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DRINKING WATER QUALITY AND TRUST: COMMUNITIES AND RISK INFORMATION

By Caitlin J Burley, Hon. B.Sc., University of Ottawa, 2005

A Thesis presented to Ryerson University in partial fulfillment of the requirements for
the degree of

Master of Applied Science
In the program of Environmental Applied Science and Management

Toronto, Ontario, Canada
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Drinking Water Quality and Trust: Communities and Risk Information

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Master of Applied Science
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Abstract

Ontario drinking water systems face increasing contamination risks due to over-taxed water systems. Canadian perceptions of drinking water, and trust in government, have declined as a result of Walkerton and other contamination episodes. Research in the field of trust, risk communication and risk perception has developed extensively in recent years. However, there is very little research regarding risk perception, communication and trust as it relates to drinking water. This study investigated drinking water perceptions, trust in drinking water authorities and communication needs of a small Ontario municipality with a positive drinking water history and good communication practices. The results indicated that the community members had positive perceptions about their source and drinking water. They had high levels of trust in their local government and low levels of trust in outside sources. Despite the high levels of trust in the local government, the residents displayed additional information needs; suggesting the presence of *critical trust*.

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Dedication

I would like to dedicate this research to Carolyn, Joe and Meredith Burley, and David Gallagher who have always believed in my capabilities and given unending encouragement and support.

Table of Contents

1.0 Introduction.....	1
2.0 Context:	
2.1 Risk Perception.....	5
2.2 Risk Communication.....	9
2.3 Trust: Definitions, Determinants and Nature.....	13
2.4 Trust and Communication: Applications to Drinking Water.....	16
3.0 Objectives:.....	20
4.0 Background:	
4.1 The Walkerton Tragedy.....	22
4.2 Risk Perception and Communication Post-Walkerton.....	24
4.3 Drinking Water Legislation.....	26
4.4 Present Drinking Water Situation in Ontario.....	28
5.0 Study Community Background:	
5.1 Community Drinking Water History.....	31
5.2 Drinking Water Communication Efforts.....	33
5.3 Media Coverage.....	35
6.0 Study Method:	
6.1 Community Selection.....	36
6.2 Participant Selection.....	37
6.3 Questionnaire Development.....	38
6.4 Data Collection.....	43
6.5 Review of Communications.....	45
7.0 Analysis:	
7.1 Community Surveys.....	47
7.2 Local Government Interviews.....	50
7.3 Communication Gap.....	50
8.0 Results:	
8.1 Community Interviews.....	51
8.2 Local Government Interviews.....	78
8.3 Studying the Gap.....	82
9.0 Discussion.....	85
10.0 Conclusion.....	97
Appendices.....	100
References.....	144

List of Figures and Tables

Figures

Figure 1: Knowledge of source and perceptions of source.....	52
Figure 2: Water-related information and perceptions source.....	54
Figure 3: Perceptions of source water and perceptions of drinking water.....	56
Figure 4: Water-related information and perceptions of drinking water.....	57
Figure 5: Summary of Trust in drinking water authorities (participants with positive perceptions of their drinking water quality).....	61
Figure 6: Summary of Trust in drinking water authorities (participants with negative perceptions of drinking water quality).....	63
Figure 7: Summary of Trust in drinking water authorities (participants with positive perceptions of their drinking water safety).....	64
Figure 8: Summary of Trust in drinking water authorities (participants with negative perceptions of their drinking water safety).....	67
Figure 9: Preference for dissemination method based on the type of information required.....	70
Figure 10: Preference for information frequency based on the type of information required.....	71
Figure 11: Preference for information type based on perceptions of drinking water safety.....	74
Figure 12: Preference for information frequency based on perceptions of drinking water safety.....	75
Figure 13: Preference of dissemination method based on perceptions of drinking water safety.....	76
Figure 14: Drinking water habits and quality perceptions.....	77
Figure 15: Drinking water habit and safety perceptions.....	78

Tables:

Table 1: Knowledge of source and perceptions of source.....	52
Table 2: Water-related information and perceptions source.....	53
Table 3: Perceptions of source water and perceptions of drinking water.....	55
Table 4: Water-related information and perceptions of drinking water.....	56
Table 5: Specific concerns about source water quality, drinking water quality and drinking water safety.....	59
Table 6: Summary of Trust in drinking water authorities (participants with positive perceptions of their drinking water quality).....	61
Table 7: Summary of Trust in drinking water authorities (participants with negative perceptions of drinking water quality).....	63
Table 8: Summary of Trust in drinking water authorities (participants with positive perceptions of their drinking water safety).....	64
Table 9: Summary of Trust in drinking water authorities (participants with negative perceptions of their drinking water safety).....	67
Table 10: Most and least trusted drinking water authorities.....	68
Table 11: Communication needs of participants.....	72
Table 12: Preference for information type based on perceptions of drinking	

water safety.....73

Table 13: Preference for information frequency based on perceptions
of drinking water safety.....74

Table 14: Preference of dissemination method based on perceptions
of drinking water safety.....75

Table 15: Drinking water habits and quality perceptions.....77

Table 16: Drinking water habits and safety perceptions.....77

Table 17: Communication efforts made by the local government
categorized by information source.....80

Table 18: Communication efforts made by the local government,
categorized by information type.....81

Table 19: Communication efforts made by the local government,
categorized by dissemination method.....82

Table 20: Gaps between communication efforts and communication needs.....83/84

List of Appendices

Appendix A: Detailed Tables of Communications Efforts and Media Coverage.....100

Appendix B: Questionnaires.....116

Appendix C: Coding Sheet.....121

Appendix D: Cross Tabulations Raw Data.....125

Chapter 1: Introduction

In 2000 Canadians were shocked by the Walkerton drinking water contamination.

Leading up to the Walkerton crisis Canadians, and most North Americans, were under the naïve impression that safe drinking water was a certainty. Until recently, most North Americans believed that poor drinking water quality was a problem associated with developing countries (Adamowicz 2004, Jalba and Hrudey 2006). However, in the wake of events such as the *Cryptosporidium* outbreaks in Milwaukee (1993) and North Battleford (2001), and the *E. coli* outbreak in Walkerton (2000), it has become increasingly apparent that providing safe drinking water is becoming more challenging. In recent years drinking water management systems in Ontario have faced governmental problems such as the absence of legislation, changing legislation and low priority among health issues (Adamowicz 2004, Jalba and Hrudey 2006). They have also faced fiscal constraints such as increases in treatment and processing costs (Adamowicz 2004). Source and tap water have begun to deteriorate as a result of industrial and agricultural pollution, increased population, concentrated land use, and aging infrastructure that is not equipped to cope with seasonal variations (Adamowicz 2004, Jalba and Hrudey 2006, Krewski 2004). These problems have been more troublesome for smaller drinking water facilities because they have had less funding than larger municipalities, few or no trained operators, and diminished public awareness (Jalba and Hrudey 2006).

As information about water contamination events, such as Walkerton, became more prevalent, the public has become increasingly aware of the risks they could face every time they turn on the tap. This awareness is heightened by the public's growing knowledge of other possible contaminants through industrial pollution and the chemicals used to treat drinking water (Turgeon 2004). In addition to the sensitivity surrounding this issue, the perceptions of risk

associated with microbial and chemical contaminants are compounded by a lack of trust (Parkin 2003). During each of the abovementioned events, the water service providers, local and provincial governments did not act quickly and, in some cases, attempted to conceal information from the public (Krewski 2004 et. al., O'Connor 2002).

The Walkerton tragedy had very negative effects on the Ontario public's risk perceptions of drinking water and their trust in the provincial and local governments (Adamowicz 2004 et. al., Jalba and Hrudey 2006, Turgeon 2004 et. al.). Indeed, many Canadian residents have since increased their use of bottled water and alternative drinking water sources (Adamowicz 2004, Turgeon 2004). Despite the potential health risks surrounding drinking water contamination, very little research has been conducted about risk perception, communication and trust specifically pertaining to drinking water. This research is meant to investigate community members' perceptions of drinking water, their trust in drinking water providers and drinking water information sources, and their information needs about water issues as a community. The research will then investigate whether the informational needs of the community members differ from the information provided to them by their local government, thus revealing a gap between communication needs and communication efforts.

Not all Ontario municipalities have suffered from decreased trust post-Walkerton. Some municipalities have had enough foresight to involve their community in drinking water-related decisions and have been fortunate enough to not have experienced drinking water contamination episodes that resulted in Boil Water Advisories (BWA). Instead of investigating a community that has had negative experiences with drinking water, the research will investigate a community that has had a positive drinking water history. The study community for this research has had this combination of good communication strategies and a positive drinking water history; one

without contamination episodes. In essence, this community provides the ideal atmosphere for a high level of trust between the public and the local government. This community was chosen in order to obtain information about good communication and trust-building practices and to investigate possible future steps that might be taken to eliminate communication deficiencies.

The research uses a mixed-method approach that incorporates both quantitative and qualitative analysis of the data collected. The data were collected through interviews with residents of the study community and local government officials from the Public Health, Public Works and Community Planning Departments of the County that holds the study community. Quantitative analysis was used to interpret the responses of the community members, while qualitative analysis was used to interpret the responses of the local government officials. The results of the community and expert interviews were compared in order to assess a potential gap between the communication needs of the residents and the communication efforts of their local government.

It is thought that, for this community, perceptions of drinking water will be relatively positive. It is also thought that trust in local government will be relatively high. If the positive perceptions of drinking water and high levels of trust exist, they will be the result of the combination of good communication practices on the part of local government officials and the absence of negative drinking water-related experiences. It is also thought that even though a high level of trust may be present, residents will still want more information than they are presently receiving. This could be due to decreased trust as a result of Walkerton, to be henceforward termed the “Walkerton effect” or it could be an indicator of the presence of critical trust. Critical trust is described as a high level of general trust in the local government combined with practical skepticism (Poortinga 2003, Walls 2004). Over the past thirty years there has been

a distinct decline in deference on the part of the public assessed by Laird (1989) and subsequently Nevitte (1996). This decline has instilled in the public a sense of skepticism about the decisions made by all levels of government. Indeed, episodes such as Walkerton, the media and actions of politicians have caused the public to be skeptical. Critical trust is simply the reaction of a skeptical public resigned to the fact that, in some cases, decisions that will expose them to risk will be made for them by their government.

Chapter 2: Context

2.1 Risk Perception

The public's perception of a risk is absolutely critical for trust-building activities and the manner in which risks are communicated. In the past, risk perception did not play a great role in risk management (Doern and Reed 2000). Risk management decisions were often made by government officials and experts, behind closed doors, based on quantifiable objective risk assessments (Doern and Reed 2000). This decision making approach, however, has not been effective in present-day society. Many controversial events over the past 30 years have led the public to openly question and criticize government decisions concerning risk. Events such as the tainted blood scandal, Bovine Spongiform Encephalopathy (BSE), the collapse of the fish stocks and Walkerton have shaken the public's trust in our government's ability to make decisions that protect our health and wellbeing (Doern and Reed 2000). A decline in deference seen in the public's unwillingness to passively accept decisions that affect their health has led to a change in the way risk perception is viewed by risk managers (Laird 1989). Perceived risk can no longer be a secondary interest to be dismissed by risk managers and regulators as irrational (Leiss and Chociolko 1994). Indeed, risk perception is simply a more intuitive way of evaluating risks (Slovic 1987, Slovic 1993, Siegrist 2000b).

As indicated by much of the risk perception literature over the past thirty years, there has been a general unwillingness on the part of the public to accept the way government regulates risk (Laird 1989, Slovic 1987, Doern and Reed 2000, Leiss and Chociolko 1994, Frewer and Miles 2003). Slovic (1987) suggests that the general public is in pursuit of a "zero-risk society" which could undermine efforts that promote political and economic stability. The idea of zero-risk is elaborated upon by Brian Wynne who indicates that "zero risk demands should perhaps be

interpreted as expressions of zero trust” (Risk and Social learning, 281). A general decline in trust in decision makers, and a subsequent rise in interest group activity, has been documented by Laird (1989) and Nevitte (1996). Laird’s research shows that since the mid-seventies the public has: lost confidence in the government and industry, decreased in voting numbers, felt more alienated from its government, and become more active in ad-hoc voluntary interest groups. Additionally, although the overall confidence in the medical and scientific community has declined, the data show the confidence in these authorities to consistently be the highest. Studies about trust show that the medical and scientific communities are frequently the most trusted source of information (McCallum 1991, Savadori 2004). It is obvious that the public feels that their decision-making capabilities, and sometimes those of scientists, are superior to those of the people actually making most of the decisions. This is particularly the case in a post-Walkerton society where bad decisions have led many people to trust bottled water over their own municipal supply even though most municipal supplies are, in fact, safer (Turgeon 2004, Adamowicz 2004).

The apparent differing opinions about decision-making competencies stem from two very different definitions of risk. When decisions about risk are made, decision-makers will often base their decisions on objective risk evaluations conducted by risk experts (Slovic 1987, Shrader-Frechette 1993). Mathematical estimates called risk assessments take into account the probability of a risk occurring and magnitude of damage if the event occurs (Leiss and Chociolko 1994). Risk assessment for waterborne pathogens, such as those that affected the Walkerton water supply include: assessment of the pathogen, its frequency, the possibility of exposure, the dose at which exposure results in adverse health effects and the health effects (Neumann and Foran 1997). From the frequency data in the risk assessment, risk is estimated as

a probability. This number is compared to a number that reflects an acceptable level of risk; typically called “*de minimus*” 1/1 000 000 (Sly 2007).

Subjective risk, better known as risk perception, differs dramatically. When faced with a potentially risky situation/event, the general public will often use more intuitive, value-based criteria to make decisions (Slovic 1987, Slovic 1993, Sjoberg 2000, Frewer et al 2003). It has been observed that voluntariness, dread, catastrophic potential, knowledge and controllability of a situation had more influence over a person’s decision than probability estimates (Slovic 1987). The difference between subjective and objective risk evaluations has caused significant frustration between the general public, the experts and decision-makers (Leiss and Chociolko 1994). The experts believe that the members of the public are irrational in the way they perceive risks (Leiss and Chociolko 1994). The risk-averse public believes the experts are underestimating risks (Leiss and Chociolko 1994). Slovic depicts the conflict between the experts and public through this statement:

“.....although one may legitimately disagree with public perceptions of risk, they are clearly not irrational. More generally, psychometric research demonstrates that, whereas experts define risk in a narrow, technical way, the public has a richer, more complex view that incorporates value-laden considerations such as equity, catastrophic potential, and controllability” (Slovic1987, pg.150)

As a result of this conflict, decision-makers are put in the precarious position of deciding between expert advice and the values of the public. In the past, they have often sided with the experts (Doern and Reed 2000). This has surely been a prevailing factor in the decline in public deference, leading the public to believe that their risk evaluations are not taken seriously.

Many risk researchers feel that the future of risk management depends on reconciling these two definitions of risk (Savadori 2004 et al, Doern and Reed 2000, Leiss and Chociolko 1994). Slovic (1987) and Doern and Reed (2000) believe that decisions can no longer be made based on purely quantitative risk assessments. Indeed, Slovic (1987) goes as far as to state that “There is no such thing as ‘real risk’ or ‘objective risk’”. Through this statement he suggests that we must not define risk as a purely quantitative assessment. In order to manage risks properly, all components of risk must be considered; the quantitative probability and the qualitative assessment. This sentiment is supported by Doern and Reed (2000) who feel that we must change the way we measure risk in order to incorporate perceived risk. More practical applications of incorporating the two types of risk can be seen in Shrader-Freschette’s (1993) work on incorporating value-based judgments into quantitative risk assessments of radio active waste repositories.

Incorporating the qualitative components of risk is essential if decision-makers and experts want to effectively provide information to the public. The general population has the power to stop almost any decision that the government makes, or force them into making costly decisions (Gerrard 1994). Examples of this include: the public opposition to siting a landfill in Toronto (Hostovsky 2006), and launching a lawsuit against the provincial government forcing them to take responsibility for the Walkerton tragedy (*Smith v Brockton 2001*). Effective communication with the public can help avoid opposition and help the public make more informed decisions about their health. However, communication cannot be reactionary as it was in the case of the Walkerton tragedy.

2.2 Risk Communication

Risk communication is one of the most challenging components of risk management because it is dependent on ever-changing public attitudes and relaying complicated information to a general audience (Parkin 2003 et al, Fischhoff 1995). Risk communication aims to: build trust, raise awareness, educate, reach agreements, and motivate the public (Bier 2001). It is defined as the “flow of information between academic experts, regulatory practitioners, interest groups and the public” (Leiss and Chociolko 1994 pg. 35). This flow of communication is not smooth, as one might expect due to different perspectives about risk, as well as differing final objectives (Leiss and Chociolko 1994). Governments are often motivated by economic and development concerns whereas the public, including public interest groups, place more emphasis on personal well-being (Leiss and Chociolko 1994). Scientists, depending on their funding, can be motivated in either direction.

One of the primary complications with communication between these three groups is the fact that they speak different “languages” (Leiss and Chociolko 1994). Technical language used by scientists can be difficult for the general public to understand (Jardine and Hrudey 1997). Terms such as; significant and non-significant results, population and individual risk, and relative and absolute risk are used in order to explain probabilities associated with risk (Jardine and Hrudey 1997). These terms are not well understood by the general public and can result in misunderstandings and mixed messages. To the general public, these terms show that risk is present. And yet, experts and decision-makers often indicate that the public should not be concerned.

In the case of drinking water, particularly with ground water supplies, experts must always acknowledge the presence of a risk (Neumann and Foran 1997). However, the public

cannot differentiate between relatively benign risks and harmful risks. The public hears the word 'risk' and tends to interpret it as 'harmful risk.' Mixed messages such as these can be detrimental to a communication strategy because they lead to a decreased sense of trust and justice between the community and the decision-makers and experts (Jardine and Hrudey 1992).

As a means of addressing the complications of risk communication Baruch Fischhoff (1995) describes some previous tactics decision-makers have used to impart risk information, and subsequent lessons learned (Fischhoff 1995). Fischhoff's research relates specifically to communication about objective risk assessments for the purpose of siting hazardous facilities. However, his findings are useful for communication of more general risk information. He suggests that there have been at least seven risk management strategies attempted by decision-makers.

- 1) Getting the right information: Decision-makers historically have been more concerned with developing accurate risk assessments and less concerned with imparting this information to the public (Fischhoff 1995, Doern and Reed 2000).
- 2) Giving the public the information: A lack in confidence in decision-making capabilities in the early 80s obliged a more transparent decision-making process in which the public was informed (Fischhoff 1995, Laird 1989).
- 3) Explaining the information: Decision-makers soon realized that giving information to the public was not enough; they had to explain the information by focusing on the information that matters to the public (Fischhoff 1995).
- 4) Comparing risks: When the public was still not responding well to the information, decision-makers tried to compare risks, showing the public that they accepted similar risks on a regular basis (Fischhoff 1995).

- 5) Highlighting the benefits: The next attempt to force public acceptance was to show the public that whatever was being proposed had benefits for them (Fischhoff 1995).
- 6) Being nice: Decision-makers found the public responded more positively to information when they felt the expert cared about their interests (Fischhoff 1995).
- 7) Incorporating the public into the decision making process: Decision-makers found that if the public was involved in the decision making, from the earliest possible stages, the chance for acceptance of a risk was higher (Fischhoff 1995).

Fischhoff suggested that the best approach for effective risk communication was to incorporate all of these strategies.

Lundgren and McMakin (1998) built on Fischhoff's research a few years later by suggesting additional requirements for risk communication. They focused on providing the community with complete information and tailoring the communication technique to the community. They suggested that communicators should start early and provide as much information as possible and indicated that depriving people of information would increase the risk of hostility and decrease trust in decision-makers. Tailoring communication to a specific audience through flexibility in approach and use of proper language would increase the chance that the communication would be received more readily. They stressed that tailored information did not imply that complicated information should be left out. It simply meant that more time should be spent explaining the information in comprehensive terms.

Additional research has also stated that experts must address uncertainty (Lundgren and McMakin 1998, Johnson and Slovic 1995). Most communicators are apprehensive about communicating uncertainty because they feel the public will react negatively to expressed uncertainty. It has been found that the public would rather have the expert communicate

completely accurate information (Johnson and Slovic 1995). However, the information must be accurate. The consequences could be disastrous if the information provided is incorrect (Lundgren and McMakin 1998). This causes the public to lose trust in their information source. Communication after a loss of trust is exceptionally difficult because the public does not have confidence in the information (Slovic 1993). Regaining trust is a costly endeavour, both time-wise and financially (Slovic 1993, Kasperson et al 1992). This principle is exceptionally apparent in Walkerton where, years after the tragedy, many people will not drink their tap water despite communication attempts about the safety of the water (Mackay 2002). Indeed, the public health officer who took charge of the Walkerton situation indicated that "it [would] be years before people in Walkerton trust the water supply" (Mackay 2002)

Lundgren (1998) and Fischhoff (1995) have developed strategies for risk communication under the assumption that risk communication will take place before an event occurs. However, recent history has illustrated that this is often not the case. In many cases risk communication occurs as a reaction to an event or in the aftermath of an event (Parkin et al 2003). In these situations trust has already been lost. Examples of these types of communication efforts are: food safety after the BSE controversy in the UK, HIV/AIDS and Hepatitis C after the tainted blood scandal, over-fishing after the collapse of the fish stocks, and drinking water safety after the Walkerton tragedy. In the aftermath of these events, attempts at communication were functioning under a lack of trust which made communication a very difficult task. In fact, in most of these cases trust was lost altogether. Low trust impacts negatively on risk communication (Walls 2004 et al). Trust is a precarious emotion and must be at least partially present for communication to be successful (Slovic 1993).

2.3 Trust: Definitions, Determinants and Nature

Events such as the ones listed above have sadly not been uncommon in recent history and have affected both risk perception and risk communication. This is because these events have had significant impacts on the trust society holds in their decision-makers. In recent years, North America as a society has been exposed to many situations in which government and industry have not acted in the best interest of the public (Kasperson 1992). Studies have indicated that the Vietnam War, episodes of economic recession, environmental degradation and repeating energy crises have all led to a general distrust (Kasperson 1992). Kasperson indicates:

“A broad-based loss of trust in the leaders of major social institutions and in the institutions themselves has occurred over the past three decades” (Kasperson 1992, pg. 161).

Kasperson's statements echo the sentiments that Laird expressed in his paper *The Decline of Deference: The Political Context of Risk Communication* (1989) and are seen in more recent research by Nevin (1994). Most risk communication researchers highlight the importance of trust in risk communication strategies (Laird 1989, Leiss and Chociolko 1994, Kasperson 1992, Frewer 1996, 1999, 2003, Frewer and Miles 2003, Walls 2004 et al, Slovic 1993, Peters 1997 et al). Trust is specifically important for risk communication about drinking water quality in a post-Walkerton society.

A general distrust in government, and a distinct loss of trust in decision-makers, has led many researchers to question “what determines trust?” “What destroys trust?” and “What helps build trust once it has been lost?” These questions are very important considering that trust is the foundation on which effective communication is built (Bier 2001). Frewer and Miles (2003) outline three determinants of trust; knowledge and expertise, openness and honesty, and caring and compassion. These determinants of trust have been empirically tested and have their origin

in a wealth of trust and risk communication literature produced by well known risk authors such as Renn and Levine (1991), Kasperson (1988) and Covello (1992) (Frewer and Miles 2003). They indicated that knowledge and expertise play a significant role in determining trust. If there is a history of failure on the part of the decision maker, or a lack of evidence that the decision maker has experience in the field, it will be harder for the public to trust the communicator. The second set of determinants is openness and honesty. Frewer and Miles (2003) demonstrated that if the government/industry chose not to disclose all information, or misrepresent certain information, trust would be lost. The idea of sharing all information is echoed extensively in much of the risk communication literature (Bier 2001, Fischhoff 2005, Lundgren and McMakin 1998, Peters 1997). Likewise, the third set of determinants is closely related to risk communication strategy. Concern and care play a very large role in how much a community trusts the motives of a governing body or industry (Frewer and Miles 2003). In addition to these determinants of trust, information accuracy has been repeatedly identified as an important determinant of trust (Peters 1997, Frewer 1996).

In addition to a wealth of research about the determinants of trust, the nature of trust has also been extensively studied. Trust has been found to be fragile and consequently asymmetrical in nature (Slovic 1993). This means that trust can be lost very quickly and can take a very long time to be regained (Slovic 1993). Trust is lost more easily for four reasons. Negative events are more visible than positive events; the public and the media tend to give more attention to negative events than positive events (Slovic 1993, White 2005, Savadori 2004). Negative events carry more weight; the public has a more powerful response to negative information (Slovic 1993, White 2005, Savadori 2004, Siegrist 2001). The sources of bad news tend to be more credible (Slovic 1993, Savadori 2004, Frewer 1996, Siegrist 2001). For example, McCallum was

able to show that people tend to trust media sources more than doctors, government or friends (McCallum 1991). Finally, distrust will perpetuate distrust (Slovic 1993). This has been shown by Kasperson (1988) in his seminal paper and book about the social amplification of risk. He suggested that once a negative event has occurred, risk perceptions are amplified through social networks, the media and other informational sources (Kasperson 1988). When negative perceptions are amplified, distrust is perpetuated through the same information channels. Trust is more difficult to gain for the same reasons. Positive events are not as visible or powerful. In fact, very few positive *events* occur with respect to risk (Siegrist 2001). Typically risk is being managed well when *events* do not occur. However, people do not process the maintenance of the status quo in the same way they do media coverage of an event. Undeniably, the coverage of Walkerton had a much greater impact on people than the maintenance of drinking water safety in other Ontario municipalities. Additionally, positive information is often seen as self-serving and is therefore trusted less (Siegrist 2001). Therefore trust must be built by communicating a large number of safety-confirming messages to the public (Slovic 1993).

Building trust is an essential component of risk communication. However, recent research indicates that decision-makers focus too much on gaining trust and not enough on developing a healthy relationship with the public (Walls 2004, Poortinga 2003). Often, they mistake what is known as critical trust for distrust. In reality critical trust is simply general trust, as defined by Frewer and Miles (2003), with a healthy dose of skepticism. The public can not be expected to accept decisions without questioning them (Walls 2004, Poortinga 2003). This has already been shown by Laird 1989 and Kasperson 1992. Decision makers must expect skepticism and address it. However, they must not focus on annihilating the skepticism. Instead

they should focus on other trust building activities such as good communication skills, openness, honesty and compassion.

Trust, risk communication and risk perception are all related. However, the relationship between trust, risk communication, risk perception and risk acceptability is still unclear. Poortinga (2005) has suggested that there are two possible models that describe the relationship between these components of risk. The Causal Model indicates that trust should determine how people perceive risks and how they respond to communication. Conversely, the Associationist Model indicates that previous perceptions of risk acceptability dictate how people perceive risks, respond to communications and who they trust. The Associationist Model is supported by White (2003) and Frewer (1996) who both suggest that prior perceptions about risk often influences how people respond to risk information. In any case, targeting one of these components of risk will undeniably have rippling effects on the others, positive or negative. Therefore, more applied research is needed to address the relationships between these components for specific risk issues.

2.4 Trust and Communication: Applications to Drinking Water

To date, very little research has been conducted about risk, trust and drinking water. Risk and trust studies tend to concentrate on more general topics. These include: the effects of trust on risk communication and perception, and what were previously believed to be more risky undertakings such as the siting of nuclear and hazardous facilities. The more applicable studies have been conducted on topics such as genetically modified organisms and BSE (Frewer 2003, 1996, 1999). Drinking water risks and communications about them have not been a focal point for trust and risk research. As a result of the Walkerton tragedy the public has become more aware of the risks associated with drinking water (Turgeon 2004, Adamowicz 2004, Jalba and Hrudey 2006). The Walkerton tragedy has specifically drawn the public's attention to source

water protection and the effects that decisions about source water have on drinking water safety. Therefore, how the general public processes these risks and communications is important for future decisions about drinking water. One of the more recent studies found that public concern about drinking water had increased as a result of increased awareness of environmental pollution and waterborne disease outbreaks (Turgeon 2004). Turgeon indicated that a large number of Quebec residents were choosing alternatives to tap water such as bottled water or purification systems. He found that people rejected tap water based on their perceptions of aesthetic criteria (colour, odour and taste). This is because the public associates the aesthetic qualities of water with health concerns. Moreover, Turgeon found that the two determining factors for consumer behaviour as it relates to drinking water were knowledge of the source and taste.

The predominance of aesthetics as a determining factor for risk perception raises obstacles for water treatment. Maintaining sufficient levels of chlorine through the distribution system is paramount in order to diminish health risks (Turgeon 2004, Jalba and Hrudey 2006, Neumann 1997). However, the public will be more likely to use alternative sources if the taste or smell of chlorine is too strong (Turgeon 2004). Ultimately, Turgeon discovered that risk perceptions about drinking water were strongly correlated with knowledge of contamination events, information that the public possesses about the source of their water, and aesthetic characteristics of the water. These findings are supported by Johnson's research which indicated that general trust and aesthetic quality of the water were the two prevailing factors that affected how people perceive their water (Johnson 2003a, Johnson and Slovic 1998).

Johnson's research focused more on trust as it related to risk communication. The United States Safe Drinking Water Act obliges water utilities to produce and distribute annual reports about drinking water quality. The annual reports are called Consumer Confidence

Reports (CCRs) and are disseminated actively. Over the past ten years Johnson's important research in this new form of risk communication has revealed that although the content of the reports was important, trust in the utilities was more important, because trust tended to determine how the report was interpreted (Johnson 2003a). The CCRs have had modest effects, but did not significantly change readers' perceptions of their water quality. Moreover, he found that qualitative reports tended to produce more concern because people wanted exact information. Further research indicated that setting benchmarks for water quality had little effect because the public did not have confidence in their government and industry to set proper standards (Johnson 2003b). The public only had positive attitudes about the standards as a result of previous positive attitudes towards government and industry. Conversely, people with negative attitudes towards industry and government had negative attitudes about standard setting (Johnson 2003b). Once again, trust was the foundation on which the public interpreted information. Johnson also investigated the issue of uncertainty with Slovic and they found that discussion of uncertainty in communications with the public signaled honesty and therefore increased trustworthiness (Johnson and Slovic 1995).

Apart from Johnson, other researchers have focused on the efficacy of the CCR as a communication tool. Nancy Meyer-Emerick (2004) found that CCRs only marginally increased consumer satisfaction by 2.4% above previous levels. This could be because very few people actually read their CCRs. The 2001 National Consumer Water Quality Survey (Meyer-Emerick 2004) indicated that 86% of people were concerned about their drinking water. However, only 17% actually read the report. Like Johnson, her findings suggest that building trust is of paramount importance to improving communications. She also suggested that two-way

communication with the public is important and that the utilities must pay attention to the needs of their audience.

The consensus is that every risk communication scenario will be different, and tailoring the strategy to the needs of the community is the most important component of trust-building and subsequently effective risk communication (Fischhoff 2005, Meyer-Emerick 2004, Johnson 2003a,b, Parkin 2003). Parkin (2003) has based her investigations on the findings from a two-day workshop, hosted by the Centre for Risk Science and Public Health at The George Washington University Medical Centre, that addressed risk communication strategies and drinking water. Parkin suggested that the reactionary approach in water risk communication is not good enough. Boil water advisories (BWAs) do not provide enough information and foster distrust. The finding of the conference indicated that proactive planning based on the educational needs of the community must be implemented. Messages should use simple language and allow people to choose the information level they find satisfactory. Similar to Meyer-Emerick, Parkin suggested that there is not enough focus on the information needs of the public.

Community leaders and utilities managers are making communication and risk decisions about drinking water on a regular basis. However, they may not be well enough informed about the informational needs of their community members. Bridging this gap between information provision and information needs could help to develop a greater sense of trust between the public and the local decision-makers. This in turn could lead to more effective communication. More effective communication will allow community members to make more informed choices about their health on a daily basis and in emergency situations such as drinking water contamination.

Chapter 3: Objectives

The existing risk literature has indicated that trust plays a significant role in how the public perceives risk and reacts to risk communication strategies. The Walkerton tragedy caused the Canadian public to lose trust in their water providers, local and provincial governments. Significant advances have been made with respect to drinking water regulation in the aftermath of Walkerton. Nevertheless, these regulations primarily focus on contamination prevention and blame avoidance. They do not focus on communication methods. Municipalities are struggling to find resources and time to implement many new policies required by the *Safe Drinking Water Act* (2002).

This research examines the risk communications about water in a single Ontario community and its affects on the community's perceptions about drinking water, who the public trusts and what type of information they may need. The research will examine the public's perception of their drinking water using the perception principles through inquiries about both source and tap water quality and safety. Who the public trusts will be found using the following determinants of trust: expertise, accurate information provision and honesty. Informational needs of the public will be assessed by asking them about the type, frequency and source of information they require. Finally, communication efforts of local government will be assessed through interviews with local government officials, media releases and internet resources. This information will help determine whether risk perception, risk communication and trust pertaining to drinking water follow typical risk management theories. It will also emphasize any communication gaps between a local government and its public.

The study community was selected because it has an excellent history of safe drinking water provision and communication about drinking water. Therefore it is expected that a

community such as this, having a low number of negative water-related events, will have high levels of trust in their local government. It is also expected that, because the community exists in a post-Walkerton society, trust will be slightly tempered by skepticism. This will result in what is known as critical trust. More specifically, we expect to find that perceptions of drinking water, and source water, quality and safety will be relatively high. It is also expected that the residents will trust their local government officials (public health and public works departments) more than outside sources (private water suppliers, the province and the media). Despite the positive perceptions, the trusting relationship and the communication efforts made by the local government officials, it is expected that the residents will still want more information than they are being given. They will want more specific information, more frequently, using more direct communication methods. This gap between communication needs and efforts could be attributed to either a latent distrust about drinking water as a result of Walkerton or the presence of skepticism and trust, better known as critical trust.

Chapter 4: Background

4.1 The Walkerton Tragedy

The Walkerton tragedy changed the way people perceive the safety of their drinking water. It drew attention to a lack of legislation and action concerning drinking water safety and source water protection. Given the situation in Ontario at the time, many local government officials believe that the Walkerton tragedy could have occurred in any municipality that depended upon well water as their source (Jalba and Hrudey 2006). It was also the driving force behind new water legislation in Ontario and other provinces. This section will: a) highlight the events of Walkerton, b) demonstrate how Walkerton affected trust, perception and communication as it related to drinking water safety, c) outline legislative changes that have occurred since Walkerton and d) summarize the present situation as it relates to drinking water safety communication.

Walkerton was the result of negligent behaviour, inadequate resources and inadequate regulation combined with atypical environmental events. In 1978 a study conducted on Walkerton's well systems indicated that:

"The town of Walkerton should consider establishing a water protection area by acquiring additional property to the west and south in the vicinity of well #5.

Shallow Aquifers are prone to pollution and farming and human activities should be kept away from the site of the new well as far as possible." (Steven Hrudey ND)

Sadly, no action was taken with respect to these warnings. Almost twenty years later the Conservative government took two steps that contributed to the Walkerton tragedy; they cut the environmental budget by 42% and completed the privatization of municipal water testing

(Spurgeon 2000). The previous government, the New Democratic Party, began this process. Subsequently, many of the water related responsibilities were downloaded onto municipalities that lacked the resources to support these responsibilities. Stan Koebel, director of Walkerton Public Utilities Commission who later pled guilty to common nuisance endangering lives, was not properly trained for the new responsibilities that his position included (Spurgeon 2000). In testimony, he indicated that he and his staff were actually trained to falsify drinking water reports. These negligent actions ultimately led to the deaths of seven people and the illness of hundreds.

In the spring of 2000 Walkerton experienced excessively high rainfall which exposed well #5 to agricultural runoff. As stated in the 1978 report, the shallow aquifer was susceptible to farming activities and E. coli contamination occurred in well #5. The staff responsible for the water supply did not maintain adequate chlorine levels. As a result, the chlorine was essentially ineffective as a decontaminant. Soon after this the residents of Walkerton began to show symptoms of E. coli poisoning. Unfortunately, mistakes and failures continued after the contamination event which led to seven deaths. Private testing of the water supply showed that the water was contaminated with E. coli. However, Stan Koebel chose not to notify the local Public Health Department. Hundreds of people became ill, leading the Public Health department to issue a boil-water-advisory and conduct independent tests. Once the public health tests revealed that the water was contaminated a provincial agency, the Ontario Clean Water Agency, took over the Walkerton water system. The actions came too late because seven people had died and hundreds were ill (O'Connor 2002).

In order to avoid implication, the parties involved began to accuse each other of negligence (O'Connor 2002). The provincial government blamed the municipality for not

reporting the incident. The municipality blamed the government for cutting water testing and treatment budgets. The private testing company had no responsibility to the province and therefore could not be held legally responsible although they were the first to obtain the adverse results. The residents of Walkerton were the victims of a horrible sequence of events and incompetent actions and yet no one would take responsibility. Consequently, the residents wanted compensation and launched a class action lawsuit against: the municipality, the health unit, the Public Utilities Commission, Stan Koebel, and the provincial government. The class action was settled very soon after by the development of the Walkerton Compensation Plan.

4.2 Risk Perception, Communication and Trust Post Walkerton

Walkerton is a tragic example of poor decision making that diminished trust between the public and the local and provincial authorities. Subsequently, perceptions of risk associated with drinking water have increased (Turgeon 2004, Adamowicz 2004, Jalba and Hrudey 2006). This is because perceived risk is shaped by experience and dictates how the public will react to risk-related decision making and events (Siegrist 2000, Slovic 1993). Additionally, communications about water-related risks have become more difficult (Parkin 2003, Jalba and Hrudey 2006). Safe drinking water was a public good that many Canadians took for granted until the Walkerton tragedy in 2000. Trust was lost because the governing bodies and “experts” did not exhibit the three determinants of trust: knowledge and expertise, openness and honesty, and caring and compassion. The Walkerton Water Utilities Commission certainly did not have adequate knowledge or expertise with respect to water safety. When the contamination occurred, they exhibited dishonesty by concealing test results. Lastly, when the facts were exposed, the provincial and local governments would not take responsibility. Their blame avoidance exhibited more self-interested priorities and an evident lack of compassion for the residents of

Walkerton. From this point onwards the Canadian public has exhibited very low confidence in how the government responds to crisis situations (Woo and Vincente 2003).

In addition to diminishing trust, the lack of communication during the events of Walkerton jeopardized the attributes that the public finds most important when evaluating risk; controllability, voluntariness, fatality and dread (Slovic 1987). When the e.coli contamination occurred, residents were not informed. As a result their control over the situation and ability to voluntarily accept/decline the risk was taken away. Moreover, thousands of people became ill and seven people died. The deaths emphasized the risk fatality associated with the situation and amplified the sense of dread.

Presently, the public's perception of risk is heightened as a result of the events of Walkerton. More people are drinking bottled water and purchasing purifiers (Turgeon 2004). This action gives them a greater sense of control over the potentially risky situation. Unfortunately, these types of decisions are ill-informed. In the absence of information the public bases their risk decisions completely on value-based criteria (Siegrist 2000). They cannot weigh the costs and benefits of certain risks if they only know the costs of one option and the benefits of another. Municipal tap water, when treated correctly, is more strictly regulated than bottled water and has greater health benefits (City of Toronto 2007). Therefore, in the case of tap water most of the risk is perceived risk. Risk in this case is simply based on the amount of trust a person has in their local water providers and the amount of information they have (Siegrist 2000).

Currently, the government (mainly local) is attempting to communicate information about drinking water to communities across Ontario. Walkerton has changed the way people think about their drinking water. In communities such as the study community, where

communication techniques are more intensive and transparent, greater trust in water safety and the water providers is expected. Although, even in such communities, memories of Walkerton and a general distrust in authority could still increase the information needs of the community.

4.3 Drinking Water Legislation

The events of Walkerton instigated the development of several water-related policy changes. The *Nutrient Management Act* and the *Safe Drinking Water Act* received royal assent in 2002 soon after the findings of the Walkerton Inquiry (2001) were released. More recently, the *Clean Water Act* received royal assent in 2006. Legislative changes such as these were greatly needed for the broken Ontario water systems. Walkerton provided the impetus for action.

Safe Drinking Water Act:

The *Safe Drinking Water Act* (2002) was developed directly in response to the recommendations of Justice O'Connor in Part II of the Walkerton Inquiry (2002). The act specifically addressed the treatment and distribution of drinking water in Ontario. It implemented fifty of the ninety-three recommendations outlined by Justice O'Connor in Part II of the Inquiry (O'Connor 2002). The purpose of the development of the legislation was:

“to provide for the protection of human health and the prevention of drinking-water health hazards through the control and regulation of drinking-water systems and drinking-water testing.” (Safe Drinking Water Act 2002, S1.2)

The legislation explicitly describes and regulates the proper management of drinking water systems. It was designed to control numerous aspects of drinking water management. It controls water systems through water system approvals, permits and licensing. Testing is controlled through introducing the accreditation of water testing laboratories and licensing of water testing facilities. The legislation also outlines how compliance will be monitored and non-compliance

punished. Additional regulations were made under the *Safe Drinking Water Act* that addressed: how water system operators are to be certified (O.Reg 128/04), the setting of safe drinking water standards (O.Reg 169/03), specific testing requirements (O.Reg 248/03) and reporting and communication requirements.

Clean Water Act:

The Safe Drinking Water Act very thoroughly addressed and regulated the essential components of drinking water treatment and distribution. In 2006 the *Clean Water Act* was developed, also with the intention of providing the Ontario public with safe drinking water. However, this legislation concentrates on an area of safe drinking water provision that was sorely lacking from the Safe Drinking Water Act; source water protection. The act specifically states: “*The purpose of this Act is to protect existing and future sources of drinking water*” (Clean Water Act 2006). Source water protection is considered of paramount importance because it takes a precautionary approach as opposed to a reactionary one and the prevention of contamination is much easier than the clean-up associated with contamination.

The legislation is in the beginning stages of implementation. The legislation essentially calls for the identification and risk assessments of drinking water sources in Ontario. Implementation will be challenging because the development, monitoring and enforcement of the legislation will be carried out by local officials at the municipal level. A Source Protection Committee (SPC) will be responsible for the implementation of the legislation. This committee will outline how the legislation will be implemented, the responsibilities of involved parties and potential conflict areas. The SPC will assess drinking water sources in their area for vulnerability. Drinking water sources that are considered at higher risk will require a source water protection plan. This is a particularly forward-thinking policy as it considers threats to

drinking water on a case-by-case basis. Therefore decisions about source water protection will be made at the local level as opposed to the broad sweeping decisions that, to date, have been made at the provincial level. In addition to identification of the risks the policy highlights how the specific sources of drinking water will be protected and monitored in order to prevent contamination.

4.4 Present Drinking Water Situation

The development of the above legislation was essential in order to protect source water, drinking water and the health of populations. However, not all problems associated with safe drinking water provision have been addressed. Additionally, the provincial legislative changes have increased the responsibility of the municipalities with very little additional financial support (Adamowicz 2004, Jalba and Hrudey 2006). In fact, one of the obstacles that many municipalities face is that the provinces are ultimately responsible for safety of drinking water through legislation, but perceptions of risk are developed locally because the municipalities are responsible for managing the water (Adamowicz 2004). This means that the municipality is responsible for the treatment, testing, distribution of the municipal water supply and communication with public (Adamowicz 2004). It is then, however, required to provide the results of its tests to the provincial government (Adamowicz 2004). The provincial government is responsible for making final decisions with respect to drinking water events (Adamowicz 2004). Although this provides increased opportunities for safety assessment, it is not always efficient and leaves very little time for communication efforts (Jalba and Hrudey 2006).

In addition to increased responsibilities as a result of new legislation, municipalities must contend with increased water treatment and processing costs (Adamowicz 2004). There are several reasons for increasing costs. The new legislation stipulates that municipalities use higher

quality treatment processes (Adamowicz 2004). In general source water quality is deteriorating due to agricultural and industrial runoff and must be treated more intensively (Adamowicz 2004). Increasing populations in most municipalities put more pressure on the water suppliers to provide more water at a faster rate (Krewski 2004). Most municipalities' infrastructures are aging and deteriorating. Upkeep and/or replacement of aging facilities is extremely expensive (Adamowicz 2004). The *Sustainable Water and Sewage System Act* (2002) compels municipalities to pay the full cost for their water treatment. However, municipalities cannot overtax their residents, particularly in smaller towns where economic stability is low. Recent research indicates that the public will pay more for removal of contaminants, but are not eager to pay for the upkeep and maintenance of the facilities (Adamowicz 2004). Consequently equipment is not being well maintained and more contamination events are occurring (Adamowicz 2004).

Ontario municipalities are evidently overextended with respect to safe drinking water provision. Very few municipalities actually have the opportunity to implement risk communication strategies (Jalba and Hrudey 2006). Jalba and Hrudey (2006) investigated the local public health agency's role in communities across Canada. They interviewed local government officials (environmental health officers) regarding their roles in the provision of safe drinking water. Many emphasized their reliance on reactive strategies such as following up on adverse water monitoring results and investigating water quality complaints (Jalba and Hrudey 2006). Although source to tap management is promoted by the *Clean Water Act* (2002) only some local governments are actually taking proactive steps; watershed management, assuring source protection, adequate treatment and disinfection, maintaining quality in the distribution system and ensuring regular monitoring. Even fewer local governments consult with and/or

involve their communities. Only 17.8% (26) of the 146 environmental health officers surveyed indicated they participated in public education (Jalba and Hrudey 2006).

Jalba and Hrudey's (2006) research emphasized the importance of public consultation and education. They also emphasized the difference in risk concerns between professionals and the public. The public's concerns about drinking water safety are more commonly focused on the safety of the chemicals in the water. Conversely, professionals are more concerned about microbiological contamination and source water protection. Therefore, of the few communities that communicate with their residents, many do not communicate effectively because they target the wrong concerns. In order to solve such communication problems Parkin (2003) recommended a consultative process with the public by which the local authorities can determine their informational needs. Public consultation is also a trust building activity because it shows care and concern.

The community I have chosen has been able to provide its residents with consistent information about their drinking water safety and source. They have managed a proactive source-to-tap strategy for safe drinking water provision and have never been in serious violation of the new water legislation. Through interviews with local officials and the public, I will be able to determine whether, under ideal communication conditions, the public has additional communication needs.

Chapter 5: Study Community Background

5.1 Community Drinking Water History

The study community is located in South Western Ontario and has a population of approximately 33 000. The community is supplied by ten wells. The majority of the drinking water comes from natural aquifers just south of the city centre; seven of the ten wells are found at that location. Three of the wells are found directly within the city limits. All drinking water comes from ground water sources. Six of the wells are Groundwater Under the Direct Influence of surface water (GUDI) wells. These have effective natural filtration. The remaining four wells are strictly groundwater wells. Recently the city implemented a new water treatment plant that combines traditional chlorination disinfection with UV treatment. This treatment plant disinfects water from seven of the ten wells (Annual Drinking Water Report 2006).

The aquifers have consistently provided good quality, reliable water supplies (Golder 1999). The responsibilities for drinking water management are spread over three County departments. The Public Works Department in collaboration with the municipality oversees the treatment, testing and distribution of the study community's drinking water. The Public Health Department responds to adverse results. However, because there are very rarely adverse results, their primary duty is to assist private well owners with testing and interpreting well water quality test results. The Planning Department is predominantly responsible for source water protection. The development of the *Clean Water Act* (2006) has relocated some of the source water protection responsibilities to the Public Works and Public Health Departments. All departments are located within the study community and have an excellent working relationship. They communicate frequently and effectively.

The municipality's communication strategies about water extend past excellent intradepartmental communication strategies. As early as 1997 the Public Works Department had developed a system by which water quality tests were conducted and reported. This type of voluntary standardization was not prevalent pre-Walkerton. Furthermore, the reports were made available to the public on the County website; a form of passive drinking water risk communication. As a result of the water management system and high quality source water, the study community has not had a serious BWA in many years. During the blackout of 2003 a precautionary BWA was announced. There was a threat of pumping failure, but the generator at the water treatment plant was able to keep the water supply flowing until power from the grid was reestablished. Therefore the BWA was simply a precautionary measure. When the *Safe Drinking Water Act* (2002) came into effect the study community made a much more straightforward transition to adopting the regulations. However, even their transition was not easy. The amount of additional paperwork and testing has allowed them little time to devote to public communication strategies.

This community is unique due to its early involvement with source water protection. In 1995, well before the *Nutrient Management Act* (2002) was established, the County that holds the study community implemented well head protection policies (Golder Associates 1999 and interviews). Two years later, three years before the Walkerton tragedy, they responded to public concern about the development of a large scale hog farm by passing an interim by-law. The by-law was implemented to control the size of livestock operations. The by-law stimulated the development of a local Water Protection Committee. In 1999 the County, with the help of an environmental consulting agency, Golder Associates, began phase I of ground water studies. In 2001 the County completed phase II of ground water protection studies. The second phase of the

study consisted of a public consultation. Telephone interviews were conducted two weeks before the Walkerton tragedy regarding residents' water habits and water perceptions. A large number of the residents indicated that ground water protection should be a high priority for the County. Most recently, the provincial government used the County in which the study community is located as an example of source water protection strategies in Ontario (Ministry of the Environment 2005).

The ground water protection study yielded some interesting information regarding residents' attitudes towards water. The interviews were conducted by telephone across the entire County and therefore answers were not specific to the study community. Previous to Walkerton, 53% of the study community thought that their tap water was excellent. 40% thought that it was average while only 5% thought it was poor. Those taking their water from municipal water supplies were more critical of their water quality. In March of 2000, 71% of the residents of the study community knew their drinking water came from wells. Interviewees felt that financial incentives would be the most effective method of promoting groundwater protection. However, this was closely followed by educational initiatives. Furthermore, nearly three quarters of the interviewees said they would benefit from more information about ground water protection.

5.2 Communication Efforts

The findings of the above study indicate that the public would like additional information. The communication efforts of the study community's local government have been well-rounded. Each department communicates with community members about different aspects of drinking water safety. In order to facilitate public access to information, the information provided by each department is made available on the County website. As there has never been a serious BWA, most of the communication efforts are passive forms of information

dissemination such as web accessible information. However, each department has been involved in more proactive, consultative communication activities.

As stated above, the Public Works Department is responsible for the treatment, testing and distribution of the water. Their communications about these efforts can found in the form of an annual drinking water report and annual drinking water summary. The summary provides information about non-compliance issues with Ontario drinking water legislation and the corrective actions taken. The drinking water report provides the annual average for quality tests conducted on each of the ten wells. These annual reports are required by O.Reg. 170/03 created under the *Safe Drinking Water Act* (2002). However, well before this regulation, the County had already developed a similar report that was posted annually. In addition to posting the standardized reports, the Public Works Department has also been involved in more proactive communication strategies such as: public consultations regarding Class Environmental Assessments for the extension of the study community's water system, community information days, and notification of rate changes. These communications are disseminated through both passive (media or website) and active channels (telephone calls, addressed letters etc).

The Public Health Department plays a smaller role in communicating about municipal drinking water. Its role has traditionally been to inform private well owners about safe drinking water practices. These communications are beyond the scope of this research. The Public Health Department's role with respect to communications about municipal water is mainly to react to adverse water results and issue a BWA if necessary. Because there has been one precautionary boil water advisory in recent years, its role has remained quite small. However, this will soon change as a result of the new *Clean Water Act* (2006). The Public Health Department will now be uniting with the Public Works and Community Planning Departments in

order to conduct risk assessments on drinking water sources. These risk assessments will involve communication with the public about ways to minimize risk to drinking water sources.

The Community Planning Department is considered the expert in source water management and protection. They have been developing source water protection studies and strategies since 1997, long before the *Clean Water Act* (2006). Indeed, most of their past and present communications provide information about source water or concern the use of land around the County's source water. The Community Planning Department generally uses passive communication techniques including the County website and the media. However, for land-use decisions, they utilize several more active communication techniques such as open houses, letters to people who will directly affected, and town meetings.

5.3 Media Coverage

The public also receives information about their drinking water through the local newspaper. This type of information can influence general perceptions of drinking water quality and safety. Over a three year period, twenty-two articles directly related to drinking water were found. The articles tended to be negative accounts of changes to water systems and BWA episodes. Most of these articles concerned municipalities within the County that were not the study community. Only a few articles related specifically to the study community. The articles specific to the community addressed the extension of the drinking water system and frustration the study community felt about the County having more control over drinking water management than the municipality. Generally, the information in the media was negative. Please see appendix A for a comprehensive description of the 22 articles.

* All information provided in this section was obtained through interviews with local government officials and the documents from the website.

Chapter 6: Study Method

6.1 Community Selection

Rationale for Selection: Due to requirements of the Ryerson Research Ethics Board, the study community cannot be named. Therefore it will be referred to as “the study community.” The study community was specifically selected because it has been able to provide its residents with consistent information about its drinking water safety and source. It has managed a proactive source-to-tap strategy for safe drinking water provision. It has frequently communicated and consulted with their public. Moreover, it has rarely been in violation of the new water legislation and has never had a serious violation. Its drinking water management strategy makes it an atypical community amongst smaller Ontario municipalities, which have had repeated BWAs or been consistently in violation of legislation. The choice of such a community allows for the investigation of three aspects of drinking water management: a) the perception of drinking water under good communication efforts post-Walkerton, b) the trust relationship between the public and various levels of government post Walkerton, and c) additional informational requirements of the public under good communication efforts.

A community with a poor drinking water management history was specifically avoided. There is a wealth of research about the fallout of Walkerton and other negative events such as BSE or GMOs regarding the lack of trust and increased perceptions of risk (Frewer 2003). Conversely, this research concentrates on the potential need for additional efforts once good strategies have been implemented and trust has been recovered. The public should be more critical of drinking water management as a result of Walkerton. However, the study community is an excellent example of how consistently good drinking water management efforts could prevent a movement from critical trust to complete distrust.

Community Location: The community's drinking water source was particularly important. Municipalities situated adjacent to Great Lakes such as Lake Ontario or Lake Huron do not have the same concerns about drinking water contamination as municipalities that depend on ground water. The study community is a ground water community. Communities that depend on ground water tend to be closer to agricultural operations. Additionally there is less available water for dilution of contaminants. Therefore, the residents are at higher risk for microbiological contamination. Post-Walkerton, more ground water communities have become aware of the dangers of microbiological contamination and subsequently, more aware of their water source. Community size was considered in order to avoid the indifference of large city residents. The study community was chosen because the residents were more likely have concerns about their drinking water and be aware of the source of their water than a surface water community.

6.2 Participant Selection

Community Participants: The study community was defined according to census tracts. Community participants were selected randomly. The Institute for Social Research at York University was employed to provide a list of six hundred randomly-selected names, telephone numbers, and addresses from within that census area¹. A sample size of four hundred responses is ideal as it would give a precision level of $\pm 5\%$ (Institute of Food and Agricultural Sciences 2007, Sly 2006). However, given the time constraints it was decided that a precision level of $\pm 7\%$ for 95% confidence limits would be acceptable. This means that the final percentage results are likely to differ from a theoretical population by 14 percentage points. Therefore the studies statistical significance is weakened significantly by this sample size. To reach a $\pm 7\%$ precision level a total of 204 respondents were needed; a response rate of 34%. This response rate is

¹ The census area yielded 40 participants on the outskirts of the study community that depended on private well water. These interviews were dropped from the results.

higher than typical response rates of 20% (Institute of Social Research, Correspondence). In order to increase the response rate, letters were sent to the participants. The letters informed them that they would be contacted by telephone for an interview in the upcoming months.

Local Government Participants: The local government participants were purposefully selected. The study area has a County Public Works Department, a County Public Health Department, and a Community Planning Department that are responsible for drinking water management. Six representatives from the three departments were chosen. The Director, Manager of Water Services and Water and Waste Water Operations Coordinator from the Public Works Department were contacted. The Director of Public Health and Emergency Services and a public health officer from the Public Health Department were contacted. A senior planner from the Community and Strategic Planning Department was contacted. These local government officials were chosen because it was felt that they would provide a thorough representation of the drinking water management strategy for the study community. They were contacted by telephone and/or email and all six responded. A representative from the municipality was contacted and did not respond. After being informed about the nature of the research all six agreed to be interviewed.

6.3 Questionnaire Development²

Community Survey: The interviews of community members were conducted by telephone. Telephone interviews were chosen because mail-out questionnaires have an exceptionally low response rate, about 10% (Statpac 2007). The ideal method for collecting this type of data would have been to conduct focus groups or in-person interviews. However, financial and time constraints did not allow for these methods. Telephone interviews also have a low response rate; 22% (Institute for Social Research, Correspondence). This interview was designed in order to

² Questionnaires for community members and local government officials can be found in Appendix B

maximize the response rate. The response rate decreases in relation to the length of the interview. No compensation was offered for participation. Therefore, the interview had to be as short as possible. The total length of the interview was 16 questions. The majority of the questions were close-ended, 3 of the 16 were open ended. Close-ended questions are often easier for participants to answer and they ensure a shorter interview time. The entire interview, including discussion of the ethical concerns took between three and five minutes. The interview was pre-tested on ten initial participants.

The survey questions were designed to assess three subject areas: a) the public's perception of their drinking and source water, b) who the public trusts most with respect to safe drinking water provision and c) informational needs of the public. Additional questions addressed whether the community members remembered receiving communications about their drinking water and whether they drank their tap water. The public perception questions asked the participants to rank their drinking and source water quality as excellent, good, fair or poor. They were also asked if they had ever been suspicious about their drinking water safety. The open-ended questions were part of the public perception section. They were asked in order to determine specific concerns the public might have about their water quality and safety. They were left open ended so as not to lead the participant's answers. Additionally, the question was not asked of the people who rated their drinking or source water quality excellent or good. It was also not asked of people who stated they were not suspicious about their drinking water safety.

The questions about trust were developed using some of the determinants of trust taken from the literature. Expertise, provision of accurate information and honesty regarding drinking water were ranked between several governing authorities, water providers and the media. Three

possible authorities are responsible for providing drinking water: the provincial government which regulates the drinking water, the local public works department which oversees the testing and distribution, and finally, private water companies such as bottled water or purifier companies that provide alternative drinking water sources. Participants were asked to rank the authorities on a scale of most expertise to least expertise in safe drinking water provision. The media, provincial government, public health department and public works department are responsible for provision of information about drinking water. The participants were asked to rank who they felt provided the most to least accurate information about drinking water. These same water authorities were then ranked for honesty. The ranking process was the best option because it kept the questions closed and the answers more directed thus decreasing the survey time and making the final analysis simpler.

The informational needs questions assessed three aspects of risk communication: the ideal type of information desired by community members, their ideal frequency of distribution and their ideal method of distribution. Although open ended questions might have been more suitable for this section, close-ended questions were used in order to simplify the analysis process. The choices given for each question attempted to encompass a broad range of potential answers. This was done by creating more general choices and allowing participants to select more than one option if they requested. The survey asked what type of information they desired. The participants were given a choice of exact information, more general information (examples were given), or regular communication. The survey asked how frequently they would like to receive communication. The participants were given choices of: as soon as tests are done, on a regular basis monthly, yearly or only if negative results are obtained. Finally the survey asked

about the preferred mode of communication. The participants could choose: media, direct communication or information they can access themselves.

Local Government Interviews: The interview questions for the local government officials were designed to compliment the community survey. They were designed to inquire about communication strategies, departmental roles and areas of improvement with respect to communication about drinking water. The questions were open-ended in order to allow for a broad range of answers. Different departments were very likely to have a different set of possible answers to the same question. Prompts were included in the interview questions in order to clarify a question, give examples or facilitate a stalled discussion. It was expected that some questions would be dropped from the interview if they did not pertain to the specific departmental official being interviewed. Because interviews were conducted during working hours the interview was designed to be relatively short; half an hour to forty-five minutes.

The questions regarding communication strategies/efforts mirrored the community survey questions. However, this section was more detailed than the community survey in order to elicit as much information as possible about how the municipal officials communicate with their public. The participants were asked if they communicated with the public about water. They were asked about the frequency of their communications, the types of communications they were responsible for, the means by which they communicated and possible communication targets within the community. Additionally, they were asked about how they kept track of their communication, who was responsible for their communications and how the public responded to the communications. These questions were specifically designed in order to achieve a better understanding of the communication efforts of each department. Documentation of the

communication efforts was meant to provide a basis for comparison against the needs of the community, obtained from the community survey.

The following interview section addressed the role of the departments. However most of these questions only pertained to the public works department. Moreover, most of the answers could be found on the County website. The questions very specifically addressed water treatment, testing and distribution practices. The participants were asked about training practices, inspection practices, ground water testing practices and whether they felt their municipality provided source-to-tap protection. The most important question of the section asked if the participants sought input from their community members about how drinking water messages should be communicated. These questions were designed more to give context to the structure of the community drinking water management strategy as opposed to addressing the objectives of the project.

Akin to the departmental role section, the third interview section regarding communication limitations and improvements was designed to provide context. The questions in this section were applicable to all participants. They inquired about the ease with which their department met the requirements of Ontario Water legislation. This question was very important as it was meant to determine how the study community has managed the difficulties associated with the new legislation. The last two questions simply inquired about areas of improvement for communication efforts and areas that have been improved upon.

* Ethics approval was obtained for both the community survey and the local government interviews with the following restrictions: 1) anonymity was to be maintained at all times for the survey participants, interview participants, 2) personal questions such as age, sex, income etc were not to be asked of community participants, 3) the study community itself was to remain anonymous.

6.4 Data Collection

Community Interviews: The community surveys were conducted by telephone over the months of February and March in 2007. A letter was sent to the six hundred randomly-selected participants informing them that they would be called in February or March. The letters were sent in two batches so as to decrease the time between receiving the letter and the telephone call. Between forty and fifty phone numbers were called each day. Participants were considered to be the first person who answered the phone, over the age of 18. All participants were called during the day between 10:30am and 3:00pm. If they did not respond during the day, they were called again during the evening between 4:00pm and 5:00pm or 7:00pm and 8:30pm. The evening calls were separated to avoid peak dinner hour. The day and night calling method was used to achieve a maximum response rate. I was able to reach people who worked at night, or did not work, during the day and people that worked during the day at night. All numbers that were called twice with no response were documented as such and these were called once more after all six hundred numbers were tried twice. Day and night calling also allowed for a more diverse set of participants. The intention was to reach as wide a demographic of people over eighteen as possible; male, female, day workers, night workers, not working, retire, students.

The responses were documented beside the telephone numbers on the excel list of names and numbers. Responses were catalogued as the following:

Y: agreed to be interviewed

N: did not agree to be interviewed

NA: no answer

CBL: call back later (this was followed by a requested time for a call back)

BUSY: busy

Fax number: the number given was a fax number (unusable number)

Business: the number given was a business number (unusable number)

Each time a participant was called, the above responses were placed into a cell beside the phone number. Once there were three NAs or three CBLs in a cell, the person was not contacted again. If a participant indicated that they would like to participate, responses to the questions were recorded on an electronic MS Word copy of the questionnaire as they were answered. This was done by highlighting the answer they chose. Additional information given by the respondents was also recorded below the question it corresponded to. After the interview the document was given a header and file number that corresponded to the original excel file number for that phone number (001-600). The electronic version was saved under that file number.

Local Government Interviews: The local official interviews were less structured and more discussion-based. Data were recorded by hand on an interview sheet as the discussion progressed. Tape recording would have been a superior method for collecting the data; however, it was determined that recording a conversation with questions about legislation compliance might decrease the openness with which the participants communicated. Therefore hand-notes were taken. The majority of the interview discussions centered around the communication efforts section. This was expected because the other two sections, departmental role and limitations and improvement, were mainly context-building sections. In fact, the majority of the departmental role questions were answered in discussion that accompanied the first section.

The interviews typically lasted about an hour. All were conducted in the workplaces of the participants. At the conclusion of the interview, participants were asked if they would be willing to share any publicly available communications they had developed over the past five years. Each department shared its communication materials. The Public Works Department provided communications about public meetings regarding water. The Public Health Department provided communications about private well water testing. The Community

Planning Department provided a community survey that had been conducted on ground water in the previous five years.

6.5 Review of Communications

In addition to the communications collected within the interviews with the County departments, a review of communications was conducted. This was carried out in order to more fully illustrate communications to which the public might have been exposed. A thorough review of the County website was performed. Each department has an individual site within the County website. All drinking water or water-related information within each department's website was collected. Media communications were also collected because a large proportion of the population obtains its information from media sources (McCallum 1991 et al). Therefore, media communications were mandatory. An online search of the local newspaper was performed. The search term "water" was used because the search engine for the newspaper was not very sophisticated. Twenty-three of one hundred and sixty-one hits related to drinking or source water.

The communications were assembled for two reasons; to give context to the study community and for analysis purposes. In order to properly analyze the communications they were organized based on their source:

- a) Interviews: Information or communications given during the local government interviews (department specified)
- b) Website: Information obtained on the County website (department specified)

They were then organized based on their content:

- a) Drinking Water Quality Information: All information regarding treatment testing, drinking water distribution and public perceptions of quality.

- b) Source Water Quality Information: All information regarding the community's drinking water source and public perceptions regarding the source.
- c) Health Information: All information relating drinking water to health
- d) Public Interest Information: All additional information about regulation, costs, and water system management.

Finally the communications were organized based on their communication method:

- a) Consultative Communication: Communication about drinking water related information during which the public were consulted.
- b) Active Dissemination: Communications that were actively transmitted to the public
- c) Passive Dissemination: Communications that were made available to the public to access on their own.

Chapter 7: Analysis

7.1 Community Surveys

Of a possible 600 telephone numbers, 213 participants responded to the interview; a response rate of 35.5%. The community surveys were analyzed quantitatively. Each interview was given an ID number (1-213). Each possible answer to each question was assigned a number as well. Upon completion of the interviews the number correlating to the specific answer was entered into an Excel file according to the specific question, which was also numbered. For example, the first question of the interview asks “Can you recall any messages about your drinking water quality from the past five years”. The answer ‘Yes’ was recorded as a 1, ‘No’ was recorded as a 2. The number of questions asked varied between participants. There were three open-ended questions that were only asked if the participants indicated that their source water was fair or poor, their tap water was fair or poor, or they were suspicious about the safety of their drinking water. The interview was technically thirteen questions in length. However, a maximum of sixteen questions could be asked.

Although a maximum of sixteen questions were asked, the total number of recorded data sets is higher than sixteen. There are two reasons for this. Firstly, the three questions regarding trust were ranked-response questions. Participants were asked to give three or four authorities a specific ranking for each ranking question. The simplest way to record this was to separate the question into three or four questions. For example, the question regarding expertise asks:

Who do you think has the most expertise in providing safe drinking water? (please rank in order from most expertise to least expertise)

- a. Provincial government
- b. Local water service providers
- c. Private water suppliers (bottled water companies)

When recording the answers this question was broken up into three individual questions that would have read:

Who do you think has the most expertise in providing safe drinking water?

Who do you think has the next most expertise in providing safe drinking water?

Who do you think has the least expertise in providing safe drinking water?

Secondly, additional information was given at times when questions were not asked.

Specifically, participants gave information about whether they used filters for their drinking water. This was added on as an additional information-set. The participants were recorded as having indicated the use of a filter, having not indicated the use of a filter or of not needing a filter as they did not drink their tap water. The total information set is 25. A template for the full information set is available in Appendix C.

In some cases participants were not able to decide upon one answer. For the trust questions they would request to split rank some of their answers. For example, they thought that the Public Health Department and the Public Works Department were equally honest. This issue was addressed by randomly selecting an answer within their split rank. For instance, the public health department was randomly given the highest ranking, while the public works department was randomly given the second highest ranking. Random selection was done for each participant that requested a split ranking. The participants requested split ranking were: 23, 24, 35, 42, 48, 49, 64, 74, 78, 96, 98, 103, 109, 114, 119, 135, 142, 165, 181, 183, 199, 201 and 209; a total of 24 out of 213 participants. In other cases participants wanted to choose more than one answer. This was particularly predominant in the informational needs questions and the questions regarding specific water quality and safety concerns. In these cases the choice of two answers was recorded as a separate answer. If participants were concerned about chemical *and*

microbiological contamination their answer would receive a completely new numerical value. Or, if participants wanted to receive information from media *and* direct communications, their answer would be given a value different from the two answers chosen. Participants that requested more than one answer were: 2, 5, 14, 19, 28, 32, 37, 38, 46, 49, 63, 65, 66, 67, 86, 96, 101, 116, 122, 131, 154, 173, 183, 187, 191, 193, 194, 210; 28 out of 213 participants.

The two different methods of dealing with similar problem were chosen intentionally. It was thought that randomly choosing an answer for the trust questions would not change the significance of the answers. Additionally, the possible answer set for these questions would have become very large and difficult to manage. Conversely, random selection of an answer for the specific concerns and informational needs questions would change the answers significantly. A participant that wants to receive information from all possible sources is giving a very different answer from a participant that wants to receive information from one source. Furthermore a participant that is concerned about microbiological contamination *and* chemical contamination is giving a different answer from a participant that is simply concerned about chemical contamination.

Once the data had been input and verified the analysis was conducted. All possible answers were analyzed as to their proportion within the data set, and cross-tabulations were conducted between information sets thought to be related using SPSS cross-tabulations function. Cross-tabulations were not conducted between all information sets. The outputs for cross tabulations of 25 information sets would be too large to manage and many of those outputs would not be useful for achieving the objectives of the research.

7.2 Local Government Interviews

The interviews with local government officials were analyzed qualitatively. The information gathered during these interviews was used to compile a communication history of the study community in order to give the research context (see Study Community Background Section). The information gathered was then assessed for general communication trends such as: information source, information type, and method of communication (active or passive dissemination), and areas that need improvement. In order to analyze information such as this, the communications were briefly summarized and tabulated.

7.3 Communication Gap

Assessment of a potential gap between communication needs and communication efforts was also done qualitatively. A comparison between the needs of the community and the efforts of the municipality was done by highlighting the needs of the community. The efforts of the municipality were then highlighted. Any gaps were reported. Instances where the residents indicated they wanted something that was already provided by the municipality were also reported because this indicated a gap in communication; the message was delivered but was never received.

Chapter 8: Results

8.1 Community Interviews

Perceptions of Source Water Quality:

Perceptions of source water quality were generally good. Slightly over half, 57.7% of the participants interviewed knew where their drinking water came from. That is to say, they knew that the source of their drinking water was groundwater that came from wells. A larger proportion, 69%, indicated that they felt their source water quality was excellent (20.2%) or good (48.8%). Cross-tabulation results show that a large proportion of the participants, 47.4%, knew the source of their drinking water and felt the source water quality was excellent or good. All other proportions for knowledge of the source and perception of the source quality cross tabulation were under 25%. In order to establish if prior knowledge of the source could affect the participants' perceptions of their source water quality cross tabulations were conducted. Participants that knew where their water came from tended to have better perceptions of their source water. Of the people that had knowledge about the source of their drinking water, 82.1% rated their source water quality excellent or good, while 17.9% rated their source water fair or poor. Of the people that did not know about their water source, 51.1% felt their source water was excellent or good, while 24.4% felt their source water was fair or poor. An additional 24.4% did not know where their water came from and therefore could not answer the question. This shows that a positive relationship between knowledge of the source and perceptions of the sources exists, as indicated by Turgeon (2004). (Please see Table and Figure 1)

Table 1: This table shows the relationship between knowledge of the source and perceptions of the water source. Participants that rated their source water as excellent or good had a higher proportion that had knowledge of the source water. Participants that rated their water as fair or poor had a lower proportion that had knowledge of the source water.

Source Water Perceptions	Knowledge of Source	No Knowledge of Source
Excellent/Good	82.1% (101)	51.1% (46)
Fair/Poor	17.9% (22)	24.4% (22)
Don't Know	0% (0)	25.5% (22)
Total	100% 123	100% (90)

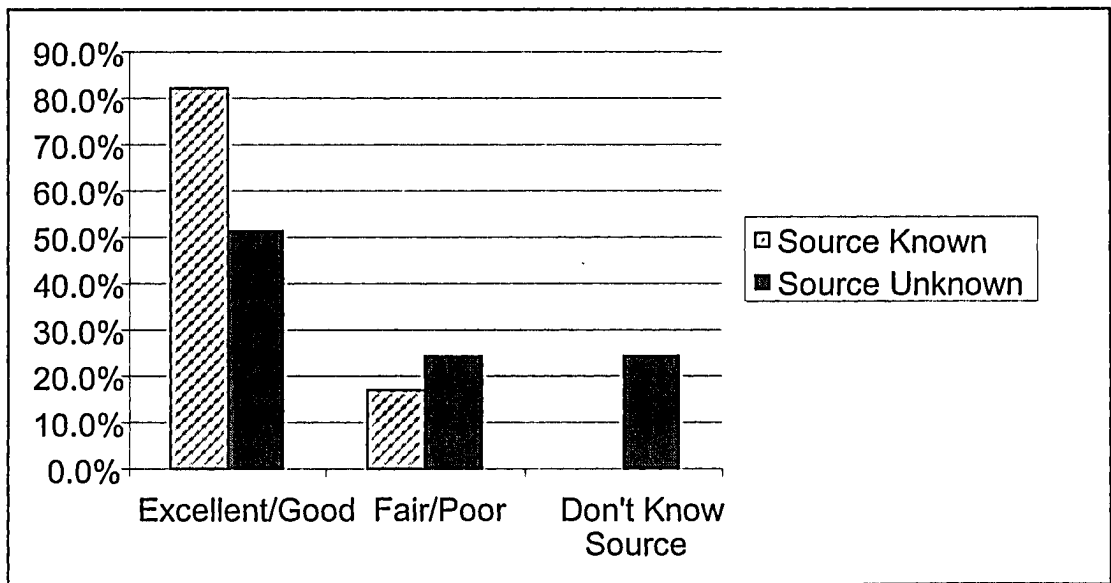


Figure 1: This figure is a graphical representation of the relationship between knowledge of the source and perceptions of the water source.

In order to determine if information given to the public was related to public perceptions of the source, the participants were asked if they remembered receiving any messages about their drinking water (source or tap). A negative relationship between information recollection and source quality perceptions was found. 85.5% of participants did not remember receiving information about their water. Of the participants that did not remember receiving information about their water, 70.9% felt their source water quality was excellent or good, 18.7% felt their

source water quality was fair or poor, and 10.4% indicated that they did not know where their water came from and could not give an answer. Of the participants that remembered receiving information about their drinking water, a slightly smaller proportion, 58.1%, rated their source water quality excellent or good, while a larger proportion, 29.0%, rated their source water quality fair or poor. 12.9% did not know where their water came from and therefore could not give an answer (See Table 2 and Figure 2). These results indicate that the recollection of having received water-related information could be affecting the perceptions of the source water negatively. Literature supports this by stating that the most influential information is often negative and recent (Savadori 2004, White 2005). Therefore, the recollected messages may have been negative and hence left the public with negative perceptions.

Table 2: This table shows the relationship between recollection of information about water and perceptions of the water source. Participants that rated their source water as excellent or good had a higher proportion that did not remember water information. Participants that rated their source water as fair or poor had a higher proportion that remembered water related information.

Source Water Perceptions	Recall Messages	Do Not Recall Messages
Excellent/Good	58.1% (18)	70.9% (129)
Fair/Poor	29.0% (9)	18.7% (34)
Don't Know	12.9% (4)	10.4% (19)
Total	100.0% (31)	100% (182)

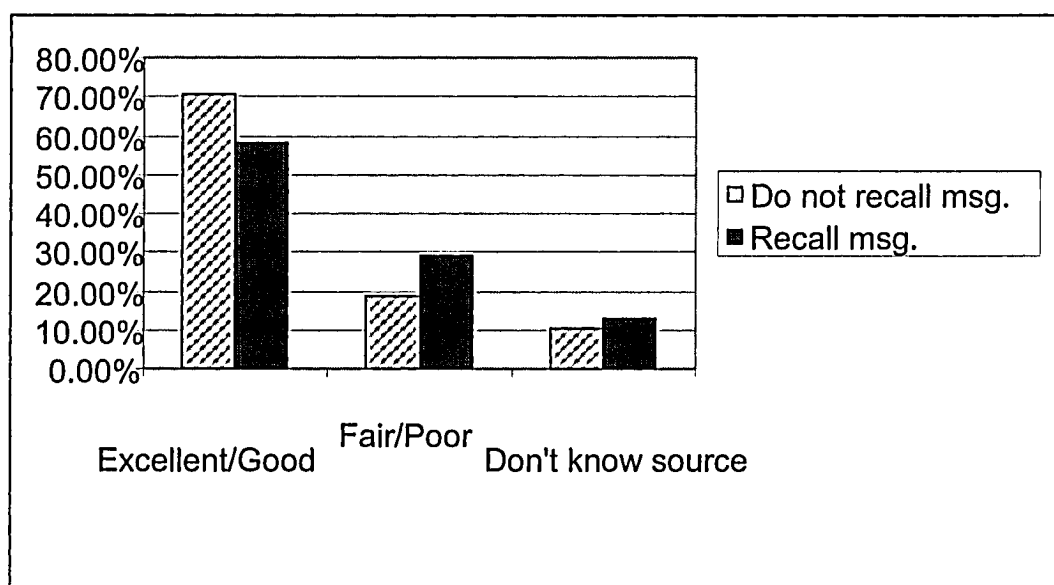


Figure 2: A graphical representation of the relationship between recollection of information about water and perceptions of the water source.

Because the majority of participants, 66.7%, rated their source water as excellent or good, few had specific concerns about quality of the water (43 participants). The participants that rated their source water quality as fair or poor had concerns about: nothing specific, aesthetics (taste, odour and colour), chemical contamination, biological contamination, and chemical and biological contamination. The highest proportion of people indicated that their water source was fair or poor, but had no specific concerns; 55.8%. Next, the participants were most concerned about aesthetics, 23.3%. Together, microbiological and chemical contamination accounted for less than 21% of the concerns. (See Table 5 for summary of results)

Perceptions of Tap Water Quality:

Similar cross tabulations were conducted on the questions that related to tap water quality, source water quality, recollection of drinking water-related information, and specific concerns about tap water quality. Like the perceptions of source water, general perceptions of drinking water were also good. Of all participants interviewed the majority, 69.0% felt that their tap water was excellent (23.9%) or good (45.1%). Cross-tabulations between tap water quality

and source water quality responses revealed that the majority of people interviewed, 57.7%, indicated that both their source water and tap water were excellent or good. Perceptions of source water and perceptions of drinking water appear to have a positive relationship. Of the people that rated their tap water good or excellent, 83.7% rated their source water excellent. Of the people that rated their tap water fair or poor, 50.0% rated their source water quality fair or poor. This shows a strong relationship between knowledge of source and confidence in the quality of the tap water. Some participants did not possess knowledge about their water source. 60.9% of these participants rated their tap water excellent or good. (Please see Table 3 and Figure 3)

Table 3: A tabulated relationship between perceptions of source water and perceptions of source water. Participants that had positive perceptions of their tap water had more positive perceptions of their source water. Participants that had poor perceptions of their tap water had more negative perceptions of their source water.

	Tap: Excellent/Good	Tap: Fair/Poor
Source: Excellent/Good	83.7% (123)	36.4% (24)
Source: Fair/Poor	6.8% (10)	50.0% (33)
Source: Unknown	9.5% (14)	13.6% (9)
Total	100% (147)	100% (66)

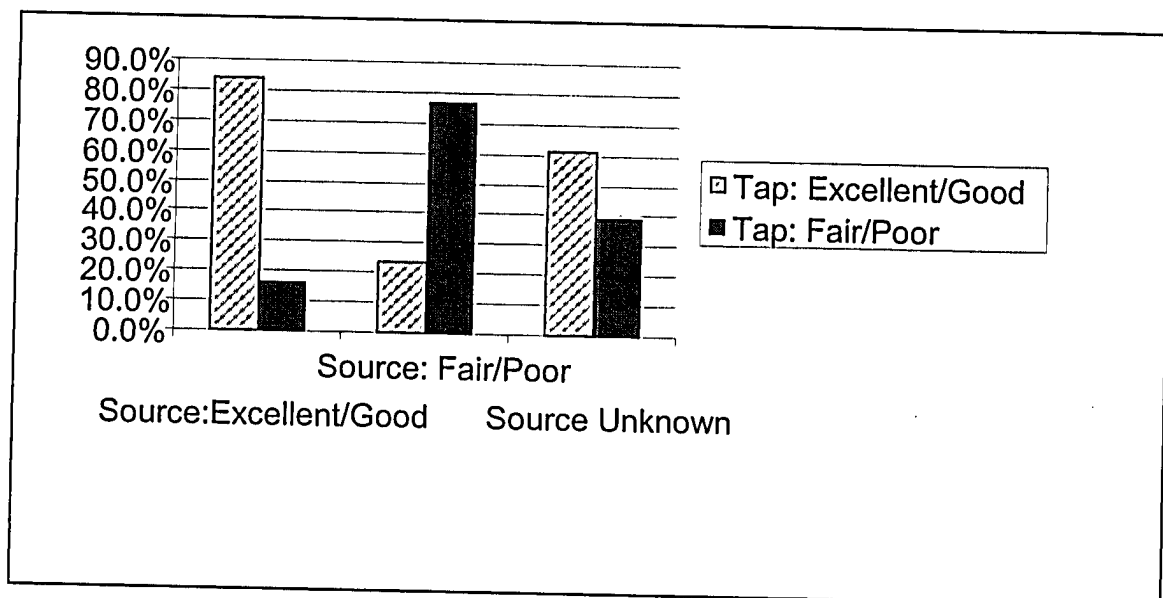


Figure 3: A graphical representation of the relationship between perceptions of source water and perceptions of source water.

The affect of recollection of messages on tap water perceptions was also analyzed. The majority of participants, 60.1% did not remember receiving any messages/information about their water but still felt their tap water was excellent or good. Of the participants that did not recall water related information, 70.3% felt their tap water was excellent or good. Of the participants that recalled having received water related information 61.3% felt their tap water was excellent or good. While these results still show a negative association between the recollection of messages and perceptions of tap water quality, the relationship is not as strong as with source water quality perceptions. (Please see Table 4 and Figure 4)

Table 4: A table describing the relationship between recollection of information about water and tap water perceptions. Participants that had positive perceptions of their drinking water had a lower proportion that recalled messages. Whereas, participants that had poor perceptions of their drinking water had a higher proportion that recalled messages about water.

Tap Water Perceptions	Recalls Messages	Do Not Recall Messages
Excellent/Good	61.3% (19)	70.3% (128)
Fair/Poor	38.7% (12)	29.7% (54)
Total	100% (31)	100% (182)

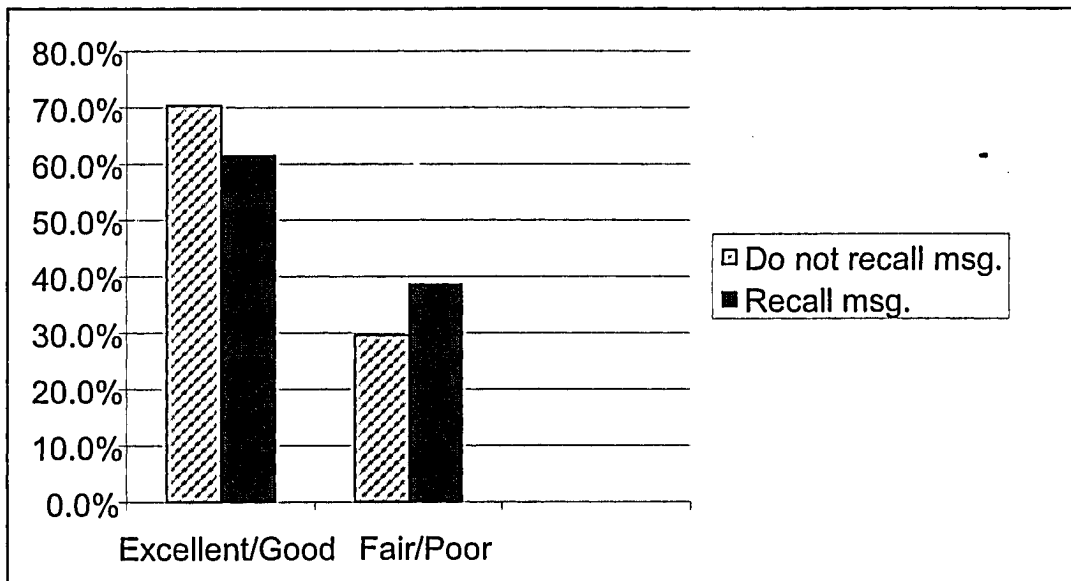


Figure 4: A graphical representation of the relationship between recollection of information about water and tap water perceptions.

Generally, the participants felt that their tap water quality was excellent or good, and therefore did not have specific concerns about the quality of their tap water; 57.8% of the participants. However, the participants that rated their tap water quality fair or poor had the following concerns: aesthetics, addition of chemicals, microbiological contamination, had been affected by a bad experience, rated their tap water quality fair or poor for no reason, chemical addition and microbiological contamination, aesthetics and chemical addition. The predominant concerns were about aesthetics and the addition of chemicals. 49.4% and 24.7% of the participants that rated their water quality fair or poor were concerned about aesthetics and chemicals respectively. An additional 5.6% were concerned about both chemicals and aesthetics. The next highest proportion of participants, 7.9%, with concerns about their water quality could not give a reason. Concerns about biological contamination ranked second lowest at 6.7% with an additional 4.5% being worried about chemicals and biological contamination. One participant indicated that they had become sick because of their tap water. (See Table 5 for a summary of the results)

Perceptions of Tap Water Safety:

Perceptions of tap water safety were determined by asking participants if they had ever been suspicious about the safety of their tap water. 73.7%, the majority of participants, had never been suspicious of their tap water, while 23.0% were occasionally suspicious, and 3.3% were frequently suspicious. Of the participants that were occasionally or frequently suspicious about the safety of their drinking water, the majority rated their water quality as fair or poor, 58.9%. The remaining 41.1% felt that their tap water was excellent or good. This suggests that water quality and safety are distinct components of water perceptions. This is supported by the following results from the analysis conducted on specific concerns and water safety. Of the participants that were suspicious about their tap water, the largest group was concerned about microbiological contamination, 39.3%. 19.7% were concerns about chemicals added to water. An additional 8.2% were worried about microbiologicals and chemicals. This was followed by 18.1% of the participants not being able to give a reason for their suspicion, 13.1% that were concerned about aesthetics and 1.6% that were concerned about chemicals and aesthetics. A small group of people (4) indicated that they had never been suspicious; however, they were occasionally concerned about microbiologicals and/or aesthetics. (See Table 5 for a summary of the results)

Table 5: This table compares the specific concerns about source water quality, tap water quality and tap water safety. The highest proportion of people that were concerned about their source water could not give a reason for their concerns. The second highest area of concern was aesthetics. Participants were most concerned about aesthetics and chemicals affecting their tap water quality. Participants were most concerned about biological and chemical contamination with respect to their tap water safety.

Specific Concerns	Source Water Quality	Tap Water Quality	Tap Water Safety
Aesthetics	23.3% (10)	49.4% (44)	13.1% (8)
Chemical	2.3% (1)	24.7% (22)	19.7% (12)
Aesthetics and Chemical	NS*	5.6% (5)	1.6% (1)
Biological	16.3% (7)	6.7% (6)	39.3% (24)
Biological and Chemical	2.3% (1)	4.5% (4)	8.2% (5)
No Reason	55.8% (24)	7.9% (7)	18.1% (11)
Negative Experience	NS	1.2% (1)	NS
Total	100% (43)	100% (89)	100% (61)

*concern not stated for this question

Trust:

The three determinants of trust that were tested were expertise, information accuracy and honesty. It was found that the participants generally trusted local authorities over the province, media and private water suppliers. 62.4% of the participants felt that their local water providers had the most expertise in providing safe drinking water. A significantly smaller proportion of the participants felt that private water suppliers and the province of Ontario had the most expertise, 17.8% and 16.9% respectively. A few participants felt that they could not answer the question, 1.9%, while the remaining participants felt that no one had expertise, 0.9%. Analysis done on the authority felt to have the least expertise shows that private water suppliers ranked the highest at 53.5%. 36.2% of the participants felt that the provincial government had the least expertise and 5.2% felt that the local water providers had the least expertise. These results were

essentially duplicated for the other two determinants of trust that were tested. The majority of the participants felt that the public health department or public works department would provide them with the most accurate information, 61.0% and 23.9% respectively. Additionally, the majority felt that the media, 50.2%, and the province, 35.7%, would provide the least accurate information. 67.6% and 20.2% felt that their Public Health and Public Works Departments were most honest, while 48.8% and 37.6% felt the media and the province were the least honest. (See Table 10 for a summary of the results)

Cross-tabulations were conducted in order to correlate trust with water quality and water safety perceptions. Participants with positive perceptions of their water tended to have higher levels of trust in their local government officials. Of the participants that rated their water quality excellent or good, 71.4% thought their local providers had the most expertise. 15.6% thought that the province had the most expertise and 11.6% thought that private water suppliers had the most expertise. 62.6% of these participants felt that their public health department would provide them with accurate information, followed by 28.6% which felt that their public works department would provide them with the most accurate information. 5.4% thought that the province would provide them with the most accurate information and 2.7% felt that the media would provide them with most accurate information. A large number of the participants, 69.4%, who rated their tap water excellent or good, felt that the public health department was most honest. This was followed by the 23.1% of the participants who felt that the public works department was the most honest. The province and the media were only thought to be the most honest by 3.4% and 2.7% of the participants that had good perceptions about their drinking water. (see Table 6 and Figure 5 for summary of the results)

Table 6: This table depicts which authority is trusted the most by participants who felt their water quality was excellent or good. The Public Health Department and Public Works Department were thought to have the most expertise, be the most accurate and most honest. The province, the media and private water suppliers were trusted the most by a maximum of 15% of the participants.

	Most Expertise	Most Accuracy	Most Honest
Public Health	NA	62.6%	69.4%
		(92)	102
Public Works	71.4%	28.6%	23.1%
	(105)	(42)	(34)
Province	15.6%	5.4%	2.7%
	(23)	(8)	(4)
Media	NA	2.7%	3.4%
		(4)	(5)
Water Suppliers	11.6%	NA	NA
	(17)		
Don't Know	1.4%	0%	0%
	(2)	(0)	(0)
Neither	0%	0.7%	1.4%
	(0)	(1)	(2)
Total	100%	100%	100%
	147	(147)	147

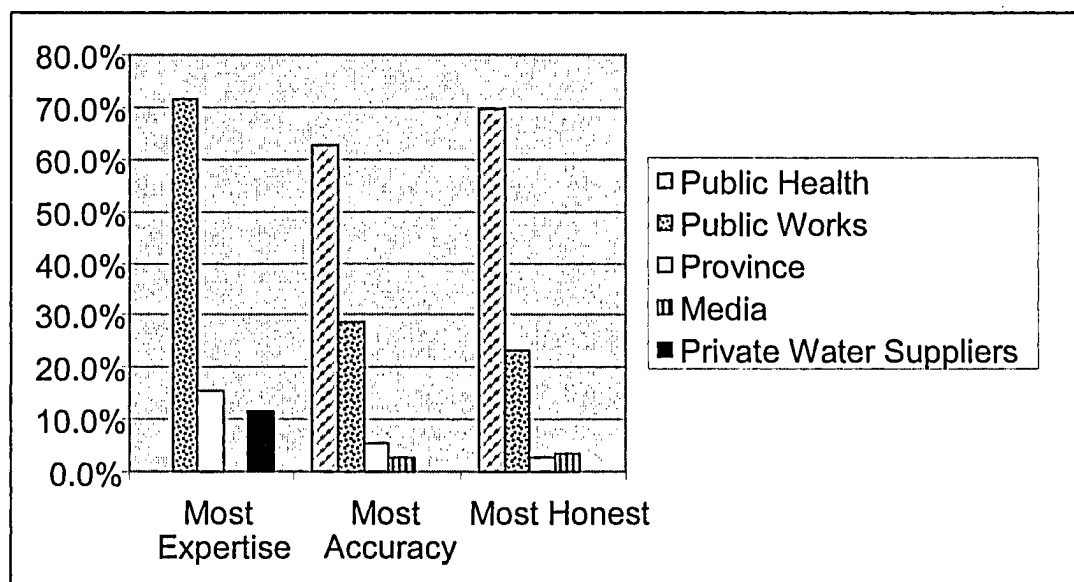


Figure 5: This figure depicts which authority is trusted the most by participants who felt their water quality was excellent or good.

Cross-tabulations were also done on participants who thought their tap water was fair or poor. Confidence in the expertise of the Public Works Department dropped to from 71.4% to 42.2%. Confidence in the expertise of the province and private water supplier increased from 15.6% to 19.7% and 11.6% to 31.8% respectively. Confidence in the accuracy of information provided by local government also dropped with negative perceptions of water quality. The confidence in the accuracy of the public health department and public works department dropped from 62.6% to 57.6% and 28.6% to 13.6% respectively. Confidence in the accuracy of the province dropped slightly from 5.4% to 4.5%. Confidence in the accuracy of the media increased from 2.7% to 16.7%. This same trend was seen in participant's perceptions of honesty. Confidence in the honesty of the Public Health and Public Works Departments dropped from 69.4% to 62.6% and 23.1% to 13.6% respectively. Confidence in the honesty of the media and province increased from 3.4% to 13.6% and 2.7% to 3.0% respectively. These numbers show a possible relationship between perceptions of water quality and trust. When people felt positively about their water source they tended to trust the public works and public health departments the most. The participants still trusted the Public Health Department the most even when their perceptions of water quality were poor. However, a smaller proportion trusted public works the most, while a larger proportion tended to trust the media.

A cross-tabulation conducted between participants with fair or poor perceptions of their water and the authorities they trusted the least supports the above-results. Of these participants 42.4% and 45.5% felt that the province and private water suppliers had the least expertise. While only 4.6% felt that the local providers had the least expertise. 40.9% and 34.8% felt that media and province provided the least accurate information, while 9.1% felt that the public works department provided the least accurate information. Finally, 43.9% and 28.8% felt that

the media and province were the least honest, while 12.1% felt that the public works department was the least honest. (Please see Table 7 and Figure 6)

Table 7: This table depicts which authority is trusted the least by participants that felt their drinking water quality was fair or poor. The province, the media and private water suppliers were trusted the least. A maximum of 12% of the participants felt the Public Works and Public Health Departments should be trusted the least.

	Least Expertise	Least Accurate	Least Honest
Public Health	NA	0%	0%
		(0)	(0)
Public Works	4.6%	7.6%	10.6%
	(3)	(5)	(7)
Province	42.4%	34.8%	28.8%
	(28)	(23)	(19)
Media	NA	40.9%	43.9%
		(27)	(29)
Private Water Supplier	45.4%	NA	NA
	(30)		
Don't Know	4.5%	7.6%	4.6%
	(3)	(5)	(3)
None	3.0%	9.1%	12.1%
	(2)	(6)	(8)
Total	100%	100%	100%
	(66)	(66)	(66)

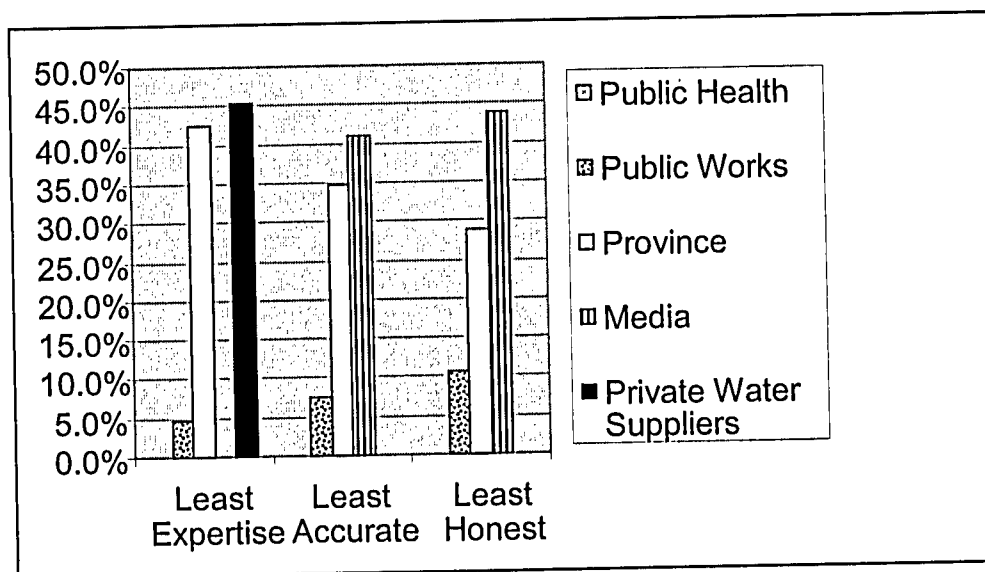


Figure 6: This figure depicts which authority is trusted the least by participants that felt their drinking water quality was fair or poor.

The relationship between trust and safety perceptions was also analyzed. Like the participants with positive perceptions of water quality, those with positive perceptions of water

safety trusted their local government officials the most. Of the people that had never been suspicious about their water, the majority, 68.2%, felt that the public works department had the most expertise, 15.9% felt that private water suppliers had the most expertise and 14.0% felt that the province had the most expertise. Most of this subset of the participants, 61.8%, felt that the public health department would give them the most accurate information. 29.3% felt that the public works department would give the most accurate information, while 2.5% thought the media would give the most accurate information and 5.7% thought that the province would provide the most accurate information. 68.2% felt that the public health department was the most honest. This was followed by the public works department at 24.2%. 3.8% felt the media was most honest and 1.9% felt that the province was the most honest. These results show a strong relationship between drinking water safety perceptions and trust in the local public health and public works department. (See Table 8 and Figure 7 for a summary of the results)

Table 8: This table depicts the authority that is trusted the most by participants who were never suspicious about their drinking water. The Public Health and Public Works Departments are most highly trusted. The province, the media and private water suppliers are trusted the least.

	Most Expertise	Most Accurate	Most Honest
Public Health	NA	61.8% (97)	68.2% (107)
Public Works	68.2% (107)	29.3% (46)	24.2% (38)
Province	14.0% (22)	5.7% (9)	1.9% (3)
Media	NA	2.5% (4)	3.8% (6)
Private	15.9% (25)	NA	NA
Don't Know	1.9% (3)	0% (0)	0% (0)
None	0% (0)	0.7% (1)	1.9% (3)
Total	100% (157)	100% (157)	100% (157)

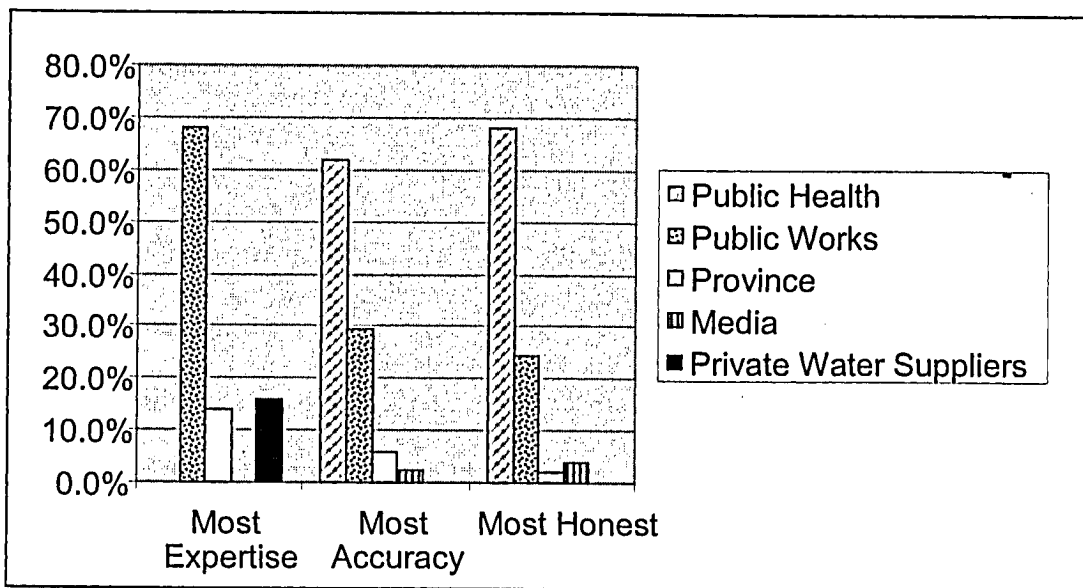


Figure 7: This figure depicts the authority that is trusted the most by participants who were never suspicious about their drinking water.

The presence of a relationship between perceptions of safety and trust was found when cross-tabulations were conducted on participants who were suspicious about their drinking water. Confidence in expertise dropped from 68.2% to 46.4% for the Public Works Department. Confidence in expertise increased for the province and the private water suppliers from 14.0% to 25% and 15.9% and 23.2% respectively. The suspicious participants were also less confident in the accuracy of the information provided by the public health and public works departments. The percentage that trusted them the most dropped from 61.8% to 59% and 29.3% to 8.9% respectively. The confidence in the accuracy of the province also dropped from 5.7% to 3.6%, while the confidence in the accuracy of the media increased from 2.5% to 19.6%. Once again this same trend was seen in the honesty category. Confidence in the honesty of the public health and public works departments dropped from 68.2% to 66.1% and 24.2% to 8.9% respectively. Confidence in the honesty of the media and province increased from 3.8% to 14.3% and 1.9% to 5.4% respectively. Once again, although trust was still high for the public health department

there was a large decrease in the trustworthiness of the public works department and a large increase in trust in the media.

These findings were supported by cross-tabulations between the participants that were suspicious about their water safety and the authority that the participants trusted the least. Of the people that had been suspicious, 44.6% felt that private water suppliers had the least expertise. 35.7% felt that the province had the least expertise. Only 12.5% felt that the public works department had the least expertise. A large proportion of the suspicious subset thought that the media and the province would provide the least accurate information, 33.9% and 39.3% respectively. While only 10.7% felt that the public works department would provide the least accurate information. 33.9% and 39.3% felt that the media and the province were the least honest. 12.5% thought that the public works department was the least honest. These results show a relationship between suspicion and trust. Those that are suspicious about their water tend to have low levels of trust in private water suppliers, the media and the province and lower levels of trust in the local government. These findings show that trust that is built locally tends to remain local; it does not change the public's perceptions about outside drinking water authorities.

Table 9: This table depicts the authority that is trusted the least by participants who were suspicious. The province, the media and private water suppliers were all trusted the least, while only a small proportion of the participants thought that the Public Health and Public Works Departments could be trusted the least.

	Least Expertise	Least Accurate	Least Honest-
Public Health	NA (0)	0% (0)	0% (0)
Public Works	12.5% (7)	8.9 (5)	12.5% (7)
Province	35.7% (20)	39.3% (22)	32.1% (18)
Media	NA (20)	33.9% (19)	39.3% (22)
Private	44.6% (25)	NA	NA
Don't Know	3.6% (2)	7.2% (4)	3.6% (2)
None	3.6% (2)	10.7% (6)	12.5% (7)
Total	100% (56)	100% (56)	100% (56)

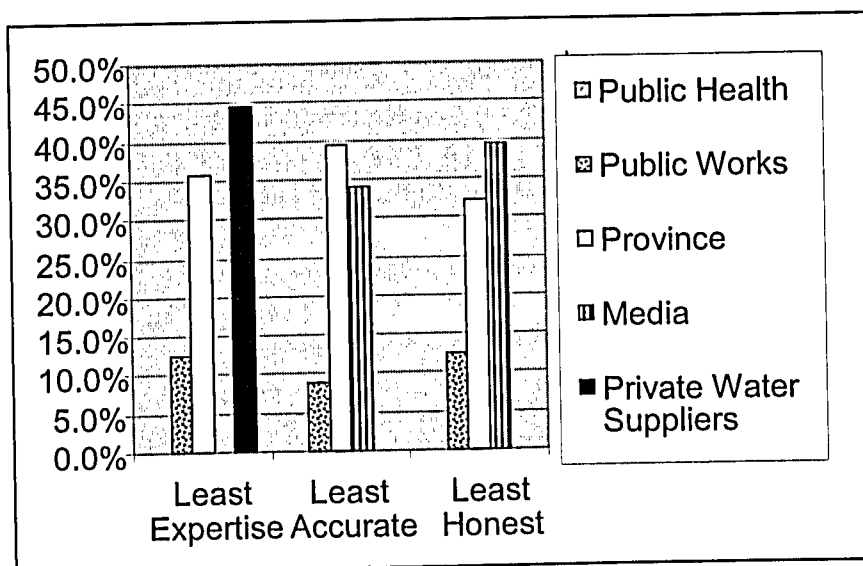


Figure 8: This figure depicts the authority that is trusted the least by participants who were suspicious.

Table 10: This table compares different water authorities and their rankings for expertise, accuracy and honesty. The Public Works Department was thought to have the most expertise while the private water suppliers were thought to have the least expertise. The Public Health Department was thought to be the most accurate while the media was thought to be the least accurate. The Public Health Department was thought to be the most honesty while the media was thought to be the least honest.

	Expertise		Accuracy		Honesty	
	Most	Least	Most	Least	Most	Least
Public Health	NA	NA	61.0% (130)	0% (0)	67.6% (144)	0% (0)
Public Works	62.4% (133)	5.2% (11)	23.9% (51)	3.8% (14)	20.2% (43)	5.6% (12)
Province	16.9% (36)	36.2% (77)	5.2% (11)	35.7% (76)	2.8% (6)	37.6% (80)
Media	NA	NA	7.0% (15)	50.2% (107)	6.6% (14)	48.8% (104)
Private Water Suppliers	17.8% (38)	53.5% (114)	NA	NA	NA	NA
Don't Know	1.9% (4)	3.3% (7)	1.45% (3)	3.8% (8)	0.5% (1)	2.3% (5)
None	1.0% (2)	1.8% (4)	1.45% (3)	3.8% (8)	2.3% (5)	5.6% (12)
Total	100% (213)	100% (213)	100% (213)	100% (213)	100% (213)	100% (213)

Communication Needs:

The reported information needs of the community were apparent with respect to the type of information and the dissemination method. 60.6% of the people interviewed wanted information in the form of regular reports. 28.2% wanted exact information about their drinking water. Only 5.2% of the participants wanted more general information indicating whether the water quality was above or below provincial standards. The remainder of the participants wanted a combination of the possible types of communications. The majority of participants (54.9%) also wanted to be communicated with directly. 29.6% wanted to be able to access the information themselves and 12.2% wanted to be informed through the media. The remainder of

the participants wanted a combination of communication methods³. It is clear that most participants wanted information in the form of regular reports sent directly to them via mail or email. This is confirmed by the cross tabulation results. When information type was cross-tabulated with dissemination method 34.4%, the highest percentage of participants, wanted regular reports and wanted information sent to them directly. The next highest percentage, 17.8%, consisted of participants that wanted regular reports that they could access themselves⁴ (See Table 11 for a summary). These findings are interesting on two levels. Firstly, when combined with the previous results regarding trust it is apparent that even though the community members trust the local government, they still need more information. The combination of high levels of trust and yet the need for more information signals presence of critical trust; a general trust in local authorities with the presence of skepticism. Secondly, if we refer back to Johnson (2003) and Meyer-Emericks (2006) works about the use of CCRs in the United States, it was apparent that very few people actually read direct communications. Additionally, the CCRs were not very effective. Therefore, the study community residents may simply be asking for information because they possess latent skepticism and the option was given to them.

³ The percentage of participants that wanted a combination of communication type of dissemination method were minimal and therefore are not reported.

⁴ Other than the 34.4% and the 17.8%, the results of the type x method cross-tabulations yielded values of less than 6%.

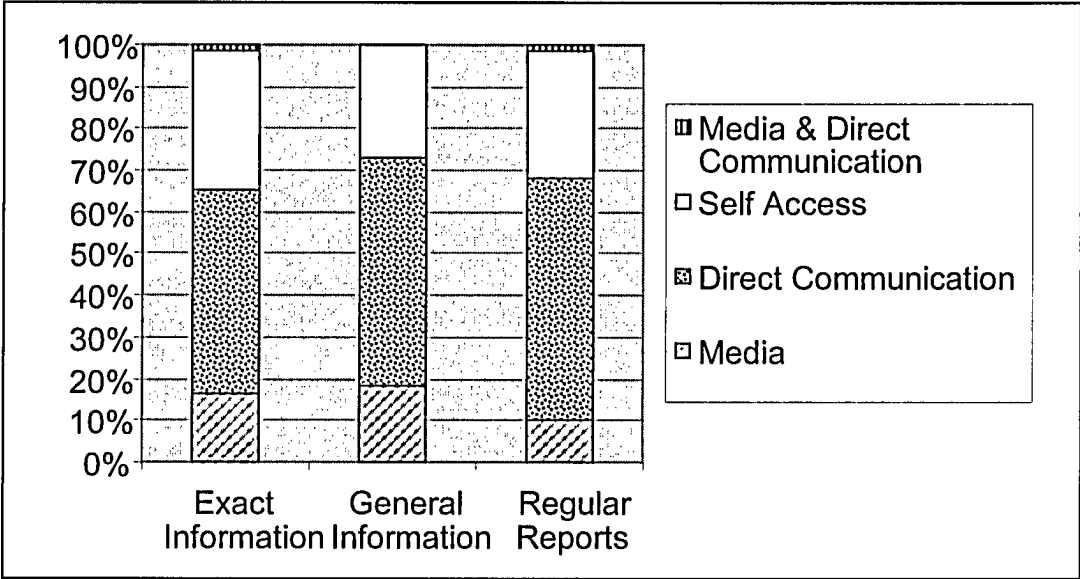


Figure 9: The data presented below indicates that very few people want information from the media. Most want to receive information in the form of a direct communication or self-access. This trend is consistent between participants with preferences about information type.

Results concerning the frequency of communications were slightly more ambiguous. The largest percentage of people, 36.2%, only wanted information when negative results were obtained. This was closely followed by participants who wanted information monthly and immediately, 30.0% and 20.2% respectively. The smallest proportion of participants wanted information on a yearly basis, 13.6%. Due to the ambiguous nature of these proportions, the cross tabulations did not yield conclusive results. The proportions were more evenly spread throughout the table. The largest proportion of participants, 21.1%, wanted regular reports monthly. 16.9% wanted regular reports only when negative results had been obtained. 13.6% wanted exact information only when negative results were obtained and 12.2% wanted regular reports immediately. (See table 11 for a summary)

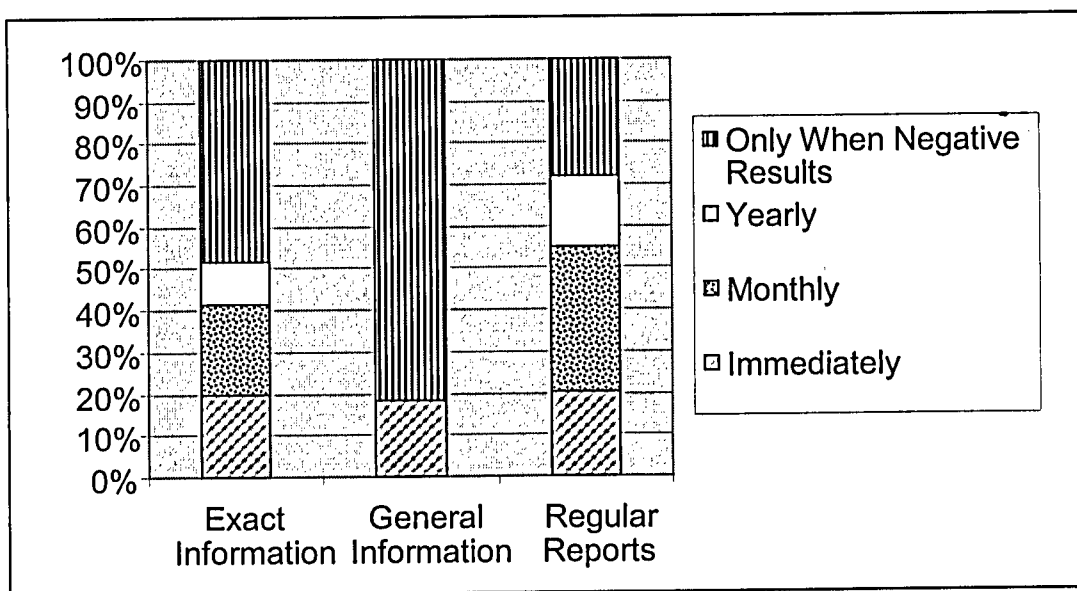


Figure 10: This figure shows compares the type of information the public wants with the frequency with which they want it. The majority of people want information only when negative results are obtained and the smallest proportion want information yearly. The people that want regular reports show less of a preference for information frequency. The people that want general information prefer to receive information when negative results are obtained. This is similar to the participants that want exact information.

Table 11: A summary of the communication needs expressed, in percentage, by the participants. Regular reports are highly preferred, as is direct communication. Weaker trends are seen regarding information frequency needs.

Information Type	Exact	28.2% (60)
	General	5.2% (11)
	Regular Reports	60.6% (129)
	Combination of Above Choices	6.1% (13)
	Total	100% 213
Information Frequency	Only When Negative Results Obtained	36.2% (77)
	Immediately	20.2% (43)
	Monthly	30.0% (64)
	Yearly	13.6% (29)
	Total	100% 213
Dissemination Method	Media	12.2% (26)
	Direct Communication	54.9% (117)
	Self Access	29.6% (63)
	Combination of Above Choices	3.3% (7)
	Total	100% (213)

Informational needs were cross-tabulated with safety perceptions in order to assess whether perceptions of safety were related to communication needs. Generally, people that had suspicions about their drinking water wanted information in the form of regular reports and wanted information immediately or monthly. This is shown by cross tabulation results that indicate that 75% of suspicious participants wanted regular reports while only 55.4% of non-suspicious participants wanted regular reports (see Table 12 and Figure 11 for a summary).

33.9% and 48.2% of suspicious participants wanted immediate or monthly information, while only 15.5% and 23.6% of non-suspicious participant wanted immediate or monthly information (see Table 13 and Figure 12 for a summary). Suspicious people also wanted direct communication methods. However this did not differ significantly from the needs of non-suspicious people, 51.8% v 56.1%. The next highest proportion was also similar for suspicious and non-suspicious; 32.1% and 28.7% wanted to be able to access the information themselves. (see Table 14 and Figure 13 for a summary)

Table 12: This table compares the type of information participants want with their perceptions of water safety. More participants that were not suspicious want exact information. More participants that were suspicious want regular reports. No suspicious participants want general information. Only a small number of participants want a combination of all three types, or exact information and regular reports.

	Suspicious	Not Suspicious
Exact Information	21.4% (12)	30.6% (48)
General Information	0% (0)	7.0% (11)
Regular Reports	75.0% (42)	55.4% (87)
Exact Information + Regular Reports	1.8% (1)	5.1% (8)
All of the Above	1.8% (1)	1.9% (3)
Total	100% 56	100% 157

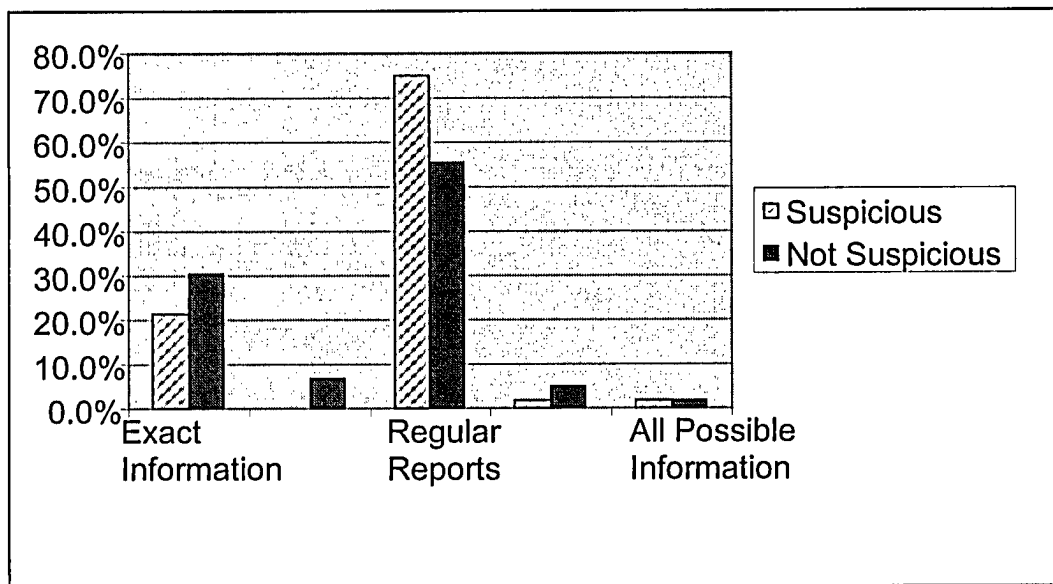


Figure 11: This figure compares the type of information participants want with their perceptions of water safety.

Table 13: This table compares the information frequency preferences of participants that were suspicious to those that were not suspicious. The majority of participants that only wanted information when negative results were obtained were not suspicious. Most suspicious participants wanted information immediately or monthly. A small number of participants wanted information yearly.

	Suspicious	Not Suspicious
Immediately	33.9% (19)	15.3% (24)
Monthly	48.2% (27)	23.6% (37)
Yearly	10.7% (6)	14.6% (23)
Only when Negative Results	7.1% (4)	46.5% (73)
Total	100% 56	100% 157

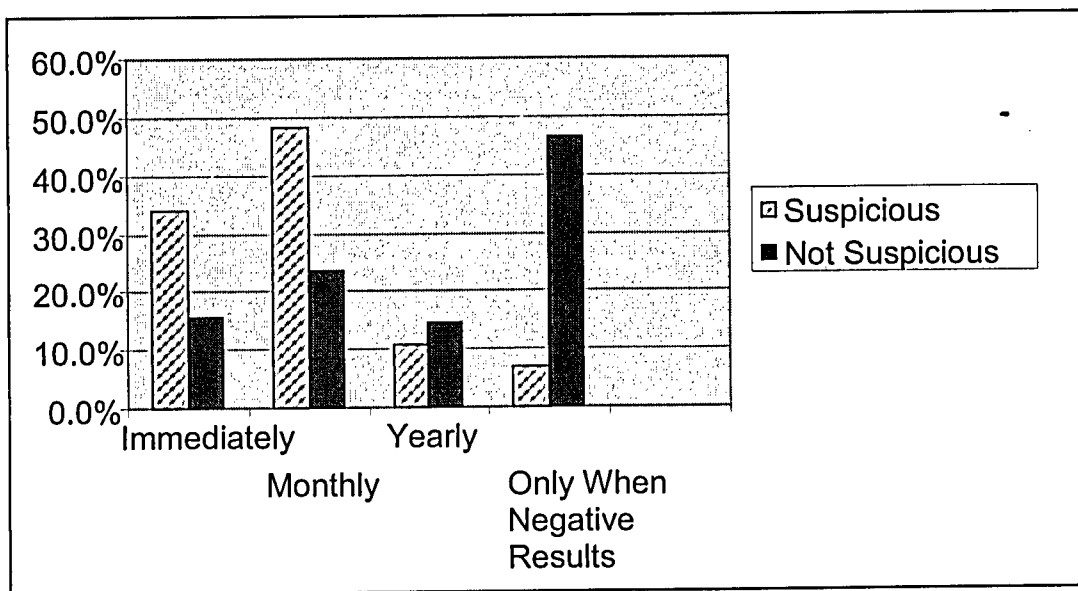


Figure 12: This figure compares the information frequency preferences of participants that were suspicious to those that were not suspicious.

Table 14: This table compares the preferred method of communication for suspicious and non suspicious participants. Suspicion does not seem to have a significant effect on method of communication preference. Those who are suspicious have a slight preference for self-access information. Those who are not suspicious had a slight preference for direct communication or the media. Direct communication is overwhelmingly preferred by all participants.

	Suspicious	Not Suspicious
Media	8.9% (5)	13.4% (21)
Direct Communication	51.8% (29)	56.1% (88)
Self-Access	32.1% (18)	28.7% (45)
Media + Direct Communication	1.8% (1)	1.3% (2)
Direct Communication + Self Access	3.6% (2)	0.5% (1)
All Options	1.8% (1)	0% (0)
Total	100% (56)	100% (157)

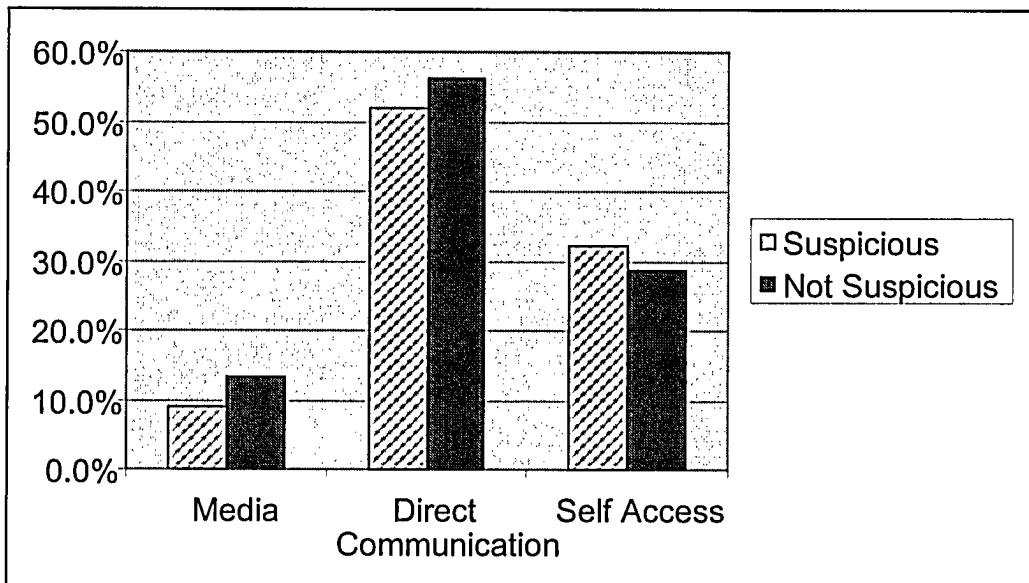


Figure 13: This figure compares the preferred method of communication between suspicious and non suspicious participants.

Water Use Habits:

Water use habits were assessed. Participants that had positive perceptions about their drinking water tended to consume their tap water more frequently. 67.1% of participants drank their tap water all the time or frequently. Of the participants that felt their tap water quality was excellent or good, 82.3% drank their tap water all the time or frequently. Of the people that felt their tap water was fair or poor, 33.3% drank their tap water all the time or frequently (see Table 15 and Figure 14 for a summary or results). This trend was mimicked when tap water consumption was cross tabulated with safety perceptions. 72.6% of people that have never been suspicious about their drinking water drink their tap water all the time or frequently, while only 51.8% of suspicious people do this (see Table 16 and Figure 15 for a summary of results). This suggests that negative perceptions of quality and safety will lead to reduced consumption of tap water.

Table 15: This table compares perceptions of drinking water quality to drinking water habits. A larger proportion of participants who rated their drinking water excellent or good drink their tap water all the time or frequently. A larger proportion of participants who rated their drinking water fair or poor drink their tap water occasionally or never.

	Excellent/Good	Fair/Poor
All the Time/Frequently	82.3% (121)	33.3% (22)
Occasionally/Never	17.7% (26)	66.7% (44)
Total	100% (147)	100% (66)

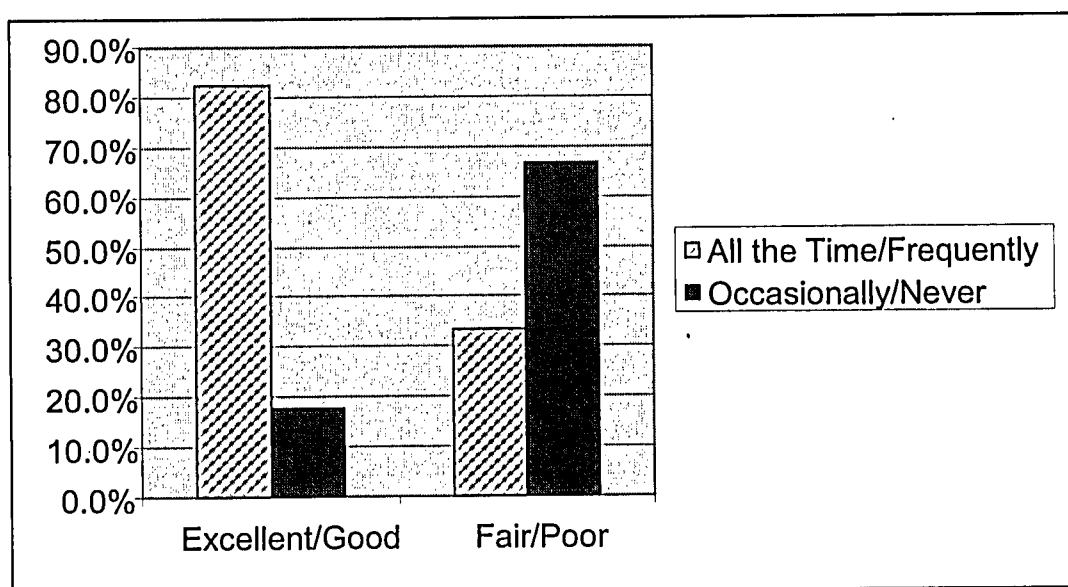


Figure 14: This figure compares perceptions of drinking water quality to drinking water habits.

Table 16: This table depicts the drinking water habits of participants that were suspicious and those that were not suspicious about their drinking water safety. Participants that were suspicious showed very little distinction between their drinking water habits. About the same proportion drank their water all the time or frequently as those that occasionally or never drank their water. A larger proportion of people that were not suspicious drank their water all the time or frequently.

	Suspicious	Not Suspicious
All the Time/Frequently	51.8% (29)	72.6% (114)
Occasionally/Never	48.2% (27)	27.4% (43)
Total	100% (56)	100% (157)

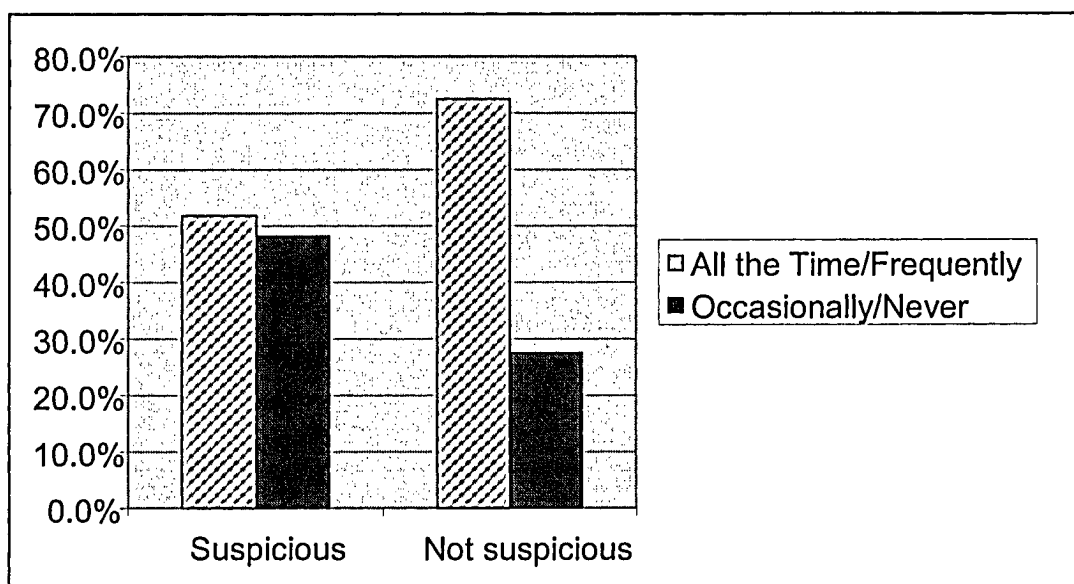


Figure 15: This figure depicts the drinking water habits of participants that were suspicious and those that were not suspicious about their drinking water safety.

Habits regarding the use of purifiers and alternative water sources were not intentionally sought during the interviews. However, their use was noted every time a participant so indicated. 72.4% of participants never indicated the use of an alternative source. 13.1% indicated they used alternative methods. 12.7% indicated they never drank their tap water and therefore it was assumed they must use alternative methods. Participants with poor perceptions of water quality or water safety tended to use purifiers more. 51.5% of participants who felt their tap water quality was fair or poor used purifiers or alternative methods, whereas 14.3% of people that felt their water quality was excellent or good used purifiers or alternative methods. 37.5% of people that had suspicious about their water safety used purifiers or alternative methods, whereas only 21.7% of people that had never been suspicious about their water safety use alternative methods.

8.2 Local Government Interviews

An overview of the community communication efforts confirmed the supposition that the study community has made substantial attempts with respect to communication efforts.

Community members can obtain information about their drinking water regularly from various sources including: a public website, televised council decisions and by directly communicating with the Public Works, Public Health, or the Community Planning Departments. The public website is designed to provide a large amount of information. The public can find drinking water reports and summaries which review both the annual water quality results and the non-compliance issues within the past year. The website also provides links to drinking water related regulations, drinking water programs and initiatives, and studies and reports conducted by the community concerning drinking and source water. In addition to the website, the public works, public health and community planning departments use the media, open houses and public meetings to address specific water related issues such as the extension of the water system. Direct contact is also used as a communication tool for more urgent matters. During the blackout of 2003, BWAs were handed out door-to-door. During the Class Environmental Assessment for the extension of the study community's water system, the residents that were going to be directly affected were mailed notices and invited to community meetings. Less frequently, information days were organized in order to establish awareness. These included an Emergency Response Day and the Children's Water Festival.

The method of communication and the type of information provided has already been shown to be quite important to the community. For this reason the communications were categorized by communication type and communication method. It was found that source water communications were more prevalent than drinking water quality information, health information and public interest information. However, the source water information tended to be disseminated more passively through the website. Public interest communications such as those concerning rate changes, water use, and extension of the water system were the second most

prevalent. These messages were disseminated more actively using channels such as the media, direct communication and public meetings. Drinking water quality information was the third most prevalent type of communication. Information about drinking water quality was disseminated passively except for three instances; the BWA during the blackout, when the water system was being flushed, and the Children’s Water festival. Lastly, the least prevalent type of information was health information relating to water. This information tended to be provided to residents who obtain their drinking water from private wells. The information was actively disseminated, if a resident chose to contact the Department of Public Health. However, private wells systems are beyond the scope of this project. For a full list and description of the categorized communication efforts, please see below. For a more complete list please see Appendix A.

Table 17: This table highlights the communication efforts made by the local government regarding drinking water and source water. The information is categorized by the source of the information.

Local Government Interviews	County Website
Televised Information	Drinking Water Related Regulations/By-Laws
Open Houses	Drinking Water Notices
Public Meetings	Drinking Water Tenders
Media	Drinking Water Programs and Resources
Direct Contact	Provincial Drinking Water Initiatives
Information Days	Ground Water Information and Descriptions
Requested Information	Drinking Water Studies and Reports
Ground Water Projection Study: Public Consultation Report	Annual Report
Annual Report	
Private Well Information	
Report to Council	

Table 18: This table highlights the communication efforts made by the local government regarding drinking water and source water. The information is categorized by information type

Drinking Water Quality Information	Source Water Quality Information	Health Information	Public Interest
Boil Water Advisories	Land-use decisions (televised, reported to council and community meetings)	Private Well Information	Water Rate Change meetings
System flushing notices	Ground Water Projection Study (Phase I and II)		Class Environmental Assessment meeting for extension of the water system
Children's Water Festival	Environmental Farm Plan		Notices for water conservation
Annual Report	Ground Water Videos		Emergency Response Days
	Provincial Initiatives regarding source water protection		Requested Information
	Descriptions of groundwater		Drinking water related regulations
	Ground Water Protection Case Study: Provincial Initiative		

Table 19: This table highlights the communication efforts made by the local government regarding drinking water and source water. The information is categorized by dissemination method.

Consultative Communications	Active Dissemination	Passive Dissemination
Open Houses	Media: notices for public meetings, BWAs, water conservation notices, system flush notices	Televised Information
Public Meetings	Direct Contact: letters and phone calls to people directly affected by a water system change, BWA	Annual Report
Ground Water Projection Study: Phase II	Information Days	Private Well Information
	Requested Information	Reports to Council
	Private Well Information	Drinking Water Related Regulations
		Drinking Water Programs and Resources
		Provincial Initiatives
		Groundwater Descriptions
		Studies and Reports

8.3 Studying the Gap

The results from assessing the potential gap between the communication needs of the community and the efforts of the local government indicated that the gap is not exceptionally large. Each effort on the part of the local government shows that they are, in some way, meeting the needs of the community. The gap is most apparent in the way in which water information is disseminated. The drinking water quality reports are posted annually, as directed by O.Reg. 170. They are posted on the website and available to the public through the Public Works Department. Community members stated that they would rather have this type of information either on a monthly basis or only when negative results were obtained. Additionally, they stated that they would rather have a direct communication as opposed to a document they had to access themselves. Other gaps included the use of the media as an informational tool and the low

prevalence of direct communications. The media were clearly the least preferred means of receiving information. However, in the case of the study community, the media were predominantly used to inform the public of informational sessions. The low prevalence of direct communications is understandable because it is a very costly activity. Direct communication was only used when necessary in order to avoid large costs on the part of the community.

Table 20: This table highlights the areas in which the Local Government is not meeting the communication needs of the residents. Small gaps between communication efforts and communication needs are present. The largest gap concerns the dissemination method. A large number of community members indicated they would like to be contacted directly about their drinking water. The local government only uses this type of dissemination method during emergency situations or if the residents are going to be personally affected.

Efforts of the Local Government	Needs of Community Met	Gaps
Website: providing information about regulation, annual reports, programs, initiatives, studies and reports	<ul style="list-style-type: none"> • Specific information about water quality • Regular reports 	<ul style="list-style-type: none"> • Reported annually (residents would rather receive this monthly or only when negative results are obtained) • Self-Access (residents would rather have direct communication)
Open Houses	<ul style="list-style-type: none"> • Direct Communication 	
Public Meetings	<ul style="list-style-type: none"> • Direct Communication 	
Media	<ul style="list-style-type: none"> • Used to notify public of open houses and meetings • Good emergency response tool 	<ul style="list-style-type: none"> • Media communication was the least favourite method (residents would have preferred direct communication)
Direct Contact	<ul style="list-style-type: none"> • Direct Communication 	<ul style="list-style-type: none"> • Only used as an emergency response tool (except in the case of the Class EA)
Information Days	<ul style="list-style-type: none"> • Direct Communication 	
Requested Information	<ul style="list-style-type: none"> • Direct 	

	Communication	
Ground Water Projection Study	<ul style="list-style-type: none"> • Direct Communication 	
Annual Report	<ul style="list-style-type: none"> • Specific Information 	<ul style="list-style-type: none"> • Reported annually (residents would rather receive this monthly or only when negative results are obtained) • Self-Access (residents would rather have direct communication)
Reports to Council	<ul style="list-style-type: none"> • Provides community with information about decisions that affect them 	<ul style="list-style-type: none"> • Not direct communication
Televised Information	<ul style="list-style-type: none"> • Provides community with information about decisions that affect them 	<ul style="list-style-type: none"> • Not direct communication

In conclusion, the results of this research show that the study community has relatively good perceptions of their drinking water, and high levels of trust in their local government. The local government provides the residents with a wide variety of information about their drinking water and uses various dissemination methods, both active and passive. However, the public indicated that they wanted more direct communications in the form of regular reports. It is important to state that cost was not associated with the communication method options and therefore, experimental bias could be present in these findings. It is possible that participants chose the direct communication option because it was suggested without implying that there would be a cost. However, the need for more direct communication must be considered. It is also the only significant gap in communication needs and efforts that could be found. It therefore suggests either a slight lack of confidence in the local government or the presence of critical trust.

Chapter 9: Discussion

These results generally show that community members of a low risk, well managed community have positive perceptions of their drinking water and high levels of trust in their local government. This appears to be the results of the local government's efforts to provide source-to-tap drinking water management and implement effective risk communication strategies. However, the trust that the community has in its local government is not blind. Some skepticism about drinking water safety exists on the part of the community members. The call for direct communication and regular reports indicated this. Therefore, trust is present in its critical form.

The results of this research highlight the generally positive attitudes of the community members regarding their source water, tap water and trust in local government. These perceptions were fostered locally and therefore have remained local. The public's trust does not extend farther than the community level as shown through the low trust ranking of the provincial government, the media and private water suppliers. It therefore follows that their positive perceptions of drinking water generally do not extend farther than the community level; several participants took the time to comment on other community's poor drinking water quality. It is assumed that positive perceptions of drinking water and high levels of trust in the local government were obtained through effective communication techniques by the local government as well as through the absence of negative water-related events. Fostering positive attitudes and building trust can be much more effective on the local level because specific community needs can be targeted.

The results draw attention to several positive aspects of the study community's drinking water management strategy which include: source-to-tap protection, shared duties between the Public Works, Public Health and Community Planning Departments and regular communication

with the public. It is thought that this strategy has had positive effects on the public's perception of their drinking water and their trust in local government officials. Regular and honest communications are trust building activities (Siegrist 2001b, Frewer 1996, Slovic 1993). Trust and risk perception share a strong relationship and therefore trust-building activities will also increase positive perceptions (Siegrist 2001b). Although a small gap between communication needs of the community and communication efforts of the local government is still present, the gap is quite small. Generally, the residents want regular reports sent directly to them via mail or email. This is more than the local government is providing presently and thus could be a sign of distrust. However, critical trust is often mistaken for distrust (Poortinga 2003, Walls 2003). The full set of results will be used to assess the gap in order to interpret whether distrust or critical trust is present.

When compared to Phase II of the Groundwater Protection Study, conducted just weeks before the Walkerton tragedy, this research found that community perceptions of source water had changed slightly. A smaller proportion of community members knew the origin of their drinking water. In March of 2000, 71% of the residents of the study community knew their drinking water came from wells, while 11% did not know. The remaining 18% thought their water came from the Great Lakes or other sources. The present interviews show that only 57.7% of the residents knew the source of their drinking water. However, perceptions about the quality of the source still remain quite positive. The majority, 69.0%, of the present day participants felt their source water was excellent or good. This figure rises to 82.1% for participants that had knowledge of their source.

Familiarity with the drinking water source could have declined due to a recent lack of public concern regarding source water. In the late 90s the County's public was more aware of

the source of their drinking water because it was being threatened by large scale agricultural operations. Specifically, their concerns centred around the development of a hog farm. Subsequent by-laws and the development of the *Nutrient Management Act* (2002) have addressed those concerns. Therefore awareness of the risks and, the source in general, has likely declined. A distinct decline in knowledge about the source is also manifested in the specific concerns the participants. Slovic (1993), Poortinga (2005) and Savadori (2004) suggest that decisions about perceptions tend to be spontaneous, particularly under conditions where information is lacking. 50% of the participants that rated their source water quality fair or poor could give no specific reason for this rating. Additionally, people that had knowledge about the source rated their water quality, source and tap, better than those that did not have knowledge. This indicates an intuitive assessment of the source water quality. Indeed, some participants rated their source water and then indicated they did not know about the source. These findings suggest that the residents, as a whole, have less knowledge of their source than they did six years ago.

Perceptions of tap water have changed little since the interviews in 2000. Previous to Walkerton, 53% of the study community thought that their tap water was excellent. 40% thought that it was average while only 5% thought it was poor. The recent interviews indicated that 23.9% of the participants rated their tap water excellent. 45.1% rate their tap water good. 21.6% rated their tap water fair and 9.4% rated it as poor. These results are difficult to compare because the possible set of answers is different. There has been a large drop in the number of participants that indicated their tap water was excellent. However, this could have been because people differentiate between the terms 'excellent' and 'good' less than they do between 'excellent' and 'average.'

The Groundwater Protection Study has provided a basis of comparison for this research, allowing us to see the changes previous to, and after Walkerton. The above observations indicate that perceptions of water quality may have changed slightly. However, the Groundwater Protection Study did not ask about suspicions regarding water safety. The present research found that there was a distinct difference in the publics' responses to questions about water quality and their responses to questions about water safety. This was discovered when results regarding specific concerns about water quality and water safety were compared. When asked about specific tap water quality concerns, the highest proportion of responses indicated that the public was concerned about: aesthetics and chemicals. When asked about water safety, the participants listed their highest concerns as: microbiological and chemical contamination.

The prevalence of a fear of chemicals in both categories is understandable. The chlorine added to drinking water is thought by many people to be a carcinogen. Chlorine is a necessity for preventing waterborne diseases and carcinogenicity has not been strongly established for the small doses that the public receives in its drinking water (Adamowicz 2004, Turgeon 2004, Jalba and Hrudey 2006, Krewski 2004). However, people have negative perceptions because of its nature. The risk is perceived as uncontrollable, having fatal consequences, of high risk to future generations, not easily reduced, and involuntary. As stated by Slovic (1987), these factors contribute to increased perceptions of risk. This is supported by Page (2006) who suggested that 'slow killers' such as chemical carcinogens are feared the most. Therefore, the addition of chemicals is a reasonable concern for most of the public. As well, the prevalence of aesthetic concerns related to water quality has been demonstrated by Turgeon (2004) and Jardine and Hrudey (1999). Therefore, the predominance of aesthetic concerns such as odour, taste and colour is also reasonable.

A greater concern about microbiological contamination was expected from the questions about drinking water quality. However, these concerns were not observed until the drinking water safety questions. Turgeon (2004) suggested that the general public relates most of its concerns about water quality to aesthetics. In fact, many aesthetic quality observations actually reflect concerns about health. For this reason, the questions about water safety and subsequent specific concerns are vital contributors to a better understanding of the public's health concerns. As stated above, the primary safety concerns were microbiological contamination and chemical contamination whereas the primary quality concerns were aesthetics and chemical contamination. On the surface, aesthetic concerns appear to be unrelated to chemical and biological contamination. However, Turgeon (2004) has suggested that these concerns are related to health. Therefore comments about taste, colour and odour in this case could be expressions of concerns about the health effects of chemicals and microorganisms. Therefore participants needed the questions about safety in order to extract more specific information about their concerns. It can be concluded that the public's largest health concerns were about the addition of chemicals and microbiological contamination.

Whereas, the concerns about microbiological and chemical contamination were the greatest in number for the subset of people that had concerns, the overall number of people with concerns was surprisingly small. Only 28.7% of the participants had specific concerns. This combined with the slight changes in water quality perception suggest that manifestations of a "Walkerton Effect", a significant loss of trust in the community leaders to provide safe drinking water, were minimal. In fact, "social amplification of risk"(Kasperson 1988) did not occur in this community as a result of Walkerton. This is almost certainly a result of trust-building activities, an absence of negative information about the local drinking water and the absence of a

negative water-related event. The trust-building activities in this case were good communication efforts on the part of the local government. The reason why the communications were readily accepted by the community members was the presence of positive prior attitudes to drinking water. Additionally, social amplification of a risk must start with an event (Kasperson 1988). Walkerton may have had a greater effect on the community if the residents had been exposed to multiple BWAs or another negative water-related event. However, the events of Walkerton were not strong enough to shake this community's perceptions of water quality and trust in their local government.

General trust is said to reduce uncertainty and therefore simplify decisions about risks (Savadori 2004). Good communication efforts are an excellent method of building trust. The content of these communications is less important than the method of communication and a general trust in the communicators (Johnson 2003a). Frewer (2003) suggests that when the public does not understand or care about the information communicated, they use their perceptions of the communicators to evaluate the issue. The communication efforts on the part of the local government used good risk communication practices and addressed the significant determinants of trust. Although Fischhoff's (1995) risk communication methods were designed to be used for the introduction of a risky facility, his communication principles and those of other researchers (Bier 2001, McCallum 1991) are still relevant to this case. The study community's local government made accurate information readily accessible to the public via the website and public postings. They involved the public early and incorporated them in the decision making process when decisions needed to be made. For example; during the class environmental assessment for the extension of the water system, they showed concern for public interest issues by answering all questions asked by the public, during meetings or during working hours.

Moreover, they targeted some communications by informing those who would be affected by water system or land use changes as specified by Parkin (2003).

Trusted sources such as the Public Health and Public Works Department tend to have multiple positive attributes; responsible, trustworthy, accountable, accurate, good past track record (Frewer 1996). The determinants of trust were shown to be most often achieved by both the public health department and the public works department through the responses of the participants. The determinants tested were expertise, accuracy and honesty as taken from research by Peters (1997) and Frewer (1996). Expertise was exhibited by the study community's history of providing safe drinking water. The community has had no significant BWAs or non-compliance issues with provincial legislation. Accuracy and honesty are difficult to prove. However, the community members evidently feel that the information provided to them is accurate and their public health and public works departments are honest.

The results of the trust analysis were very similar to the results of previous trust research. The overwhelming trust in the public health department was expected and the existing trust literature supports this finding. Frewer (1996), McCallum (1991), Walls (2004) and Corburn (2003) have all shown empirically that doctors and/or public health departments tend to be the most highly trusted sources of information. The absence of trust in the provincial government and private water providers was also expected. Frewer (1996), McCallum (1991) and Walls (2004) have demonstrated that industry and provincial government tend to be trusted less than public health departments and/or doctors. It is thought that this is because the provincial government often aligns itself with industry (Frewer 1996). Industry is seen to be self-serving and economically driven with no concern for the welfare of the public (Frewer 1996). Therefore, neither industry nor the provincial government can be trusted (Frewer 1996).

The only deviation from past research occurred when the public works department was rated the second most highly trusted source and the media were rated one of the least trusted sources. The literature tends to place local government officials on the same level of trustworthiness as industry and the provincial and federal government (McCallum 1991). However, this research shows them to be highly trusted. About 20% of participants trusted their public works department most while less than 15% trusted the province, media and/or private water suppliers combined. They also ranked highest in the second most trusted category. The media ranking was also slightly different from previous research results. Media have been shown to be trusted more highly than local government (Frewer 1996, McCallum 1991). This research shows that only around 7% of the population thought that the media were most trustworthy, while around 50% of the participants thought they were the least trustworthy. The reason for this differentiation is definitely the active role that the public works department plays with respect to drinking water provisions. They are the first resource for municipal drinking water system information and they have a very close relationship with the public health department. As seen above, association with a highly distrusted source can affect the public's trust negatively (Frewer 1996). Therefore association with a trusted source could affect the public's sense of trust positively. The lack of trust in the media could simply be a function of the community residents knowing they can get better information from other sources.

The existing literature has also suggested that prior attitudes and salient values play a large role in the development of trust, risk perceptions and acceptability (White 2003, Siegrist 2000). There are two existing models for the relationship between trust, perception and acceptability; the causal model and the associationist model (Poortinga 2005). The causal model specifies that trust is a determining factor for risk perceptions and acceptability whereas, the

associationist model indicates that the acceptability of a risk determines trust and perceptions.

Poortinga (2005) supports the associationist model in his research, indicating that laypeople often have prior conceptions of acceptability. This, in turn, helps them form perceptions and build or lose trust. Poortinga's (2005) research is consistent with both White (2003) and Frewer (2003), who indicate that prior conceptions play a large role in trust and perception. A person's sense of what is important is known as a salient value (Siegrist 2001a). Their perceptions of situations and people are often formed from these salient values.

There have been no significant problems with the study community's drinking water and they have rarely received negative messages; a perfect atmosphere in which to build trust (White 2005). Therefore, the study community's prior conceptions about drinking water should have been generally positive. Hence, trust in the water providers should be high. This is the case for the study community. Almost 70% of the participants felt their water was excellent, or good, and safe. As well, a potential relationship between trust and positive perceptions of water quality and safety was found. A slightly higher percentage of people that felt their water quality and water safety was excellent or good felt their local government was most trustworthy. Fewer people ranked their local government as the most trustworthy source when they rated their water quality as fair or poor and were suspicious about the safety of their water. This relationship was also seen in Johnson's (2003b) research in which he found that positive attitudes towards water quality were related to higher trust in the government and industry to set safe drinking water standards. These positive prior perceptions about drinking water could be the reason for the diminished "Walkerton Effect" and the high trust in the local government. White (2005) states that trust will be higher when a message is more congruent to a prior opinion.

The diminished “Walkerton Effect” is actually quite surprising because negative events, such as Walkerton, tend to have a very strong affect on the public. This is because bad news is often more trusted and more frequently reported than good news (Savadori 2004, White 2005, Siegrist 2004). Negative information is often more diagnostic while reporting positive information can be seen as self-serving on the part of the communicator (Siegrist 2001). Positive information is simply the maintenance of the status quo. Therefore the media cannot make “good news” out of it (McCallum 1991). A large proportion of the population gets its information from the media. As a result people assess negative information more frequently and trust it more. This could be the reason for the increased perceptions of risk found in the group of people that remembered receiving messages about their drinking water. This group of people had lower perceptions of water quality and safety. However, the communication efforts and positive information distributed by the local government combined with persisting good drinking water conditions have apparently been able to overcome the effects of negative information. Additionally, very little negative information specifically concerning the study community has been produced or provided. Their ability to isolate themselves from the negative experiences of others signals a resounding local confidence in their drinking water supply and hence water providers.

The above results show that the participants generally have positive perceptions about their drinking water and that the determinants of trust are met best by the public works and public health departments. However, the results regarding the communication needs of the community show some evidence of a lack of trust on the part of the community members. Although the local government provides community residents with information about their drinking water, the public still felt it needed more direct communication. The participants

indicated that they wanted information in the form of regular reports. Their preference regarding the frequency of communications was not strong, although most participants wanted them either more frequently than yearly or only if negative results were obtained. Their preferred dissemination method showed a strong preference for direct communications. This was expected because direct communication shows more concern, care and compassion, all of which meet both the determinants of trust and good communication risk practices (Frewer 1996, Fischhoff 1995). The strength of this preference is reduced slightly because the participants were not asked if they would be willing to pay for the cost of this more expensive communication method. A handful of participants acknowledged that they realized they were not communicated with directly because of the cost of the endeavour. Some participants suggested that they would like to receive water quality information in their water bill.

The information about water provided by the local government in some ways exceeds the expectations of the participants. The website provides the community members with a wealth of information supplementary to the water quality report, which is provided annually. However, very little information is provided directly to residents either by mail, phone or email unless an urgent message needs dissemination, people are going to be directly affected by a change in the water system or residents specifically ask for information. It is apparent that residents want slightly more information than the community is presently giving.

Although all other aspects of this research suggest that the residents of the study community trust their local government, the informational needs section signals a slight distrust. It is thought that the request for additional information or a change in the way information is provided signals distrust (Poortinga 2003, Frewer and Miles 2003). However, the request for additional information in this case may simply be skepticism. Poortinga (2003) and Walls

(2004) focus on the presence of critical trust. Their research emphasizes that trust can still be present even if the public is skeptical. Poortinga (2003) encourages the acknowledgement of critical trust in the trust research community. Indeed he feels that often researchers and decision-makers place too much emphasis on attempting to gain complete trust when this goal is clearly unrealistic, particularly in an increasingly critical society (Poortinga 2003, Laird 1989, Doern and Reed 2000). He believes that as long a general trust is high, even skeptical people can rely on institutions to provide them with public goods. Only when trust is low does skepticism lead to complete rejection of a communication or proposal.

Skepticism could be an explanation for the apparent lack of trust in the informational needs section of the survey. There is an apparent general trust in the study community's local government as proven by the trust section of the survey. While Walkerton did not shake public perceptions of water quality or safety significantly, it perhaps instilled skepticism. The skepticism combined with a general trust could have led to critical trust in the local authorities. This is expressed by the public's positive perceptions about their water, and towards their local authorities, combined with the need for more information and more direct communication.

Chapter 10: Conclusion

There are policy implications that stem from this study. Trust appears to be built locally and remain local. It is therefore important that provincial legislation gives counties and municipalities enough flexibility to manage their water systems and risk communications as is appropriate for their local environment. The case-by-case risk assessments legislated by the *Clean Water Act* (2006) are examples of positive actions in this direction. At the local level, communications about drinking water should be a regular occurrence and should contain positive messages. Perceptions and trust can be elevated with multiple positive messages. That being stated, there is evidence to show that limited value of the drinking water annual report and communication can be expensive. Additionally, municipalities should not use communications solely for reactionary purposes. The public will lose trust and have decreased perceptions about water quality if they only ever receive negative information.

Finally and most importantly, counties and municipalities should not mistake critical trust for distrust. Post-Walkerton, residents who rely on ground water may be skeptical, but may still trust their water managers. It is important to foster the existing trust through regular positive communications and transparent policies. If critical trust is mistaken for distrust, local government officials could become frustrated with their residents and attempt to convince the residents of their ignorance. These types of communications can be destructive to levels of trust and perceptions of water quality. This research suggests that messages about drinking water should be pro-active, consistent and positive. For communities that have positive drinking water histories, this should be enough to maintain a critical level of trust. However, local governments must listen to its residents needs; if people ask for information it should be provided. For communities that have negative drinking water histories, efforts should be more intensive and

should include a broader spectrum of information that includes communications about drinking water and source water. Communications could be more targeted, more direct and allow for more public input.

Unfortunately, the scope of this study could not include communities with negative drinking water experiences. Therefore, suggestions for further research includes studies about trust and drinking water perceptions in communities with negative drinking water experiences and comparative studies between communities with positive and negative drinking water experiences. This project was conducted on a very small scale due to time constraints and therefore a larger-scale project of this nature should be conducted in order to achieve statistical significance for the trends seen here. Additionally, more attention should be paid to investigating communication needs of community members. It would be helpful to know if the public would be willing to pay more for direct communications or more frequent water quality reports. A large number of the participants that indicated they would like direct communication also indicated they would like water quality reports in their water bill. This could be an idea for an interesting pilot study. The CCRs in the United States are proving to be quite ineffective even though they are a form of active dissemination. Would reports in the water bill befall the same fate? Perhaps researchers could learn from the mistakes of the CCRs to make the communications more effective.

The community studied in this research is an exemplary community in terms of drinking water history, source-water protection and communication with the public. Despite their efforts, all departments indicated that they would like to do more with respect to risk communication, but are held back by financial and time constraints. This attitude will hopefully keep them motivated. As a society becomes increasingly skeptical, it will be important to address the skeptical

questions and perhaps increase communications with the public in order to maintain their trust.

This will help avoid negative reactions to decisions and panic during negative water events; both of which can lead to a loss of trust. As we have learned empirically and through research, once trust is lost it is not easily regained. It is much less expensive, emotionally, time-wise and financially, to maintain trust than it is to rebuild.

Appendix A: Detailed Tables of Communications Efforts and Media Coverage

Information Source

Local Government Interviews	Website
<p>Televised Information:</p> <ul style="list-style-type: none"> - All land use decisions and debates are televised on the local Rogers network. This type of information mainly pertains to land use around source water. (Community Planning) 	<p>Drinking Water Related Regulations/By-laws:</p> <ul style="list-style-type: none"> - By-Law 4811-2007: Water and Sewer Rates (accompanied by a presentation given to the community about impending rate changes). The by-law indicated a rate change for water customers and the reasons. - By-Law 4193-2002: Revised External Water Use By-Law. This by-law restricted the external water use of residents during the summer months.
<p>Open Houses:</p> <ul style="list-style-type: none"> - Part of the land use decision making process (Community Planning) 	<p>Notices: None</p>
<p>Public Meetings (typically day and night):</p> <ul style="list-style-type: none"> - Part of the land use decision making process (Community Planning) - Conducted when water rate changes occur (Public Works) - Conducted as part of Class Environmental Assessment for implementation or extension of water systems (Public Works) 	<p>Tenders: None</p>
<p>Media:</p> <ul style="list-style-type: none"> - Notices for public meetings and open houses are publicized in the newspaper and on radio (Community Planning, Public Works) - BWA during the blackout was issued through the local news, radio and newspaper (Public Works and Public Health) - Notices for water conservation issued through the media. 	<p>Programs and Resources:</p> <ul style="list-style-type: none"> - Environmental Farm Plan: A Voluntary Environmental Education and Awareness Program delivered by the Ontario Farm Environmental Coalition (http://www.omafra.gov.on.ca/english/environment/efp/efp.htm) - Environmental Choice: A free information source about more environmentally sustainable living

<p>This occurred because one large water reserve was taken off line for upgrades. They wanted people to reduce their water use so that the city would not run out. (Public Works)</p> <ul style="list-style-type: none"> - Notices issued to all customers when the system was flushed (Public Works) 	<p>(http://www.environmentalchoice.com/English/ECP%20Home/)</p> <ul style="list-style-type: none"> - Video: Ground Water-Our Hidden Treasure. A video about source water protection (http://www.conservation-ontario.on.ca/resources/index.html) - Video: Well Aware. A video about safe well practices (http://www.ogwa.ca/)
<p>Direct Contact:</p> <ul style="list-style-type: none"> - During the blackout (or any emergency situation) a precautionary BWA issued. These were delivered door to door. (Public Health and Public Works) - Phone calls or mailed notices sent to anyone affected by a water system extension. This was part of the Class EA and is followed by public meetings. (Public Works) 	<p>Provincial Initiatives:</p> <ul style="list-style-type: none"> - Watershed based source protection planning. A website with information about source protection (http://www.ene.gov.on.ca/envision/water/spp.htm)
<p>Information Days:</p> <ul style="list-style-type: none"> - Children's Water Festival. A day of fun activities used to educate children and parents about water. (Public Works) - Emergency Response Days. A day to educate people about emergency planning. (Public Health) 	<p>Descriptions of Groundwater:</p> <ul style="list-style-type: none"> - Website gives links to various authorities that specialize in ground water protection; Environment Canada, Nature's Hidden Treasure, Drinking Water Safety-Wells, Water Pollution
<p>Requested Information:</p> <ul style="list-style-type: none"> - Respond to requested information. Generally concerns regard dirty water, cost, water service extension and tours of the water plants. (Public Works) 	<p>Studies and Reports:</p> <ul style="list-style-type: none"> - Annual Water Quality Reports and Water Summary Reports are posted. The Water Quality Report fulfils <i>Ontario Regulation 170/03</i>, Section 11.1. This regulation requires annual reports about water quality. Water Summary Reports list all the known failures to meet the requirement of <i>O. Reg. 170/03</i>. A report is available for each community within the County. - Ongoing studies regarding drinking water are made available. Presently only one study is being conducted.

	<p>It concerns the water servicing options for a previously well dependent community.</p> <ul style="list-style-type: none"> - Ground water studies: In the late 90's the County began ground water studies in collaboration with an environmental consulting agency. Two phases of the ground water studies were completed. They concluded that because ground water is the sole water source for the County it must be fervently protected. This should be considered when considering future development of area surrounding the source water. Both phases of the study are available. - Groundwater Protection Case Study: The County was a case study for a source water protection study conducted by Environment Canada (http://www.ec.gc.ca/water/en/manage/qual/e_multi.htm)
<p>Ground Water Projection Study: Public Consultation Report (Phase II)</p> <ul style="list-style-type: none"> - The County conducted public consultations about ground water and drinking water as part of their ground water studies. The County residents were asked about: a) their outdoor water use, b) their indoor water use, c) their water quality, d) water testing/treatment habits (private well owners) e) their water source, f) their water supply, g) the cost of their water, h) the importance of ground water protection, i) methods of groundwater protection, j) hazardous waste disposal, k) their fertilizer and pesticide use, l) the County's role in educating the public, m) restriction of residential development as a method of protecting ground water, n) municipal water restrictions and o) meter v flat rate. (Community Planning 	

<p>Annual Report:</p> <ul style="list-style-type: none"> - Annual report as required by the <i>Safe Drinking Water Act (2002)</i>. Previous to the <i>Safe Drinking Water Act's</i> standardized annual report, the Public Works Department issued a similar report. (Public Works) 	
<p>Private Well Information:</p> <ul style="list-style-type: none"> - A large proportion of the County, outside the study community, is dependent on private well water. The public health department has a vast amount of information about private well water testing, treatment and maintenance. These include: visits to private homes for information provision, a video about safe well practices (Well Aware: A Well Owner's Guide), and books about safe well practices and outside testing. (Public Health) 	
<p>Reports to Council:</p> <ul style="list-style-type: none"> - All municipal decisions (including drinking water decisions) must be reported to council (Public Works) 	

Information Type

Drinking Water Quality Information	Source Water Quality Information	Health Information	Public Interest
<p>Media:</p> <ul style="list-style-type: none"> - Notices for public meetings and open houses publicized in the newspaper. 	<p>Televised Information:</p> <ul style="list-style-type: none"> - All land use decisions and debates televised on the local Rogers network. This type of information 	<p>Private Well Information:</p> <ul style="list-style-type: none"> - A large proportion of the County, outside the study community, is 	<p>Public Meetings:</p> <ul style="list-style-type: none"> - Conducted when water rate changes occur - Conducted as part of Class Environmental Assessment

<ul style="list-style-type: none"> - BWA issued during the blackout was issued through the local news, radio and newspaper. - Notices issued to all customers when the system flushed 	<p>mainly pertains to land use around source water.</p>	<p>dependent on private well water. The public health department has a vast amount of information about private well water testing, treatment and maintenance. These include: visits to private homes for information provision, a video about safe well practices (Well Aware: A Well Owner's Guide), books about safe well practices and outside testing.</p>	<p>for implementation or extension of water systems</p>
<p>Direct Contact:</p> <ul style="list-style-type: none"> - During the blackout (or any emergency situation) a precautionary BWA was issued. These were delivered door to door. 	<p>Open Houses:</p> <ul style="list-style-type: none"> - Part of the land use decision making process Public Meetings (typically day and night): - Part of the land use decision making process 		<p>Media:</p> <ul style="list-style-type: none"> - Notices for water conservation issued through the media. This occurred because one large water reserve was taken off line for upgrades. They wanted people to reduce their water use so that the city would not run out.
Information Days:	Media:		Direct Contact:

<ul style="list-style-type: none"> - Children's Water Festival. A day of fun activities used to educate children and parents about water 	<ul style="list-style-type: none"> - Notices for public meetings and open houses are publicized in the newspaper. 		<ul style="list-style-type: none"> - Phone calls or mailed notices sent to anyone affected by the water system extension. This is part of the Class EA and is followed by public meetings.
<p>Annual Report:</p> <ul style="list-style-type: none"> - Annual report posted as required by the <i>Safe Drinking Water Act</i> (2002). 	<p>Ground Water Projection Study: Public Consultation Report (Phase II)</p> <p>The County conducted public consultations about ground water and drinking water as part of their ground water studies (full study is available online). The County residents were asked about: a) their outdoor water use, b) their indoor water use, c) their water quality, d) water testing/treatment habits (private well owners) e) their water source, f) their water supply, g) the cost of their water, h) the importance of ground water protection, i) methods of groundwater protection, j) hazardous waste disposal, k) their fertilizer and pesticide use, l) the County's role in educating the public, m) restriction of residential development as a method of protecting ground water, n) municipal water restrictions and</p>		<p>Information Days:</p> <ul style="list-style-type: none"> - Emergency Response Days. A day to educate people about emergency planning.

	o) meter v flat rate. (Dept of Community Planning			
<p>Reports to Council:</p> <ul style="list-style-type: none"> - All municipal decisions (including drinking water decisions) must be reported to council 	<p>Reports to Council:</p> <ul style="list-style-type: none"> - All municipal decisions (including drinking water decisions) must be reported to council 		<p>Requested Information:</p> <ul style="list-style-type: none"> - Respond to requested information. Generally concerns regard dirty water, cost, water service extension and tours of the water plants. 	
	<p>Programs and Resources:</p> <ul style="list-style-type: none"> - Environmental Farm Plan: A Voluntary Environmental Education and Awareness Program delivered by the Ontario Farm Environmental Coalition (http://www.omafr.gov.on.ca/english/environment/efp/efp.htm) - Video: Ground Water-Our Hidden Treasure. A video about source water protection (http://www.conservation-ontario.on.ca/resources/index.html) 		<p>Drinking Water Related Regulations/By-laws:</p> <ul style="list-style-type: none"> - By-Law 4811-2007: Water and Sewer Rates (accompanied by a presentation given to the community about impending rate changes). This by-law indicates a rate change for water customers and the reasons. - By-Law 4193-2002: Revised External Water Use By-Law. This by-law restricts the external water use of residents during the summer months. 	
	<p>Provincial Initiatives:</p> <ul style="list-style-type: none"> - Watershed based source protection planning. A 		<p>Programs and Resource:</p> <ul style="list-style-type: none"> - Environmental Choice: A free information source 	

	<p>website with information about source protection (http://www.ene.gov.on.ca/envision/water/spp.htm)</p> <p>Descriptions of Groundwater:</p> <ul style="list-style-type: none"> - This part of the website gives links to various authorities that specialize in ground water protection; Environment Canada, Nature's Hidden Treasure, Drinking Water Safety- Wells, Water Pollution 		<p>about more environmentally sustainable living (http://www.environmentalchoice.com/English/ECP%20Home/)</p> <p>Studies and Reports:</p> <ul style="list-style-type: none"> - Ongoing studies regarding drinking water are made available. Presently only one study is being conducted. It concerns the water servicing options for a previously well dependent community.
	<p>Studies and Reports:</p> <ul style="list-style-type: none"> - Ground water studies: In the late 90's the County began ground water studies in collaboration with an environmental consulting agency. Two phases of the ground water studies were completed. They concluded that because ground water is the sole water source for the County it must be fervently protected. This should be considered when considering future development of area surrounding the source 		

	<p>water. Both phases of the study are available.</p> <p>Groundwater Protection Case Study: The County was a case study for a source water protection study conducted by Environment Canada (http://www.ec.gc.ca/water/en/manage/qual/e_multi.htm)</p>		
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Dissemination Method

Consultative Communications	Active Dissemination	Passive Dissemination
<p>Open Houses:</p> <ul style="list-style-type: none"> - part of the land use decision making process. 	<p>Media:</p> <ul style="list-style-type: none"> - Notices for public meetings and open houses are publicized in the newspaper - BWA issued during the blackout was issued through the local news, radio and newspaper - Notices for water conservation issued through the media. This occurred because one large water reserve was taken off line for upgrades. They wanted people to reduce their water use so that the city would not run out. - Notices issued to all customers when the system flushed. 	<p>Televised Information:</p> <ul style="list-style-type: none"> - All land use decisions and debates are televised on the local Rogers network. This type of information mainly pertains to land use around source water.

<p>Public Meetings (typically day and night):</p> <ul style="list-style-type: none"> - Part of the land use decision making process - Conducted when water rate changes occur - Conducted as part of Class Environmental Assessment for implementation or extension of water systems. 	<p>Direct Contact:</p> <ul style="list-style-type: none"> - During the blackout (or any emergency situation) a precautionary BWA was issued. These were delivered door to door. - Phone calls or mailed notices are sent to anyone that will be affected by the water system extension. This is part of the Class EA and is followed by public meetings. 	<p>Annual Report:</p> <ul style="list-style-type: none"> - Annual report as stipulated by the <i>Safe Drinking Water Act's</i> (2002).
<p>Ground Water Projection Study: Public Consultation Report (Phase II)</p> <ul style="list-style-type: none"> - The County conducted public consultations about ground water and drinking water as part of their ground water studies (full study is available online). The County residents were asked about: a) their outdoor water use, b) their indoor water use, c) their water quality, d) water testing/treatment habits (private well owners) e) their water source, f) their water supply, g) the cost of their water, h) the importance of ground water protection, i) methods of groundwater protection, j) hazardous waste disposal, k) their fertilizer and pesticide use, l) the County's role in educating the public, m) restriction of residential development as a method of protecting ground water, n) 	<p>Information Days:</p> <ul style="list-style-type: none"> - Children's Water Festival. A day of fun activities used to educate children and parents about water - Emergency Response Days. A day to educate people about emergency situations 	<p>Private Well Information:</p> <ul style="list-style-type: none"> - A large proportion of the County, outside the study community, is dependent on private well water. The public health department has a vast amount of information about private well water testing, treatment and maintenance. These include: visits to private homes for information provision, a video about safe well practices (Well Aware: A Well Owner's Guide), books about safe well practices and outside testing.

municipal water restrictions and o) meter v flat rate. (Dept of Community Planning)		
	<p>Requested Information:</p> <ul style="list-style-type: none"> - Respond to requested information. Generally concerns regard dirty water, cost, water service extension and tours of the water plants. 	<p>Reports to Council:</p> <ul style="list-style-type: none"> - All municipal decisions (including drinking water decisions) must be reported to council.
	<p>Private Well Information:</p> <ul style="list-style-type: none"> - A large proportion of the County, outside the study community, is dependent on private well water. The public health department has a vast amount of information about private well water testing, treatment and maintenance. These include: visits to private homes for information provision, a video about safe well practices (Well Aware: A Well Owner's Guide), books about safe well practices and outside testing. 	<p>Drinking Water Related Regulations/By-laws:</p> <ul style="list-style-type: none"> - By-Law 4811-2007: Water and Sewer Rates (accompanied by a presentation given to the community about impending rate changes). This by-law indicated a rate change for water customers and the reasons. - By-Law 4193-2002: Revised External Water Use By-Law. This by-law restricted the external water use of residents during the summer months.
		<p>Programs and Resources:</p> <ul style="list-style-type: none"> - Environmental Farm Plan: A Voluntary Environmental Education and Awareness Program delivered by the Ontario Farm Environmental Coalition (http://www.omafra.gov.on.ca/engli)

		<p>sh/environment/efp/efp.htm)</p> <ul style="list-style-type: none"> - Environmental Choice: A free information source about more environmentally sustainable living (http://www.environmentalchoice.com/English/ECP%20Home/) - Video: Ground Water-Our Hidden Treasure. A video about source water protection (http://www.conservation-ontario.on.ca/resources/index.html) - Video: Well Aware. A video about safe well practices (http://www.ogwa.ca/)
		<p>Provincial Initiatives:</p> <ul style="list-style-type: none"> - Watershed based source protection planning. A website with information about source protection (http://www.ene.gov.on.ca/envision/water/spp.htm)
		<p>Descriptions of Groundwater:</p> <ul style="list-style-type: none"> - This part of the website gives links to various authorities that specialize in ground water protection; Environment Canada, Nature's Hidden Treasure, Drinking Water Safety-Wells, Water Pollution
		<p>Studies and Reports:</p> <ul style="list-style-type: none"> - Annual Water Quality Reports and Water Summary Reports are posted. The Water Quality Report fulfils

		<p><i>Ontario Regulation 170/03, Section 11.1.</i> This regulation requires annual reports about water quality. Water Summary Reports list all the known failures to meet the requirement of <i>O. Reg. 170/03</i>. A report is available for each community within the County.</p> <ul style="list-style-type: none"> - Ongoing studies regarding drinking water are made available. Presently only one study is being conducted. It concerns the water servicing options for a previously well dependent community. - Ground water studies: In the late 90's the County began ground water studies in collaboration with an environmental consulting agency. Two phases of the ground water studies were completed. They concluded that because ground water is the sole water source for the County it must be fervently protected. This should be considered when considering future development of area surrounding the source water. Both phases of the study are available. (http://www.county.oxford.on.ca/site/881/default.aspx) - Groundwater Protection Case Study: The County was a case study for a source water protection study
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		conducted by Environment Canada (http://www.ec.gc.ca/water/en/management/qual/e_multi.htm)
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Media Coverage
Report on the sentencing of the Koebel brothers for their role in the Walkerton tragedy: Highlights that the punishment does not fit the crime. (2004)
Wastewater from two adjacent communities to be brought to the study community's wastewater treatment plant: Generally residents are not happy. They feel their community is growing too quickly to support that much wastewater. A class environmental assessment will have to be completed. (2005)
Smaller private drinking water systems thought to be a good method for helping owners of rural wells. The new drinking water legislation regulating site-based risk assessments for drinking water will be harmful to rural wells. Frequent testing will be too energy-intensive. It is suggested that the Public Health Unit could take over the testing of these wells. (2005)
Minister of the Environment (Leona Dombrowsky) introduces a new legislation that proposes to assign environmental penalties of up to \$100 000 for corporations that produce unlawful spills or emissions. (2005)
Commentary on the expropriation of nearby land over a ground water source. Community member is disappointed that the municipality would do this as opposed to helping with the clean up. (2005)
A mobile home community within the County is placed under a BWA for close to a month as a result of a poorly maintained water system. Residents upset because of the inconvenience and expense (2005)
Report on the Kashechewan contamination. Highlights that this should not be happening in a post-Walkerton society. Also highlights inactivity of the Provincial and Federal Government.
Commentary on the month long BWA in the mobile home community. Highlights the inattentiveness of the Public Health Department and the park management.(2005)
Commentary on the month long BWA in the mobile home community. Stresses that action must be taken and that compensation must be awarded. Indicates that a private water supplier gave resident coupons for 50 free litres of water. (2006)
Report on the capped budget increases. The Ministry of Health and Long -Term Care capped provincial public health budget increases at 5%. Report indicates that this should not be done in the wake of Walkerton. Many people blame budget cuts such as these for the Walkerton tragedy. (2006)
Community within County will lose their well water for a municipal water system. Most residents are upset. They are being forced to change at their own expense. A community consultation meeting was held although little was achieved. The report highlights that the

chlorine used to treat water is a carcinogen. The report suggests that residents install filters on their own systems.
Reports on a call to amalgamate public health units (including the study community's). The Director of the County Public Health Unit stresses that this would be ineffective at addressing individual community needs such as drinking water issues.
A second community within the County is being asked to seal their wells in order to connect to the study community's municipal water system. The residents are very unhappy about this proposition. Residents claimed that they were not told of the decision. They denied that the County had hand delivered notices to their doors.
Power outage causes the County to issue a precautionary boil water advisory.
A nearby mobile home community gets a new water system. However, each person must pay \$18/month. The aesthetics of the water are still poor. The residents are unhappy.
Another report about water costs incurred by mobile home owners as a result of the <i>Safe Drinking Water Act</i> . This report attempts to highlight to positive aspects associated with the new water systems.
The drinking water in a nearby community is turning black. This is due to naturally occurring manganese sedimentation. The County indicated that the discolouration is not a health issue, but it is a nuisance.
High levels of E. Coli in a nearby lake have forced a beach closure. The municipality blames the contamination on animal droppings, storm water runoff, sewer overflow, faulty septic systems and agricultural activities. The municipality suggests that community members should decrease their water use, make sure their sanitary pipes are properly connected and, in the case of agricultural areas, keep animals away from streams.
Residents from a community within the county to be hooked up to a larger municipal water system as opposed to developing their own water system. This will be \$700 000 cheaper than the original plan.
Study community requests that the County give them more control over the water mains and waste water sewers. The study community indicates that they often cannot respond to water crisis situations fast enough because they need the County's approval.
Another community's wells are being closed in order to create a municipal water treatment plant. During the public consultation process, the residents stated they were against this project. However, the project began. Many residents are now paying more for their water, but not seeing their wells closed off.
Report on the repercussions of Bill. 130. The municipality is not happy because the bill assigns responsibility of water distribution to the County. The municipality believes more responsibility should be assigned to the municipality.

Appendix B: Questionnaires

Community Member Questionnaire

2. Can you recall any messages about your drinking water quality from the past five years.
(Prompt: This could include: newspaper articles, advisories from your local public health agency or water service providers)
 - a. Yes
 - b. No
3. Do you feel the source of your drinking water is:
 - a. Excellent
 - b. Good
 - c. Fair
 - d. Poor(if you answered b., c. or d. please specify why you did not choose excellent)
4. Do you know where your drinking water comes from, before it is treated?
 - a. Yes
 - b. No
5. Do you feel the quality of the drinking water that comes from your tap is:
 - a. Excellent
 - b. Good
 - c. Fair
 - d. Poor(if you answered b., c. or d. please specify why you did not choose excellent)
6. Have you ever been suspicious about the safety of your drinking water?
 - a. Never
 - b. Occasionally
 - c. Frequently(If they answer occasionally or frequently ask: Why?)
7. Who do you think has the most expertise in providing safe drinking water? (please rank in order from most expertise to least expertise)
 - a. ____ Provincial government
 - b. ____ Local water service providers
 - c. ____ Private water suppliers (bottled water companies)
8. Who do you think is most likely to give you accurate information about your drinking water? (please rank in order from most likely to least likely)
 - a. ____ Media (newspaper, radio, television)
 - b. ____ Provincial Government
 - c. ____ Local public health agency
 - d. ____ Local water service providers

9. Who do you think is the most honest when giving you information about your drinking water? (Please rank from most honest to least honest)
- Media (newspaper, radio, television)
 - Provincial government
 - Local public health agency
 - Local water service providers
10. If the quality of your water dropped below provincial standards, would you want to know:
- What, exactly, was in your water
 - Only that it has dropped below provincial standards
 - Would you like regular reports on the quality of your water
11. When would you like to receive information about your drinking water quality?
- Immediately, as soon as tests are done
 - On a monthly basis
 - On a yearly basis
 - Only when negative results are obtained
12. How would you prefer to receive information about your drinking water quality?
- Media (newspaper, radio, television)
 - Direct communication to you (i.e. mail/email)
 - Access yourself (i.e. public records or publicly accessible website)
13. Do you drink your tap water:
- All of the time
 - Frequently
 - Occasionally
14. If the quality of your drinking water dropped below provincial standards would you like information about how it could affect you?
- Yes
 - No

Local Government Official Interview Questions:

Questions on Providing Drinking Water Information to Public:

1. Have you sent any messages to the public regarding their drinking water in the past three years?

Prompt: give examples of situations in which they might have done so.

2. Do you keep records of the messages you send?

3. How often to you give the public information on their drinking water?

Prompt: only when there are adverse results or more often?

4. Do you provide real-time information

Prompt: explain real-time information

5. Can the public access water quality information on their own

Prompt: from a website, public records?

6. What type of information do you provide?

Prompt: BWAs, educational information, specific information about contaminants

7. How is the information disseminated?

8. To whom is the information disseminated?

Prompt: are there specific targets within a community?

9. Do you have a communications office/department that addresses communication?

10. How does the public respond to information about their drinking water?

Prompt: give examples of drinking water events in the past three years

Questions about the Role of the Public Health Department:

1. Are you currently meeting your targets for training and educating water service providers?

2. What is the frequency of on-site inspections of the water treatment facilities?

3. How do you monitor the quality of the source water (ground or surface)?

4. Given the above statements do you think your public health department provides “source-to-tap” protection?

5. Are you pro-active about communicating information about drinking water?

6. Do you seek input from the public about how messages about drinking water are communicated

If YES:

- a) Do you ask about what type of information they want?

Prompt: negative information only, negative and positive information, real-time information

- b) Do you ask them if they want to be able to access information on their own

Prompt: from a website?

- c) Do you ask them how frequently they want information?

- d) Do you ask them who they want to receive information from?

- e) Do you ask them who's information they trust the most?

- f) Do you think the community has positive, negative or neutral perceptions about their drinking water?

Limitations and Improvements:

1. Does your department have any limitations with respect to meeting the requirements of Canadian water legislation?
2. Are there areas that could be improved?
3. Are there areas that have been improved?

Final Question:

Do you have any communication documents that you could share with me?

Appendix C: Coding Sheet

1. Can you recall any messages about your drinking water quality from the past five years.
(Prompt: This could include: newspaper articles, advisories from your local public health agency or water service providers)
 - c. Yes = 1
 - d. No = 2
2. Do you feel the source of your drinking water is:
 - a. Excellent = 1
 - b. Good = 2
 - c. Fair = 3
 - d. Poor = 4
 - e. Don't Know = 5
3. (if you answered b., c. or d. please specify why you did not choose good or excellent)
 - a. No answer because they felt the water was excellent or good = 0
 - b. Aesthetic reasons = 1
 - c. Chemical contamination = 2
 - d. Biological contamination = 3
 - e. No reason = 4
 - f. Biological and chemical contamination = 5
 - g. Chemical and aesthetic reasons = 6
4. Do you know where your drinking water comes from, before it is treated?
 - a. Yes = 1
 - b. No = 2
5. Do you feel the quality of the drinking water that comes from your tap is:
 - a. Excellent = 1
 - b. Good = 2
 - c. Fair = 3
 - d. Poor = 4
 - e. Don't Know = 5
6. if you answered b., c. or d. please specify why you did not choose excellent or good.
 - a. No answer because they felt their water was good or excellent = 0
 - b. Aesthetic reasons = 1
 - c. Chemical addition = 2
 - d. Microbiological contamination = 3
 - e. Negative past experience = 4
 - f. No Reason = 5
 - g. Chemical and Biological = 6
 - h. Chemical and aesthetics = 7
7. Have you ever been suspicious about the safety of your drinking water?
 - a. Never = 1
 - b. Occasionally = 2
 - c. Frequently = 3

8. (If they answer occasionally or frequently ask: Why?

- a. No answer because they indicated never = 0
- b. Aesthetic reasons = 1
- c. Chemical addition = 2
- d. Microbiological contamination = 3
- e. No reason = 4
- f. Chemical and Biological Contamination = 5
- g. Chemical and aesthetic concerns = 6

9, 10 and 11: Who do you think has the most expertise in providing safe drinking water?
(Please rank in order from most to least)

- a. _____ Provincial government = 1
- b. _____ Local water service providers = 2
- c. _____ Private water suppliers (bottled water companies) = 3
- d. None = 4

12, 13, 14 and 15: Who do you think is most likely to give you accurate information about your drinking water? (please rank in order from most likely to least likely)

- a. _____ Media (newspaper, radio, television) = 1
- b. _____ Provincial Government = 2
- c. _____ Local public health agency = 3
- d. _____ Local water service providers = 4
- e. None = 5

16, 17, 18 and 19 Who do you think is the most honest when giving you information about your drinking water? (Please rank from most honest to least honest)

- a. Media (newspaper, radio, television) = 1
- b. _____ Provincial government = 2
- c. _____ Local public health agency = 3
- d. _____ Local water service providers = 4
- e. None = 5

20. If the quality of your water dropped below provincial standards, would you want to know:

- a) What, exactly, was in your water = 1
- b) Only that it has dropped below provincial standards = 2
- c) Would you like regular reports on the quality of your water = 3
- d) a) and b) = 4
- e) a) and c) = 5
- f) a), b) and c) = 6
- g) b) and c) = 7

21. When would you like to receive information about your drinking water quality?

- a) Immediately, as soon as tests are done = 1

- b) On a monthly basis = 2
- c) On a yearly basis = 3
- d) Only when negative results are obtained = 4

22. How would you prefer to receive information about your drinking water quality?

- a) Media (newspaper, radio, television) = 1
- b) Direct communication to you (i.e. mail/email) = 2
- c) Access yourself (i.e. public records or publicly accessible website) = 3
- d) a) and b) = 4
- e) a) and c) = 5
- f) b) and c) = 6
- g) a), b) and c) = 7

23. Do you drink your tap water:

- a) All of the time = 1
- b) Frequently = 2
- c) Occasionally = 3
- d) Never = 4

24. Reported use of filter or alternative to tap water:

- a) Reported yes = 1
- b) Did not report = 2
- c) Definitely used alternative sources because they answered “never” above = 0

25. If the quality of your drinking water dropped below provincial standards would you like information about how it could affect you?

- b. Yes = 1
- c. No = 2

Appendix D: Cross Tabulations Raw Data

Source Water Perceptions

CROSSTABS

/TABLES=Q#1 BY Q#2
/FORMAT= AVALUE TABLES
/CELLS= COUNT TOTAL
/COUNT ROUND CELL .

Q#1 (Msg Recollection) * Q#2 (Source Water Quality) Crosstabulation

			Q#2					Total
			1	2	3	4	5	1
Q#1	1	Count	3	15	5	4	4	31
		% of Total	1.4%	7.0%	2.3%	1.9%	1.9%	14.6%
	2	Count	40	89	19	15	19	182
		% of Total	18.8%	41.8%	8.9%	7.0%	8.9%	85.4%
Total		Count	43	104	24	19	23	213
		% of Total	20.2%	48.8%	11.3%	8.9%	10.8%	100.0%

CROSSTABS

/TABLES=Q#2 BY Q#3
/FORMAT= AVALUE TABLES
/CELLS= COUNT TOTAL
/COUNT ROUND CELL .

Q#2 (Source Water Quality) * Q#3 (Specific Concerns) Crosstabulation

			Q#3						Total
			0	1	2	3	4	5	0
Q#2	1	Count	43	0	0	0	0	0	43
		% of Total	20.2%	.0%	.0%	.0%	.0%	.0%	20.2%
	2	Count	99	3	1	1	0	0	104
		% of Total	46.5%	1.4%	.5%	.5%	.0%	.0%	48.8%
	3	Count	1	5	1	5	11	1	24
		% of Total	.5%	2.3%	.5%	2.3%	5.2%	.5%	11.3%
	4	Count	1	4	0	2	12	0	19
		% of Total	.5%	1.9%	.0%	.9%	5.6%	.0%	8.9%
	5	Count	23	0	0	0	0	0	23
		% of Total	10.8%	.0%	.0%	.0%	.0%	.0%	10.8%
Total		Count	167	12	2	8	23	1	213
		% of Total	78.4%	5.6%	.9%	3.8%	10.8%	.5%	100.0%

CROSSTABS

/TABLES=Q#2 BY Q#4

/FORMAT= AVALUE TABLES

/CELLS= COUNT TOTAL

/COUNT ROUND CELL .

Q#2 (Source Water Quality * Q#4 (Knowledge of the Source) Crosstabulation

			Q#4		Total
			1	2	1
Q#2	1	Count	40	3	43
		% of Total	18.8%	1.4%	20.2%
	2	Count	61	43	104
		% of Total	28.6%	20.2%	48.8%
	3	Count	13	11	24
		% of Total	6.1%	5.2%	11.3%
	4	Count	8	11	19
		% of Total	3.8%	5.2%	8.9%
	5	Count	1	22	23
		% of Total	.5%	10.3%	10.8%
	Total	Count	123	90	213
		% of Total	57.7%	42.3%	100.0%

Drinking Water Quality Perceptions

CROSSTABS

/TABLES=Q#2 BY Q#5
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#2 (Source Water Quality * Q#5 (Tap Water Quality) Crosstabulation

			Q#5				Total
			1	2	3	4	1
Q#2	1	Count	30	10	3	0	43
		% of Total	14.1%	4.7%	1.4%	.0%	20.2%
	2	Count	15	68	18	3	104
		% of Total	7.0%	31.9%	8.5%	1.4%	48.8%
	3	Count	1	8	12	3	24
		% of Total	.5%	3.8%	5.6%	1.4%	11.3%
	4	Count	0	1	5	13	19
		% of Total	.0%	.5%	2.3%	6.1%	8.9%
	5	Count	5	9	8	1	23
		% of Total	2.3%	4.2%	3.8%	.5%	10.8%
Total	Count	51	96	46	20	213	
	% of Total	23.9%	45.1%	21.6%	9.4%	100.0%	

CROSSTABS

/TABLES=Q#1 BY Q#5
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#1 (Msg Recollection)* Q#5 (Tap Water Quality) Crosstabulation

			Q#5				Total
			1	2	3	4	1
Q#1	1	Count	7	12	8	4	31
		% of Total	3.3%	5.6%	3.8%	1.9%	14.6%
	2	Count	44	84	38	16	182
		% of Total	20.7%	39.4%	17.8%	7.5%	85.4%
Total	Count	51	96	46	20	213	
	% of Total	23.9%	45.1%	21.6%	9.4%	100.0%	

CROSSTABS

/TABLES=Q#5 BY Q#6

/FORMAT= AVALUE TABLES

/CELLS= COUNT TOTAL

/COUNT ROUND CELL .

Q#5 (Tap Water Quality)* Q#6 (Specific Concerns) Crosstabulation

			Q#6								Total
			0	1	2	3	4	5	6	7	0
Q# 5	1	Count	50	1	0	0	0	0	0	0	51
		% of Total	23.5%	.5%	.0%	.0%	.0%	.0%	.0%	.0%	23.9%
	2	Count	73	12	10	0	0	1	0	0	96
		% of Total	34.3%	5.6%	4.7%	.0%	.0%	.5%	.0%	.0%	45.1%
	3	Count	1	22	10	5	1	1	3	3	46
		% of Total	.5%	10.3%	4.7%	2.3%	.5%	.5%	1.4%	1.4%	21.6%
	4	Count	0	9	2	1	0	5	1	2	20
		% of Total	.0%	4.2%	.9%	.5%	.0%	2.3%	.5%	.9%	9.4%
	Total	Count	124	44	22	6	1	7	4	5	213
		% of Total	58.2%	20.7%	10.3%	2.8%	.5%	3.3%	1.9%	2.3%	100.0 %

Drinking Water Safety Perceptions

CROSSTABS

/TABLES=Q#5 BY Q#7

/FORMAT= AVALUE TABLES

/CELLS= COUNT TOTAL

/COUNT ROUND CELL .

Q#5 (Tap Water Quality) * Q#7 (Suspicion about Safety) Crosstabulation

			Q#7			Total
			1	2	3	1
Q#5	1	Count	43	7	1	51
		% of Total	20.2%	3.3%	.5%	23.9%
	2	Count	81	15	0	96
		% of Total	38.0%	7.0%	.0%	45.1%
	3	Count	26	19	1	46
		% of Total	12.2%	8.9%	.5%	21.6%
	4	Count	7	8	5	20
		% of Total	3.3%	3.8%	2.3%	9.4%
	Total	Count	157	49	7	213
		% of Total	73.7%	23.0%	3.3%	100.0%

Drinking Water Safety Perceptions

CROSSTABS

/TABLES=Q#7 BY Q#8

/FORMAT= AVALUE TABLES

/CELLS= COUNT TOTAL

/COUNT ROUND CELL .

Q#7 (Suspicion about Safety) * Q#8 (Specific Concerns) Crosstabulation

			Q#8							Total
			0	1	2	3	4	5	6	0
Q#7 1	Count	152	2	0	1	2	0	0	157	
	% of Total	71.4%	.9%	.0%	.5%	.9%	.0%	.0%	73.7%	
2	Count	0	5	11	20	8	4	1	49	
	% of Total	.0%	2.3%	5.2%	9.4%	3.8%	1.9%	.5%	23.0%	
3	Count	0	1	1	3	1	1	0	7	
	% of Total	.0%	.5%	.5%	1.4%	.5%	.5%	.0%	3.3%	
Total	Count	152	8	12	24	11	5	1	213	
	% of Total	71.4%	3.8%	5.6%	11.3%	5.2%	2.3%	.5%	100.0%	

Trust As It Relates To Perceptions About Water Quality And Water Safety

CROSSTABS

/TABLES=Q#5 BY Q#9

/FORMAT= AVALUE TABLES

/CELLS= COUNT TOTAL

/COUNT ROUND CELL .

Q#5 (Tap Water Quality) * Q#9 (Who has the most expertise) Crosstabulation

			Q#9					Total
			0	1	2	3	4	0
Q#5 1	Count		0	8	40	3	0	51
	% of Total		.0%	3.8%	18.8%	1.4%	.0%	23.9%
2	Count		2	15	65	14	0	96
	% of Total		.9%	7.0%	30.5%	6.6%	.0%	45.1%
3	Count		2	9	20	14	1	46
	% of Total		.9%	4.2%	9.4%	6.6%	.5%	21.6%
4	Count		0	4	8	7	1	20
	% of Total		.0%	1.9%	3.8%	3.3%	.5%	9.4%
Total	Count		4	36	133	38	2	213
	% of Total		1.9%	16.9%	62.4%	17.8%	.9%	100.0%

CROSSTABS

/TABLES=Q#5 BY Q#12
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#5 (Tap Water Quality) * Q#12 (Who will give the most accurate information) Crosstabulation

			Q#12						Total
			0	1	2	3	4	5	0
Q#5	1	Count	0	0	3	31	17	0	51
		% of Total	.0%	.0%	1.4%	14.6%	8.0%	.0%	23.9%
	2	Count	0	4	5	61	25	1	96
		% of Total	.0%	1.9%	2.3%	28.6%	11.7%	.5%	45.1%
	3	Count	0	8	3	27	7	1	46
		% of Total	.0%	3.8%	1.4%	12.7%	3.3%	.5%	21.6%
	4	Count	3	3	0	11	2	1	20
		% of Total	1.4%	1.4%	.0%	5.2%	.9%	.5%	9.4%
	Total	Count	3	15	11	130	51	3	213
		% of Total	1.4%	7.0%	5.2%	61.0%	23.9%	1.4%	100.0%

CROSSTABS

/TABLES=Q#5 BY Q#16
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#5 (Tap Water Quality) * Q#16 (Who is most honest) Crosstabulation

			Q#16						Total
			0	1	2	3	4	5	0
Q#5	1	Count	0	1	3	33	14	0	51
		% of Total	.0%	.5%	1.4%	15.5%	6.6%	.0%	23.9%
	2	Count	0	4	1	69	20	2	96
		% of Total	.0%	1.9%	.5%	32.4%	9.4%	.9%	45.1%
	3	Count	0	6	1	29	8	2	46
		% of Total	.0%	2.8%	.5%	13.6%	3.8%	.9%	21.6%
	4	Count	1	3	1	13	1	1	20
		% of Total	.5%	1.4%	.5%	6.1%	.5%	.5%	9.4%
	Total	Count	1	14	6	144	43	5	213
		% of Total	.5%	6.6%	2.8%	67.6%	20.2%	2.3%	100.0%

CROSSTABS

/TABLES=Q#7 BY Q#9
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#7 (Suspicious about Safety) * Q#9 (Who has the most expertise) Crosstabulation

			Q#9					Total
			0	1	2	3	4	0
Q#7	1	Count	3	22	107	25	0	157
		% of Total	1.4%	10.3%	50.2%	11.7%	.0%	73.7%
	2	Count	1	13	24	11	0	49
		% of Total	.5%	6.1%	11.3%	5.2%	.0%	23.0%
	3	Count	0	1	2	2	2	7
		% of Total	.0%	.5%	.9%	.9%	.9%	3.3%
Total	Count		4	36	133	38	2	213
	% of Total		1.9%	16.9%	62.4%	17.8%	.9%	100.0%

CROSSTABS

/TABLES=Q#7 BY Q#12
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#7 (Suspicious about Water Safety) * Q#12 (Who will give the most accurate information) Crosstabulation

			Q#12						Total
			0	1	2	3	4	5	0
Q#7	1	Count	0	4	9	97	46	1	157
		% of Total	.0%	1.9%	4.2%	45.5%	21.6%	.5%	73.7%
	2	Count	1	10	2	29	5	2	49
		% of Total	.5%	4.7%	.9%	13.6%	2.3%	.9%	23.0%
	3	Count	2	1	0	4	0	0	7
		% of Total	.9%	.5%	.0%	1.9%	.0%	.0%	3.3%
Total	Count		3	15	11	130	51	3	213
	% of Total		1.4%	7.0%	5.2%	61.0%	23.9%	1.4%	100.0%

```
CROSSTABS
  /TABLES=Q#7  BY Q#16
  /FORMAT= AVALUE TABLES
  /CELLS= COUNT TOTAL
  /COUNT ROUND CELL .
```

Q#7 (Suspicion about Water Safety) * Q#16 (Who is the most honest) Crosstabulation

			Q#16						Total
			0	1	2	3	4	5	0
Q#7	1	Count	0	6	3	107	38	3	157
		% of Total	.0%	2.8%	1.4%	50.2%	17.8%	1.4%	73.7%
	2	Count	0	7	2	33	5	2	49
		% of Total	.0%	3.3%	.9%	15.5%	2.3%	.9%	23.0%
	3	Count	1	1	1	4	0	0	7
		% of Total	.5%	.5%	.5%	1.9%	.0%	.0%	3.3%
Total		Count	1	14	6	144	43	5	213
		% of Total	.5%	6.6%	2.8%	67.6%	20.2%	2.3%	100.0%

Q#5 (Tap Water Quality) * Q#11 (Who has the least expertise) Crosstabulation

			Q#11					Total
			0	1	2	3	4	0
Q#5	1	Count	1	16	2	32	0	51
		% of Total	.5%	7.5%	.9%	15.0%	.0%	23.9%
	2	Count	3	33	6	52	2	96
		% of Total	1.4%	15.5%	2.8%	24.4%	.9%	45.1%
	3	Count	2	19	2	22	1	46
		% of Total	.9%	8.9%	.9%	10.3%	.5%	21.6%
	4	Count	1	9	1	8	1	20
		% of Total	.5%	4.2%	.5%	3.8%	.5%	9.4%
	Total	Count	7	77	11	114	4	213
		% of Total	3.3%	36.2%	5.2%	53.5%	1.9%	100.0%

Q#5 (Tap Water Quality) * Q#15 (Who will provide the least accurate information) Crosstabulation

			Q#15					Total
			0	1	2	4	5	0
Q#5	1	Count	1	30	18	1	1	51
		% of Total	.5%	14.1%	8.5%	.5%	.5%	23.9%
	2	Count	2	50	35	8	1	96
		% of Total	.9%	23.5%	16.4%	3.8%	.5%	45.1%
	3	Count	1	21	16	4	4	46
		% of Total	.5%	9.9%	7.5%	1.9%	1.9%	21.6%
	4	Count	4	6	7	1	2	20
		% of Total	1.9%	2.8%	3.3%	.5%	.9%	9.4%
	Total	Count	8	107	76	14	8	213
		% of Total	3.8%	50.2%	35.7%	6.6%	3.8%	100.0%

Q#5 (Tap Water Quality) * Q#19 (Who is the least honest)Crosstabulation

			Q#19					Total
			0	1	2	4	5	0
Q#5	1	Count	0	28	22	0	1	51
		% of Total	.0%	13.1%	10.3%	.0%	.5%	23.9%
	2	Count	2	47	39	5	3	96
		% of Total	.9%	22.1%	18.3%	2.3%	1.4%	45.1%
	3	Count	1	21	13	5	6	46
		% of Total	.5%	9.9%	6.1%	2.3%	2.8%	21.6%
	4	Count	2	8	6	2	2	20
		% of Total	.9%	3.8%	2.8%	.9%	.9%	9.4%
	Total	Count	5	104	80	12	12	213
		% of Total	2.3%	48.8%	37.6%	5.6%	5.6%	100.0%

Q#7 (Suspicion about water safety) * Q#11 (Who has the least expertise) Crosstabulation

			Q#11					Total
			0	1	2	3	4	0
Q#7	1	Count	5	57	4	89	2	157
		% of Total	2.3%	26.8%	1.9%	41.8%	.9%	73.7%
	2	Count	1	18	7	23	0	49
		% of Total	.5%	8.5%	3.3%	10.8%	.0%	23.0%
	3	Count	1	2	0	2	2	7
		% of Total	.5%	.9%	.0%	.9%	.9%	3.3%
	Total	Count	7	77	11	114	4	213
		% of Total	3.3%	36.2%	5.2%	53.5%	1.9%	100.0%

**Q#7 (Suspicion about Water Safety) * Q#15 (Who will provide the least accurate information)
Crosstabulation**

			Q#15					Total
			0	1	2	4	5	0
Q#7	1	Count	4	88	54	9	2	157
		% of Total	1.9%	41.3%	25.4%	4.2%	.9%	73.7%
	2	Count	2	18	20	4	5	49
		% of Total	.9%	8.5%	9.4%	1.9%	2.3%	23.0%
	3	Count	2	1	2	1	1	7
		% of Total	.9%	.5%	.9%	.5%	.5%	3.3%
Total	Count	8	107	76	14	8	213	
	% of Total	3.8%	50.2%	35.7%	6.6%	3.8%	100.0%	

Q#7 (Suspicion about Water Safety) * Q#19 (Who is least honest) Crosstabulation

			Q#19					Total
			0	1	2	4	5	0
Q#7	1	Count	3	82	62	5	5	157
		% of Total	1.4%	38.5%	29.1%	2.3%	2.3%	73.7%
	2	Count	1	20	17	5	6	49
		% of Total	.5%	9.4%	8.0%	2.3%	2.8%	23.0%
	3	Count	1	2	1	2	1	7
		% of Total	.5%	.9%	.5%	.9%	.5%	3.3%
Total		Count	5	104	80	12	12	213
		% of Total	2.3%	48.8%	37.6%	5.6%	5.6%	100.0%

Communication Needs

CROSSTABS

/TABLES=Q#20 BY Q#21
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#20 (Type of Information) * Q#21 (Frequency of Information) Crosstabulation

			Q#21				Total
			1	2	3	4	1
Q#20	1	Count	12	13	6	29	60
		% of Total	5.6%	6.1%	2.8%	13.6%	28.2%
	2	Count	2	0	0	9	11
		% of Total	.9%	.0%	.0%	4.2%	5.2%
	3	Count	26	45	22	36	129
		% of Total	12.2%	21.1%	10.3%	16.9%	60.6%
	5	Count	2	4	1	2	9
		% of Total	.9%	1.9%	.5%	.9%	4.2%
	7	Count	1	2	0	1	4
		% of Total	.5%	.9%	.0%	.5%	1.9%
Total		Count	43	64	29	77	213
		% of Total	20.2%	30.0%	13.6%	36.2%	100.0%

CROSSTABS

/TABLES=Q#20 BY Q#22
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#20 (Type of Information) * Q#22 (Information Source) Crosstabulation

			Q#22						Total
			1	2	3	4	6	7	1
Q#20	1	Count	10	29	20	1	0	0	60
		% of Total	4.7%	13.6%	9.4%	.5%	.0%	.0%	28.2%
	2	Count	2	6	3	0	0	0	11
		% of Total	.9%	2.8%	1.4%	.0%	.0%	.0%	5.2%
	3	Count	13	73	38	2	3	0	129
		% of Total	6.1%	34.3%	17.8%	.9%	1.4%	.0%	60.6%
	5	Count	1	6	2	0	0	0	9
		% of Total	.5%	2.8%	.9%	.0%	.0%	.0%	4.2%
	7	Count	0	3	0	0	0	1	4
		% of Total	.0%	1.4%	.0%	.0%	.0%	.5%	1.9%
Total		Count	26	117	63	3	3	1	213
		% of Total	12.2%	54.9%	29.6%	1.4%	1.4%	.5%	100.0%

CROSSTABS

/TABLES=Q#21 BY Q#22
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#21 (Information Frequency) * Q#22 (Information Source) Crosstabulation

			Q#22						Total
			1	2	3	4	6	7	1
Q#21	1	Count	9	21	10	2	1	0	43
		% of Total	4.2%	9.9%	4.7%	.9%	.5%	.0%	20.2%
	2	Count	3	36	23	0	1	1	64
		% of Total	1.4%	16.9%	10.8%	.0%	.5%	.5%	30.0%
	3	Count	2	15	11	1	0	0	29
		% of Total	.9%	7.0%	5.2%	.5%	.0%	.0%	13.6%
	4	Count	12	45	19	0	1	0	77
		% of Total	5.6%	21.1%	8.9%	.0%	.5%	.0%	36.2%
Total		Count	26	117	63	3	3	1	213
		% of Total	12.2%	54.9%	29.6%	1.4%	1.4%	.5%	100.0%

Communication Needs as They Relate to Perceptions about Water Quality and Safety

CROSSTABS

/TABLES=Q#20 BY Q#7
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#20 (Type of Information)* Q#7 (Suspicion about Safety) Crosstabulation

			Q#7			Total
			1	2	3	1
Q#20	1	Count	48	11	1	60
		% of Total	22.5%	5.2%	.5%	28.2%
	2	Count	11	0	0	11
		% of Total	5.2%	.0%	.0%	5.2%
	3	Count	87	36	6	129
		% of Total	40.8%	16.9%	2.8%	60.6%
	5	Count	8	1	0	9
		% of Total	3.8%	.5%	.0%	4.2%
	7	Count	3	1	0	4
		% of Total	1.4%	.5%	.0%	1.9%
Total		Count	157	49	7	213
		% of Total	73.7%	23.0%	3.3%	100.0%

CROSSTABS

/TABLES=Q#21 BY Q#7
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .

Q#21 (Information Frequency) * Q#7 (Suspicion about water Safety) Crosstabulation

			Q#7			Total
			1	2	3	1
Q#21	1	Count	24	16	3	43
		% of Total	11.3%	7.5%	1.4%	20.2%
	2	Count	37	25	2	64
		% of Total	17.4%	11.7%	.9%	30.0%
	3	Count	23	6	0	29
		% of Total	10.8%	2.8%	.0%	13.6%
	4	Count	73	2	2	77
		% of Total	34.3%	.9%	.9%	36.2%
Total		Count	157	49	7	213
		% of Total	73.7%	23.0%	3.3%	100.0%

CROSSTABS
 /TABLES=Q#22 BY Q#7
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .
Q#22 (Information Source) * Q#7 (Suspicion about Water Safety) Crosstabulation

			Q#7			Total
			1	2	3	1
Q#22	1	Count	21	4	1	26
		% of Total	9.9%	1.9%	.5%	12.2%
	2	Count	88	25	4	117
		% of Total	41.3%	11.7%	1.9%	54.9%
	3	Count	45	16	2	63
		% of Total	21.1%	7.5%	.9%	29.6%
	4	Count	2	1	0	3
		% of Total	.9%	.5%	.0%	1.4%
	6	Count	1	2	0	3
		% of Total	.5%	.9%	.0%	1.4%
	7	Count	0	1	0	1
		% of Total	.0%	.5%	.0%	.5%
	Total	Count	157	49	7	213
		% of Total	73.7%	23.0%	3.3%	100.0%

Drinking Water Habits

CROSSTABS

/TABLES=Q#23 BY Q#24
/FORMAT= AVALUE TABLES
/CELLS= COUNT TOTAL
/COUNT ROUND CELL .

Q#23 (How often do people drink their tap water) * Q#24 (Use of alternatives) Crosstabulation

			Q#24			Total
			0	1	2	0
Q#23	1	Count	0	19	79	98
		% of Total	.0%	8.9%	37.1%	46.0%
	2	Count	0	6	39	45
		% of Total	.0%	2.8%	18.3%	21.1%
	3	Count	0	2	39	41
		% of Total	.0%	.9%	18.3%	19.2%
	4	Count	27	1	1	29
		% of Total	12.7%	.5%	.5%	13.6%
Total		Count	27	28	158	213
		% of Total	12.7%	13.1%	74.2%	100.0%

CROSSTABS

/TABLES=Q#24 BY Q#5
/FORMAT= AVALUE TABLES
/CELLS= COUNT TOTAL
/COUNT ROUND CELL .

Q#24 (Use of alternatives) * Q#5 (Water Quality) Crosstabulation

			Q#5				Total
			1	2	3	4	1
Q#24	0	Count	0	2	15	10	27
		% of Total	.0%	.9%	7.0%	4.7%	12.7%
	1	Count	3	16	4	5	28
		% of Total	1.4%	7.5%	1.9%	2.3%	13.1%
	2	Count	48	78	27	5	158
		% of Total	22.5%	36.6%	12.7%	2.3%	74.2%
Total		Count	51	96	46	20	213
		% of Total	23.9%	45.1%	21.6%	9.4%	100.0%

CROSSTABS
 /TABLES=Q#24 BY Q#7
 /FORMAT= AVALUE TABLES
 /CELLS= COUNT TOTAL
 /COUNT ROUND CELL .
Q#24 (Use of alternatives) * Q#7 (Suspicion about Water Safety) Crosstabulation

			Q#7			Total
			1	2	3	1
Q#24	0	Count	13	11	3	27
		% of Total	6.1%	5.2%	1.4%	12.7%
	1	Count	21	6	1	28
		% of Total	9.9%	2.8%	.5%	13.1%
	2	Count	123	32	3	158
		% of Total	57.7%	15.0%	1.4%	74.2%
Total		Count	157	49	7	213
		% of Total	73.7%	23.0%	3.3%	100.0%

Q#23 (Frequency of Tap Water Use) * Q#5 (Tape Water Quality) Crosstabulation

			Q#5				Total
			1	2	3	4	1
Q#23	1	Count	37	48	8	5	98
		% of Total	17.4%	22.5%	3.8%	2.3%	46.0%
	2	Count	9	27	6	3	45
		% of Total	4.2%	12.7%	2.8%	1.4%	21.1%
	3	Count	5	18	17	1	41
		% of Total	2.3%	8.5%	8.0%	.5%	19.2%
	4	Count	0	3	15	11	29
		% of Total	.0%	1.4%	7.0%	5.2%	13.6%
	Total	Count	51	96	46	20	213
		% of Total	23.9%	45.1%	21.6%	9.4%	100.0%

Q#23 (Frequency of Tap Water Use) * Q#7 (Suspicion about water safety) Crosstabulation

			Q#7			Total
			1	2	3	1
Q#23	1	Count	83	13	2	98
		% of Total	39.0%	6.1%	.9%	46.0%
	2	Count	31	14	0	45
		% of Total	14.6%	6.6%	.0%	21.1%
	3	Count	29	11	1	41
		% of Total	13.6%	5.2%	.5%	19.2%
	4	Count	14	11	4	29
		% of Total	6.6%	5.2%	1.9%	13.6%
	Total	Count	157	49	7	213
		% of Total	73.7%	23.0%	3.3%	100.0%

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