Dealing with Toxicity in the Risk Society: The Case of the Hamilton, Ontario Plastics Recycling Fire*

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Une perspective de la construction sociale sert de cadre à l'analyse des controverses sur la gestion des risques qui ont été provoquées à la suite d'un incendie majeur dans une usine de recyclage de matières plastiques à Hamilton, en Ontario. En mettant l'accent sur les processus de réclamation au cœur de l'interaction entre les représentants du gouvernement, les acteurs environnementaux, les experts techniques et les résidants, il a été révélé qu'un accent trop limité aux questions d'ordre technique avait mené à l'exclusion des préoccupations fondées sur la rationalité culturelle ayant ainsi entraîné un cadre d'interaction très litigieux divisant profondément. Les conséquences des conclusions empiriques de la thèse de la société des risques ainsi que de la théorie sur la communication des risques sont explorées.

A social construction perspective is applied in the analysis of the risk management controversies that arose in response to a large toxic fire that occurred at a Hamilton, Ontario plastics recycling facility. By focussing on the claimsmaking processes involved in the interaction of government officials, environmental movement actors, technical experts, and residents, it was found that an overly narrow focus on technical matters led to the exclusion of lay concerns based on cultural rationality, thereby resulting in a very contentious and divisive setting for interaction. Implications of the empirical findings for the risk society thesis and risk communication theory are explored.

ON THE EVENING OF JULY 9, 1997 a large fire erupted at the Plastimet plastics recycling facility that was situated in the mixed residential/industrial North End area of the city of Hamilton, Ontario (population: 337,000). The conflagration lasted for four days and was fuelled by such materials as polyvinyl chloride and polyurethane foam from dashboards, interior door panels and other soft components of automobiles. As the

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plastic materials burned, a huge dense plume of black smoke drifted across the city, leaving a thin film of black ash in its wake. Of concern was the fact that this smoke and ash contained a toxic mix of chemicals including, among others, dioxin, furan, benzene and hydrogen chloride, as well as heavy metals. Due to the potential for exposure to these airborne and deposited chemicals, nearly 600 residents were forced to evacuate the area. The actual scope of the environmental health dangers that were unleashed in the area was later revealed by an Environment Canada study finding that nearly five per cent of Canada's total 1997 annual production of the highly toxic chemical dioxin was attributable to the Plastimet fire alone (McNeil, 1999).

This study uses the Plastimet case as an empirical referent to illustrate how risk was treated within the social context that emerged in the aftermath of a technological disaster. The concept of risk is not a simple or straightforward concept and, in this connection, Deborah Lupton (1999) identifies at least six major ways the notion is used in Western society. However, this paper focusses on only one of these, namely, environmental risks such as radiation, toxins in foodstuffs, pollution, genetically modified organisms and, for the present study, chemical contamination.[1] At the most fundamental level, environmental risks can be thought of as those threats to human beings that arise in, or are transmitted through the air, water, soil and/or food chains (Whyte and Burton, 1980: 1). Such a conceptualization of risk is clearly informed by a "realist" position, but that should not be taken to completely exclude a more social constructionist view of risk that recognizes the extent to which environmental risks are also the products of "a dynamic social process of definition, negotiation and legitimation" (Hannigan, 1995: 31). Risk, as an inherently complex concept, necessarily involves both objective and subjective dimensions and, in this light, the approach taken here does not deny the objective or subjective reality of the risks dealt with by those involved in the Plastimet disaster.[2] Rather, the analysis developed here gives credence to both perspectives but favours a more sociologically informed method of approach that consciously focusses on the *claims made about these risks*, thus adhering to the spirit of W.I. Thomas' (1928) famous dictum that, "If men (*sic*) define situations as real, they are real in their consequences." Further, as Picou and Gill (2000: 145) argue, culturally based relationships between the biophysical environment and human communities in effect connect

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1. Other types of risks identified by Lupton (1999: 13) include "lifestyle risks" related to such activities as drug consumption, driving practices, leisure activities and so on; "medical risks," related to medical procedures, including surgery and therapy; "interpersonal risks," associated with intimate relationships, sexuality, parenting, friendship and social interaction; "economic risks," having to do with financial investment, business matters and employment; and "criminal risks" involving engagement in, or being victimized by, illegal activities.
2. It is beyond the scope of this paper to dwell on details of the realist versus constructionist debate, but for commentary on this see: Burningham and Cooper (1999); Lupton (1999: 17–34); McMullan and Eyles (1999); Tierney (1999); Wynne (1996); Hannigan (1995); and Murphy (1994).

realist and constructionist perspectives. As such, much of the empirical focus of this study will centre on the role that knowledge plays in the claimsmaking process within the post-disaster social context. Secondly, since the types of knowledge claims that are primarily dealt with in this case study relate to the concept of risk, it is argued that an effort should be directed towards the development of an analytical synthesis of the work in risk communication with the social constructionist perspective. As the social constructionist perspective explicitly focusses on claimsmaking (Hannigan, 1995), while risk communication explicitly deals with the treatment of risk information by expert and lay actors (Powell and Leiss, 1997), there is perhaps a "natural fit" between these two approaches that has not yet been fully addressed in the literature. The analysis will also situate the discussion of the claimsmaking processes within the broader, over-arching theoretical framework of the risk society thesis developed by Ulrich Beck (1992), as the macro-orientation of this perspective explicitly deals with issues related to risk management on a more general level. It should be noted, however, that to a large extent the risk society thesis lacks empirical verification at the meso-domain level (Picou and Gill, 2000; Mol and Spaargaren, 1993), where interactive risk communication and the social construction of risk actually takes place (particularly in situations involving technological disasters). The present study is a preliminary effort to empirically address this deficiency.

Methods and Data

Several days after the North End residents returned to their homes, a series of Ministry of Environment and Energy (MOEE)–sponsored community meetings were held to deal with the management of the risks stemming from the fire. Although attendance varied from week to week, participants included members of the residents' group Citizen Action for the North End (CANE), officials from the MOEE, Hamilton-Wentworth regional public health officials, representatives from the environmental group Greenpeace and, during the later stages, technical consultants hired to carry out risk assessments for the eventual environmental remediation of the contaminated site. The overall data collection orientation adopted during these meetings was aimed at gathering information about the substantive claims that were being made about the environmental and health risk issues associated with the toxic fire from the period shortly after the fire to about two years subsequent (i.e., September 1997 to June 1999). It should be noted, however, that during the earlier stages I focussed on identifying the types of claims related to the general controversies that emerged, but, as public attention increasingly centred on the environmental health risks during the later stages, my focus turned towards questions of how risk information was being used in the expert-lay exchanges that were observed. Aside from data gained through the observational

component of the study, other sources of data that were consulted included: newspaper accounts from the *Toronto Star* and the *Hamilton Spectator*, neighbourhood news bulletins produced by CANE, technical (toxicological) reports produced by the MOEE, as well as reports prepared by the Hamilton-Wentworth Regional Health Department. The analysis begins with a brief discussion of the general character of the setting that emerges after a technological disaster. The purpose of this review is to gain a general appreciation of how the extreme circumstances associated with the post-disaster setting may have influenced the nature and types of technical claims that were made about risk in the Plastimet case.

Characterizing the Post-disaster Setting

According to the risk society thesis (Beck, 1992), Western societies presently find themselves in situations where they must urgently confront the unanticipated side effects and by-products of industrialization that take the form of large-scale environmental risks and technological disasters. According to the risk society argumentation, in the past, environmental risks were socially accepted (or, at least, they were not *as* politically problematic) because they were tacitly considered to be the price that was expected to be paid for the Enlightenment-driven strategy of "progress." This collective mindset was further reinforced by the increasing affluence of the post-war period, during which time societal attention was devoted to the building of strong economies and the development of a welfare state founded on the guiding principle of the distribution of such "positives" as wealth, consumer goods, jobs, incomes, educational opportunities and property. Beck (1992: 26) contrasts those socio-political-economic circumstances to the contemporary era, where it is his contention that societal focus has increasingly shifted to issues related to the distribution of "negatives"—that is, environmental risks. In support of the risk society thesis, Anthony Giddens (1990: 124) adds that the risk profile of modern society has changed because the frequency and the magnitude of the impacts of environmental risks experienced today have dramatically increased, thus stimulating increased public interest in, and problematization of, environmental issues in general and risk issues in particular.

Beck (1995: 63) further contends that since many modern environmental risks, such as those associated with chemical contamination or nuclear radiation, may not be readily detected by our physical senses, members of society are obliged to rely on scientific and technological means to detect these risks to a greater extent than in the past. Similarly, Kai Erikson (1991) argues that the environmental and public health risks arising from modern technological disasters such as the Plastimet fire, represent a "new species of trouble." They are said to be "new" because these types of risks are in some important ways qualitatively different from the risks that have always existed in nature (such as, for example,

the dangers and havoc brought on by floods, droughts, tornadoes, earthquakes or hurricanes). Notably, the distinguishing features of technologically based modern environmental risks have to do with their particularly *insidious* character. In contrast to the situation with natural disasters, in the case of modern environmental risks, the physical damage to the human victim does not directly result from an *overt, external assault*, as would be the situation, for example, when a fallen tree branch injures a hurricane victim. Instead, the physical damage from modern environmental risks is less conspicuous and more ambiguous and worrisome because the potentially toxic or carcinogenic effects target the individual victim from *within the body and work their way out*—as a result of previous inhalation, dermal absorption or ingestion from the contaminated surroundings (Erikson, 1991: 15; Edelstein, 1988). The experience of these risks is made even more frightening in light of the fact that the negative impacts of these insidious threats to the body may not manifest themselves until some unknown time in the future. The latency period associated with modern environmental risk underscores the *unbounded* or *open-ended* quality of experiences in the aftermath of toxic disasters:

> Invisible contaminants remain a part of the surroundings—absorbed into the grain of the landscape, the tissues of the body, and worst of all, into the genetic material of the survivors. An "all clear" is never sounded [in contrast to natural disasters]. The book of accounts is never closed (Erikson, 1991: 21).

It is exactly these types of conditions and circumstances that have led Kroll-Smith, Couch, and Marshall (1997) to characterize the post-disaster setting as an "extreme environment" in which victims are significantly burdened by a pervasive and long-lasting sense of inescapable peril or dread, as well as other anxiety-driven, psychosocial impacts (see for example, Edelstein, 1988 and Eyles et al., 1993). Kroll-Smith et al. note that extreme environments provide important opportunities to conduct sociological research because these situations "reveal and magnify aspects of social systems and processes that are typically obscured by the routinization of everyday life" (1997: 2). In this light, the analytical emphasis of the social constructionist approach on claimsmaking is particularly well-suited to the study of extreme environments because, as John Hannigan (1995: 46) observes, an analysis of the claims made about risk in the aftermath of a disaster may facilitate the identification of those risk issues that are normally hidden by virtue of being part of the non-threatening, taken-for-granted reality of everyday life. As will be discussed in more empirical detail shortly, the interactions occurring in the aftermath of a techno-environmental disaster are based on a complex array of competing claims about risk that are made in a climate of distrust and hostility amongst the claims-makers as they grapple with issues related to the fixing of blame and responsibility, accountability, compensation, litigation and assessment

of the environmental and health impacts. Such a socially disruptive backdrop has been referred to as a "corrosive community" by William Freudenberg (1997) and it is important to note that this type of corrosive setting poses particularly difficult problems for risk communication between the different claims-makers since emotional levels would be expected to be particularly high under the extreme circumstances of the post-disaster setting.

Adding to the dread element and the corrosive community backdrop of the extreme environment are the anxieties introduced by the "invasion" of science into everyday life. This has the effect of even further disrupting the taken-for-granted sense of reality victims previously held (referred to by Giddens (1991: 184) as "ontological security"). Although referring to a much grander scale, Beck notes that in the risk society, the real world essentially becomes transformed into a laboratory as:

> Nuclear reactors must be *built*, artificial biotechnical creatures must be *released into* the environment, and chemical products must be *put into circulation* for their properties, safety, and long-term effects to be studied (1995: 104; emphasis in original).

This transformation of the real world into a research laboratory setting becomes even more glaringly evident in the post-disaster setting because of the localization and enhanced public visibility of scientific risk assessment activities under the emergency circumstances of a large disaster. Thus, in the case of Plastimet, one journalist notes the following in an article entitled, "Eco scientists scour Hamilton to study fallout":

> Hamilton has become a giant petri dish for scientists studying the environmental fallout from the Plastimet Inc. fire. Dozens of Environment Ministry workers have been working day and night collecting and analysing samples from trees, vegetables, soil, dust and water to better understand the impact of the blaze that burned hundreds of tonnes of polyvinyl chloride last week (McNeil, 1997).

Similarly, another observer comments that:

> As far as measuring the effect of elevated exposure to dioxins on a human population, Plastimet will be the largest, most detailed natural experiment ever conducted (Gillmor, 1998: 90).

Alan Irwin (1995: 43) notes that by participating in environmental risk conflicts, lay citizens personally and explicitly encounter the limitations of science and technology, and under the particularly tense circumstances of the post-disaster "natural experiment," such encounters would be especially problematic for the lay citizenry. That is, science as an activity that previously existed only outside of the general public's purview and direct experience becomes front and centre as victims of technological disasters

are forced to deal with potentially serious life-and-death issues that are framed largely in terms of scientific claims about risk and safety. Dealing with technical information may therefore introduce additional anxieties to the uninitiated lay community and further contribute to the tensions that develop in the corrosive community. This is especially true in light of Kaminstein's finding that:

> [I]ncreasingly scientists are brought in to help inform and calm public anxiety. But instead of helping, these talks have become a source of anxiety and frustration for those who attend the meetings (1988: 5).

The section that follows reviews some empirical instances of the types of claims and issues that arose in the Plastimet case. The overview is divided into two parts: the first deals with claims made shortly after the fire and outlines some of the controversies that pertained to the emergency response; the second reviews the interactions occurring at the community meetings in which risk management became the central focus. Such a division roughly corresponds to Tierney's (1999: 220) observation that the social construction of risk approach tends to focus on two general topics. The first identifies and analyzes the social factors that influence the selection of the "risk object"—which Hilgartner (1992) defines as the actual object that poses the risk. On the other hand, the second approach deals with the social construction of formal risk management. In the present case, however, it would be fair to say that these two types of social constructions were interrelated, because well-publicized problems, controversies and perceived inadequacies in the official identification of the risk object in the earlier stages of the toxic fire had important repercussions for the development of the corrosive community that served as the backdrop for the subsequent risk management interactions.

Emergency Response and the Development of the Corrosive Community

Identification of the risk object was particularly critical during the early stages of the Plastimet fire because information concerning the risk object was needed not only to effectively combat the blaze, but also to come to a decision about the evacuation of residents. In the Plastimet case, controversy surrounding the timing of the evacuation order had a significant impact on the development of a corrosive community and the general social atmosphere found at the community meetings. For some time after the onset of the fire, the contaminants that arose failed to be recognized as risk objects by the firefighters and government officials present at the emergency scene (specific reasons for this will be examined shortly). As a consequence, the fire was not classified as a hazardous chemical fire and, for a certain duration, firefighters were not wearing the appropriate pro-

tective gear and crowds of onlookers were permitted to stand by and watch the spectacular blaze (several spectators even brought lawn chairs to sit on). The failure to identify and recognize the risk object was soon brought to public attention through statements made by the chief toxicologist of the environmental group Greenpeace, who had flown in from England to take dioxin measurements from the site:

> Why was the fire not classified as a chemical incident? Why wasn't it managed as a chemical incident? Why was there no significance given to the fact that it was PVC that was burning as this leads to hydrogen chloride and dioxins? (Greenpeace toxicologist, Community Meeting, August 25, 1997).

A second issue that was brought to public attention by Greenpeace dealt with the limitations of the technological methods used by government officials to determine the environmental health risks during the emergency period. In the absence of the more sophisticated monitoring technologies housed in the mobile Trace Atmospheric Gas Analyzers (known as TAGA units), early air quality tests were conducted by MOEE officials through the use of handheld Gastec colorimetric tubes. It was noted by Greenpeace, however, that these devices could only give a crude indication of airborne contamination as their range of accuracy falls within plus or minus 30% (Greenpeace press conference, August 27, 1997). An added complication arose from the fact that these colorimetric tubes had a specific shelf life and the ones used during the Plastimet fire had exceeded their expiry date. Further still, another limitation of these devices pertained to the fact that they could only be used to test for specific chemicals one at a time, which meant that the user had to have prior knowledge of what was to be tested, and such knowledge seemed to be lacking in the Plastimet case. In light of these limitations, Greenpeace insisted that the government was negligent in not doing more tests for dioxins and furans during the emergency response period. The environmental group also demanded that the scientific protocols used by the government officials be publicly released so that others could confirm the analytical results of the toxicological testing done by the Ministry of Environment and Energy.

Complications concerning the identification of the risk object also arose in regard to what appeared to be a delayed release of the special TAGA units. Since the evacuation order was formally made by the City of Hamilton about a day after the toxic blaze started, the public felt that they were unnecessarily exposed to dangerous chemicals for that duration and some community members argued that, had the TAGA units arrived earlier, then an evacuation call would have been made much sooner. The residents' demand for a full-scale public inquiry into these matters was rejected by the province, but it did respond by carrying out a more limited investigation through the Ministry of Environment and Energy's

Investigations and Enforcement Branch (IEB). The IEB's report was released two months later (MOEE, October 1997) and outlined the government's rationale for the ostensible delay in the evacuation order, but, in the end, the report essentially justified and defended what had happened during the emergency response.[3] Many residents were not satisfied with that assessment and felt that the internal report was simply a cover-up akin to an internal police investigation, where police officers investigate "their own" while maintaining a code of silence over what "really" happened (Community Meeting, October 23, 1997).

Claims about Risk in the Corrosive Community

In the days and weeks that followed, the chemical dioxin was firmly established as the risk object of concern and was the topic of discussion for many community meetings. The awareness of dioxin risk was further heightened as residents were warned by a city-wide directive not to consume any of the produce they had grown in their gardens. They were also told not to allow their children to play on lawns and sandboxes in the area, and were advised to thoroughly wash all outdoor items before use (a chemist from the environmental group Greenpeace also suggested that residents wear gloves while washing these items). Several weeks after the fire, the regional health department declared that no harmful long-term health effects would result from exposure to the fire ash and soot and that homegrown produce could be eaten if carefully washed. However, suspicions about the validity of these government claims and advice surfaced when the MOEE claimed that the laboratory analysis of the dioxin samples from the Plastimet site would take several weeks (despite the fact that they had earlier been able to obtain laboratory results in a few days). Such claims appeared to support Greenpeace's claim that the MOEE was trying to conceal the seriousness of the situation from the public for as long as possible (Greenpeace press conference, August 27, 1997).

The general atmosphere in the early community meetings was typical of a corrosive community: fraught with emotion, anger, mistrust and tension as actors dealt with such issues as who was responsible for the disaster and the potential impact of the chemical dioxin on long-term health. As the citations presented below reveal, it was also during this time that many residents expressed fears that their questions and concerns were being ignored by government officials, thus leading to the further entrenchment of the corrosive community:

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3. The review (MOEE, October 1997: iii) concluded that an earlier arrival of the TAGA units would not have resulted in an earlier evacuation, because the decision to evacuate was based on a range of factors, including the visual observation of the smoke plume, changing meteorological conditions, reported respiratory problems, and a change in the firefighting strategy.

> There were no answers, absolutely none. Everyone was very disappointed, we were coming here to get answers to our questions and all we did get was angrier and angrier (Resident, Community Meeting, July 21, 1997).
>
> I want to trust you people, but after everything that's happened at this site I can't. And you sir [pointing to the meeting facilitator from McMaster University], have been extraordinarily condescending (Resident, Community Meeting, July 21, 1997).
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> We were looking for answers because of the confusion created over the information-misinformation issued during the crisis, and after, by those who, whether elected or appointed, have been entrusted with our community's health and safety. We attended this meeting in search of answers. What we got was patronizing, arrogant condescension. We trust no more . . . (Resident, Letter to the Editor, *The Hamilton Spectator*, July 25, 1997, A12).
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> I came away [from the community meeting] angrier and more fearful. . . . Our officials were aware of the risks involved in allowing the operations to continue at Plastimet, and yet they stood and let it go on. . . . We deserve more than this. We deserve a guarantee that those people entrusted with our safety will take that trust seriously. We deserve better and our children deserve better (Resident, Letter to the Editor, *The Hamilton Spectator*, July 31, 1997, A10).

It was evident that many residents simply did not trust the results of the toxicological testing done by the government officials and were angered that they were not being given clear and consistent information on the risks to which they were exposed. For example, one resident commented that she was hearing stories about mysterious illnesses afflicting her neighbours and their pets. And on this basis of this anecdotal evidence, she doubted the claims made by government officials that the tests for toxic chemicals were within acceptable limits: "It really makes you not believe these officials. It makes you not believe the tests" (Community Meeting, July 23, 1997).

As a result of the mounting public concerns over the risks stemming from dioxin contamination, two sources of government funding were provided. First, the Regional Municipality of Hamilton-Wentworth committed $20,000 for soil and other testing to be provided by a third-party agent, while the provincial government contributed $40,000 to the City of Hamilton, and according to the Hamilton West MPP Lillian Ross:

> This funding will permit neighbourhood residents to hire professional experts who will independently review the city and ministry's plans to clean up the site, and confirm or critique MOEE test results. Residents have said they want independent views before they will feel safe and feel that their health is not being affected (MOEE press release, July 31, 1997).

Towards the middle of August 1997, the CANE neighbourhood bulletin noted that Greenpeace results were in fact in line with those of the MOEE and the independent consultants (CANE, August 19, 1997). Nevertheless, public distrust prevailed.

During the early community meetings, Greenpeace took a lead role in informing concerned residents about the possible dangers of dioxin through direct communication at public meetings, as well as through the publication of opinion pieces in the local newspaper. The environmental group also publicly critiqued the risk assessment science carried out by the government officials during the early stages of the fire and challenged the officials about this on various occasions, for instance:

> *Greenpeace toxicologist*: I have questions about the monitoring and the disjunctions in the various analyses. How do we know we can rely on the data you have? How do we know the data you have is reliable? The toxic levels quoted by [government] officials seem to be examples of revisionist science (Community Meeting, October 2, 1997).

The significant role of this environmental group in raising the residents' awareness about dioxin risk was noted by one of the leaders of the local citizens' group who commented that:

> We [i.e., the residents] had no idea what was really going on until [the Greenpeace expert] came along. The ministry kept revising its figures and people were more apt to believe Greenpeace (Gillmor, 1998: 89).

She also noted that although the residents were not "hippie environmentalists," they nevertheless were encouraged to become active in the risk management process through the efforts of Greenpeace, who provided technical critiques of the scientific tests performed by government officials that members of CANE used in their own consultations with health officials (Lousley, 1998). For example, although the federal government standard for the tolerable daily intake of dioxin was quoted in one public meeting to be 10 picograms per kilogram of body weight, CANE, using information from Greenpeace, argued that the standard was too lenient and that health effects were possible at much lower levels (Community Meeting, August 21, 1997). Based on their raised awareness of dioxin risk, residents persistently questioned the claims made by the MOEE and Regional Health officials that there would be little or no long-term threats to human health from acute chemical exposure:

> *Resident*: Will you promise in writing that our children will not experience any long-term effects from the fire?
> *Response from regional health official*: From the current information available, no long-term health effects are expected from the brief time that residents, including children, were exposed to the chemicals in the smoke and soot from the fire (Written letter and response, August 6, 1997).

Such expressed concerns about the long-term health effects led the regional public health department to announce that it would develop a survey to study these effects (Community Meeting, August 21, 1997), but the worries continued:

> *Resident*: We know there is a lot of community concern over the long-term health effects [of the fire], even though we know that the scientific literature indicates that the long-term effects are not going to be problematic based on the test sample results.
> *Response from regional health official*: A seventy-year exposure to dioxin at the levels present would increase the chances of getting cancer by one in a million. Any dioxin that did come out is broken down by sunlight. There is basically no threat to human life (Community Meeting: September 25, 1997).

> *Resident*: My particular concern is with the long-term health effects. Can you tell with 5 years (i.e., the intended length of the health study) whether cancer will occur? I have started reading materials and feel that the effects may not come for 10 or 20 years. 5 years is not adequate.
> *Response from regional health official*: The anticipated long-term health effects are very, very small (Community Meeting: September 25, 1997).

In November 1997, work on the proposed long-term health study was begun by a group of residents, experts from McMaster University and staff from the public health department. A couple of months later, however, the effort collapsed as North End residents rejected the direction in which the proposed study was proceeding. Specifically, the study was rejected because it seemed to emphasize the psychological rather than the biophysical health impacts of toxic exposure and, according to one CANE leader, the university and health department experts were ignoring the residents' input. She further claimed that residents were excluded from meetings, given little time to review the data and were essentially "shut out of the process" (Community Meeting, December 15, 1997). The citizen-rejected health study proposal relied on data gathered from the self-reporting of symptoms, in-depth interviews and focus groups and was to be supplemented by statistical information that tracked, among other things, cancer rates, birth defects and mortality rates. The residents, on the other hand, demanded a study similar to the 25-year health study proposed for the firefighters, which would involve annual check-ups, blood and urinalysis, X-rays and other laboratory tests. The public health department, however, countered that the costs of testing everyone in the North End neighbourhood would be too prohibitive at $900 per dioxin test. They further argued that the low-level exposure to toxins experienced by residents was very different from the high-level, acute exposure experienced by firefighters, thus implying that the costly measures would have little benefit for the residents (Herron, 1997).

Residents were particularly dissatisfied with the inconsistency of standards that were being applied in the interpretation of the toxicological risk data. The standards used for the interpretation of data in the government reports varied and included a wide array of standards including (among others): industrial guidelines, occupational health standards, different "acceptable" dioxin levels for soil, grass and vegetables, threshold limit values versus half-hour standards, and standards for ambient air quality. Consequently, interpretation of results was difficult and the experts' responses to the questions posed about these standards resulted in feelings of exasperation and frustration on the part of the residents:

> *Resident*: Pick one standard. You seem to pick a standard to suit yourself, whether it is a point of impingement standard or an occupational setting standard. We are bad at one level, but this is acceptable for another level. Sure we failed this test, but we are okay for this test. When it's put that we failed this test standard but passed another one, it does not put my mind at ease. This doesn't give us confidence. MOEE should have a community exposure standard. It is better to err on the side of caution (Community Meeting, November 19, 1997).
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> *Resident*: The public health safety standards, what are they based on? Are they theoretical or real?
> *MOEE official*: They are risk-based, and a safety factor is put in that varies from parameter to parameter (Community Meeting, November 19, 1997).
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> *Resident*: It seems like you are fiddling around with your data to suit your own purposes. Pick one standard. The problem is that the occupational standard is applied across the whole community, but it only considers adults—40-hour exposure for adults over a working lifetime. What about kids and the elderly who are particularly susceptible to illness? (Community Meeting, November 19, 1997).

An illustration of the typical way in which data and standards were presented in the government reports that were reviewed by the residents is given below and is followed by a resident's response:

> Hydrogen chloride levels exceeded MOEE half-hour standards in approximately fifty per cent of the samples. Instantaneous levels of HCl were as high as 930 mg/m^3 which is well below the occupation limit of 7000 mg/m^3. Most of the monitoring was conducted within hundreds of metres of the fire site. Hydrogen chloride levels returned to baseline levels immediately after the fire was extinguished in the early afternoon of July 12 (Saturday) (*Internal Review of the MOEE Response to the Plastimet Fire*, November 27, 1997, p. 15).
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> *Resident responding to above paragraph of the report*: This means what? How does the MOEE decide which standard, of your *limitless supply of limits*, to apply to the data collected? (Community Meeting, November 27, 1997; italics mine).

Thus, as Kaminstein (1988: 7) notes, it is not the lack of specific technical information that is problematic for citizens involved in risk controversies, rather, the critical factor is the lack of explanation and interpretation of this information. The exchanges presented above highlight a distinction between technical and cultural rationality that, as will now be discussed, formed much of the underlying basis for the contentious nature of the claimsmaking interactions observed in the corrosive community.

Discussion: Risk Communication and Cultural Rationality in the Corrosive Community

The risk society thesis holds that the insidious nature of modern environmental risks has led to a greater public reliance on the risk information provided by technical experts. Thus, Beck observes that:

> [Risks] initially only exist in terms of the (scientific or anti-scientific) *knowledge* about them. They can thus be changed, magnified, dramatized or minimized within knowledge, and to that extent they are particularly *open to social definition and construction* (1992: 23; emphasis in original).

Stressing the importance of the intimate connection between knowledge and risk in contemporary life, Stehr and Ericson (1992: 193) take the argument even further by suggesting that the risk society should in fact be considered as a variant of the "knowledge society" because, according to Beck, "one might say: in class and stratification positions, being determines consciousness, while in risk positions *consciousness determines being*" (1992: 23; emphasis in original). Due to the urgency of dealing with risk issues in the extreme setting arising in the aftermath of a technological disaster, it would be expected that risk information will play an even greater and more pressing role in influencing the public consciousness of risk. The role of risk information in mediating expert-lay interactions is a central investigative focus of the field of risk communication to which we now turn.

The field of risk communication was initiated around 1984 to deal with the differences between the evaluation of risks made by technical experts on the one hand, and members of the lay public on the other (Powell and Leiss, 1997). With this focus, earlier research efforts in risk communication were based on the premise that lay individuals would be convinced of the acceptability of the findings and recommendations of the risk assessors if they were to simply become better educated and informed on technical matters (Fischer, 2000: 106). With time, such efforts were found to be ineffective and the current work in risk communication has moved away from a unilateral view of risk information dissemination to a model based on a two-way exchange of information between technical

experts and lay individuals. Evidence from the Plastimet case reveals, however, that a two-way exchange of risk information did not occur, and as one resident noted:

> We feel that information is being controlled and the more we feel that information is controlled, the more we want to know. We want more information so we can be more involved in the process (Community Meeting, October 2, 1997).

According to Douglas Powell and William Leiss (1997: 31), one of the main obstacles to effective risk communication is the development of a *risk information vacuum* that arises from the difference between the assessment of risk done by the experts and the public perception of that risk. Powell and Leiss (1997: 59) note that journalists and interest groups often take the opportunity afforded by the risk information vacuum to fill it with their own information and perspectives on the particular risk in question. As discussed, this was clearly evident in the Plastimet case as the environmental group Greenpeace played a critical role in filling the risk information vacuum by providing residents with counter-evidence and critiques of the risk information.[4]

To narrow the gap and facilitate good risk communication practice, Powell and Leiss (1997: 30) suggest that technical findings be translated into terms that are understandable to lay individuals while, at the same time, attempts be made by the experts to understand the "framing" of the risk issue by lay individuals (especially its qualitative dimensions). As the evidence reviewed above indicates, both of these aspects of good risk communication practice were absent from the risk management activities occurring in the Plastimet situation. To explore why this was so, it will be useful to consider the way in which technical and cultural rationality were treated during the risk management process.

Plough and Krimsky (1987) define technical rationality as a mindset that is based on the scientific method and relies exclusively on the judgments of technical experts. Cultural rationality, on the other hand, relies on personal and familiar experiences rather than the depersonalized technical calculations involved in formal risk assessment. As a result, the cultural rationality of the public is based on a much broader notion of risk that incorporates non-technical factors such as accountability, personal values and trust (Powell and Leiss, 1997: 10). Frank Fischer (2000: 132) elaborates on this notion by noting that cultural rationality is informed by the circumstances "under which the risk is identified and publicized, the standing or place of the individual in his or her community, and the social

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4. The role of Greenpeace in the Plastimet disaster was not unexpected because, as Powell and Leiss (1997: 61) note, this particular group has "been in firm control of the public agenda on dioxin risk" by filling the risk information vacuum with their own findings. In fact, the dioxin issue has been used by Greenpeace as a linking theme in a series of high-profile campaigns beginning in 1987 and continuing to the present (including public issues related to pulp-mill effluent, the chlorine industry, incineration and PVC).

values of the community as a whole." Since cultural rationality tends to focus on case-specific contextual information it also influences lay people's decisions about whom they can trust and under what circumstances (Fischer, 2000: 138; see also Wynne, 1996) and, as we have seen in the Plastimet case, such decisions are especially problematic under the extreme conditions of a corrosive community.

The negative lay reactions to the technical work of the government officials in the Plastimet case can therefore be understood as a culturally rational response to specific context factors related to the government's handling of earlier controversies (i.e., the late evacuation call, the slow dispatch of the TAGA units, and the questionable detection methods used to identify the risk objects—all deficiencies which the government did not acknowledge). Problems within the corrosive community were further compounded when the culturally rational assessments of risk that lay people used in their claimsmaking were denied legitimacy, as demonstrated, for example, by: the failure of officials to clarify and address how different regulatory standards were applied in risk assessment; the lack of acknowledgement about residents' concerns about long-term health impacts; and the lack of serious consideration given to lay-public input into the proposed long-term health study.[5] Thus, as Beck notes:

> [W]hat becomes clear in risk discussions are the fissures and gaps between scientific and social rationality in dealing with the hazardous potential of civilization. The two sides talk past each other. Social movements raise questions that are not answered by the risk technicians at all, and the technicians answer these questions which miss the point of what was really asked and what feeds public anxiety (1992: 30).

Another noteworthy lesson revealed by the Plastimet case is that lay input based on cultural rationality can contribute to less problematic risk management if such input is received by experts as a *complement* to the technical methods of the experts, rather than as an opposing force. In other words, the incorporation of cultural rationality into technical decisions may very well lead to more satisfactory results. An illustration of how the incorporation of cultural rationality can lead to beneficial outcomes is given in one resident's account of the adoption of the government advisory not to eat homegrown vegetables or allow children to play in backyards. According to this resident (Community Meeting, November 27, 1997), the public health department claimed that it was safe for residents to use their backyards if they washed the toys, patio furniture and so on with "soap, water and a little elbow grease," but when asked about the basis for this recommended action, the public health department

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5. In this connection, it would logically be expected that cultural rationality would play an even more critical role in the aftermath of a disaster because the consequences of misplaced trust would be more severe (i.e., injury or death). Moreover, the open-ended and latent quality of modern environmental risks pose particular concerns about long-term health impacts.

explained that "theoretically" dioxin posed no threat to human health. The residents countered that they did not have "theoretical children" and argued that it was irresponsible for the public health department to advise people that everything was fine without doing any actual testing for dioxin. The resident noted that, in response to such (culturally rational) concerns, the government officially reinstated the advisory until the actual dioxin test results were in. Such an exchange dramatically illustrates how claims based on culturally rational considerations, such as concern for children and the immediate need to consider precaution in extreme circumstances, can be incorporated as a corrective to the purely theoretical emphasis of technical rationality.

Notwithstanding the above example, the review of the social construction of risk in the Plastimet case presented throughout this paper *reveals that there* were many more instances in which cultural rationality was ignored in the risk management process. This neglect can be understood to reflect the inequality of power between the technical experts and the lay residents. Government officials and experts set the agenda for the meetings and framed the debate in terms of the narrow technical criteria with which they were familiar (and which the members of the lay community were not). As such, the "official" discourses on risk excluded culturally rational considerations because they were implicitly assumed to be outside the scope of the risk management process. Such developments illustrate the use of what Dana Kaminstein (1988: 5) refers to as a "rhetoric of containment," where the rhetoric used by technical experts leads to the restriction of discussion and the avoidance of certain kinds of questions so that the potential for resistance and involvement of active citizens is essentially undermined. Furthermore, officials may have been professionally trained in the unilateral mode of traditional risk communication, thus neglecting the importance of cultural rationality in risk management. Consequently, as Brian Wynne (1996: 58) observes, the risk situation may be framed very narrowly because the experts simply assume (and take for granted) the competence and trustworthiness of the controlling bodies, thus precluding the need to consider lay input.

On an analytical level, it is my contention that the emphasis on the broader claimsmaking process that underlies the social constructionist approach will enable the identification and more thoughtful consideration of the non-technical, culturally based, context factors that inevitably influence risk management activities in the corrosive community setting. By broadening the scope of risk communication to include a social constructionist approach, it will be possible to start investigating how social standards of relevance and culturally rational concerns can be incorporated into the risk management process, instead of being defined away by official pronouncements. As alluded to previously, the adoption of this broader emphasis can only be pursued if the lay input based on cultural rationality is considered as a complement to the technical methods of the experts, and

not as a countervailing force. Efforts in this direction include approaches that consciously pose alternatives to the exclusionary basis of science. Notably, such alternatives rely on opportunities for enhanced expert-lay collaborations and the incorporation of local knowledge, thereby addressing the problems related to "distorted" forms of communication (Habermas, 1970) that were in evidence in the Plastimet case. Examples of these collaborative alternatives are just starting to be implemented and include: "popular epidemiology" (Brown, 1992; 1997) and other forms of advocacy science such as "citizen science" (Irwin, 1995), multi-stakeholder participatory processes to deal with environmental risk issues (Ali, 1997; 1999; Ozawa, 1996) and postpositivist methodologies (Fischer, 2000).

On a final note, Leiss and Chociolko (1994: 45) note that environmental problems represent a domain in which two major institutional forces in modern society meet and interact in the public arena, namely, science/technology and political-economic institutions. From an analytical point of view, however, the risk society conceptualization on a theoretical level, and the risk communication perspective on a more practical level, appear to neglect not only the cultural dimensions of risk conflicts (Wynne, 1996; Lash, 1994), but the political-economic aspects of risk management as well. A corrective to this may be found in importing the broadened focus of a critical social constructionist approach that will not only consider the cultural rationality that is brought into the risk conflict, but will also focus attention on the question of how the claimsmaking process is informed by the larger structural issues related to social class, power, environmental inequality and environmental justice and the political economy of place. Preliminary efforts in this direction have been made by Ali (2002) and Lousley (1998) in regard to the Plastimet case, but more is needed to help move towards the development of what Kathleen Tierney (1999) calls a "critical sociology of risk." Such efforts may become even more pressing in the future as the consequences of living in the risk society are faced with greater frequency in the form of increasingly potent and pervasive environmental risks and technological disasters.

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