhetor" and "audience" (p. 142). Bradbury (1994), for her part, notes the inherent incompatibility between a linear approach to risk communication and the ostensible commitment of regulatory bodies to "democratic dialogue" (p. 360). For example, she observes how the (American) National Research Council's 1989 publication Improving Risk Communication continues to use the terminology of linear communication despite its stated commitment to a more interactive, participatory process. She argues that a "Convergence Model" of risk communication needs to replace the "Linear Model." This convergence model "shows communication as an iterative, long-term process in which participants are mutual communicators rather than senders and receivers." Through this mutual communication, "participants share and create information, either diverging or converging on a common meaning or understanding" (p. 361).

The dialogic process of risk communication that these researchers propose likewise deconstructs the hierarchical separation of reason and emotion that the transfer-deficit model presumes. Instead, public responses to risk contexts are understood as having "a rationality of their own" (Bennett, 1999, p. 3). Katz and Miller (1996) emphasize the importance of treating the public's "emotional" responses to risk not as "irrational" but as, arguably, legitimate and logical—as evidence of "reasonable concern about and understanding of risk rather than ... as an irrational reaction to a controlled situation" (p. 131). Waddell (1996) stresses not only that the public's often-emotional responses to perceived risk may well have a "rationality" of their own, but also that values, emotions, and beliefs play just as significant a role in "expert" views of risk as they do in public perceptions. As he explains, in the social constructionist model, "risk communication is not a process whereby values, beliefs, and emotions are communicated only from the public and technical information is communicated only from technical experts.

Instead, it is an interactive exchange of information during which all participants also communicate, appeal to, and engage values, beliefs, and emotions" (p. 142). Bradbury's (1994) convergence model similarly recognizes and values different forms of rationality: subjective and social perspectives as well as the "objective," analytical approach of technical risk assessment (p. 362).

Based on this very brief, selective review of science and risk communication literature, we return now to the Sudbury Soils Study to look more closely at some of its methods for fulfilling its public communication and community engagement mandate. These methods include implementing a multi-faceted range of public communication activities and genres establishing a Public Advisory Committee and an Independent Process Observer as part of the risk assessment organizational structure, and developing preliminary plans for communicating the results of the assessment to the public. In relation to these methods, we are especially interested in looking at the assumptions about communication and the role of the community in the study in order to consider how effective its public communication efforts have been in developing a dialogic, interactive process of public engagement.

In conducting this preliminary analysis of the study's public communication mandate and activities, we are mindful of Katz and Miller's (1996) findings in their study of how a government authority approached public communication in an environmental risk context. In this context, Katz and Miller found that, despite constant emphasis on the importance of two-way communication with the public, public participation was in fact "a highly controlled process of information exchange" based on a restricted understanding of communication (p. 128). As they put it,

> For the Authority, communication may be a two-way process, but it occurs on one-way streets. In forums and situations that it selects and controls, the Authority receives comments, and through its public information program it disseminates information; in essence, the Authority and the public did not participate in the same communication process. (p. 128)

Despite important differences in the context of their study (a highly contentious decision-making process for identifying a nuclear waste disposal site) and the less volatile, adversarial context for our study, Katz and Miller's findings nonetheless suggest potentially problematic features that may be to some extent present in the Sudbury Soils Study's approach to "open" and "community-based" risk assessment.

PUBLIC COMMUNICATION ACTIVITIES

As we know from its Web site, the Sudbury Soils Study has made communicating with the public in diverse and frequent ways a central feature of its process. Indeed, the informative, friendly, and quite easily navigable Web site itself represents one of the most important ways in which the public can find out about the risk assessment process. The dominant voice of the Web site is clearly directed at a lay audience rather than an expert-technical one: explanations of the study's purpose, methods, and findings to date are written in an accessible way, and it is easy to navigate menus and links to find more information. Perhaps most strikingly, the first page that the reader encounters is an open invitation to attend the next meetings of the Public Advisory Committee and the Technical Committee. For those who want to delve beyond the general information sections, the Web site includes a substantive archive of materials produced throughout the study's duration, including news releases and media reports, the study's own newsletter, reports from the Independent Process Observer, minutes of Public Advisory Committee meetings (though not of Technical Committee meetings), and a link to the provincial government's 2001 soil survey. The Web site, then, is in itself a very significant mode of public communication, and it provides access to a number of other modes. However, despite its friendly, inviting persona, the Web site's primary mode of communication is unidirectional rather than interactive: it is, for the most part, a consumption-oriented Web site that approaches the Internet mainly as a medium for individual consumers to retrieve information rather than a community-oriented Web site that exploits the Internet's potential for creating and sustaining interactions and relationships among groups of individuals, as might, for instance, a web-based citizen discussion forum (Feenberg & Bakardjieva, 2004).

Other modes of public communication that have been initiated are somewhat more interactive: a hotline has been set up that members of the public can call if they have any questions or concerns about the study, and several open houses have been held as a way of providing the public with more information about the risk assessment process and allowing the community to talk with the experts involved in the project. This range of public communication activities clearly indicates the Sudbury Soils Study's desire and tangible efforts to be an "open, public" process.

However, it is also possible to see many of these activities as essentially part of a well-intentioned but rhetor-dominated public relations campaign. In other words, the majority of these materials and communication modes provide a reassuring view of the study: reassuring in terms of the information communicated and reassuring in the sense that the very act of engaging in a wide range of public

communication activities (regardless of their specific content) contributes to an ethos of openness and accessibility. The range of information available through the Web site and other modes of public communication function as concrete proof to support this ethos. At the same time, however, keeping in mind that all communication constructs a selective (and hence deflective) version of reality (Burke, 1989), it is worth asking what restrictions there may be on the "amount and kind of information" (Katz & Miller, 1996, p. 126) to which the public has access (for example, the Public Advisory Committee minutes are easily accessible but the Technical Committee minutes are not). It is also worth considering how the official rhetoric of the Sudbury Soils Study works to create a publicly reassuring character for itself. Although the question is beyond the scope of this initial paper, our larger case study includes a close rhetorical analysis of specific public communication texts produced by the study in order to identify concrete ways in which this character (or ethos) is constructed and promoted. More generally, this kind of analysis of the rhetorical composition of the Sudbury Soils Study documents will provide a better understanding of the necessarily selective and value-laden version of reality that is being officially communicated.

Further, even though events such as open houses, hotlines, and meetings that are open to the public certainly do provide opportunities for people to ask questions and, to some extent, provide input, these events and their agendas are also, of course, managed by those in charge of the study. In that sense, they are not entirely "open" since the contributions of the public to the rhetorical exchange must be made within the terms established by the study team. One could say that an asymmetrical relationship exists between the rhetor (the study) and the audience (the public), in which the rhetor sets the agenda to which the public responds, deciding when and how the public speaks (Katz & Miller, 1996).

Despite the Soils Study's frequent appeal to public input and community dialogue and despite its tangible effort to make itself open and available to the public, a tension exists between this appeal/effort and the communication assumptions revealed by the language in which it describes public communication and involvement. For example, a recent presentation given by the Soils Study about the risk assessment process included a slide entitled "Community Involvement and Risk Communication" that identified the following "goals":

- Inform the community about the project and our goals
- Provide relevant and timely information
- Obtain input from varied stakeholders
- Communicate results in clear and concise language
- Address and incorporate community concerns (SARA Group, 2005)

Three of these goals (the first, second, and fourth) are based on a commonplace transmission model of communication, in which the soils study conveys

information to the community through the vehicle of "clear and concise language." More encouragingly, the other two goals recognize the importance of listening to the audience, though the term "stakeholders" suggests (perhaps unintentionally) a more limited and privileged audience than "community." Further, rather than suggesting reciprocal dialogue with either or both of these audiences, the phrasing of these two goals also suggests a transmission model, with the study now positioned as the receiver (rather than the sender) but nonetheless in control of the communication circuit: from "stakeholders" they will "obtain input," while the community is reduced to a source of "concerns" that are to be addressed and incorporated by the study's leaders. This terminology, we suggest, reinforces rather than calls into question a standard view of public communication as primarily a "process of information transfer" (Katz & Miller, 1996, p. 129) from an authoritative source to a lay audience of receivers. In part, this tension between the appeal to public participation and the language of information transfer may emerge from a tension between competing senses of the term "open": does being "open" mean allowing the public to view, as through an open door or window, what is going on in the study, or does the term "open" mean inviting the public to come inside and actively participate in the conversation?

In the latter sense, there have been real opportunities for lay members of the community to contribute in substantive ways to the creation (not just reception) of risk knowledge. For example, as part of the study's efforts to construct an assessment that is responsive to local concerns and realities, the community has been invited to participate in "Have Your Say Workshops" about the ecological risk assessment as well as surveys and sampling of locally-grown and wild foods that are consumed by residents. Through these initiatives, local hunting and fishing groups, gardening groups and others from the community were involved in deciding which foods and plants should be included for analysis. This was to ensure that the study captures the reality of the community's diet, reflecting choices people make and food they eat. In this way, it is possible to say that the experts in charge of the study have actively sought to include local knowledge in the construction of scientific knowledge. In addition, these workshops and surveys have provided a valuable opportunity for the study's staff to interact with the public and share information about the assessment process.

THE PUBLIC ADVISORY COMMITTEE AND THE INDEPENDENT PROCESS OBSERVER

Generating diverse and numerous public communication materials and activities is not the only way the Sudbury Soils Study has attempted to address its

public communication and community engagement mandate. Perhaps most importantly, the organizational structure for the risk assessment includes a Public Advisory Committee and an Independent Process Observer position. According to the study's Web site,

> The Public Advisory Committee has the responsibility of representing citizens' interests in the Sudbury Soils Study. Meeting quarterly, the members work closely with the Technical Committee and provide input on the process. As representatives of the community, they have the additional role of assuring the public that the study is an open, transparent process. (PAC overview, n.d.)

The role of the Independent Process Observer, meanwhile, is to "regularly review the study process, report to the public on a regular basis, and at all times represent the interests of both the general public and the environment" (Process observer: PO role, n.d.). The observer sits as a non-voting member on both the Public Advisory and the Technical committees. The terms of reference for this position further explain that "The purpose of the IPO is to oversee and report on the process used to conduct the HHRA [Human Health Risk Assessment] and ERA [Ecological Risk Assessment] to ensure that it is transparent to the community and that communication with the public is timely and effective" (Process observer: PO role, n.d.).

The decision to integrate the Public Advisory Committee and the Independent Process Observer within the Soils Study's basic organizational structure shows how concerned the project's leadership has been from the outset to ensure clear, established mechanisms for representing the public's interests in the process. As the language of the terms of reference for these two organizational components indicates, their purpose is not only to facilitate public input into the process, but just as importantly to assure the public that the process is transparent and that their interests are being represented.

In our view, the creation of the Public Advisory Committee represents an important way in which the Sudbury Soils Study has tried to make public participation a central, rather than simply peripheral, feature of the risk assessment process. From the outset, this committee has been recognized as an official part of the process responsible for advising the Technical Committee on "how best to communicate with and engage the public throughout this process" (Overview, n.d.). Because of its existence, the voice of the community has been granted an explicit, legitimate role in the process. All Public Advisory Committee meetings are open to the public who are invited to "express their

concerns or ... ask questions about any aspect of the Sudbury Soils Study" (PAC overview, n.d.).

There are, however, noticeable constraints on the Public Advisory Committee's position and functions in the process. Most noticeably, the committee has no decision-making power; its role is purely advisory to the Technical Committee, whose members direct the study. In this sense, it is structurally subordinate to the Technical Committee rather than an equitable partner in the study. Likewise, the terms of reference for the Technical Committee suggest that it largely initiates and determines the advisory process of the PAC: the TC "will *seek* [emphasis added] comment and input from the PAC *on all relevant issues*" [emphasis added]" (Overview: Technical Committee, n.d.). Further, although the Public Advisory Commiteee is described as a mechanism for ensuring the public's engagement in the process, the nature of that engagement is conceived as essentially separate from the Technical Committee's areas of responsibility. The Public Advisory Committee, in other words, was constructed as a means for ensuring that issues relevant to the public had an official status in the process, but these issues are not seen as fundamentally the same ones for which the Technical Committee is responsible. The Web site's explanation of the Public Advisory Committee's inception reveals this separate-sphere framework based on the division of the risk assessment process into two goals:

> At the October 30, 2001 PLC [Public Liaison Committee] meeting it was agreed that the two goals of the PLC were to discuss and advise on technical issues, and to provide a forum for public consultation. It was felt that this process would be best served by two separate committees. The PLC evolved into the Technical Committee (TC), established for INCO and Falconbridge and the government stakeholders to discuss and advise on technical matters. A separate Public Advisory Committee (PAC) was established to address the concerns of the community at large. (PAC: PAC Terms of Reference, n.d.)

At its inception, then, the organizational structure for the risk assessment inscribed a hierarchical separation of expert and lay knowledge, with public contributions occupying a subordinate status outside the realm of "technical issues." The concerns of the community at large were assumed not to be technical, though in accordance with the Technical Committee's mandate and composition, we should understand "technical" in this case to include issues of policy and politics, too. By contrast, the Public Advisory Committee's terms of reference stipulate its responsibility to "provide opportunities for members of the

public to express their concerns or to ask questions about any aspect of the Sudbury Soils Study, such as *questions related to scientific or technical matters* [emphasis added] or to process or procedural issues" (PAC: PAC Terms of Reference, n.d.). The public's interest in technical and scientific matters is presumed to be mainly a need for expert information rather than a desire for reciprocal knowledge exchange. Even the phrasing "community at large" suggests a community surrounding, impinging upon but ultimately outside the heart of the process—a community that needs to be addressed rather than a community engaged in reciprocal dialogue with the study team.

Interestingly, however, two subsequent modifications to the organizational procedures show the problem of functioning on the assumption of two separate, asymmetrically related spheres of knowledge and discussion. To some extent, the exclusion of the Public Advisory Committee from the realm of "technical issues" and of the public from direct contact with the Technical Committee, has been addressed over the course of the study. In late 2003 and early 2004, the Public Advisory Committee debated the need to have better access to scientific and technical information in order to support its own deliberations. As a result of this debate, the advisory committee clarified (for itself and for the Technical Committee) that it is entitled to solicit scientific information from the study's expert advisors whenever it wishes. As noted in the minutes of January 2004,

> The PAC deliberated and decided that they would not amend their Terms of Reference to include responsibility for review of technical/scientific issues. It was recommended that a statement be added to the Terms of Reference to clarify the opportunity to have the freedom to call upon Advisors at the cost of the TC, if it is deemed appropriate. It was noted that the two current Advisors are available to the PAC at any time. (Sudbury Soils Study Public Advisory Committee, 2004)

In 2003, the question of public access to Technical Committee meetings also surfaced. This issue was addressed in late 2003 by the Independent Process Observer, who noted in his report that "The public has a growing concern that they do not have access to the TC which is the key decision making body" (Mariotti, 2003). This "concern" indicates the public's clear awareness of the Public Advisory Committee's subordinate status in the process: if the public really wants its voice to be heard, this means addressing the decision-makers directly, not the designated public advisors. Indeed, this point raises the question of whether the advisory committee might be considered as much a mechanism for creating a mediating, distancing boundary (a kind of buffer zone) between the public

and the Technical Committee as it is a mechanism for creating an open channel of communication between them. Subsequent to the recommendation of the Independent Process Observer, the Technical Committee did augment its accessibility to the public, building in an opportunity for the public to make presentations or ask questions at the start of each meeting, though the rest of the meeting remains in camera.

Although these procedural statements and modifications did not substantially alter the basic structural relationship between the public, the Public Advisory Committee, and the Technical Committee, we do see in these discussions, referenced in the advisory committee minutes, an awareness of some of the challenges involved in negotiating lay and expert knowledge boundaries, and in crafting organizational procedures that truly facilitate public engagement. We also note the significance of the Independent Process Observer's role, a role that arguably has more influence on the Technical Committee's decision-making and the overall conduct of the study than does that of the Public Advisory Committee: it was the Independent Process Observer's recommendation, and not that of the Public Advisory Committee, that initiated this procedural change to allow public access to Technical Committee meetings.

Our sense is that throughout the risk assessment process, the views and recommendations contained in the Independent Process Observer's quarterly reports have been taken more seriously by the Technical Committee than the advice offered by the Public Advisory Committee. This may not be surprising, given that the observer's role is essentially to oversee the appropriateness of the study's organizational procedures, including the proceedings of the Technical and Public Advisory committees. Within the procedural framework that the Sudbury Soils Study has established for itself, it is ultimately the observer's seal of approval that is taken to guarantee that the study's process appropriately "represents the interests of both the general public and the environment" and that it is "transparent to the community" (Process observer: PO role, n.d.). It is little wonder then that, in the interest of maintaining public trust in the proceedings, the Technical Committee appears to listen carefully to the observer's recommendations.

While both the Public Advisory Committee and the Independent Process Observer are mandated to "receive comment/input/complaints from the public" (Process observer: PO role, n.d.), the terms of reference for both emphasize their responsibility to communicate information from the study to the public. In other words, the language used to describe their responsibilities suggests their primary function as transmitters of information from the study to the community (and indeed, using the term "receive" to describe their relationship to public input reinforces this transmission model of communication; one may receive in-

formation without necessarily acting upon it). The Public Advisory Committee, for example, is supposed to "provide suggestions as to how to best facilitate the process of keeping the public informed"; it "will also act to communicate *to* [emphasis added] the residents of the City of Greater Sudbury on progress as well as issues and concerns that they identify" (Process observer: PO role, n.d.). One of the observer's main responsibilities, meanwhile, is to "Prepare a quarterly written report on the overall progress and direction of the work of the committees for *dissemination* [emphasis added] to the public" (Process observer: PO role, n.d.). Further, the purpose for creating these communication conduits to the public is not simply to make sure that citizens properly understand the study's risk assessment activities (a purpose consonant with a traditional Public Understanding of Research approach to science communication); it is also, and perhaps most importantly, from a public relations perspective to make sure that the Sudbury Soils Study is perceived by the community as an "open" and "transparent" process, thus contributing to an environment of trust rather than mistrust.

RISK COMMUNICATION PLANNING

As the preceding reviews of the Sudbury Soils Study's public communication activities and the roles of the Public Advisory Committee and Independent Process Observer show, communicating with (or to) the public throughout the risk assessment process has been an important goal and activity. From our rhetorical-epistemological perspective, this constitutes part of the study's overall risk communication: that is, we see risk communication as including what occurs during the process of constructing scientific and community-based knowledge about risk, rather than seeing risk communication with the public as something that occurs only once the scientific risk assessment has been completed. From the perspective of the Sudbury Soils Study, however, the latter view of risk communication is more applicable. Now that the scientific risk assessment is nearing its completion, the study's expert consultants, together with the Technical Committee and the Public Advisory Committee, have begun to plan for what is more typically understood as risk communication: namely, communicating to the public the study's findings about current and potential future risks to human health and the environment from metal contamination in the region. At this stage, risk communication is understood as what occurs after scientific knowledge has been constructed.

In support of its goal to develop effective risk communication (and to overcome "barriers" and "communication mistakes"), the Soils Study has hired a risk communication consultant. This step signals an appreciation on the part of the

study team that not only scientific but also communication expertise is needed, even though this communication expertise is positioned as a final stage in the process and not as integral throughout. As Waddell (1996) notes, citing Lungdren, too often environmental communicators are brought in only at the end of a risk assessment process to "sell" the risk decisions, rather than being involved in the knowledge- and decision-making process from the outset:

> It is impossible for environmental communicators to simultaneously a) facilitate the social construction of environmental policy, and b) "sell" decisions that have been made by others. As with information development, environmental communicators need to be involved in—and need to involve the appropriate publics in—the process from the outset. (Waddell, 1996, pp. 15-16)

As we learned from a workshop that we attended with the Sudbury Soils Study's risk communication consultant, the main purpose of risk communication is not, in his view, simply to transmit expert information or knowledge to the public. Instead, his approach to risk communication foregrounds the importance of building trust and of acknowledging emotion as well as reason in the communication of risk knowledge; this approach identifies "dialogue" with the audience as a significant objective. His "goals for risk communicators," for example, include the following:

- Maintain and build trust and credibility
- Engage your audience in 'dialogue'
- Communicate early, often, and truthfully
- Legitimize the concerns of your audience
- Make commitments to communicate (Frontline, 2006, p. 5)

These goals indicate an awareness of the fundamental roles of trust and emotions in the risk communication process as well as the importance of validating the audience's views and engaging them in "dialogue." Rather than adopting a "pure" transmission approach to communication (along the lines of Waddell's "One-Way Jeffersonian" model, which assumes that the responsibility of experts and authorities is simply to "transfer" technical information to an uninformed lay audience), the approach of the Sudbury Soils Study's risk consultant resembles more closely the "Interactive Jeffersonian" model, which requires not only that "the public adjust to expert knowledge," but that "experts adjust to public sentiments" (Waddell, 1996, p. 9). This approach to risk communication reflects, we suggest, the kind of definition advanced by writers such as Covello and Sandman (2001): the current version of risk communication, they claim, is in-

tended to address "the new partnership and dialogue of government and industry with the public" (p. 1). However, the nature and roles of the participants in this dialogue are quite different: risk communication is a rhetorical tool (a means of persuasion) to be used by government and industry in order to "calm people down," "provide reassurance," or "generate a sense of urgency" when public response is "one of apathy" (p. 1)—in short, it is a process that involves rational experts and authorities addressing the emotional public in order to achieve the rhetor's desired "outcomes" (p. 2). Although their critique is more than 15 years old, we think it is still possible to see some of the same basic assumptions operating in Covello and Sandman's more recent work.

Althoughthe study's risk communication consultant identifies audience engagement and dialogue as desirable goals, the approach is still mainly rhetor-based: as Bradbury (1994) says, the risk assessment agency is viewed as the communicator and groups of the public are the audiences (p. 360). This coincides with Plough and Krimsky's (1987) critique of Covello and his colleagues as proponents of a "conventional" model of risk communication that restricts itself to the question of "how 'experts' inform others about the truth," rather than also considering the importance of "non-elites as risk communicators" (p. 7). In this view, the main reason for pursuing goals such as legitimizing the audience's concerns and engaging in dialogue with them is in order to maintain the rhetor's (i.e., the organization's) credibility and create a receptive audience for the message that the rhetor wants to convey. This is, we would argue, essentially a public relations strategy: understand your audience's perspective and establish rapport with them so that you can successfully craft and sell your message to them.

This approach to risk communication is also, we suggest, a defensive one: the rhetor is advised to be thoroughly prepared so that s/he can respond effectively to the audience's "fear," "outrage," and "emotional questions" (Frontline, 2006, p. 19). From this perspective, the public's emotional responses need to be acknowledged not because they have a "rationality of their own" (Bennett, 1999, p. 3) that deserves to be a substantive part of the conversation, but because these emotions need to be controlled and defused by the rhetor so that they do not become disruptive or threatening: The workshop materials list sample "emotional questions" such as "How will you deal with those who get sick?", "When were you first notified about this?", and "What can we expect?" (Frontline, 2006, p. 19). Labeling these "emotional questions" implicitly devalues them by suggesting that they are not logical or reasonable. Likewise, risk communicators who face a potentially emotional public are advised to maintain strict control over their communication by always sticking to "key messages" (Frontline, 2006, p. 16). In this way, they can defend themselves against being led astray into open,

uncharted territory—or into dialogue steered as much by the audience as by the rhetor. We would argue that this defensive approach to effective risk communication is more about managing audience responses than about engaging the public in meaningful conversation.

Thus, although the Sudbury Soils Study is in the process of developing plans for risk communication as a final stage of its project, and although the principles of risk communication that underlie these plans recognize trust and emotion, as well as pure reason, as important ingredients in the communication process, the current defensive, rhetor-based approach does not, we think, engender a substantive dialogue model of risk communication—a model that recognizes the different knowledges and perceptions of experts and lay people as equally, though differently, valid; that understands that all participants in the communicative situation are motivated by complex clusters of values, interests, and emotions; and that engages participants in a mutual process of sharing and creating meaning (Bradbury, 1994, p. 361). In Waddell's (1996) terms, the model of risk communication currently being pursued by the study does not fully illustrate a Social Constructionist approach, that would see risk communication as "an interactive exchange of information during which all participants also communicate, appeal to, and engage values, beliefs, and emotions" (p. 9).

POSSIBILITIES FOR FUTURE PUBLIC PARTICIPATION AND COMMUNITY DIALOGUE

From one perspective, the upcoming communication of the risk assessment results to the public represents a final stage in the Sudbury Soils Study: the study's mandate to undertake a human health and ecological risk assessment of soil contaminants associated with mining in the region will have been completed. From another perspective, though, this is just the first step in a much larger process, namely the process of deciding what to do about soil contamination. In moving from a question of risk assessment to a question of risk management, the issue will shift from a stasis of definition (i.e., defining the nature of the risk) to a stasis of procedure (i.e., determining the best course of action to follow in light of the study's results). As this shift occurs, the questions of public dialogue and community engagement will remain equally if not more important than they were in the risk assessment stage.

In this closing portion of our paper, we want to present, briefly, two procedures for public participation in science communication that we think provide some valuable possibilities for facilitating a more meaningful process of com-

munity dialogue for the decision-making process of risk management. These are "consensus conferences" and "citizens juries."

"Consensus conferences" are a method for facilitating direct citizen participation in decision-making about science policy questions. They originated in the late 1980s in Denmark and have since been held in a number of countries, including Australia, Canada, New Zealand, Korea, and many parts of Europe. Consensus conferences work by bringing together 12-15 lay citizens to examine a controversial science or technology issue. This group of citizens engages in a deliberative process to identify key issue areas. The process interweaves lay and expert knowledges by providing citizens with access to experts of their own choosing, whom they can question on issue areas that concern them. In other words, citizens become not simply recipients of expert information, but instead they decide what kinds of knowledge and expertise they need to help them make decisions about the key issue areas they have identified. In Einsiedel, Jelsøe, and Beck's (2001) terms, citizens are authorized to "cross-examine" experts—and they are not relegated to doing so from the marginalized position of audience members at a public presentation controlled by expert authorities. In the final stage of the process, the citizen group arrives at a consensus position, and makes recommendations to the policy-makers and the public.

According to Allen, Du Plessis, Kilvington, Tipene-Matua, and Winstanley (2003), the consensus conference method of public participation in science issues has demonstrated that "those with little previous knowledge of a particular field of science can question experts and formulate recommendations that draw on their own ethical commitments, life experience and belief systems as well as information about the technologies" (p. 5). In essence, the consensus conference functions as a deliberative forum for citizens to participate directly in democratic decision-making on science and technology issues (for more on consensus conferences, see also Joss & Durant, 1999).

Similarly, "citizens juries" are a practical method for creating more meaningful public involvement in the negotiation of risk (Coote & Franklin, 1999, p. 189). Initiated in the 1990s by the Institute of Public Policy Research in Britain, citizens juries emerged out of a critique of more traditional approaches to public involvement. Coote and Franklin (1999) summarize some of these shortcomings,

> For example, a typical 'communications strategy' would all too often treat the public as passive recipients of information or opinion provided by experts—not withstanding recent recognition of the need for dialogue. A 'consultation exercise' would often bypass important stakeholders and leave no room for

> genuine debate. A public meeting would provide a theatre for the rehearsal of fixed positions. An opinion survey would seek the views of the public but fail to provide any relevant information. A focus group would leave participants in the dark about how their contribution would be used in the future. And so on. (p. 190)

Citizens juries, by contrast, attempt to address at least some of these shortcomings by providing a method of public engagement that allows "scrutiny and deliberation" in a context that assures plenty of time and information for participants to consider complex science issues deeply and carefully (Coote & Franklin, 1999, p. 192). Like consensus conferences, citizens juries bring together a small group of ordinary citizens who meet for a number of days in order to address a controversial science issue. They receive extensive background information and they cross-examine expert "witnesses" and may request additional "evidence" (p. 190). Unlike consensus conferences, citizens juries do not have to reach a single "verdict" or group position; instead, the process may result in diverse conclusions (p. 190).

Both consensus conferences and citizens juries offer alternative models of public engagement that could, we think, be adapted to enhance the future participation of Sudbury's "ordinary citizens" in negotiating the meaning of the human health and ecological risks that the Sudbury Soils Study has been assessing. Coote and Franklin (1999) argue that the meaning of risk in public health contexts is becoming increasingly uncertain and unpredictable for all concerned—including the public, scientists, and government—yet decisions and policies on how to assess and manage risks still need to be made. In this kind of context, they claim, it is not enough to think about how to communicate with the public; it is necessary to engage in a process of negotiating what risks mean and how they should be addressed. Their preference for the term "negotiation" over "communication" is helpful, we think, for pointing out that the simple objective of public "dialogue" may not be enough: the nature and quality of the dialogue are crucial. As they explain, "while 'communication' implies (or should imply) a two-way conversation for sharing information and perspectives, 'negotiation' can be seen as a multiple engagement of diverse forms of knowledge and experience" (p. 187).

In the context of the Sudbury Soils Study, can consensus conferences and citizens juries provide possible mechanisms for ensuring that "ordinary citizens" participate directly—and with authority—in the long-term, unpredictable process of negotiating what the risks mean to the community and how they should be addressed? Can they help the study to live up to its citation by the Canadian

government as a model of "community-based participatory risk assessment" that includes "consultations with those at risk, and mechanisms for self-reflection and community empowerment" as a means "to influence the actions of local government, the private sector or others in order to address identified risks" (Infrastructure Canada, 2005)?

CONCLUSION

By drawing on recent research and theoretical developments in the fields of science and risk communication, our analysis of public communication and community involvement in the Sudbury Soils Study has allowed us to identify both the tangible ways in which those in charge of the risk assessment process have attempted to facilitate an "open" public communication process and the limitations of these efforts. In particular, we have found that, despite a clear commitment to public communication and the establishment of diverse mechanisms to carry out this mandate, a limited and fairly traditional understanding of public communication still persists. We see this in the primarily unidirectional, informational nature of the Web site and the relatively controlled agenda of open houses and other public communication activities; we see it in the study's language, which describes public communication as implicitly a transmission rather than dialogic process; we see it in the hierarchical separation of the Technical Committee and the Public Advisory Committee in the study's management structure, as well as in the emphasis placed on the role of the advisory committee and the Independent Process Observer as transmitters of information; and we see it in the defensive, rhetor-based approach to risk communication that informs the study's preliminary risk communication plan.

For the most part, then, the Sudbury Soils Study has not (yet) developed a truly effective rhetorical approach for fostering a substantive, equitable process of dialogue with community members and ordinary citizens. Ideally, this is a dialogue that would recognize the values, beliefs, and interests of all who participate (including experts and authorities), respect and account for the diverse knowledges and perspectives of all participants, and facilitate the ongoing negotiation of meaning and knowledge-making about risk in this specific context and community. However, as the study shifts from being primarily a risk assessment to a risk management process, we think that new opportunities will present themselves for the development of a more substantive, interactive, and empowering process of public communication and community involvement.

For the fields of science and risk communication, our case study demonstrates the value of applying research-based models and theories to the analysis

of specific rhetorical situations of risk communication. This application allows us to better understand the nuances and complexities of the particular situation being studied, thus generating findings that may be valuable to those directly involved in the situation as well as to researchers studying similar situations. The results of our case study likewise potentially contribute to the development of rhetorically informed models and theories in science and risk communication: for instance, by emphasizing the importance of attending to the local context and situational particularities of each risk communication process; by drawing attention to the diverse possible configurations of the relationship between rhetor and audience (or among rhetors) in risk communication contexts; by demonstrating how the language used to describe risk communication both reveals and shapes assumptions about the nature and purpose of that communication; and by reconfirming the integral but complex roles of trust and emotion in the making and communication of risk knowledge.

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