

**RESIDENTS' REAPPRAISAL OF THE HALTON REGIONAL LANDFILL SITE:
A LONGITUDINAL STUDY OF PSYCHOSOCIAL IMPACTS**

By

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**TITLE: Residents' Reappraisal of the Halton Regional Landfill Site: a Longitudinal Study
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ABSTRACT

This thesis examines psychosocial effects in a population living near the Halton Regional Landfill site in Milton, Ontario. The data described and analyzed in this research were collected between 1990 and 1995 and capture key events in the landfill site's history - site approval, construction and operation. This longitudinal study, which examines indicators of stress, reappraisal and coping at three different points in time from the same individuals, is designed to document and examine the process whereby these people have experienced and come to live with the landfill facility over time.

The theoretical basis for understanding this process of appraisal, reappraisal and coping is derived from environmental stress and coping theory generally, and from the framework proposed by Lazarus and Folkman (1984) specifically. Three research objectives are addressed: (1) to document changes in psychosocial effects in Milton area residents between 1990 and 1995; (2) to explore the processes of reappraisal and coping among Milton area residents; and , (3) to evaluate the appropriateness and usefulness of the Lazarus and Folkman (1984) framework in the context of a population living proximate to a solid waste facility.

These objectives are addressed through three administrations of a telephone survey instrument comprised of a combination of pre-validated scales and open- and closed-ended items to a random stratified (by distance) sample of households immediately after the landfill site was approved (1990), shortly after the site was constructed and began operation (1992-3), and two years after operation had begun (1995). Due to attrition, the baseline cohort

(n=187) was reduced to 108 by time 3, although no significant bias was introduced. Data from all three surveys were obtained for a sub-group of 87 respondents. Five constructs derived from environmental stress and coping theory guide the examination of individual responses to the landfill over time: psychological distress, perceptions of the landfill site, concerns about the landfill site, actions and neighbourhood satisfaction. A series of hypotheses, which capture expectations about how Milton area residents have experienced the introduction of the landfill site into their community over time, were generated from the constructs and guide the analysis.

Overall, the results portray a community that has changed from one actively opposing plans to locate a landfill site in its midst to one that has, for the most part, resigned itself to and accepted the presence of the new facility. This shift is evidenced by a decline in some measures of psychosocial effects over the study period: negative perceptions of the landfill site, concerns about the landfill site and actions taken in response to the siting of the landfill. Consistently low levels of psychological distress and high levels of neighbourhood satisfaction over the study period provide further evidence of the shift toward acceptance of the facility. Four sets of mediating factors are considered as determinants of changes in levels of psychosocial effects: characteristics of the stressor, the individual, the social network and the wider community. Characteristics of the stressor emerge as the most obvious and important factor in the interpretation of the observed changes in perceptions of the landfill site, concerns about the landfill site and actions over time.

The thesis makes several contributions to our understanding of environmental stress and the siting of landfill facilities. Theoretically, the Lazarus and Folkman (1984) model of

stress, reappraisal and coping emerges as a useful guiding framework for this longitudinal research on community response to an environmental stressor in Milton. For practice, the findings suggest that acceptance of a facility such as a landfill site by the host community can be achieved much more easily when residents' concerns are directly reflected in the design and operation of the facility. Future research directions in this area should include: an explicit focus on the process of coping; the development of more appropriate measures of psychological distress for use in this research context; more attention specifically on the siting of noxious facilities; and, more research involving larger sample sizes and additional communities to determine the influence of individual, social network and community factors in addition to characteristics of the stressor as mediators of the stress-response relationship.

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CHAPTER ONE

INTRODUCTION

1.1 Research Context

Much past research on individuals' exposure to environmentally hazardous situations has studied possible physical health effects (e.g., cancer and adverse reproductive outcomes). Increasingly, research in environment and health has recognized the significance of focusing on psychosocial effects of (perceived) exposure to environmental contaminants (Taylor et al., 1994). This thesis examines psychosocial impacts within a population living in close proximity to a landfill site near Milton, Ontario. The research is part of a larger ongoing research program which began in 1989 with a feasibility study, followed in 1990 with three parallel case studies of residents living around solid waste facilities in Southern Ontario. At that time, the Milton site had recently been given approval after more than 20 years of community-led opposition, but had not yet been constructed nor commenced operation. The 1990 study provided baseline data on psychosocial impacts in the population living near the recently approved site; a subsequent round of data collection occurred in 1992-93 at the time when construction was completed and the site began operating.

This thesis extends the study of this population with an additional round of data collection in 1995, two and one half years after the site began operating. The presentation

and analysis of these data from three critical points in time (siting, construction, operation) in the same individuals allows for the examination of change in levels of psychosocial effects over time and provides insights into the ongoing processes of reappraisal and coping as residents come to terms with their unsuccessful battle to stop the landfill and begin to experience and live with its presence in their community.

The importance of research in this area was confirmed at a symposium on the siting of hazardous waste facilities held at the University of British Columbia in 1993 (Munton, 1996). An emergent theme from these meetings was that theoretical and empirical advance in this field requires going beyond the existing catalog of cross-sectional case studies to establish the best evidence available on the psychosocial effects of waste facilities and their determinants. This thesis extends and advances our understanding of the psychosocial impacts of exposure to waste facilities by acting on one of the major recommendations for advance: a longitudinal study of a population “exposed” to a low level, non-hazardous environmental stressor such as a landfill site. The research here represents the first empirical documentation of a longitudinal study in a non-hazardous exposure setting. Furthermore, the existing studies, which looked at hazardous exposure settings, focus on the intense community opposition which often results from the proposed siting or discovery of environmental threats (Edelstein, 1988). This work seeks to fill an additional void in the literature by examining the ongoing processes of reappraisal and coping after the battle is over, the decision to locate and construct the landfill is irrevocable and residents get on with their lives.

In addition to these important empirical contributions, this work seeks to add a useful theoretical contribution through an evaluation of the framework typically employed in cross-

sectional studies of psychosocial effects. The theoretical basis for most research in this area is derived from environmental stress and coping theory, drawing primarily on the work of Lazarus and Folkman (1984). The transactional model of stress and coping put forward by these authors, where individual response to a stressor is envisioned as an iterative process of primary and secondary appraisal, reappraisal and coping, has continued to be prominent in much current stress research in both environmental (e.g., McGee, 1996) and social psychological (e.g., Valentiner et al., 1994) contexts. The stress theory of Lazarus and Folkman is inherently longitudinal - it is based on examining a continuing *process* of reappraisal and coping. Most social psychology applications informed by this theory are designed to examine this temporal process and include studies of student stress and anxiety (Terry, 1994), work place stress (Parkes, 1986) or life-event stress (McCrae, 1984). However, the limited number of studies of populations exposed to environmental stressors are typically cross-sectional such as research around Three Mile Island (Baum et al., 1983), lead contamination (McGee, 1996) or a landfill (Elliott, 1992). The current longitudinal study at Milton which collected indicators of stress, reappraisal and coping at three different points in time from the same individuals, facilitates the documentation and examination of the *process* whereby people have experienced and come to live with this landfill over time. In this way, a theoretical reevaluation of Lazarus and Folkman based on empirical evidence collected in an environmental context is undertaken.

The siting of noxious facilities such as landfills is high on the political agenda in most industrialized countries as two things happen: 1) land becomes increasingly scarce; and 2) more is known about the environmental and health consequences of the various waste

disposal options. Additionally, the North American public increasingly expects advances in science to find solutions to all environmental and social ills - in essence, to create a risk-free environment.

The siting of landfills is a heightened political issue in the province of Ontario where community opposition has been strong and political mandates have been too short to settle the issues definitively. The Milton community is an excellent case study as it went through 20 years of vocal opposition leading up to the decision to locate and construct the landfill. This was the last landfill site in Ontario to be constructed after going through the provincial environmental assessment process (Stein, 1996) and the written decision of the Joint Board of the Environmental Assessment Board (Province of Ontario, 1986) and the Ontario Municipal Board (Province of Ontario, 1989) describes how the involvement of community residents contributed to the construction of the “state-of-the-art” facility which now exists. Currently, the provincial government is proposing a “fast-track” system for licensing landfill sites with a weakened environmental assessment process which severely curtails community involvement. It is important, therefore, that we gain further insight into the processes involved through the siting, construction and acceptance of facilities for future public policy.

1.2 Research Objectives

The primary objectives of this research are as follows:

1. To document changes in psychosocial outcome measures in Milton area residents between 1990 and 1995.
2. To explore the processes of reappraisal and coping among Milton area residents.

3. To evaluate the appropriateness and usefulness of the Lazarus and Folkman (1984) framework in the context of a population living proximate to a solid waste facility.

1.3 Organization of the Thesis

This thesis consists of six chapters including this introductory chapter. Chapter Two provides a brief profile of the Milton community, followed by a detailed account of the 25 year history of the siting of the Halton Regional Landfill Site and a description of the waste facility itself. Chapter Three reviews relevant literature in the areas of environmental stress and coping and the physical and psychosocial impacts associated with environmental hazards. It contains a detailed theoretical examination of the Lazarus and Folkman (1984) model of stress, reappraisal and coping. The chapter concludes with the presentation of a set of theoretically-derived hypotheses about how Milton residents have experienced the introduction of a landfill site into their community over time.

Research design issues are addressed in Chapter Four, including a review of the decisions made as part of the larger research program such as site and sample selection, survey instrument design and administration. This chapter also provides details of the sample characteristics, response rates, the tracking of the baseline cohort from 1990 to 1995 and attrition.

Chapter Five presents the results of the longitudinal study conducted in the population living around the landfill site at Milton. The presentation of the results is organized around the eight theoretically-derived hypotheses developed in Chapter Three. The chapter addresses each of the hypotheses in turn by presenting and analyzing the data gathered by the survey.

Chapter Six reviews the main research findings of the thesis. These are considered within the context of psychosocial effects which remained consistent over time, those that changed over time and the determinants of that change. The chapter concludes with a discussion of implications of the study for theory, practice and future research.

This thesis makes an empirical contribution to environmental stress literature as it represents the first longitudinal study in a non-hazardous exposure setting. The unique “fit” between theory and data in this project facilitates a meaningful evaluation of the theoretical framework as data collected over time are necessary to assess a process-based framework. Through an enhanced understanding of the processes by which a community experiences and lives with a new landfill, this thesis can offer informed suggestions about policies regarding the siting of future waste disposal sites in communities.

CHAPTER TWO

THE RESEARCH CONTEXT

2.1 Introduction

The data described and analyzed in this thesis were collected between 1990 and 1995. These years contain the key events of interest (site approval, construction and operation), and as such, offer the best opportunity to examine changes in attitudes and concerns about the landfill site over time. However, the story of the Halton Regional Landfill site began to unfold in the early 1970's when the search for a location for a new landfill site to serve the population of the area commenced. The study period covered by the current research, then, is a snapshot of a very long process spanning some 25 years that is still unfolding to some extent. It is therefore important to review and consider the context in which the 1990-1995 data are situated, since what went on prior to the final site approval in 1990 continues to shape subsequent community response.

This chapter begins with a brief profile of the Milton community, which contains the study population living around the landfill site, and a discussion of the contemporary political climate. This is followed by a detailed account of the 25 year history of the siting of the Halton Regional Landfill Site. The chapter ends with a description of the waste management

facility which resulted from this process and has become a permanent part of the Milton landscape.

2.2 Milton Community Profile

The Regional Municipality of Halton is located at the west end of Lake Ontario within commuting distance of Metropolitan Toronto (Figure 2.1 inset). Halton Region is comprised of four area municipalities: the City of Burlington and the Towns of Halton Hills, Oakville and Milton. The Halton Regional Landfill Site is located within the boundaries of Town of Milton, in the predominantly rural area to the south of the Town proper. The site is accessible from Highway 25 which borders the property to the east, and is contained by First Line to the west (Figure 2.1). The total property area of the landfill site is approximately 126 hectares of which 53 hectares is approved for landfill (Regional Municipality of Halton, 1991).

Bordered by Sixteen Mile Creek, the Niagara escarpment, Highway 401 and a dump to the south, Milton's natural boundaries create a buffer zone separating it from neighbouring municipalities (Lu, 1996). The predominant land use in the area surrounding the landfill is agriculture and residents enjoy access to numerous parks and cultural/historical amenities. The community boasts many service clubs (e.g., Lions, Optimists, Rotary) as well as active youth groups (e.g., YM/WCA, Boy Scouts, Girl Guides) and a vibrant Chamber of Commerce. Although linked by GO commuter buses and trains to Toronto, the Town of Milton has maintained its rural, small town nature (Elliott, 1992).

Selected census characteristics for Ontario, the Regional Municipality of Halton and the Town of Milton are displayed in Table 2.1. The population of the Town of Milton in 1991 was 32,037 and has remained virtually unchanged since 1986. This despite the fact that the region as a whole has seen a population increase of 15.4 percent, 5 percent above the provincial rate. Much of this growth is attributable to a large (31.6 percent) increase in the population in the Town of Oakville between 1986 and 1991. Estimates suggest that the Town of Milton could grow to 85,000 by 2011, but all development has been on hold for years because Milton does not have enough sewer and water capacity (Lu, 1996).

When compared to provincial characteristics (Table 2.1), the Region of Halton and the Town of Milton have slightly more youthful populations, a higher percentage of owned-dwellings and single-detached dwellings, lower incidences of low income families and higher median household incomes. According to Lu (1996), the average household income in Milton in 1996 was \$67,588. In summary, Milton residents enjoy a high standard of living and are part of community and region which offer the potential for an excellent quality of life. Elliott (1992) asserts that communities such as Milton, with this type of socio-demographic profile (e.g., stable population, rural character, conventional family structure), typically have well-developed social and community support networks and therefore an enhanced capacity to cope with an environmental stressor. However, Elliott (1992) also suggests that other aspects of this community profile (e.g., youthful population with young children, a high proportion of home owners, substantial agricultural component of the local economy), imply greater susceptibility.

Milton is located in an area which is currently undergoing rapid and dramatic political and structural change. This change, called “the 905 revolution”, is witnessing a rise in political influence among the voters who live in the new area-code belt around Metropolitan Toronto, made necessary when the 416 area code became overloaded (Delacourt, 1995). The transformation of small-town Ontario into suburban Ontario is part of a larger phenomenon occurring throughout suburban North America. It is characterized by a political mood of distrust of government, an opposition to taxes and the belief in the rights of the individual and according to Delacourt (1995), is the result of rapid change and fear of change.

In Milton, where the town’s population has tripled since the late 1960’s, some people have had trouble dealing with the transformation from rural peace to suburban angst. Town of Milton Mayor Gord Krantz, is a proponent of what he calls “managed growth” for the town as the current situation sees a large number of people who leave Milton to commute to work each day. Mayor Krantz would like to see more people living and working in Milton and commented that “you can stand still for so long, but sooner or later you’ve got to go ahead or you go backward” (Delacourt, 1995). Other residents of Milton, however, are worried about growth and about Milton getting too big. Milton resident and Reform Party candidate Richard Malboef articulates this concern: “they say that this is a nice town, shielded from a lot of the problems of other suburbs closer to Toronto, and they want to keep it that way. They look at Markham, they look at Scarborough, and they don’t want Milton to end up like that” (Delacourt, 1995).

Delacourt (1995) describes the mood in Milton as one of a curious ambivalence: a desire to grow yet remain the same. These conflicting visions are played out each time the

town faces a development issue whether is it a subdivision proposal, a transportation plan or the introduction of a facility such as the landfill site. One recent source of hot debate has been residents' opposition to chlorination of the water supply. The Milton Ratepayers' Association formed in 1996 to lead the fight to prevent the provincial environment ministry from forcing the town to put in a full-scale chlorine disinfection system for its aquifer-fed water supply (McAndrew, 1996). The theme of drinking water quality and quantity is a recurring one in Milton and will be discussed in more detail in Chapter 5. Community mobilization around environmental and development-related issues is also a recurring theme in Milton and it is to the battle against the siting of a new landfill facility in Halton Region that this chapter now turns.

2.3 Halton Regional Landfill Siting History

A detailed account of the series of events leading to the eventual confirmation of Milton as the location for the new Halton Regional landfill site is provided as part of the baseline study by Elliott (1992). Here, these events will be summarized and supplemented with information from several additional sources: the Review under the Environmental Assessment Act (Province of Ontario, 1986), the Joint Board decision and reasons for decision (Province of Ontario, 1989), and an issues analysis of the decision (Environment Ontario, 1989). The 1986 document is a review of the Environmental Assessment document prepared by the provincial government to address the quality of the environmental assessment. Issues such as: the technical quality and completeness of the information contained in the environmental assessment; the level of detail in which environmental effects are considered;

the appropriateness of the range of alternatives investigated; and, the weight given to policy interests are evaluated in this review. Of particular interest to the current research, this review contains comments provided by a host of government ministries and agencies on the specifics of the environmental assessment in Halton which could shed some light on the issues and concerns raised by local agencies at this early stage in the siting of the landfill site.

The 1989 Joint Board document, comprised of over 200 pages, also provides factual information about the siting decision, but more importantly, serves as a rich source of commentary by local residents, experts and members of both the Environment Assessment and Ontario Municipal Boards. It summarizes “194 days of evidence and argument, almost fifty-thousand pages of transcript and about one-thousand exhibits” from the Joint Board Hearing (Province of Ontario, 1989). The chronology presented here (Table 2.2) brings up to date the previous chronology by adding in important events, including the timing of the three research surveys, since final approval of the site in 1990.

“Locating a suitable site for landfill in the Regional Municipality of Halton has been a protracted and acrimonious process” (Province of Ontario, 1989, p. 7). Prompted by the imminent closure of existing landfills, the Region’s search for a new site to contain its municipal solid waste began in the early 1970’s. Six potential sites were initially evaluated and by 1976, two preferred sites emerged: a site in Burlington and one in Milton. The Burlington site was initially rejected because it was considered too far from the centre of waste generation. At the time these two were announced, citizens from around each of the sites came together to form opposition groups. The Tremaine-Britannia Citizen’s Group (named for the streets bordering the proposed site), supported by Milton Municipal Council, formed

to oppose the Milton site. Supported by the City of Burlington, the West Burlington Citizen's Coalition formed to oppose the selection of their community. In 1978 the Region proceeded with an application for a landfill site located at the junction of Tremaine and Britannia Roads in Milton in the same general area as the current landfill facility. This site was approved by the Ontario Municipal Board on June 15, 1979. Over the next four years, citizens from around the site, with the cooperation of the Town of Milton who would not amend its official plan to zone the site, fought the OMB-approved site bitterly and successfully. A decision was made to have the new site reviewed under the Environmental Protection Act (Province of Ontario, 1989).

Both the Burlington (Site F) and the Milton (Site D) alternatives were submitted by the Regional Municipality of Halton for approval under the Environmental Assessment Act, seeking a certificate of approval to dispose of non-hazardous domestic and commercial solid waste. During the period of pre-submission consultation (August 1982 to September 1985), meetings with the Region, Ministry of Environment staff, agencies, municipalities and the public were conducted and the Region of Halton's consultant attempted to address all the concerns that were raised during this consultation. The Region made extensive efforts to promote and hold public meetings to provide opportunities for individuals, groups and agencies to make their concerns known and to inform them of the assessment's progress and process (Province of Ontario, 1986).

Two types of analysis were employed to rank the candidate sites and to establish a preferred site in the environmental assessment: a "worst case scenario" analysis that considered the potential impact of a landfill system failure on water resources, and a "pairing

analysis” approach which compared candidate site plan areas against one another to achieve an overall preferred site ranking. Six evaluation categories were considered: public health and safety, natural environment, social environment, cultural environment, costs, and engineering and operations. However, the review of the environmental assessment is critical of the evaluation methodology, as there is no indication of how these factors were weighted. The most important sub-factor to emerge was hydrology/hydrogeology. Out of the six candidate sites, Site F in Burlington and Site D in Milton were ranked first and second respectively (Province of Ontario, 1986).

The government review of the environmental assessment contains a summary of reviewers’ comments on the quality and completeness of the environmental assessment. It is interesting to note that a great number of the reviewers, primarily government ministries and agencies, responded with “no comments”, “no concerns”, “no objections” and “no impacts”. On the other hand, agencies such as the Halton Region Conservation Authority, the Ministry of Agriculture and Food, the Ministry of the Environment did respond with specific concerns about the quality of the assessment itself and about the impact the proposed landfill site might have on their specific area of interest. For example, the Ministry of the Environment considered Site F acceptable in terms of noise without condition or mitigating measures, however, felt that Site D would require mitigating measures to secure an acceptable noise climate for nearby residences. The government review document of the environmental assessment concludes with a summary of the environmental impacts and anticipated mitigative measures of both the Burlington and Milton candidate sites. These impacts and mitigative measures for Site D in Milton are presented in Table 2.3. The anticipated adverse effects of

Site D include noise, visual, land use, natural environment, agriculture and heritage impacts. In the worst case scenario, there is a potential for changes in groundwater quality of local supply wells, however the review suggests that additional mitigative measures could be undertaken to remedy this potential impact. Anticipated mitigative measures would offset other impacts noted with the exception of noise impact for one residence (Province of Ontario, 1986).

The Joint Board hearing began on May 5, 1987 and concluded on November 8, 1988, releasing the Decision and Reasons for Decision on February 24, 1989. The Decision quite simply was to deny approval of landfilling at Site F in Burlington and to grant approval to proceed with landfilling at Site D in the Town of Milton, subject to the conditions set out in the Decision (Province of Ontario, 1989). In presenting its Reasons for Decision, the Joint Board summarizes the opinions brought forward by various experts in the field, and, more importantly, offers some valuable insights into the fears and concerns of area residents at this early stage in the life of the landfill site.

The first issue to be considered by the Joint Board was to establish the need for a landfill site and the size of facility required based on the Region's estimated projections of waste generation. There was little question that a landfill was required, although the size and lifetime would depend on the extent to which source separation, recycling and energy from waste initiatives were undertaken by the Region. The issue of equity as it relates to sources of waste and the location of the landfill in Halton Region was debated. It was suggested that since Burlington had 41 percent of the population in the Regional Municipality of Halton, Oakville had 34 percent and Milton had only 11 percent, and it was felt that Oakville would

grow much faster because of developmental pressures in the greater Toronto region, the decision of the Joint Board should be influenced by considerations of social equity and thus select the Burlington site. The Joint Board rejected this argument:

Because 'environment' means the social, economic and cultural conditions that influence the life of man or a community, among other things, and because the continued location of a landfill in one community could affect such conditions, there will be some effect. But in this case there are so many other more important factors to consider that 'source of waste' pales by comparison (Province of Ontario, 1989, p. 11).

The plan to develop an energy from waste facility to extend the lifespan of a new landfill site forms an interesting component of the Joint Board document. The Region had set aside the necessary funds to ensure that this facility could be constructed when needed, and by June of 1984 had concluded that an energy from waste facility was technically, environmentally and fiscally feasible. Public hearings were held to consider such a development and in response to negative public reaction, private sector customers of such a facility backed away from purchasing the energy from it. The Region subsequently decided to reconsider the issue and the assumption that it would be part of the facility was downplayed in the evidence considered by the Joint Board with respect to projections of waste quantities for landfilling (Province of Ontario, 1989).

The Joint Board report criticizes the Region's lack of attention of alternatives to landfilling such as mandatory recycling, waste levies and by-laws, composting and source separation, citing this as the weakest part of the proponent's case with respect to the need for the undertaking. In response to some Burlington area residents' concerns that a number of

chemicals had been deposited in existing landfill sites over the years, the Joint Board stated that they would only approve a new landfill site in the Region if a condition was applied to ensure that there were reception areas designated for household hazardous wastes. With regard to other alternatives, the Joint Board “was convinced that the situation had deteriorated to one of ‘crisis management’ and irrespective of what else is done now, there would still have to be a landfill component to Halton’s waste management program” (Province of Ontario, 1989, p. 13).

The Joint Board considered the impact of the proposed landfill site on “cultural conditions that affect the life of man or a community” and identified two potential kinds of impacts: those which affect archaeological sites and those which affect heritage sites. No significant archaeological impacts were identified which distinguished the two sites. With respect to threats to heritage sites, the Joint Board found that the impact of a landfill on heritage features would be more severe at Site D in Milton than at Site F. The Ford Farm was the feature of greatest concern at Site D as the terra cotta barn foundation is a rare type of structure in the Halton Region. The Joint Board report noted the somewhat bizarre possibility that the approval of a landfill site near a heritage feature such as the Ford Farm, currently at risk because it is not protected by legislation, with appropriate conditions, could have the effect of preserving a heritage feature not otherwise protected. The Board stated that it gave no weight to this peculiar opportunity, but cited it as one example of a number of instances raised by various parties of the ‘advantages’ of choosing a particular site that were extraneous to the undertaking (Province of Ontario, 1989).

The section of the Joint Board report devoted to the discussion of social impacts is quite instructive as it relates to the current research. Dr. Myra Schiff was Halton Region's expert witness on social impact. Overall, she told the Board that all six sites would create moderate social impacts for adjacent communities. Dr. Schiff considered seven evaluation factors to narrow the sites under consideration from six to two: population impact (disruption of households, emotional impacts, community disruption, special population group disruption), social equity, community facilities, airborne contaminants, noise, visual impact and land use compatibility. Dr. Schiff's approach and methodology was strongly criticized on a number of grounds, including the inadequacies of the rating scales and categories employed, the interaction and duplication of findings created by the evaluation factors used, different boundary delimitation around the various sites, and failure to give serious consideration to many submissions made to the Region during the process of public hearings. Dr. Schiff explained that she had interviewed as many people within a half-mile radius of the sites as possible and made adjustments to the area boundaries that she deemed necessary to capture 'population communities' and to accommodate 'psychological barriers'.

The Joint Board observed that the recent Environmental Assessment Act (1980) definition of environment included "the social conditions that influence the life of man or a community", required the application of new methodology for dealing with population impact, social equity and community disruption. As the report indicates:

The Board recognizes that probing the depths of human emotions, to elucidate the proper weight to be given to social impact, adds a new and difficult dimension to the process of environmental assessment. But the assessor must not quarantine the population being studied in order to avoid the risk of becoming infected with its bias (Province of Ontario, 1989, p. 19).

It was argued that Dr. Schiff's social impact assessment was based on her subjective perception of impact on individuals in the areas affected, rather than on actual expressions of concern by these individuals.

The West Burlington Citizens Group called its own expert on social impact, Professor Lang, who reviewed the Region's social impact assessment and submissions made by residents as well as preparing and administering his own questionnaire to elicit the views of citizens about the Site F proposal. In Professor Lang's view, there were five critical deficiencies in the Region's social impact assessment: the social impact assessment was not designed appropriately for an urban community or to probe public concern; the impact on workers in the area had been overlooked; internal inconsistencies existed such as the setting of study area boundaries; an insufficient account of community; and, failure to provide an integrated picture of landfill impacts. Further:

Professor Lang felt that the Region had not shown the actual cause and effect relationship between stress on a community and the perceptions of community citizens about that stress. Dust, odour, litter, visual and other environmental effects were not assessed in the social impact assessment. Rather they were left to other experts. But the other experts assumed that societal responses to the physical changes they were predicting would be assessed in the social impact assessment (Province of Ontario, 1989, pp. 20-21).

The Joint Board considered the social impacts foreseen by Dr. Lang and did not find support for them. The explanation offered in the Joint Board report speaks directly to the issues of stress, risk, anticipatory concern and other psychosocial effects and makes some rather pointed comments about the nature of social impact data, as evidenced in the excerpt below:

Mr. Lang's evidence on technical versus interactive social impact studies led the Board to conclude that the interactive component is a desirable facet of social impact analysis. But the interactive component, which requires the synthesis of community feelings from views expressed by some of its spokespersons, poses the danger of misrepresentation of the wider community. This Board carefully sorted through expressions of fear which appeared not to have a reasonable basis in fact and, while recognizing the apprehension they legitimately conveyed, did not determine the matter of fact according to the frequency with which they were expressed.

The Board heard evidence that social impacts occur when people are subject to a new situation which they perceive to be bad. We were also told that such impacts may arise as a result of expectations that a bad situation would end if, in fact, that situation does not end. Aldershot residents believed that, after many years of landfilling in the vicinity of Site F, the practice was about to end. Whether or not there are physical manifestations of damage if the landfilling does not stop, social impact assessors ought not to ignore the associated emotional manifestations.

Professor Lang's evidence brought into focus the role of "expert" versus "layman" evidence in the assessment of social impacts at environmental hearings. Social impact assessment is unlike the physical sciences; for the physical sciences, the Board may need the assistance of an expert in order to understand the raw data and their meaning. Such intermediaries are not necessarily needed to understand people's feelings; people can express those feelings directly, in the forum of the Hearing. Thus, this Board was not convinced that the services of an 'emotional translator for the community' was necessary.

The Board recognizes, on the other hand, that social impact experts may agglomerate, amplify or filter the feelings of a large number of people in an attempt to categorize them and thus make them more useful for the hearing process. Dr. Schiff noted that although the perception of risk is an important factor in environmental assessment, it ought not to be as significant a social factor as dislocation and other quantifiable physical factors. The Board agrees. (Province of Ontario, 1989, pp. 21-22).

The Joint Board report highlights the impacts expressed by four families living near the proposed Milton site. The family most seriously affected by dislocation at Site D ran an antique aircraft repair and rebuilding facility which provides 75 percent of the family income

and could not be re-established elsewhere in the area. Another family, who purchased and restored the century old Ford Farm in March of 1986 under the impression that they were safe from landfilling at Site D since they believed that the Burlington site had been selected, stood to lose the 40 percent of their family income earned from grooming and raising show dogs. The Board expressed concern about the extent to which several residents in the vicinity of Site D were apparently unaware of what was going on around them, although they state that they heard no evidence to suggest that the proponent had not been thorough in providing appropriate notice. A third family, who purchased their retirement house in 1968 and restored and had it designated under the Heritage Act, told the Board that they wanted to be allowed to continue to live on the land for the rest of their lives. They felt that if a landfill was built at Site D, they would have to move as they would be within five hundred feet of the landfill, their water would be polluted and they would suffer from dust, noise and odour due to their proximity to the proposed landfill. In light of the fact that they would be almost two thousand feet from the fill area, the Joint Board responded: "there ought to be an obligation on someone, (Environment Ministry officials or legal counsel perhaps), to ensure that where local residents' fears do not relate to the fact situation they are properly informed at the earliest opportunity" (Province of Ontario, 1989, p. 23).

The fourth family highlighted in the Joint Board report purchased property on Site D in 1986 based on the understanding from media reports at the time that Burlington was the preferred site and Site D was out of the running. They held to this belief and invested a great deal of money and effort into construction of their house in 1987, despite notices published in the local paper and receipt of a certified letter explaining that a hearing was to be held to

consider landfilling on the property on which they planned to build a house. “The Board finds that adequate notice of the undertaking was given and that reasonable prudence on the part of the [family] would have removed the risk of having their labours undone” (Province of Ontario, 1989, p. 24).

In addition to these four families, the Joint Board heard evidence from an additional 28 residents from the community around Site D, as summarized below:

Their concerns about the effect of a landfill on their relatively peaceful rural society centred around noise, dust, visual impact, litter and increased traffic, as well as the loss of valuable agricultural land in what is a predominantly agricultural community. The Board finds that a number of their expressed concerns did not correspond to the facts about the proposed undertaking, and that many nearby residents had not taken the opportunity to read the environmental assessment documents prepared for their use as well as for other official uses. This makes an already unpleasant situation unnecessarily traumatic; it creates a scenario whereby any decision this Board makes will be rejected by those most affected on the basis that it places an unconscionable burden upon them (Province of Ontario, 1989, pp. 24).

The Joint Board also heard evidence from the West Burlington Citizen’s Coalition who outlined their concerns about a proposed landfill at Site F. In addition, special public sessions were held to allow those citizens not associated with any particular group of residents to express their views. The Board echoed the concern that a lack of understanding about the Region’s proposal and its associated mitigating measures “fueled unnecessary fears about possible impacts” (Province of Ontario, 1989, p. 27). To address this concern, the Board recommended that ways be found to ensure that potentially affected residents have a good understanding of the steps being taken to minimize environmental impacts of landfill operations. The Board observed: “the frequent and voluble vocal opposition to landfill

proposals was often not matched by evidence of a willingness to reduce the problem at source, either individually or in concert with others” (Province of Ontario, 1989, p. 27).

After considering all of the submissions and social impact evidence, the Joint Board reached the following conclusion:

The Board was persuaded by the end of the Hearing that there would be a serious social impact at both sites. At Site F [Burlington] the impact would be more diffuse and less serious for a large number of people. At Site D [Milton] social impact would be severe for a small number of people. The severity of the impact would diminish with distance from the site (Province of Ontario, 1989, pp. 28).

The Joint Board may impose terms and conditions in approving an undertaking where it considers “the waste disposal site may create a nuisance, is not in the public interest or may result in a hazard to the health or safety of any person” (Province of Ontario, 1989, p. 28). Since the Board considered it “probable that the Halton landfill would create such problems”, specific terms and conditions were deemed necessary to minimize them (Province of Ontario, 1989, p. 28). The concerns to be addressed were grouped into three main categories: nuisance concerns such air quality, noise and visual impact; resource policy considerations including agriculture versus mineral resource policies and flora and fauna; and, public health and safety comprised of aircraft/bird hazard, transportation risk, leachate treatment, surface water and ground water impacts and design and operations. After a detailed examination of each category, the Board concluded that mitigation would be required to address unpleasant air quality, noise and visual impacts regardless of which site was selected. Further, that based on the resource policy category, the significant and varied flora and fauna at Site F were more deserving of protection given that the mineral resource impact at Site F would counterbalance

the interim agricultural impact at Site D. With respect to public health and safety, the Board found Site F clearly unacceptable, while Site D was acceptable with the hydraulic trap design proposed and appropriate conditions applied (Province of Ontario, 1989, p. 113).

“Walking through the complex minefield of dumpsite selection with the Environmental Assessment Act as a guide was difficult enough; doing so while in the crossfire of rival communities only added to the tension” (Province of Ontario, 1989, p. 151). The fact that this was a ‘two-site’ undertaking was strongly criticized by the Joint Board and seen to have a detrimental effect of public confidence in the process. In the opinion of the Board, if the proponent had narrowed its choice to the most suitable site, Site D, it would have served to shorten the length of the Hearing significantly and “would have prevented unnecessary trauma and could have helped to engender public support for the environmental assessment process” (Province of Ontario, 1989, p. 157).

Concerns about the extent to which information was shared between parties was also expressed by the Joint Board. The withholding of information by one party or another for dramatic introduction late in the hearing was criticized. In addition, “failure to undertake the necessary studies in a timely fashion and exchange the information between parties, caused aggravation for citizens - aggravation subsequently directed against the process of environmental assessment itself” (Province of Ontario, 1989, p. 162). The example cited in the report was the failure of the consultants to perform certain tests and studies, which led residents living around Site D to be persuaded that their groundwater would be poisoned despite the fact that the Board was convinced that this would not be the case.

The Joint Board report offers other valuable insights into the public's perception of the process in which they were engaged. Many Aldershot residents, who were affected by both present and proposed landfills, told the Board that the public meetings did not accommodate public concerns and that their perception of distress was not taken into account as a social impact factor. This was acknowledged as "a difficult matter to deal with, since the Board must deal with realities and facts, while recognizing that perception of stress itself causes stress, and thus can cross the boundary into reality" (Province of Ontario, 1989, p. 163). The Board observed that as "citizens in the vicinity of both sites have been led to believe that the consequences of the establishment of a landfill in their area would be far more serious than the facts support . . . [opposition] against a specific site [is] based on fear rather than fact" (Province of Ontario, 1989, p. 163).

A major problem with the Halton environmental assessment identified by the Joint Board was "that the process must not only be fair, it must be seen to be fair by the citizens affected by it" (Province of Ontario, 1989, p. 169). Many of the residents who appeared as witnesses at the Hearing voiced frustration about the perceived unfairness of the process, and often expressed their perception of a bias in the process. However, both the proponent's principal consultant and the Joint Board agreed that equity would be the result of the process - "to let people get on with their lives" (Province of Ontario, 1989, p. 171).

Based on the evidence provided by expert and citizen witnesses at the Hearing, 34 conditions of approval for the new landfill site in Milton were imposed by the Joint Board. Among them: the establishment of a Municipal-Regional Waste Management Committee with a goal of the reduction, recycling and reuse of waste to minimize the stream to be

landfilled; provision of facilities for the collection and transfer of household hazardous wastes; formation of a Citizen's Advisory Committee comprised of local residents to make recommendations for the avoidance or minimization of off-site impacts from the landfill; preservation and maintenance of the Ford Farmhouse and associated landscape plantings; widening of Highway 25 at the entrance to the site; a hydraulic trap leachate collection system; vegetation and berms to mitigate visual impacts; litter control activities; vermin and gull control activities; ground and surface water monitoring; leachate storage and removal system; woodlot preservation and planting; paved roads to minimize dust, and sound level restrictions on machinery and equipment (Province of Ontario, 1989).

“For more than a decade the Regional Municipality of Halton searched for a new landfill site to receive the waste of its citizens. A great deal of money was spent in the search, and residents of two communities felt threatened by the impending decision” (Province of Ontario, 1989, p. 172). “From a citizen's perspective this hearing was about: ‘something that no person wants to see as a next door neighbour’” (Province of Ontario, 1989, p. 4). The selection of Milton as the preferred site for the Regional landfill prompted the Tremaine-Britannia citizens' group, backed by Milton Municipal Council, to appeal this decision one last time to the Supreme Court of Ontario (Elliott, 1992). This appeal was denied in June of 1990; construction of the site commenced in 1991 and Halton's Waste Management Site opened to the public in November of 1992.

2.4 Halton's Waste Management Site

The Halton Waste Management site is an integrated, multi-use, fully engineered landfill facility designed for the disposal of 7.96 million cubic metres of domestic, commercial and non-hazardous solid industrial waste (Regional Municipality of Halton, 1991). The site, which cost \$120.5 million to construct, is 126 hectares in size, with 53 hectares used for landfilling. The lifespan of the site was expected to be 20 years, after which time the site was to be reclaimed for agricultural use (Regional Municipality of Halton, 1992). However, the facility, which was initially designed to accept 200,000 tonnes of waste annually, is operating at 80,000 tonnes annually due to the success of recycling and other programs to divert waste and because much of the Region's waste continues to be exported to the United States (Morley, 1994/5). The 20 year lifespan will likely be extended since the facility is operating at two-thirds less than its projected capacity.

A site visit and tour of the Halton Waste Management site reveals a facility that is quite different from the traditional images of 'dumps' as excavated holes in the ground filled with waste which over time become large mountains of garbage. Some common expectations, according to the facility's environmental inspector and tour guide, are that "most people say it is going to smell, that they will see garbage and litter blowing everywhere, and that rodents and seagulls will be there to scavenge the garbage" (Morley, 1994/5, p. 8). These old 'dumps' are also typically associated with environmental problems such as groundwater contamination from leachate. The Halton site does not meet these typical images or expectations, due in large part to the conditions set by the Joint Board when approval was granted to construct the site.

Even before the facility was open for business, environmentally aware practices were employed such as re-using tires to construct roadways on the site and the mulching of branches of trees which had to be removed for use on planting beds on the site. This concern about environmental impacts, largely attributable to the community involvement through the lengthy assessment and appeal processes, permeates virtually every aspect of the landfill's construction and operation. The site incorporates state-of-the-art engineering techniques for landfilling which reduce environmental impacts, a container station for regular waste and recyclables, a household hazardous waste facility, a composting project and an Amity Re-use Centre. A \$5 per vehicle tipping fee was implemented in January 1994 for local residents who use the facility. The Halton Site thus offers 'one-stop shopping' for the waste disposal needs of area residents (Morley, 1994-5).

The site was engineered with a hydraulic trap to control contamination from leachate, one of the principal environmental problems associated with landfills. Leachate is captured in a series of granular and clay liners, carried through collector pipes to storage tanks, and pumped out of the tanks and taken to an approved water pollution control plant to be treated. A series of fences including a mobile fence are positioned near the tipping area to trap windblown litter. A falconer is employed to deter seagulls from congregating at the landfill site. A series of landscaped earth berms and extensive tree planting obscure visibility of the site from Highway 25. A new Halton Heritage centre with a collection of local artifacts and the preserved Ford farmhouse are located adjacent to the site.

Public involvement in the facility has been actively encouraged. In addition to holding regular open houses and tours of the site on request, a Waste Management Site Advisory

Committee comprised of local residents and agency representatives was established and the Halton Waste Management Site Newsletter is published regularly. The mandate of the Committee is to relay information and to make recommendations to Halton regarding public inquiries and comments that may arise from the design and operation of the new landfill. According to the site's environmental inspector, the site has been operating successfully since 1992 and there have been virtually no complaints from nearby residents (Morley, 1994/5; Regional Municipality of Halton, 1991, 1992).

2.5 Conclusion

This chapter provides some insights into the Milton community to set the context for the longitudinal study of psychosocial effects, reappraisal and coping as they experience the introduction of a landfill site. The profile reveals a stable, rural community with characteristics suggesting an enhanced capacity to cope with an environmental stressor. At the same time, other aspects of the community profile, such as a youthful population, high proportion of home ownership and economic reliance on agriculture, imply greater susceptibility to psychosocial effects. The Milton community, which enjoys a high standard of living and excellent quality of life, is located in an area that has been undergoing a rapid transformation from small-town Ontario to suburban Ontario. Milton area residents, worried about threats to their small-town quality of life, are becoming increasingly politicized and mobilized. Their lengthy, and ultimately unsuccessful battle against the siting of the Halton Regional Landfill site into their community provided an opportunity for their concerns and fears to be articulated to the Joint Board during the Environmental Assessment hearings. The

landfill facility which now operates on the outskirts of the Town of Milton, was designed, engineered and functions in a manner which addresses many of the concerns raised by the residents. This siting history provides an important context for understanding and explaining subsequent reaction to the site by Milton area residents in the study which follows.

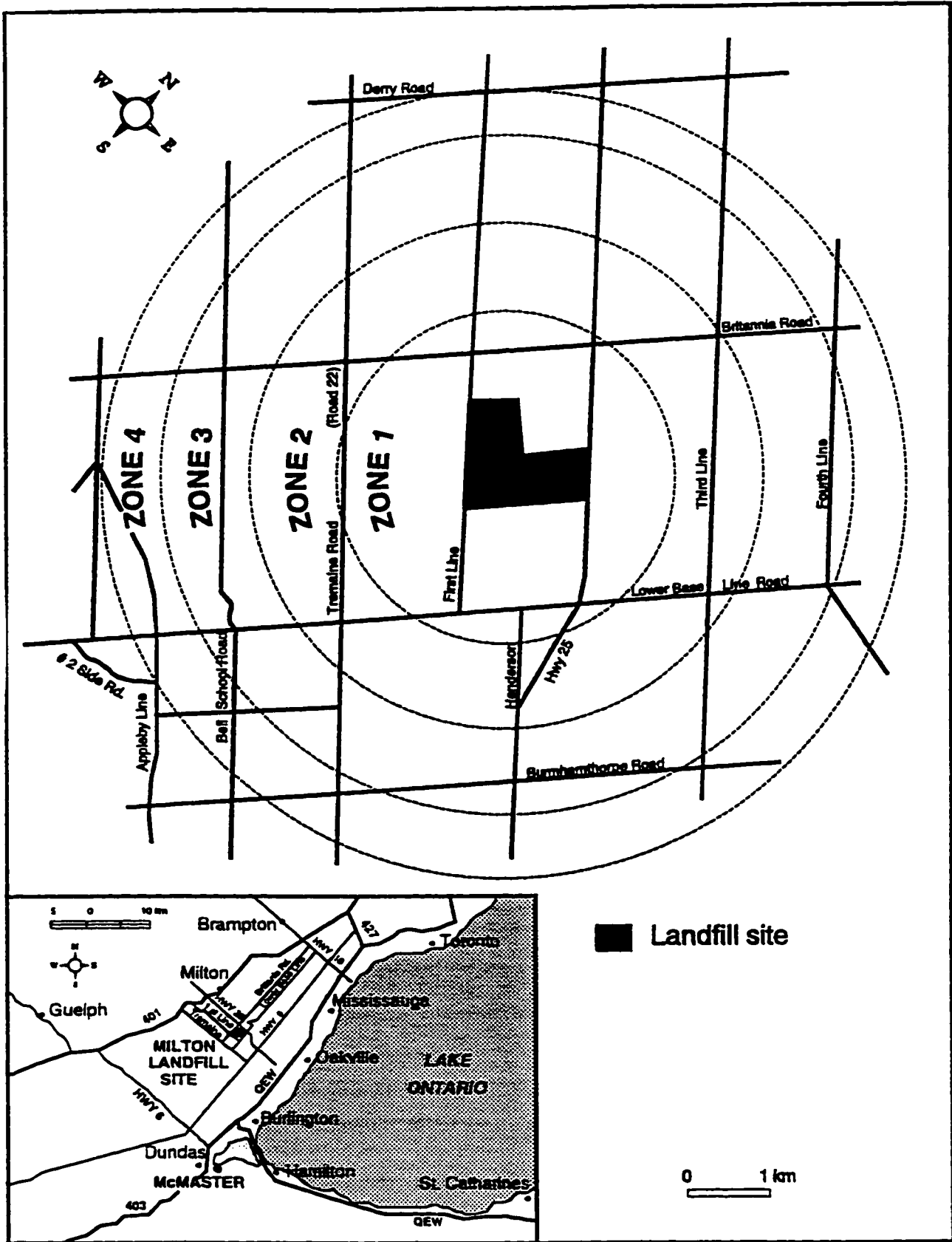


FIGURE 2.1: Location of the Halton Regional Landfill Site and Identification of Zones

TABLE 2.1: Selected 1991 Census Characteristics, Ontario, Regional Municipality of Halton, Town of Milton

1991 Census Characteristics	Ontario	Regional Municipality of Halton	Town of Milton
Total Population 1991	10,084,885	313, 136	32,037
Total Population 1986	9,101,694	271,389	32,075
Population Percentage Change 1986-1991	10.8	15.4	0.1
% Female	50.9	50.5	49.3
% age 14 and under	20.4	20.7	23.1
% age 65 and over	11.7	9.6	8.1
% owned dwellings	63.7	74.3	77.2
% single detached	57.5	65.6	71.9
% married	56.4	62.0	61.5
% no children at home	40.0	37.4	33.0
% low income families	10.9	5.3	4.4
median household income	\$44,432	\$60,256	\$60,005
% completed high school	15.5	15.6	15.4
unemployment rate	8.5	6.0	5.2

Source: Statistics Canada (1994)

TABLE 2.2: Site Chronology (*including research survey dates*)

1972	Region commissions consultant's report to identify candidate landfill sites
1974	Consultant's report identifies six candidate sites
1976	Two preferred sites emerge: Burlington and Milton
1977	(March) Regional Council passes by-law recognizing Milton as the new regional landfill site
1977	Tremaine-Britannia Citizen's Group sues Region
1977	(April) Supreme Court of Ontario quashes by-law; Region appeals to Ontario Municipal Board
1979	Ontario Municipal Board grants approval of Milton site
1981	Siting decision overturned by Provincial Cabinet; full environmental assessment required
1982	Environmental assessment begins
1983	Existing landfills close; 100 percent of garbage exported
1985	Environmental assessment complete; hearings begin
1986	Environmental assessment review released
1987	(May) Joint Board hearings begin
1988	(November) Joint Board hearings conclude; approval for Milton site granted
1989	Tremaine-Britannia Citizen's Group appeals to the Supreme Court of Ontario
1990	(March) Supreme Court appeal denied
1990	<i>(July) Telephone interviews for baseline survey conducted</i>
1991	Site construction begins
1992	<i>(June) First follow-up interviews conducted</i>
1992	(November) Halton Regional Landfill Site opens
1993	<i>(January) Recalls on first follow-up interviews conducted</i>
1995	<i>(June) Second follow-up interviews conducted</i>

Source: Elliott (1992); Province of Ontario (1989); Province of Ontario (1986)

TABLE 2.3: Environmental Impacts and Anticipated Mitigative Measures of Site D in Milton

Impacts	Anticipated Mitigation
potential conflict with truck traffic in Milton urban area	designation of haulage route will minimize conflict
loss of small woodlots	site vegetation plans for the buffer areas will reduce the impact of loss
impact on moderately stable agricultural zone	concurrent mitigation rehabilitation to possible agricultural after-use mitigation
potential land use conflict with Burlington Air Park of 8 kilometres	impact can be mitigated by bird control techniques (falcons, etc.) if needed
visual impact on Milton District Hospital	landscaping/screening required
impact on view from Niagara Escarpment	difficult to mitigate
noise impact on six residences for one year	berm/fill technique will mitigate impact on all but one residence
impact on three heritage features	relocation of heritage features with exception of the landscape plantings

Source: Province of Ontario (1986)

CHAPTER THREE

ENVIRONMENTAL STRESS, RISK AND COPING THEORY

3.1 Introduction

This chapter reviews relevant literature in the areas of environmental stress and coping and the physical and psychosocial impacts associated with environmental hazards. The purpose is to provide a theoretical foundation for the empirical research of this thesis which examines a population living near a municipal solid waste facility in Milton, Ontario. The chapter begins by setting the research in the social context of the current heightened community awareness of and mobilization around environmental issues and the public's desire for a risk-free society. This is followed by a discussion of two areas of geographical research relevant to issues of the distribution of risk: the geography of risk and hazards and the location of 'noxious' facilities. A review of the evidence regarding both the physical and psychosocial health effects of exposure to environmental hazards with a specific focus on the risks (especially the public's perception of those risks) associated with landfill sites is then offered. A detailed examination of environmental stress and coping theory, with particular attention paid to the Lazarus and Folkman (1984) model of stress, reappraisal and coping, follows. Emerging from this review of the theoretical literature are a series of plausible

hypotheses about the forms of cognitive reappraisal and coping that one would expect to be played out in Milton, Ontario. These hypotheses guide the analyses in the empirical investigation that follows.

3.2 Risk and Society

Whilst the objective material needs of most people in Western society have been fulfilled, the risks and potential of humanity's self-destruction have increased enormously. This has resulted in the traditional distributional conflicts and problems becoming less important, while problems and conflicts regarding the production, definition and distribution of *risks* (my emphasis) became more important. In industrial societies the central question was the legitimate (unequal) distribution of socially produced wealth. In the context of the emerging risk-society, the problematic consequences of the technological-economic development of Western society have become the principal foci of concern (Mol and Spaargaren, 1993, p. 440).

In order to appreciate the experience of one community within modern Western society it is imperative to consider the broader social context in which these events occur. Milton is a community in which the basic needs of life are met, and in most cases, exceeded. It is in this type of setting where communities like Milton are increasingly engaged in efforts to protect themselves against the introduction of risks which threaten their valued way of life. The underpinnings of this activism can be seen in two conflicting sets of widely held beliefs about risk in Western, in particular North American, society. On the one hand, the North American public is in an "apparent pursuit of a zero-risk society" (Slovic, 1987, p. 280) believing that advances in knowledge about the consequences of risk or technological solutions will make it possible to avoid encounters with risk in daily life. The belief that a risk-free society is achievable generates unrealistic expectations of communities where the

presence of any risk (perceived or actual) is unacceptable. As Cutter (1993) points out “there is no such thing as risk-free or hazard-free environment despite American preoccupation with a zero-risk society.” (p. 33) Despite the fact that a risk-free society cannot be realized, individuals cannot be blamed for striving to attain zero-risk in their own communities.

On the other hand, Mol and Spaargaren (1993), suggest that rather than helping us achieve a risk-free society, technological advancement has increased the potential for our own demise. According to Slovic (1987), the dominant perception for citizens of industrialized nations is that they face more risk today than in the past and that future risks will be even greater than today’s. Beck (1992) characterizes these as “unavoidable ‘residual risks’ that are the downside of the opportunities - for prosperity, relatively high social security and general comfort - that developed industrial society offers to the majority of its members in a historically unparalleled manner” (p. 97) These global circumstances of the late 20th century noted by prominent sociologists like Beck (1992) and Giddens (1990) provide the backdrop for the local issues regarding the siting of waste facilities.

These two sets of societal beliefs, the desire for a risk-free society and the view that modern day risks are more pervasive and menacing than in the past, contribute, in tandem, to the mobilization of citizens against the deliberate creation of risky environmental conditions in their own communities. Of interest, then, are the ways in which these conditions identified at the broad societal level are reflected in opposition at the local level. In Milton we can examine a localized example where the deliberate introduction of risk in the form of a landfill has come in conflict with these societal beliefs and resulted in activism against the perceived

risk the landfill represents. Before the detailed examination of the Milton case study is described, it is instructive to consider what the discipline of geography can contribute.

3.3 The Geography of Risks and Hazards

Two areas of geographic inquiry address issues at the very core of the distribution of risk within urban industrial society: environmental risk and hazard research (Cutter, 1994) and research regarding the location of noxious facilities (e.g., Dear and Taylor, 1982; Greenberg, 1987). Traditional hazards research has examined interactions between human systems and the physical environment and, according to Cutter (1994), tried to focus geographical inquiry along the lines of geography as human ecology. Early hazards research centred on how people cope with risk and uncertainty when faced with natural disasters such as floods, hurricanes and earthquakes (White, 1964; Burton et al., 1978). Hazards here are defined as the threats to people and the things they value where as risks are measures of the likelihood of occurrence of the hazard (Cutter, 1993).

The approach used in the analyses of natural disasters was later applied to issues of human made technological hazards associated with facilities like nuclear reactors, hazardous waste sites, and industrial activities (Slovic, 1987). There are, however, substantial differences between natural and technological hazards. In her book *Living With Risk*, Susan Cutter develops several themes which she views as essential for understanding human-made environmental hazards (Cutter, 1993). First, technological risk and hazards are social constructions (Douglas and Wildavsky, 1982), not acts of God, and are therefore embedded in larger political, economic, social and historical contexts. A second theme stressed by Cutter

is that the very nature of technological hazards as social constructions leads to variations in risk perceptions between experts, activists, and lay people which are the source of volatile politicized responses. Also identified is the theme of uneven burdens of risk and hazards where clear social, intergenerational, and regional inequities in burdens are associated with technological hazards. In Cutters' words, "It is the interaction between nature, society and technology at a variety of spatial scales that creates the mosaic of risks or 'hazardscape' that affect places and the people who live there" (Cutter, 1993, p. 177).

For the people who live in the Milton area, this notion of hazardscape (i.e., geographical patterns of socially produced and perceived burdens of risks and hazards), is particularly appropriate. Milton area residents have largely been spared the burden of technological risk and hazards - their environment is on the urban fringe and is relatively pristine. By virtue of their favoured position on the hazardscape, Milton residents are especially *vulnerable* because they have a great deal to lose. The vulnerability concept has had many interpretations including: the potential for loss; the likelihood that an individual or group will be adversely affected by a hazard; and individual or group resilience or capacity to absorb or recover from a hazardous event (Cutter, 1993). The vulnerability of individuals in the Milton community, confronted by the imposition of a landfill site, is an important consideration in understanding their subsequent reactions.

3.4 The Location of 'Noxious' Facilities

The specific issue of the location of 'noxious' facilities (e.g., airports, nuclear reactors, toxic or hazardous waste facilities, community mental health facilities, halfway houses,

research laboratories and landfill sites) is the second area of traditional geographic inquiry with relevance for the current research. Public facility location theory is a useful framework for research on the impacts of noxious facilities as it emphasizes the importance of the spatial externalities associated with their siting. These externalities can be tangible (e.g., property value decline, increased traffic, increased noise) and intangible (e.g., health, safety, quality of life, neighbourhood image) and are particularly relevant for understanding locational conflicts in facility siting (Elliott and Taylor, 1996). These authors also point out that public facility location theory is useful in its recognition of the social context of siting decisions, citing Dear and Taylor (1982) who argue that “spatial outcomes must seek their explanations in the wider social context; there is a direct correlation between social policy and spatial outcome” (p. 16). In the context of the current policy agenda facing governments of all levels in most jurisdictions in North America, waste management issues dominate. In some jurisdictions, in fact, these issues have reached a critical stage because the difficult policy decisions have been postponed. One need not look further than the situation that has existed in the Province of Ontario for the past eight years where very few siting decisions have been made since governments of all political parties have been unable to formulate a coherent policy for landfill siting. Inability or unwillingness to formulate policy has resulted in a spatial outcome incapable of serving the immediate and future needs of Ontarians - a series of old landfills at or near capacity which are, in many cases, remote to areas of new urban development. Currently and for the foreseeable future, then, the siting of waste facilities is going to be high on the public agenda.

Siting a new landfill is difficult. The externalities often associated with landfill sites include: impacts on the local environment, including increased levels of noise, dust, litter, rodents, odours, and traffic; aesthetic concerns and poor neighbourhood image; public water supply risks; and reduced property values (Lant and Sherrill, 1995). It is not surprising, then, that a community faced with the prospect of a new landfill in their vicinity will not be a willing host. Increasingly, attempts to site landfill facilities are met with strong local opposition, labeled NIMBY or Not In My Backyard (Heiman, 1990; O'Hare et al., 1983; Morell and Magorian, 1982). In fact, public opposition to the siting of hazardous and municipal waste management facilities and various other noxious facilities stopped or delayed nearly all major new facility proposals during the 1970s and 1980s in the United States (Kasperson, 1983). People in the targeted communities do not desire the tangible externalities, they fear the intangible externalities and their vulnerability to the intrusion of a noxious facility fuels their opposition.

Some of the most interesting issues arising from opposition to waste disposal facilities are health and health-related concerns. According to Elliott and Taylor (1997), there is a tendency for those opposing the siting of a landfill in their community to overstate health concerns. The explanation they offer is related to the high priority our society places on health, and therefore, the legitimacy, seriousness and attention paid to health-related concerns. This viewpoint is consistent with Burger (1990) who argues that health is often used as a surrogate for the environment to justify environmental actions in ways in which the scientific evidence is insufficient to support.

Sandman (1993), in a document prepared for a coalition of five citizen's groups in the Peel, Durham and York Regions of Ontario concerned about the potential siting of a solid waste landfill in their communities, presents a valuable perspective on why landfills evoke such strong community opposition. His explanation is organized around several key questions. Sandman begins by asking, "What do you do when anxiety about a risk is a greater threat to health than the risk itself?" and "How do you reassure people that you think are excessively alarmed about the risk?" He suggests that this is a challenge for risk communicators because the risks considered significant by experts differ markedly from those ranked high by the public - "the risks that kill people and the risks that upset people are completely different". (p. 5) Sandman explains why experts and the public so often disagree about risks by redefining "risk" itself. He asserts that what risk assessors mean by risk (magnitude times probability) can be termed *hazard*, and what the public means by risk (all of the things that people are worried about that the experts ignore) can be called *outrage*. Based on this, Sandman offers a new definition of risk, where risk is a function of hazard and outrage. This redefinition helps to explain why a landfill, as traditionally sited, evokes such strong community opposition - it produces a big outrage and therefore a big risk. The public, in Sandman's view, focuses on outrage and ignores hazard and as such, overestimates the risk when the outrage is high. In a study of residents' perceptions of neighbourhood quality when a new and controversial technological hazard was introduced into a neighbourhood with numerous existing hazardous facilities, Greenberg et al., (1995) tested and found evidence to support Sandman's outrage hypothesis.

What then do we know about the health and health-related impacts for individuals living proximate to a landfill site? Although the focus of this thesis is on the psychosocial effects of the Milton landfill, it is necessary to first review the evidence about the physical health effects. This is particularly relevant given that epidemiological investigations of human health impacts of exposure to waste tend to be uncertain and inconclusive in their results (Sinclair, 1990).

3.5 Physical Health Impacts of Exposure to Environmental Hazards

The potential for serious health and environmental risks from exposure to hazardous or toxic waste has been well documented (Cutter, 1993). However, there is very little evidence to support the assertion that landfills containing municipal solid waste are the source of adverse human health outcomes despite the public's tendency to overstate health concerns. To add to this, the health studies that have been conducted have focused on sites built in the 1950s and 1960s, prior to controls on site engineering and regulation of the types of materials that get deposited. For example, Schultz (1982) studied the Brookfield Avenue Landfill operating in the Great Kills section of Staten Island from 1966 to 1980. Two years after the site was closed, there was public disclosure that large scale illegal disposal of toxic industrial wastes had been occurring at the Brookfield site for years. In response to numerous complaints of intense foul odours and increased health problems (nausea, vomiting, burning eyes, sore throats and respiratory symptoms) from residents in the relatively new community constructed next to the site, a health survey was conducted. The findings revealed higher rates of respiratory tract illness for those living closest to the landfill and a corresponding

higher rate of medical utilization, but no adverse reproductive or chronic health impacts. Shultz attributed this pattern of illness to the acute noxious exposure to odour emanating from the site rather than to chronic exposure to toxic substances in the landfill. He also reports that media accounts of the discovery of illegal dumping chronicled a community which was anxious and frightened about their health and safety as well as declining real estate values.

The Upper Ottawa Street Landfill Site Health Study (Hertzman et al., 1987) is one of the most frequently cited examples of an epidemiological study of the health effects of living proximate to a landfill site. The Upper Ottawa Street Landfill in Hamilton, Ontario operated from the early 1950s until it was closed in 1980. In circumstances eerily paralleling the Brookfield experience, members of the community around the Upper Ottawa Street Landfill thought that they were living next to a harmless municipal dump until the Regional Government admitted that sludges from liquid waste solidification, as well as liquid industrial wastes were disposed of at the site (Sinclair, 1990). Hertzman et al., (1987) designed and conducted two retrospective cohort studies of workers and residents from the area around the site and found significantly higher levels of respiratory, skin, narcotic symptoms (i.e., headaches, dizziness, fatigue), mood symptoms (i.e., depression and irritability) and red, itchy eyes. There was no evidence to support adverse reproductive outcomes or increases in major chronic diseases, potentially attributable to a series of methodological challenges inherent in this type of research. Again, similar to Schultz (1982), Hertzman et al., (1987) suggest that in addition to chemical exposure, the odours emanating from the landfill site may actually increase the perception of exposure, and, therefore, of risk among local residents.

In several recent studies of residents living near a municipal solid waste landfill site in Montreal, Québec, Goldberg and colleagues (1995; 1996) investigated incidence of cancer and levels of adverse reproductive effects. The Miron Quarry Municipal Solid Waste Landfill site, located in northeast part of the island of Montreal, has been operating since 1968 and is the third largest urban landfill site in North America. Opened as a repository for domestic, commercial and industrial waste in a populous urban area (100,000 persons live within two kilometres of the site), the principal environmental health concern is the release of odourous biogas into ambient air and soil. Residents who live near the site expressed health concerns and a cancer-risk assessment study of the site was conducted. The study was justified by the fact that a number of the constituents of the biogas are suspected or recognized human carcinogens (e.g., benzene, vinyl chloride). The results of the study suggest that there may be increased risks for cancers of the stomach, liver, lung, prostate, and cervix uteri among persons who live near the Miron Quarry Landfill. The authors echo some common methodological limitations of exposure studies (unavailability of detailed environmental data to define exposure areas and the absence of some important potentially confounding variables) and therefore cannot conclude whether the excess risks for cancer observed represent true associations with exposure to biogas.

In addition to the biological plausibility of elevated cancer risk, there is a possibility that exposure to biogas may cause adverse reproductive outcomes (Goldberg et al., 1996). Citing occupational studies which have determined that several constituents of biogas are linked to hypertensive disorders of pregnancy, still births, and congenital malformations, these authors conducted an investigation to determine whether rates of these adverse reproductive

outcomes were higher in women and infants living near the Miron Quarry Landfill. Low birth weight was significantly elevated in the exposure zone as was the incidence of small for gestational age babies. There were no significant associations for very low birth weight or for preterm birth. Methodological shortcomings (inability to evaluate the effects of all possible confounders, detailed environmental exposure assessments were unavailable), however, once again kept the authors from concluding definitively whether low birth weight and small for gestational age are associated with exposure to the landfill's biogas emissions.

This brief review of the evidence of physical health impacts suggests that a plausible link exists between exposure to landfills sites and outcomes such as respiratory illness, reproductive abnormalities and cancer. Unfortunately, the uncertain and equivocal findings of these studies does little to ease the fears of communities currently facing the introduction of a new landfill. It is studies such as these, conducted around 30 year old landfill sites with all of their associated hazards of illegally buried industrial chemicals, that form the basis for many of the health-related concerns expressed by people opposing non-hazardous, state-of-the-art landfills of the 1980s and 1990s. Although research and experiences based on the impacts of such sites are clearly inappropriate comparisons to current landfill situations, the media and environmental groups rely on them to help make their case against the introduction of new sites. As a result, these inappropriate images of potentially negative physical health outcomes become the foundation for individual and community action and reaction to the prospect of a new landfill site.

If we narrow the focus of the discussion in this chapter thus far to consider how it informs our investigation of the population living in close proximity to a new landfill site near

Milton, several comments seem appropriate. First, there is a vulnerability present in this community attributable to the desire to protect its favoured, relatively risk-free environment. Second, in this context, the prospect of a landfill site represents a huge risk to this community because it evokes a great deal of outrage. This outrage is fueled in large part by images of landfills of old and the equivocal but plausible links to adverse health effects reported in the scientific literature and sensationalized by the popular media. Third, studying possible physical health impacts in Milton area residents linked to some type of toxic or chemical exposure is clearly unwarranted - during the siting, construction and early operation of the landfill, exposure to these agents was virtually impossible. Of interest, then, is the study of the range of other effects (e.g., stress, concern, anxiety, future health-related worries) which might be attributable to the landfill site. Recent years have witnessed a growing recognition of the prevalence of psychosocial effects of (perceived) exposure associated with living in close proximity to proposed or actual landfill sites (Taylor et al., 1994). It is to a consideration of these psychosocial effects that this chapter now turns.

3.6 Psychosocial Impacts of Exposure to Environmental Hazards

Psychosocial effects have been defined as a complex of distress, dysfunction and disability manifested in a wide range of psychological, social and behavioural outcomes, as a consequence of actual or perceived environmental contamination (Taylor et al., 1991). They have a complex etiology (Elliott et al., 1993), may occur in conjunction with or independent of measurable physical effects (Bertazzi et al., 1989), and may be associated with actual or perceived exposure (e.g., in advance of the siting of a waste facility) (Elliott, 1992).

As described by Taylor et al., (1994), psychosocial effects occur at various levels of social organization: individual, social network and community levels. At the individual level, they include emotional (e.g., worry, anxiety, guilt, loss/lack of control), behavioural (e.g., task performance, help-seeking, information-seeking), and somatic (e.g., headache, fatigue, depression) effects. Effects at the social network level include family disruption and social isolation as well as potentially positive outcomes such as the adoption of cooperative coping strategies which may result in greater social cohesion in response to environmental stress (e.g., a proposed waste facility). Finally, at the community level, the effects of environmental contamination often include stigmatization (e.g., a 'toxic community' label) and dislocation, but again positive effects (e.g., community empowerment and enablement) may also occur.

Taylor et al., (1989) conducted a systematic critical appraisal of the psychosocial research literature to 1988. Of the 28 out of 54 total studies critically appraised that were deemed to be credible, the sources of exposure included: nuclear power, lead, hazardous waste facilities, heavy industry, landfill sites, air pollution, power transmission lines and general environmental issues (Taylor et al., 1994). The health outcomes studied included: dysfunction, physical complaints, emotional and cognitive problems, illness behaviour and disability (Taylor et al., 1994). This critical appraisal of the literature provided equivocal evidence for relationships between environmental exposure and psychosocial impacts across a wide range of exposure-outcome relationships (Taylor et al., 1994). Further, with the exception of a small number of well-conducted studies of the (perceived) health impacts of exposure to (hazardous) waste facilities, few studies were found that dealt directly with issues

around siting and the differences between them were seen to preclude generalization of findings (Elliott and Taylor, 1996).

A review of studies in the broader area of exposure to environmental contaminants since the 1988 review, provides further illustrations of the nature of psychosocial outcomes. For example, Horowitz and Stefanko (1989) examined the stress-related effects associated with living near a toxic waste landfill. Despite public outcry and anecdotal evidence of health effects, they were unable to attribute any psychosocial effects to the landfill. Dunne et al., (1990) measured and found increased levels of reported stress and anxiety in residents living near a hazardous waste site in Queensland, Australia compared to a matched comparison community. For the exposed community, poor general health was significantly correlated with measures of stress resulting from environmental exposure (Dunne et al., 1990). In his review of epidemiological studies of industrial waste sites in Ontario, Sinclair (1990) directly links the concepts of uncertainty and stress, and asserts that the uncertainty and inconclusiveness of epidemiological studies themselves adds to stress in the community. Further, Sinclair (1990) characterizes epidemiological investigations as time specific, and suggests that more valid conclusions may be drawn if comparison studies of the same population are carried out a few years after the initial investigation. Roberts (1993), based on a review of the literature on the psychosocial effects of uncertain physical and chemical exposures in the workplace, concludes that such exposure can result in increased anxiety, fatalism, loss of self-esteem, fear, helplessness and depression.

In two studies of acute, episodic environmental stressors, an earthquake (Kiser et al., 1993) and a radiation accident (Collins and de Carvalho, 1993), the concept of anticipatory

stress is investigated. Kiser et al., (1993) found that in anticipation of an earthquake, many subjects in their study reported elevated stress-related symptoms, such as anxiety, concerns about destruction of property, and, somatic complaints. Although they did not experience an actual earthquake, these study subjects did perceive danger and reacted to those perceptions. Collins and de Carvalho (1993) found that anticipatory stress associated with potential exposure to a radiation accident in Brazil resulted in a level of stress in individuals similar to that from actual exposure to radiation. In the context of the current research, this notion of anticipatory stress might be useful in explaining levels of reported effects of the Milton landfill site over time.

In surveys conducted in three communities in British Columbia that hosted or were slated to host a waste management facility, Hertzman and colleagues (Ostry et al., 1993a, 1993b; Ostry, Hertzman and Teschke, 1995; Ostry, Marion et al., 1995; Hertzman and Ostry, 1997), identified factors that influence concern and the potential for activism in relation to the facilities. Their results indicate that concern and potential activism in response to the siting of facilities in communities may be driven in part by the extent to which people feel their property values will be depressed. Further, they suggest that people with children in their households are much more likely to consider at least moving away from the neighbourhood compared with people with no children. Distrust of the ability of facility operators to protect the community was found to have a significant independent effect on the potential for activism, but not on concern.

To summarize, psychosocial effects have been studied in association with a variety of exposure situations at the individual, social network and community levels. They include such

effects as stress, distress, concern, anxiety, help and/or information seeking, family disruption, fatigue and depression and can be a consequence of actual, anticipatory, or perceived exposure to an environmental hazard. In the context of the siting, construction and opening of a new landfill site in a community such as Milton, the psychosocial effects experienced by residents are a particularly appropriate subject of study - there is no plausible link to negative physical health outcomes yet anxiety and fear of these outcomes are generated by the stereotypical images of 'dumps'. Appropriate social psychological theoretical and conceptual frameworks are needed to understand and explain the processes and mechanisms operating in the Milton community. The theoretical basis for most research in this area is derived from environmental stress and coping theory.

3.7 Environmental Stress and Coping Theory

The two main purposes of this section are: 1) to provide a theoretical foundation for the Milton study through an overview of the relevant literature on environmental stress and coping; and, 2) to generate theoretically-informed hypotheses to guide the empirical analyses to follow. This explicit treatment of theory is imperative, given both the lack of theoretical and conceptual clarity in much previous work in this area (Taylor et al., 1994), and more immediately, the research objectives of this thesis. Recall, the three objectives of the research are to document changes in psychosocial outcomes; to explore the processes of reappraisal and coping; and, to evaluate the utility of environmental stress and coping theory in this research setting. It is through theory that expectations about the responses of the Milton community over time can be established and tested.

Although the concept of 'stress' has been widely-used by psychologists, sociologists, medical practitioners, epidemiologists and lay persons, there is little agreement about a precise definition (Cohen et al., 1986; Lazarus and Folkman, 1984). Cohen et al., (1986) identify two research traditions which they contend provide distinct clues to the effects of psychosocial and environmental stressors on people: the physiological and psychological stress traditions. The physiological tradition has origins in the work of Hans Selye (1956) who described a three-stage general physiological response pattern referred to as the general adaptation syndrome. According to Selye, the stress response involves a process of alarm, reaction, and resistance and exhaustion in which the organism increases production of stress hormones (epinephrine and norepinephrine) in order to respond to the environmental stimulus. Although the physiological tradition has largely been replaced by the psychological tradition, two aspects of Selye's model remain influential in conceptions of the stress process (Cohen et al., 1986). The first is the concept that there is a finite amount of adaptive resources available for use by an organism confronted by a stressor and depletion of these resources can have detrimental effects. A second influential aspect of Selye's work is what is termed the "adaptive-cost hypothesis." This hypothesis suggests that the process of adaptation itself causes damaging effects that occur either during or after exposure to a stressor.

The psychological stress tradition places emphasis on the perception and evaluation of the potential harm posed by a stressor and, as such, may be more useful in research examining stress associated with environmental hazards. As Cohen et al., (1986) explain, the perception of threat arises when an individual perceives that the demands imposed upon them exceed their ability to cope with them. This imbalance results in the experience of stress and

a stress response which may be physiological or behavioural in nature. Psychological stress, then, is not defined solely in terms of stimulus or response, but rather in terms of the *transaction* between the person and the environment. It involves interpretation of the meaning of the event and the interpretation of the adequacy of coping resources. The psychological stress tradition assumes that stress arises totally out of individuals' perceptions (whether accurate or inaccurate) of their relationship to their environment.

A body of environmental stress research has developed which is consistent with the psychological conceptualization of stress. Two general components of environmental stress are identified in this literature: the stressor and the response (Evans and Cohen, 1987). Environmental stress is defined as: "the process by which environmental events or forces, called stressors, threaten an organism's existence and well-being and by which the organism responds to this threat" (Baum et al., 1982, p. 15).

Evans and Cohen (1987) identify four classifications of environmental stressor: (1) cataclysmic events (e.g., natural and technological disasters) which demand significant adaptive responses by those affected; (2) ambient stressors (e.g., air pollution, toxic waste landfill), characterized as being chronic, nonurgent, physically perceivable but largely unnoticed by many of those affected unless particular circumstances result in a perceived threat to health and well-being; (3) stressful life events (e.g., divorce, bereavement, major change in economic status) which typically demand adaptive responses; and, (4) daily hassles (e.g., interpersonal problems, annoying situations) which are more frequent but far less dramatic than stressful life events and produce short-term irritation.

Sorensen et al., (1987), in their study of the psychosocial effects of the restart of the Three Mile Island nuclear reactor, suggest that a variety of factors related to the individual, the social setting and the situational context of the restart will mediate stress or heighten it. In order to understand the complex relationships between various environmental stressors and responses, Taylor et al., (1994) present a conceptual framework which describes four sets of mediating factors which they distilled from the environmental stress literature. These mediating factors are related to characteristics of the environmental stressor, the individual, the social network and the wider community system (Figure 3.1). Vyner (1988), in his review of the psychosocial effects of invisible environmental contaminants, suggests how the uncertainty of invisible stressors (e.g., Three Mile Island, Love Canal, military exposure to radiation) may lead to greater psychosocial effects than a visible exposure. Further, as discussed previously (section 2.5), noxious odours emanating from the Brookfield, Upper Ottawa and Miron Quarry landfill sites were thought to increase the perception of exposure, and, therefore, of risk among area residents. Other characteristics of the environmental stressor, such as its perceived economic necessity to the community, its severity and acuteness, and, prior experience with similar stressors can mediate the level of effects (Taylor et al., 1994).

The second set of mediating factors, characteristics of the individual, imply that there are attributes of individuals who come in contact with an environmental stressor which can influence the nature of the exposure-response relationship. Taylor et al., (1994) provide several examples from the literature which suggest how individuals' characteristics can be mediating factors. For example, individuals with low self-esteem/mastery over situations may

experience greater effects from an exposure whereas those with greater access to/control over material resources tend to experience less stress (Pearlin and Schooler, 1978).

The social network can also be a mediating factor as people are understood to derive support from social relationships or social networks. The most relevant example is an examination of the social and psychological effects of residential toxic exposure conducted by Edelstein (1988). His 'social process model' in part recognizes that when experiencing exposure to an environmental stressor, such as Love Canal, residents who were part of a relational web of family, friends and co-workers or who were involved in their communities experienced less stress and were more likely to practice problem-focussed coping in response to a stressor. Logue et al., (1981) also found that individuals who are very active in their communities experience less stress and are more likely to engage in problem-focussed coping. In their work at Three Mile Island, Baum and colleagues (1983) found that higher levels of social support were associated with fewer psychological and behavioural symptoms of stress.

Finally, characteristics of the wider community system, (e.g., the political and economic systems, the role of the media in conveying information about exposure events), can mediate the stressor-response relationship (Taylor et al., 1994). Two opposing widely-held societal beliefs, the desire for a risk-free society and the view that modern day risks are more pervasive than in the past, were suggested, at the outset of this chapter, to contribute to the mobilization of citizens against the deliberate creation of risky environmental conditions in their communities. These characteristics of the wider system, then, are seen to affect residents locally and, in turn, to mediate the stressor-response relationship at the scale of a town like Milton. Thus, this conceptual framework envisions response to an environmental

stressor as a transactive process influenced by these four sets of mediating factors, rather than as a direct cause-and-effect relationship between an environmental stressor and psychosocial impacts. The role of contextual factors in the study of response to environmental stressors is further emphasized by researchers such as Cohen et al., (1986) who, in their Los Angeles noise project, argue for the importance of viewing stressors within their broader social and physical environmental contexts.

In order to understand this transactive process in a specific 'exposure' situation such the one described at Milton, it is necessary to assess the specific stages of response. A thorough review of theoretical frameworks in the environmental literature (Elliott, 1992; Taylor et al., 1994) indicated that Lazarus and Folkman's (1984) is both the most frequently used and the best available psychological model of response to environmental stress. They propose that individual response to an environmental stressor can be divided into two stages: *primary appraisal*, whereby the individual evaluates the stressor as a threat, harm or challenge ("Am I in trouble or being benefitted, now or in the future, and in what way?"(p. 31)); and, *secondary appraisal*, the evaluation of coping resources and strategies to deal with the stressor ("What if anything can be done about it?" (p. 31)). Feedback occurs through the process of *reappraisal*; that is, on-going reevaluation of the stressor, coping resources and strategies in response to changes in the characteristics, conditions and context of the stressor or changes in the individual's coping abilities (Taylor et al., 1994). Lazarus and Folkman's transactional model of stress and coping, then, conceptualizes response to a stressor as an iterative *process* of primary and secondary appraisal, reappraisal and coping.

Lazarus and Folkman (1984) distinguish three kinds of primary appraisal: 1) *irrelevant*, which occurs when an encounter with the environment carries no implication for a person's well-being as nothing is to be lost or gained in the transaction; 2) *benign-positive*, which occurs if the outcome of an encounter is construed as positive, that is, if it preserves or enhances well-being or promises to do so; 3) *stressful*, which include harm/loss, threat, and challenge. This third type of primary appraisal is most relevant to the present research and thus Lazarus and Folkman's comments on stressful appraisals warrant more detailed consideration.

In harm/loss, some damage to the person has already been sustained (e.g., an injury or illness, damage to self- or social-esteem, loss of a loved one). Threat describes harms or losses that have not yet taken place but are anticipated (e.g., illness in the present leads to a host of related threats about future functioning). The primary adaptational significance of threat, as distinguished from harm/loss, is that it permits anticipatory coping by enabling individuals to plan for and react to some aspects of the impending threat in advance. The third kind of stress appraisal is challenge. It is similar to threat in that it also calls for the mobilization of coping efforts, however, the main difference is that challenge appraisals focus on the potential for mastery or gain inherent in an encounter and are characterized by pleasurable emotions (e.g., eagerness, excitement and exhilaration). Threat, on the other hand, centres on the potential harms associated with an encounter and is characterized by negative emotions (e.g., fear, anxiety and anger). Lazarus and Folkman (1984) point out that threat and challenge appraisals are not mutually exclusive and, in fact, can occur simultaneously. Further, these authors contend that the relationship between threat and challenge appraisals

can shift as an encounter unfolds. A situation that is appraised as more threatening than challenging can come to be appraised as more challenging than threatening because of cognitive coping efforts which enable the person to view the episode in a more positive light, or through changes in the environment that alter the troubled person-environment relationship for the better.

Secondary appraisal is described as a judgement concerning what might and can be done to manage a threatening or challenging situation. This activity, a crucial feature of every stressful encounter, is a complex evaluative process that takes into account which coping options are available, the likelihood that a given coping option will accomplish what it is supposed to, and the likelihood that one can apply a particular strategy or set of strategies effectively given other internal or external demands that might be occurring simultaneously.

Lazarus and Folkman (1984) reflect that their original choice of terminology, 'primary' and 'secondary' was unfortunate since they erroneously and unintentionally suggest that one is more important (primary) than the other and that one precedes the other in time. In fact, secondary appraisals of coping options and primary appraisals of what is at stake are seen to interact with each other in shaping the degree of stress and the strength and quality (or content) of the emotional reaction. For example, if a person is helpless to deal with a demand, stress will be relatively great because the harm/loss cannot be overcome or prevented. If the person has a high stake in the outcome, helplessness is potentially devastating. Even when people believe they have considerable power to control the outcome of an encounter, if the stakes are high any doubt can produce considerable stress. The complex interplay between primary and secondary appraisals illustrated here, demonstrates

that both are equally important and occur simultaneously. Rather than replacing 'primary' and 'secondary' with connotatively more accurate terms, these authors admit that it is difficult to attempt to change terms once they have found a place in the literature.

Reappraisal refers to a changed appraisal on the basis of the feedback of new information from the environment or from the person's own reactions. The complex two-way transactions between the person and the environment is a process of changing emotions and appraisals as, for example, threat can be reappraised as unwarranted or conversely, a benign appraisal may turn into one of threat. Thus, Lazarus and Folkman point out that, in essence, appraisal and reappraisal do not differ; a reappraisal is simply an appraisal that follows an earlier appraisal in the same encounter and modifies it.

Appraisals (and reappraisals) are influenced by both personal factors that confer meaning to an event (e.g., commitments to choices, values or goals; beliefs about personal control, world view) and situational factors that have potential for creating a threat (e.g., novelty, predictability, uncertainty, imminence, duration, ambiguity). These authors emphasize that person and situation factors must always be considered in combination because "in real life commitments and beliefs intermingle to shape the person component of the transaction; and then nature of the event, its certainty, its temporal properties, its ambiguity, and its timing all affect how the environment will enter into the transaction. Thus, *processes within the person and within the environment combine to determine the relationship between the two* (their emphasis)." (p. 114) Finally, most person and situation factors have the dual capacity to both contribute to *and* diminish threat.

The discussion thus far has focussed on the process of cognitive appraisal (primary, secondary, and reappraisal) which is but one of the two critical processes identified by Lazarus and Folkman that mediate the person-environment relationship. They define cognitive appraisal as a process through which the person evaluates whether a particular encounter with the environment is relevant to his/her well-being, and if so, in what ways (Folkman et al., 1986). The other critical process identified by Lazarus and Folkman is coping. Coping is defined as the person's constantly changing cognitive and behavioural efforts to manage specific external or internal demands that are appraised as taxing, or exceeding the person's resources. Folkman et al. (1986) highlight three key features of this definition of coping. First, it is process oriented, meaning that it focusses on what the person actually thinks and does in a specific stressful encounter and how this changes as the encounter unfolds. Second, this view of coping is contextual, in that it is influenced by the person's appraisal of the actual demands in the encounter and resources for managing them. The emphasis on context means that particular person and situation variables together shape coping efforts. Third, no a priori assumptions are made about what should be considered good or bad coping; coping is defined simply as a person's efforts to manage demands whether or not the efforts are successful. Further, Lazarus (1993) makes the important point that, because stressful encounters are complex, it is difficult to determine to what extent coping strategies are linked to particular aspects of the threat or to temporal factors (i.e., individuals changing from one coping strategy to another on the basis of feedback about its consequences.)

Two forms of coping have been described by Lazarus and Folkman: problem-focused and emotion-focused. Problem-focused coping is directed at managing or altering the problem

causing the distress and is more probable when harmful, threatening, or challenging environmental conditions are appraised as responsive to change. On the other hand, emotion-focused coping is coping that is directed at regulating emotional response to the problem and is more likely to occur when there has been an appraisal that nothing can be done to modify the environment. The coping strategy employed is therefore linked directly to secondary appraisal (evaluation of coping resources and options). Lazarus (1993) relates this to the familiar motto of Alcoholics Anonymous: “God grant me the courage to try to change what can be changed, the serenity to accept what cannot be changed, and the wisdom to know the difference.”

Lazarus (1993) provides a useful overview of the different types of emotion-focussed coping from the “Ways of Coping” Questionnaire, described as the most widely used technique for a contextually oriented approach to studying how people cope with a particular stressful encounter. The eight factors in the questionnaire are: confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving and positive reappraisal.

Terry (1994) provides an instructive review of factors influencing coping responses used by individuals to reduce the effects of stress. She distinguishes between the role of relatively stable individual differences in coping and situational variables as influences on coping responses. Stable factors are those that, irrespective of the situation, influence people’s coping responses to stress and tend to be more consistent across stressful encounters (e.g., personality traits such as optimism and pessimism, self-esteem, internal control beliefs). The

notion that personality affects both exposure and reactivity to stressful events as well as health and physical outcomes is supported in work by Bolger and Zuckerman (1995).

The other type of influence on coping responses identified in Terry's (1994) review, are situational factors. In Lazarus and Folkman's (1984) transactional model of the stress process, coping responses constitute a process that varies from one situation to another. Thus, an emphasis is placed on the role that situational variables, (e.g., type of stressor, appraised stressfulness, stage of the encounter) play as determinants of coping. Lazarus (1993) emphasizes the importance of the temporal nature of the complex series of stages in a stressful encounter and coping patterns which can be quite different in each stage. In studies of college examination stress, he reports that seeking information and social support occurred quite frequently in the anticipatory stage, but dropped sharply in later stages while distancing was the most frequently employed strategy during the waiting period but was infrequently employed during other stages.

In her longitudinal study of first year psychology students enrolled at the University of Queensland, Terry (1994) examined the stable and situational influences on coping. She found consistent support for the view that there are stable influences on coping responses, suggesting that how people cope in response to a new event appears to be a function of how they have coped in the past. In addition, Terry found evidence that the nature of the situation and the manner in which it is appraised are also important determinants of the type of coping strategies that a person chooses when dealing with a specific event. In general terms, the results of Terry's study support Lazarus and Folkman's transactional model of stress and coping.

An additional dimension to coping theory is the concept of the 'costs of coping.' As defined by Cohen et al. (1986), the costs of coping refer to the deleterious effects of exposure to a stressor that occur as a consequence of the coping processes that are employed, rather than because of the stressor itself. These costs, also termed secondary or indirect effects of exposure to a stressor, can result from successful or unsuccessful problem-focused or emotion-focused coping strategies. Some examples of the costs of coping with a stressful event include cumulative fatigue effect, where an individual's energies are drained by ongoing coping; over-generalization of a coping strategy, where an individual employs a coping response in an inappropriate situation; side effects of coping responses, such as smoking or drinking to reduce stress; and, helplessness, when efforts to cope are perceived as futile even in cases where coping is possible. Evidence consistent with the costs of coping concept is provided by Cohen and colleagues' in their Los Angeles noise project (1986). Children coping with ambient noise at home and in school exhibited effects suggestive of these various examples of coping costs (e.g., poor problem solving performance, 'tuning out' in both noisy and nonstressful situations, inflated blood pressure levels, and a tendency to give up on moderately difficult cognitive tasks). When studying environmental stress and coping, therefore, an explicit treatment of both response to the stressful situation and to the nature of coping itself is warranted.

The Lazarus and Folkman model has formed the theoretical foundation for their own empirical research and for a larger body of work in the field of social psychology. These applications examine particular aspects of stress and coping at specific stages in the experience of and response to stressful encounters. Studies of life-event stress (McCrae,

1984), work-place stress (Parkes, 1986), daily hassles (Ptacek et al., 1992), examination stress (Terry, 1994), and parental support and coping with college life (Valentiner, 1994) exemplify the social psychology applications of the Lazarus and Folkman model. Typically these studies share several important features. First of all, they examine the processes of stress and coping as they occur - over a period of time. In addition, these studies explicitly focus on specific stages of the stressful encounter (i.e., before, during and following). These applications have employed the Lazarus and Folkman model to successfully address their research questions. Thus it seems that from the vantage point of social psychology (the model's originating discipline) and in research settings where the continuing process of reappraisal and coping can be accessed, Lazarus and Folkman's transactional model of stress and coping is useful and instructive.

In environmental research contexts such as the present one, however, the model has seen limited application. As reviewed previously in section 3.6 of this chapter, examples include: Baum et al. (1983) who studied response to stress at Three Mile Island; Bachrach and Zautra (1985), Cofresi (1988), and Bachrach et al. (1989) who used the Lazarus and Folkman framework to examine, longitudinally, community response to a hazardous waste treatment facility in Arizona; Cavalini et al., (1991) employed the model to conduct studies of coping strategies in response to odour annoyance in the Netherlands; Elliott (1992) who studied psychosocial impacts in populations exposed to three solid waste facilities in southern Ontario; and, McGee (1996) who investigated community responses to lead contamination in Australia.

It is difficult to assess the utility of the Lazarus and Folkman model in these environmental research contexts for two key reasons. First, the research questions driving the empirical work in the examples cited above are less narrowly focussed than those in the social psychology applications. Rather than setting up controlled situations in which specific aspects of stress and coping can be clearly distinguished, these environmental applications are aimed at understanding stress and coping *in situ* with all of the ‘messiness’ that that entails. As a result, these applications cannot employ the model wholesale but rather borrow useful concepts from Lazarus and Folkman and integrate them with other theoretical and conceptual material. The second key factor preventing a definitive evaluation of the applicability of the Lazarus and Folkman model in environmental research contexts relates to study design. The stress and coping theory of Lazarus and Folkman is inherently longitudinal - it is based on examining a continuing *process* of appraisal, reappraisal and coping. However, the environmental applications typically use cross-sectional designs and must, therefore, default to an examination of the stressful encounter as a single event at a particular point in time. One exception to this is the work of Bachrach and others (Bachrach and Zautra, 1985; Cofresi, 1988; Bachrach et al., 1989) whose longitudinal study involved a *hazardous* waste facility in Arizona and thus the exposure setting is not comparable to that of this research.

3.7 Theoretical Constructs

This thesis is a longitudinal examination of the population living around a landfill site in Milton, Ontario. It involves the analysis of survey data, collected at three different points in time from the same individuals, designed to assess the nature of and changes in stress,

reappraisal and coping. Five constructs usefully categorize the survey data and facilitate the documentation and examination of the *process* whereby these people have come to live with this landfill at three distinct stages in the development of the site (Table 3.1). In addition to providing valuable insights into this contemporary environment and health issue, the longitudinal study design presents the opportunity to assess the utility of the Lazarus and Folkman model in an environmental context.

To examine and understand the range of potential effects of the introduction of the landfill site on individuals living around it, it is helpful to get a sense of how the general psychosocial health and well-being of the population has been affected. The first of the five constructs, *psychological distress*, is comprised of the general measures of psychiatric and emotional distress (GHQ-20) and somatically manifested psychosocial effects (SCL-90) included in the survey instrument. These measures were selected based on their appropriateness for use in a general population survey, their previous validation and the existence of published norms against which scores obtained in the Milton survey could be compared to assess the presence of elevated rates. The analysis of this construct, then, will provide a general indication of changes in levels of psychological distress in individuals in the study population which are not necessarily attributable only to the landfill but rather to all of the stresses and strains of their daily lives and thus provide a useful context in which to consider changes in site-specific effects.

The second construct is *perception of the landfill site* which includes items addressing positive aspects of the facility and a retrospective assessment of reasons for changes in opinions about the site. A major component of reappraisal in the Lazarus and

Folkman framework is changing impressions of the environmental stressor, in this case the landfill site, over time. If respondents had changed their views over time, they were asked to report what factors had influenced that change, thus allowing a direct measure of individual and site-related factors influencing cognitive (reappraisal) of an environmental stressor which, in this instance, is represented by a continuum in the life of a landfill from approval to extended operation.

The most detailed and potentially useful data collected which facilitates an examination of appraisal and reappraisal of the landfill site over time, comprise the third construct, *concerns about the landfill*. Indicators of this construct include items which address the types, levels and intensity of concerns expressed by respondents and their impact on daily living. A specific focus on health-related concerns in the survey instrument provides an opportunity to examine this outcome in greater detail. The responses to these items access the specific components upon which appraisal and reappraisal are founded.

The fourth construct is *actions* taken in response to site-related concerns. As an outcome variable, *actions* moves the analysis beyond the realm of effects of exposure to responses to exposure and may be considered an indicator of action focused or problem focused coping. The indicators used to measure actions include moving, information-seeking from peers or official sources.

The final construct is *neighbourhood satisfaction*. This construct is important for understanding the process of reappraisal in that it places perceptions and concerns about the landfill within the broader context of the respondents' home environment. Changes in concerns about the landfill site, discussed above, are more meaningful when considered not

in isolation but rather contextualized within other attributes of their neighbourhood. The landfill is but one feature on the landscape of the Milton area so attitudes towards it are more sensibly discussed with reference to their general level of satisfaction of the neighbourhood as a whole. The indicators from the questionnaire which comprise this construct include likes and dislikes about the area and various ratings of general satisfaction.

Taken together, indicators comprising these five constructs facilitate the examination of changes in individual responses to the landfill over time. By exploring the series of open and closed-ended responses of area residents through the five year study period as the landfill moved from approval through construction to operation, it is possible to address the three stages in the Lazarus and Folkman framework: primary appraisal of the facility at each stage; coping mechanisms employed at each stage in the process (secondary appraisal); and, factors affecting changes in perception over time (reappraisal). Using these constructs, the process of reappraisal and coping in Milton area residents will be explored in Chapter 5.

3.8 Hypotheses

It is possible to generate a series of statements about stress, (re)appraisal and coping around the five constructs. These hypotheses are intended to capture expectations about how Milton residents have experienced the introduction of a landfill site into their community over time. From a practical point of view, this series of statements will also serve as a useful framework for organizing the presentation of the empirical results in Chapter 5.

Hypothesis 1: The low levels of psychological distress reported by respondents in 1990 will not change over the study period.

Elliott et al., (1993) conclude that in 1990, no profound effects of the landfill on emotional distress or reporting of somatic complaints were found in Milton area respondents. This first hypothesis anticipates that these low baseline levels of psychological distress reported at the conclusion of the landfill siting process will persist through the construction and early operation of the site to 1995. This seems likely given both the elevated rates of site-specific effects at baseline in Milton as compared to an operating incinerator and an existing landfill site (details to be reported in Chapter 5), and the expected decline in many site-specific outcomes (e.g., concern) postulated in subsequent hypotheses in this chapter. If the general measures of psychological distress (GHQ-20 and SCL-90) did not detect profound effects in Milton respondents at a point in the study period where the anticipatory concerns about potential negative externalities were highest, it is unlikely that the construction and early operation of the landfill site will change this.

Hypothesis 2: Negative perceptions of the landfill site will decrease over the study period.

This hypothesis addresses the second construct, *perception of the landfill site*, and focusses directly on reappraisal over time. A change in perceptions of the landfill between 1990 and 1995 is expected given the findings described previously (e.g., Sandman, 1993; Cutter, 1993; Collins and de Carvalho, 1993), Edelstein's (1988) postulates recognizing that contamination arouses anticipatory fears, and the concept of reappraisal as described by

Lazarus and Folkman (1984). At the beginning of the study period (1990), the landfill site had only recently been approved and thus was not present on the landscape. Perceptions expressed by respondents, then, were based on *expectations* of what their landfill site was going to be like. These expectations are influenced by images of old 'dumps' such as those described previously (e.g., Brookfield Avenue, Upper Ottawa Street and the Miron Quarry sites), and the negative externalities that accompany such facilities. Furthermore, the prospect of the imminent location of such a landfill site in their midst evokes strong emotions, which Sandman (1993) terms 'outrage' as they overestimate the risk involved.

By 1995, perceptions of the landfill site as described by respondents are no longer based on its anticipated impacts, but rather on actual experience. As described by Lazarus and Folkman (1984), reappraisal refers to a changed appraisal on the basis of the feedback of new information from the environment where a benign appraisal can turn into one of threat, or, conversely, threat can be reappraised more favourably. In the Milton case, it is expected that the process of reappraisal will result in less negative perceptions, given both the amplification of risk and stress among residents in anticipation of the site, and, the eventual construction of a state-of-the-art landfill facility very different from 'dumps' of old. In order to address this hypothesis, responses to opinions about the site from each administration of the survey as well as from the retrospective items included in the 1995 round of data collection will be considered.

The perceptions of the landfill site expressed by respondents in this study are based to a large extent on their worries and concerns about it, its operation and how it will impact on their lives today and in the future. The next series of hypotheses address the third construct

- *concerns about the landfill site* by examining various aspects of concern. The level of attention given to this construct in these hypotheses reflects its emergence as an important psychosocial outcome in the baseline study (Elliott et al., 1993).

Hypothesis 3: The level of concern expressed about the landfill will diminish over the study period.

The decrease in negative perceptions of the landfill site anticipated in the previous hypothesis was attributed, in part, to reappraisal of the site: from an appraisal based on speculation about possible impacts of a site yet to be constructed, to an appraisal based on several years of actual experience with the operating landfill facility. Again, the process of reappraisal as conceptualized by Lazarus and Folkman (1984) provides the mechanism to explain how this change occurs as feedback of new information from the environment results in a changed appraisal of the stressor. This change in the nature of the stressor is expected to result in a decline in reported levels of concern about the landfill between 1990 and 1995 as sufficient time has elapsed for evidence of anticipated negative externalities to be reappraised. As discussed in Chapter 2, the 'state-of-the-art' facility at Milton was designed to reduce or eliminate many traditional 'nuisance' concerns expressed by residents during the Environmental Assessment hearings. As a result, it is expected that once residents have experienced and lived with the presence of the landfill site in their community, many of these anticipated externalities will not have been realized and their level of concern will decrease.

Hypothesis 4: Concerns about future health effects will persist over the study period.

As explained above, the reappraisal process is expected to result in a change in the nature of many of the concerns expressed about the landfill site between 1990 and 1995. However, concerns about health are different. As discussed earlier in this chapter, health and health-related concerns tend to be overstated by those opposing the siting of a landfill in their community (Elliott and Taylor, 1996) because of the legitimacy concerns of this type are afforded. Further, uncertain and equivocal yet plausible links between exposure to 'old' landfill sites and outcomes such as respiratory illness, reproductive abnormalities and cancer (Schultz, 1982; Hertzman et al., 1987; Goldberg et al., 1995; 1996), fuel health-related concerns in populations faced with the prospect of living proximate to a landfill site. Health is a basic core value that transcends other externalities (e.g. dust, litter, and property values) because the stakes are much higher when health is compromised. For these reasons, it is expected that health-related concerns will persist throughout the study period. Furthermore, as the site has only been operational for two years at the end of the study period, insufficient time will have elapsed to assess the possible health impacts of this particular landfill and thus to allay latent health-related concerns.

Hypothesis 5: The types of concerns expressed about the landfill site will change over the study period.

The process of reappraisal, as conceptualized by Lazarus and Folkman (1984), is expected to result in a decrease in negative perceptions of the landfill site as described above.

Implicit in these changing perceptions, are alterations in the specific externalities, both tangible and intangible (Elliott and Taylor, 1996) that ensue. The types of anticipatory concerns, which are based on inappropriate images of 'old' landfills and relate more to siting issues, will change to concerns related more to the actual operation of the facility as residents experience the presence of the landfill in their community. When respondents shift from reacting to the loss of the fight to stop the siting of the landfill in Milton, to getting on with their lives in a community with a 'state-of-the-art' waste facility, it is expected that the types of concerns they express will reflect this shift.

Hypothesis 6: Characteristics of several sub-groups within the study population (e.g., based on vulnerability, social support, community involvement) are related to changes in their levels of concern over the study period.

As conceptualized by Taylor et al., (1994), in addition to changes in the stressor, characteristics of the individual, social network and community can act as mediating factors in the complex relationship between environmental stressors and responses. The survey instrument employed in the current research collected information about a variety of demographic and social characteristics of the respondents plausibly associated to reappraisal of the landfill site. In particular, three sub-hypotheses about specific characteristics discussed in the literature will be explored relating to vulnerability, social support and level of community involvement.

Sub-hypothesis 6i proposes that vulnerable sub-groups within the study population will remain concerned over the study period. It is expected that respondents

who are particularly vulnerable to the potential negative impacts of the introduction of a landfill site into their community, such as families with young children whose long-term health status could be effected, property owners (versus renters) who have substantial financial investments in the area, people who rely on agriculture for their livelihood, and those with strong ties to the area, potentially have a great deal to lose. According to Lazarus and Folkman (1984), appraisals (and reappraisals) are influenced by both personal factors that confer meaning to a stressful event and situational factors that have potential for creating a threat. They emphasize that person and situational factors must be considered in combination. As the discussion of the previous hypothesis demonstrated, if any types of concerns are to remain, it is likely to be the health-related concerns. Likewise, if any subgroups within the respondents are going to have persistent concerns, it is likely to be the most vulnerable.

Sub-hypothesis 6ii suggests that respondents who report strong social support will express fewer concerns over the study period. As previously described, concern emerged as a key psychosocial outcome in the baseline study (Elliott, 1992). We are informed by the conceptual framework offered by Taylor et al., (1994) that characteristics of the social network have been shown to mediate stressful life events. Recall that Edelstein (1988) demonstrated that the psychosocial impacts of exposure could be lessened for residents who were part of a relational web of family, friends and co-workers. Accordingly, Milton area respondents who have strong social support through family and social networks should cope better with the stress created by the siting of the landfill in their neighbourhood and report fewer concerns.

A similar argument to that made for the previous hypothesis can be offered regarding community involvement as a mediator of the stress-response relationship. **Sub-hypothesis 6iii proposes that respondents who report high levels of community involvement will express fewer concerns over the study period.** As Logue et al., (1981) found, individuals who are very active in their communities experience less stress from exposures. In Milton, then, respondents who report high levels of group membership and many connections to the community should cope more successfully and report fewer concerns over the study period.

Hypothesis 7: The type of coping strategies employed will shift from problem-focussed to emotion-focused over the study period.

Coping was defined previously by Lazarus and Folkman (1984) as a person's changing cognitive and behavioural efforts to manage demands. Two forms of coping were described: problem-focussed coping which is directed at managing or altering the problem causing the distress; and, emotion-focussed coping which is directed at regulating emotional response to the problem. According to Lazarus and Folkman (1984), problem-focussed coping is more probable when the threatening or challenging environmental situation is appraised as responsive to change. Conversely, emotion-focussed coping is more likely to occur when the situation is appraised (or reappraised) as one in which nothing can be done to modify the environment. In the context of the current research in Milton, when the possibility exists that the location of the landfill can be stopped, it is expected that residents are more likely to engage in forms of problem-focussed coping to oppose and alter the decision. However, once

the decision is final and the landfill is an inevitability, coping strategies will more likely be aimed at regulating emotional response as nothing can be done to change the situation.

Hypothesis 8: Respondents' overall satisfaction with the neighbourhood will remain unchanged over the study period.

The conceptual framework presented by Taylor et al., (1994) suggest that response to an environmental stressor must be considered in the context of the wider community system. Chapter Two provides a profile of Milton as a community in which residents experience a high standard of living and excellent quality of life. Previous studies have shown that neighbourhood satisfaction is very resistant to change (e.g. Michelson, 1977). In a study of the location of new and controversial technological hazards (e.g. a waste incinerator) in what are termed "brownfields" neighbourhoods - those already densely developed with industrial and commercial facilities, Greenberg et al., (1995) found that peoples' perceptions of neighbourhood quality were associated with the distress attributed to the incinerator. With regard to moving out of the neighbourhood, Greenberg et al., (1995) report that 68 percent of respondents who rated their neighbourhood as poor wanted to leave as a result of the trash-burning facility compared to 41 percent who rated it as fair, 18 percent who rated it as good, and only 9 percent of respondents who rated their neighbourhood as excellent. Here, the introduction of a waste incinerator had the least impact, as measured by moving out of the neighbourhood, on respondents who already had high levels of neighbourhood satisfaction. In Milton, then, it is plausible that despite the intrusion of a landfill site and its associated concerns, overall satisfaction with the area as a place to live will not be adversely

affected. Milton remains a desirable community in which to live and this high level of satisfaction is not readily susceptible to change.

3.9 Summary

This chapter considers several bodies of literature which usefully inform the current research: risk and society, the geography of risk and hazards, and, the location of noxious facilities. Related directly to the longitudinal study of a population experiencing the introduction of a municipal solid waste site, the evidence of physical and psychosocial impacts of exposure to environmental hazards was reviewed. A detailed examination of environmental stress and coping literature yielded a considerable body of theoretical and conceptual material, including the conceptual framework of Taylor et al., (1994) and the stress, appraisal and coping framework developed by Lazarus and Folkman (1984), primarily from the field of social psychology. The limited applications in environmental contexts are typically cross-sectional and thus unable to examine the continuing process of appraisal, reappraisal and coping. Five constructs and eight hypotheses were developed from the theoretical literature to guide and inform the investigation at Milton.

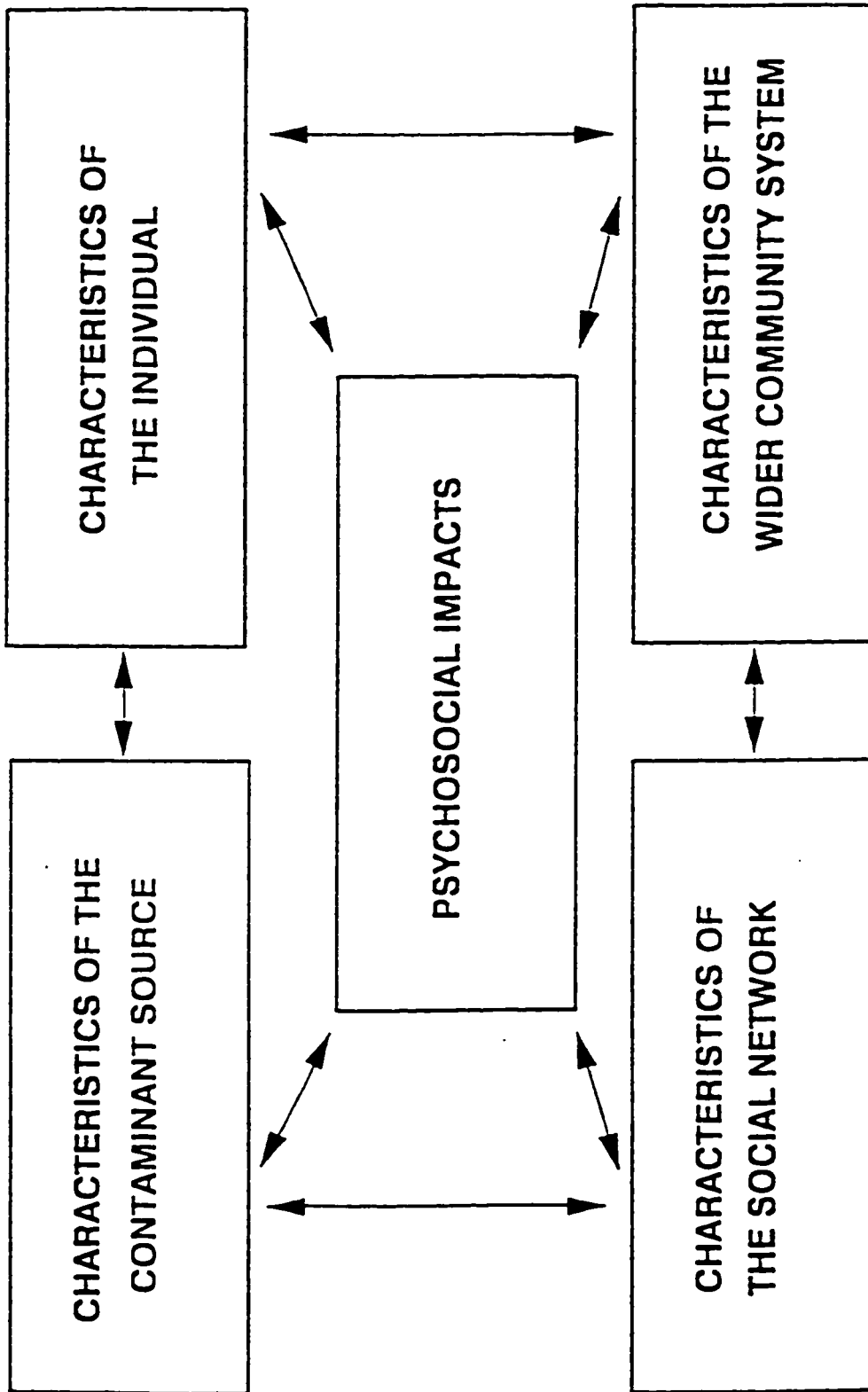


FIGURE 3.1: Conceptual Framework (Taylor et al., 1994)

TABLE 3.1: Construct/Indicator/Item

CONSTRUCT	INDICATOR	ITEM
<i>psychological distress</i>	emotional distress (GHQ-20) somatic complaints (SCL-90)	section D section E
<i>perceptions of landfill site</i>	how first felt feel better, worse, same now reasons for change positive things about site	i2 i3 i4, i5, i6 h32, h33
<i>concerns about landfill site</i>	concerns about site major, second, third concerns intensity of concerns concerns affect daily life concerns health related	h3 h4a, h4c, h4e h4b, h4d, h4f h6, h7 h5, h13a-m
<i>actions</i>	moving (in past two years) discuss concerns with friends attend citizens's meeting belong to citizen's group contacted official spoken to staff at site change in information source read about site in newspaper read books or reports	h17, h18, h19, h20, h21, h22 h27 h28 h29 h30 h31 h24 h25 h26
<i>neighbourhood satisfaction</i>	likes about area dislikes about area general satisfaction site changed satisfaction change one thing if move stay in area? why? friendliness of people	a1a, a1b, a1c a2a, a2b, a2c a3 h16 a4 a5, a5a a10

CHAPTER FOUR

RESEARCH DESIGN

4.1 Introduction

The purpose of this chapter is to lay out the research design issues for the thesis. Many of the decisions (e.g., site selection, survey instrument design and administration) were made as part of a larger research program so an account of this program is warranted. Because of the longitudinal nature of the study at Milton, a detailed explanation of sample attrition and tracking efforts will be discussed and the comparability of sample characteristics between the baseline cohort and subsequent survey groups demonstrated.

4.2 Longitudinal Study Design

As discussed in Chapter Three, the transactional model of stress and coping developed by Lazarus and Folkman (1984) views individual response to a stressor as an iterative process of appraisal, reappraisal and coping. Research informed by this theory, then, should provide an opportunity to examine the process of (re)appraisal and coping over a period of time. In the field of populations exposed to environmental stressors such as waste disposal facilities, however, most applications typically use cross-sectional designs which facilitate the

examination of a stressful encounter at a single point in time. Emerging from the Symposium on the Siting of Hazardous Waste Facilities held at the University of British Columbia in 1993 was the recommendation that research advancements in this field necessitate longitudinal studies of “exposed” populations (Munton and Castle, 1993). This thesis takes up the challenge of longitudinal research in the context of a population exposed to a landfill - a low-level, non-hazardous environmental stressor. It is useful at the outset, then, to discuss the nature of the longitudinal study design, its inherent strengths and weaknesses and its value in this particular research context.

“The defining characteristics of a longitudinal study design is that a sample of persons. or other units is observed prospectively through time [is ‘tracked’]” (Dwyer and Feinleib, 1992, p. 4). “The most obvious reason for conducting longitudinal studies in the biomedical sciences is the investigation of change over time and its determinants” (Dwyer and Feinleib, 1992, p. 5). “Implicit in the study of longitudinal data is the recognition that we are interested in the study of change . . . The classical cross-sectional study is useful for learning about populations as they are; to study change we need observations or information about two or more periods of time. Studies have often looked at *net change* by comparing the results of two or more separate cross sections, but epidemiological researchers have long noted that, to study change at a level that will allow for understanding of the processes that cause or are related to change, we really need to follow individuals longitudinally” (Fienberg et al., 1985, p. 241).

The obvious strength of the longitudinal approach is the ability to consider change in individuals over time. This quality makes the longitudinal design the most appropriate choice

in research which addresses this type of analytic question. There are, however, some problems unique to longitudinal studies. Bias can be introduced by the fact that posing questions repeatedly to the same individuals over time will likely affect or condition their responses. The biggest limitation of the longitudinal approach is the problem of loss due to follow-up. In the words of Lehnen and Koch (1974, p. 40), "The major statistical shortcoming of [longitudinal] designs is the inability to control attrition in the original sample when administering subsequent interviews." The source of the bias in this instance derives from the possibility that those who remain in the study differ from those who could not be contacted. It is important, therefore, when conducting longitudinal analyses that the researcher considers that responses in subsequent follow-ups might be conditioned by previous contacts and is cautious when drawing conclusions. In addition, clear evidence that substantial bias has not been introduced through lost cases must be demonstrated. The ability to analyze change over time, however, overshadows the potential limitations of the longitudinal design and merits adoption in this context.

The research objectives and hypotheses of this thesis are most suitably addressed with the longitudinal design. Of principal interest here is change over time - change in the nature of the stressor (in this case the landfill), and change in indicators of stress, reappraisal and coping of individuals living proximate to the stressor. Repeated contacts with the same Milton area residents facilitates a within-person analysis of change of their responses to the landfill over time. All previous research (Chapter Three) in non-hazardous exposure settings has employed cross-sectional strategies and, as such, has been unable to advance our understanding of the constituent processes and determinants of change. As reported by

Ptacek and colleagues (1992), longitudinal studies of stress and coping are appearing in the psychology literature with increasing frequency because they offer the possibility of studying the process of coping with a particular stressor. The time has come for research in environment and health with parallel interests to do the same.

4.3 Larger Research Program

The research presented here is part of a larger, on-going research program developed and led by an interdisciplinary team of researchers at McMaster University dealing with the psychosocial effects of environmental contamination. The first stage in this program was the implementation of a feasibility study including a critical appraisal of the relevant literature in epidemiology, environmental psychology, medical geography and related fields (Taylor et al., 1989). This led to the design and conduct of a parallel case study of psychosocial effects in populations living near three solid waste disposal facilities in southern Ontario (Taylor et al., 1991; 1994; Elliott et al., 1993; Eyles et al., 1993a). In addition to the parallel case study, a supplementary study of the psychosocial effects associated with a tire fire that occurred in Hagersville, Ontario on February 12, 1990 (Baxter et al., 1992; Eyles et al., 1993b) was conducted along with a study of the psychosocial effects associated with the PCB contamination and clean-up of a hazardous waste transfer station in Smithville, Ontario (Dunn et al., 1994; Taylor, Copley et al., 1994). Another avenue of investigation for the research program was several studies of community health effects in the vicinity of the Petro Canada Refinery in Oakville, Ontario (Sider et al., 1993; Taylor, Eyles et al., 1994).

The longitudinal analysis at the Milton site, the focus of this thesis, is part of the next phase of the broader research project focusing on the exploration and measurement of risk and uncertainty in environmentally sensitive situations (Eyles, 1993). The broader research agenda explores the language and meaning of risk in several Ontario communities: Caledon, a community slated for a future landfill site; Milton; and, Georgetown, selected as a comparison community. In addition, a comparative analysis of cross-sectional studies of waste sites in Ontario and British Columbia is currently being conducted. A project aimed at the development of more appropriate outcome measures which are sensitive and specific enough to detect psychosocial effects in populations exposed to low-level, non-hazardous facilities is also underway. Finally, a study of populations impacted by the siting process for proposed industrial waste landfills at Taro Quarry in Stoney Creek, Ontario and Redland Quarry in Greensville, Ontario completes the agenda to date.

4.3.1 Site Selection

The decision to conduct this investigation near the Halton Regional Landfill in Milton, Ontario was made at the time of the design of the original parallel case study. As described by Elliott (1992), possible sites for inclusion in the study were evaluated on the basis of two constraints and four criteria. The constraints were: location within a reasonable commuting distance of McMaster to facilitate frequent site visits; and, exclusion of sites if the research might interfere with an on-going environmental assessment. The site evaluation criteria were: type of exposure (acute vs chronic); source of exposure (point vs ambient); nature of the contaminants (hazardous vs non-hazardous); and, sites which could be placed on a continuum

of community awareness, from low to high (Elliott, 1992). Based on these constraints and criteria, three sites were selected: the solid waste incinerator in Hamilton, Ontario (SWARU); the Hamilton-Wentworth Regional Landfill in Glanbrook Township; and, the then recently approved Halton Regional Landfill in Milton. The Milton landfill subsequently became the study site for the longitudinal analysis, and as such warrants a fuller examination here.

Although not originally intended, the Milton landfill became the site of a longitudinal investigation, primarily because in 1990, at the time of the parallel case study, the Supreme Court of Ontario had just given final approval for its construction. As a result, the study was conducted prior to site construction providing a baseline against which to compare community reaction subsequent to construction of the landfill site and site operation. It was selected to be part of the parallel case study because it represented a site where community awareness was high compared to SWARU (low) and Glanbrook (medium). This provided an opportunity to follow the same cohort of respondents from initial siting to construction and operation and to address the process of reappraisal by documenting changes in outcome levels reported over time. In the cases of SWARU and Glanbrook, the reappraisal process had been on-going for a long time prior to the time of the study so further analyses of those cohorts would be unlikely to reveal any change - the populations had already gone through the siting, construction and operation phases.

Thus Milton became the site for a longitudinal study of psychosocial effects of a landfill - Time 1 in 1990 (approximately three months after the court ruling which permitted final approval of the landfill); Time 2 in 1992 (during construction) and 1993 (two months

after the site began accepting waste); and, Time 3 in 1995 (two years after operation began).

Details of the design of the survey instrument and sample selection follow.

4.4 Survey Instrument Design

The epidemiologic survey instrument used for the longitudinal study at Milton was originally developed for administration in the parallel case study (Taylor et al., 1994a). As these authors describe, the instrument was designed to determine the psychosocial health and well-being of populations living around waste disposal facilities and to establish the levels of awareness, concern and action with respect to each site. Essentially the items contained in the instrument were selected to address the components of the conceptual framework that guided the research (Figure 2.1). Appendix A contains the version of the epidemiologic survey instrument used in 1995.

The epidemiological survey instrument, administered by telephone, was introduced as a survey of residents' attitudes towards quality of life in southern Ontario communities. It consists of five main sections. The first section addressed attitudes towards the neighbourhood or home area including likes and dislikes, ratings of satisfaction, and involvement in local activities. The second section asked questions about social and community networks with the intention of uncovering the possible mediating influence on psychosocial effects.

The third section is comprised of two principal measures of psychosocial health derived from the literature and modified to suit telephone administration: the 20 item version of the General Health Questionnaire (GHQ) (Goldberg, 1972) and the somatic complaints

sub-scale from the Symptom Check List-90 (SCL-90) (Derogatis et al., 1973; Derogatis, 1977). Taylor et al., (1994) explain that they were selected from a larger set of existing instruments based on their appropriateness for use in a general population. Making them more attractive was the fact that they were pre-validated and published population norms existed against which scores could be compared to assess the presence of non-normal scores (McDowell and Newell, 1987; Baum, Gatchel & Schaeffer, 1983). The GHQ taps several aspects of psychiatric distress including predisposition to depression, anxiety, and social impairment. The SCL-90 sub-scale includes a variety of non-specific complaints (headache, backache) associated with psychosocial morbidity. Four additional symptoms (rashes or other skin conditions, poor appetite, fatigue, and trouble getting up in the morning) were added to the original twelve based on their plausibility as somatically manifested psychosocial effects of exposure. A subset of items from the Critical Life Events Scale (Holmes and Rahe, 1967) was also included in this section to screen for major sources of psychosocial morbidity unrelated to the environmental situation.

Section four of the survey instrument contains a combination of closed and open-ended items to determine residents' levels of awareness, knowledge, concern (including health-related concern) and action regarding the site or more general environmental problems. The final section of the original instrument included a set of socio-demographic variables as a check on the characteristics of the sample and for use in subsequent analyses of the results.

4.4.1 New items for 1995

As discussed previously in Chapter 3, the 1992-3 follow-up survey of the Milton population found that changes (between baseline and follow-up) in site-specific measures of concern, health concern and action indicated on-going reappraisal of the site by local residents (Elliott and Taylor, 1996). To facilitate a more detailed examination of this process of reappraisal occurring as people live with the landfill over time, several additional items were added to the survey instrument in 1995. These are included in the full instrument contained in Appendix A as section I. The items were added at the end of the survey immediately before the socio-demographic items so as not to compromise the reliability of the instrument.

The construction of these items was informed by the findings of depth interviews conducted with a sub-sample of respondents (Sly, 1997), and is aimed at providing an opportunity for Milton area residents to compare, retrospectively, the anticipated impacts of the landfill with those impacts, if any, that they subsequently experienced. The first item asks respondents to recall when they first became aware that the Halton Regional Landfill site (approved in 1990) had been approved for construction. The purpose of this question is to ascertain levels of awareness as recalled by respondents and to get them thinking back to the time of approval. The second item is as follows: "Thinking back to that time, how did you first feel about the site approval?" The open-ended responses to this question reflect respondents' recollections about how they felt in their own words about the impending location of a landfill site in their community. Respondents are then asked whether they feel better, worse or their feelings have not really changed since that time, in order to get an indication of reappraisal and change over time. The final items in this add-on section to the

instrument solicit up to three of the most important reasons that they believe their feelings have changed with respect to the landfill site. Collectively, these items get directly at appraisal, change in appraisal (reappraisal) and reasons for change, thereby providing valuable new information and facilitating an examination of the hypotheses presented in Chapter Three.

4.5 Survey Administration

The instrument was administered by the Institute of Social Research (ISR) at York University, North York, Ontario in 1990, 1992/3 and 1995. All interviewing was completed from ISR's centralized telephone facilities using Computer Assisted Telephone Interviewing (CATI) techniques. Each supervisory station is equipped with a video display terminal, which reproduces an image of the interviewer's screen, and a ROLM CBX telephone communications system. This allows supervisors to monitor interviewers' calls and visually verify that the interviewer has recorded the respondents' answers correctly. All telephone numbers receive a minimum of 12 call attempts before the fieldwork is completed and, to maximize the likelihood of finding respondents at home, calls are scheduled during the day, evening and weekend hours. In addition, all respondent refusals are re-contacted in an attempt to convert them to responses, a procedure which typically improves the response rate (Institute of Social Research, 1995).

4.6 Sample Selection, Response Rates and Cohorts

The goal of the parallel case study was to sample 250 households across four distance zones within a prescribed area around each of the three sites (Elliott, 1992). At Milton, this

resulted in a very high sampling fraction because it is rural with a low population density. The sampling frame consisted of a list of eligible telephone numbers compiled from assessment rolls and city and telephone directories (Taylor et al., 1991). Each household selected for inclusion in the sample was sent a letter of introduction to the study informing them that an interviewer would be contacting them in the next few days. Households for whom no telephone number was available, were sent an alternate letter explaining that their views were very important, and inviting them to participate by contacting the investigators. The response to this second request was 13 percent at Milton. The sample size goal was not achieved in Milton because there were no more households from which to sample - a total of 346 households were available within 4.5 kilometers of the site and essentially all households in the study area were contacted (Elliott, 1992; Elliott et al., 1993). Elliott et al. (1993) explain that this was unavoidable as an expansion of the study area to include more households would have gone beyond the rural area into the urban area where the households would have been qualitatively different. Of the total available households, telephone numbers were acquired for 249. A response rate of 75 percent was achieved at Milton, with a sample size of 187 stratified across the four distance zones around the site. Stratification of the sample by zone of residence effectively incorporated internal controls into the study design.

The decision to extend the cross-sectional to a longitudinal study led to attempts to recontact these 187 individuals. Two follow-up surveys were completed with as many of the 187 baseline (1990) survey respondents as possible. By 1992/3, there had been minor attrition (i.e., a loss of 9 people) due to out-migration and deaths. Mailing addresses and telephone numbers were therefore confirmed for 178 of the original 187 respondents.

There were some problems tracking baseline respondents given that the initial study was not designed to be longitudinal. Chief among these was that, at the time of the baseline survey, households were contacted and a respondent selected randomly using a traditional method (i.e., adult in the home with birthday closest to the call date). With no intentions of recontacting these individuals, the name of the actual respondent was not recorded. When the letters and subsequent telephone calls were done at the first follow-up in June 1992, they were directed at the head of the household as the original sampling frame would have indicated and 130 interviews were completed. On careful checking of the data, however, it became clear that 60 of the 130 had been completed with a respondent in the target household other than the respondent at baseline. These 60 households were subsequently recontacted in January 1993 in an effort to reach the original respondent. This was successful for 44 of the 60 cases. The net result is that the first follow-up survey was conducted in two phases: in June 1992 (n = 70) and in January 1993 (n = 44).

Overall, 114 of the 178 baseline respondents available for follow-up were re-interviewed for a response rate of 64 percent. Attrition was due to additional out-migration (2), deaths (4), illness (4), refusals or excessive (> 30) callbacks (39) and inability to trace baseline respondent (15). The time lapse between the two phases of interviewing (i.e., June of 1992 and January 1993) was important because it coincided with the opening of the Halton Regional Landfill Site in November of 1992. Nevertheless, there were no significant differences in the levels of concern reported between the two phases, nor was there any significant difference between the two subgroups in the degree of change in levels of reported

concern in 1990 and 1992/3. These two groups were therefore pooled for subsequent analysis.

The third survey was conducted in June and July of 1995 approximately two and one half years after the landfill began operating. Mailing addresses were confirmed for 170 of the original 187 respondents. There were 108 surveys completed. Attrition was due to a combination of out-migration (15), deaths (3), problems due to language, age or illness (3), refusals (17), and inability to trace baseline respondents (24). The 108 completions included most (87) of the respondents who completed interviews in 1992/3 and others not reached in that first follow-up. Through exhaustive search procedures (e.g., using telephone directories, assessment roles and municipal voters' lists), 21 of the original baseline respondents who were lost to follow-up in 1992/3 were recovered for the 1995 interviews. Thus a response rate of 64 percent was achieved. Sample comparability and the implication of attrition are addressed in the following section.

4.7 Sample Characteristics

One of the classic problems in longitudinal research is the potential for bias resulting from sample attrition (Dwyer and Feinleib, 1992). Bias in cohort studies is introduced when there are differences between those who remain in the study and those who are lost to follow-up. It is important, therefore, to examine the characteristics of the subgroups of 87 and 108 in relation to the characteristics of the original cohort of 187 for evidence of attrition bias. The strength of subsequent analyses of individual level change over time is dependent upon

a demonstration that individuals remaining in the study are not systematically different from the baseline cohort.

Table 4.1 displays the socio-demographic characteristics of the baseline cohort (n = 187), the subset followed up in 1995 (n = 108) and the subset for whom data was collected at all three contact years (n = 87). It is important to clarify here that the subgroups of 108 and 87 are not two independent samples; the 87 are contained in the group of 108. They are separated here to facilitate the analyses to follow. The primary data come from the group of 108 respondents who were interviewed in both 1990 and 1995. These years represent the two time points of principal interest for examining change in response to the landfill, prior to construction of the landfill and two and a half years after it began operating and accepting waste. It is also a slightly larger group than the subgroup of 87 for whom data are available for an intermediary time point during the construction of the landfill facility. The subgroup of 87 is valuable for examining trends in the key outcome variables over time.

As Table 4.1 reveals, there are no obvious differences between the characteristics of the baseline cohort and those of the two subsequent survey groups. For example, the slight over representation of women respondents in the baseline sample is maintained in both follow-up subgroups. The follow-up groups are somewhat older on average than the baseline group and there are slightly fewer households reporting incomes less than \$30,000. Those respondents retained in the follow-up surveys continue to reflect the high level of home ownership revealed in the baseline survey as well as the stability apparent from the mean number of years in the area. Based on socio-demographic indicators, then, there is no bias introduced through sample attrition. A comparison of the baseline cohort and the two follow-

up groups on one of the main outcomes of interest - concern, reveals a slightly higher percentage expressing concerns in 1990 about the landfill site in the sub-groups of 108 and 87 than in the baseline group of 187. However, in all three sample groups, the percentage of respondents expressing concerns about the landfill site is consistently high at between 74 and 79 percent. Thus, on one of the main outcomes of interest, the groups are comparable. Further, as discussed previously, since the baseline respondents constituted 75% of all households in the study area, not only are the subgroups representative of the baseline cohort, they are representative of the population of the area. Use of a separate control group, a technique sometimes employed in studies of environmental exposures, was precluded by the low population density in the Milton area and by the difficulty common to studies of this kind (Taylor et al., 1991) of identifying a matched control group.

In addition to socio-demographic differences as a source of bias, there is also a concern that lost cases are concentrated in particular zones, leaving open the possibility for zonal bias in attrition. Table 4.2 shows the number of respondents by zone for the baseline and two follow-up groups. The percentage of respondents by zone for each of the groups is remarkably similar suggesting that there is no zonal bias in attrition. This correspondence demonstrated between the baseline cohort and the two subsequent groups allows for confidence when analyzing individual level change over time. Any change documented cannot be attributed to systematic differences between baseline and follow-up samples.

Another source of bias introduced by the longitudinal approach is *conditioning*, or the notion that posing questions repeatedly to the same individuals will, over time, affect their responses (Dwyer and Feinleib, 1992). Ironically, sampling errors that occurred in 1992/3

actually allow for the comparison of responses for 60 individuals interviewed for the first time in 1992/3 and 70 individuals interviewed for the second time in 1992/3. There were no differences between these groups on outcome variables (i.e., concern, health concern, voluntary dislike, and actions) and one difference in the groups' sociodemographic profiles: the $n = 60$ group had a significantly higher proportion of individuals living with a spouse or partner at the time of the interview ($P = .02$). The comparability of these two subgroups suggests that conditioning is not a serious concern in this study.

4.8 Summary

The purpose of this chapter was to address relevant research design issues. The strength and appropriateness of the longitudinal study design for the current research was established, and the research undertaken in this thesis was set in the context of a larger program of on-going research into the psychosocial effects of environmental contamination. Details of site selection, survey instrument design, survey administration and sample selection were provided. The results of the 1995 round of data collection with regard to response rates, attrition and sample characteristics were documented, setting the stage for the presentation of the empirical results in the next chapter.

TABLE 4.1: Sample Characteristics

Characteristic (1990)	n = 187	n = 108	n = 87
% Female	50.8	54.6	52.9
Mean age	48.2	50.3	51.4
% Total household income <\$30,000	23.2	17.9	19.0
% Partner	75.9	79.6	78.2
Employment			
% Full time	57.2	56.5	57.5
% Part time	10.2	11.1	6.9
% Other	32.6	32.4	35.6
Mean # persons/household	3.0	2.9	2.8
% Households with children < 5 years	14.6	17.6	14.9
% Own dwelling	90.8	93.5	92.0
Median # years at:			
Current Address	10.0	11.0	10.0
Area	22.0	25.0	26.0
% Concerned	74.3	77.8	79.3

TABLE 4.2: Sample by Zone

	n = 187	n = 108	n = 87
Zone 1	44 (23.5)	27 (25.0)	22 (25.6)
Zone 2	38 (20.3)	21 (19.4)	18 (20.7)
Zone 3	58 (31.0)	32 (29.6)	26 (29.9)
Zone 4	47 (25.1)	28 (25.9)	21 (24.1)

CHAPTER FIVE

MILTON RESIDENTS' REAPPRAISAL OF THE LANDFILL SITE

5.1 Introduction

The purpose of this chapter is to present the results of the longitudinal study conducted in the population living proximate to the Halton Regional Landfill site in Milton. As such, the chapter addresses the first two research objectives of the thesis: to document changes in major psychosocial outcome measures among Milton area residents between 1990 and 1995; and, to explore the processes of reappraisal and coping among Milton area residents as they experience the introduction of a landfill site into their community. As previously described, the survey instrument contains measures of several psychosocial outcomes and was administered to Milton area residents at three points in time. This longitudinal design allows for an explicit focus on *change* consistent with Lazarus and Folkman's (1984) conceptualization of environmental stress and coping as a *process*.

The presentation of the results is organized around the eight theoretically-derived hypotheses presented in Chapter 3 which were generated from the five constructs: psychological distress, perceptions of the landfill site, concern, coping and neighbourhood satisfaction. This hypothesis-based approach to the empirical results allows us to follow several strands of inquiry in order to untangle the process of reappraisal and coping. The chapter addresses each of the hypotheses in turn by presenting and analyzing the data

gathered by the survey. These results also provide the platform for the evaluation of the Lazarus and Folkman (1984) framework in light of the research findings in the final chapter.

5.2 Psychological Distress: Hypothesis 1

The first hypothesis suggests that: **the low levels of psychological distress reported by respondents in 1990 will not change over the study period.** In order to address this hypothesis, the baseline findings for the general measures of the psychological distress construct included in the survey instrument will be reviewed and changes in these measures in the two subsequent administrations of the survey will be presented and analysed.

Details of the design of the survey instrument and the original parallel case study, which included the 1990 round of data collection at Milton, are contained in Chapter 4. Recall that the instrument contained two principal measures of psychosocial health and well-being: the 20 item version of the General Health Questionnaire (GHQ) and a modified version of the somatic complaints sub-scale from the Symptom Check List-90 (SCL-90). As described in Chapter 4, the baseline study at Milton was conducted concurrent with two additional sample populations living near solid waste facilities in southern Ontario: a landfill at Glanbrook and the SWARU incinerator in Hamilton. It is instructive to examine the findings of the baseline study at all three study sites both to get a sense of the starting point of these indicators at baseline and to get an indication of the magnitude of the scores at Milton relative to the other waste sites (Table 5.1).

The GHQ measures several aspects of emotional distress, including predisposition to depression, anxiety and social impairment over the two week period prior to the survey. The

original published reliability for the GHQ is .90 (McDowell and Newell, 1987) and the alpha reliability coefficient for this scale at baseline (n = 696) was .85 (Elliott, 1992). On the GHQ-20, a score of 4 or more indicates a probable case of emotional distress (Goldberg, 1972; Elliott, 1992). In a review conducted by Elliott (1992), the percentages reporting scores about the cut-point for normal (4+) on the GHQ-20 in general populations range from 16 percent to 24 percent. In the 1990 study of waste sites in southern Ontario, the percentage of the population above this cut-point for normal at each site overall was low; it was highest at the incinerator SWARU (17 percent), next highest at Glanbrook (13 percent), and lowest at Milton (9 percent). Note that for the populations living near the existing and proposed landfill sites, Glanbrook and Milton, the percentages above the cut-point are less than those reported previously in general populations. Results for all three sites showed that the GHQ score did not vary significantly by zone (an indicator of exposure as measured by distance from the site).

The SCL-90 sub-scale contains twelve items which measure somatic complaints (e.g. headache, backache, fatigue) associated with psychosocial morbidity. As described in Chapter Four, four items related to sleeping and eating disorders as well as rashes and other skin conditions were appended to the sub-scale as additional plausible symptoms of environmental exposure. The original published alpha reliability coefficient for the SCL-90 was .86 (Derogatis et al., 1973) and an alpha of .81 was reported in the baseline study (Elliott, 1992). The 12-item symptom checklist taken from the SCL-90 has a normal cut-point of 0.36 (Derogatis, 1977). In 1990, the mean score for SWARU area respondents was 0.39, while Glanbrook had a mean score of 0.30 and Milton 0.31 (Table 5.1). Thus, only SWARU

residents scored slightly above the cut-point for normal. The percentage of respondents above the cutpoint on the SCL-90 was 38 percent at SWARU, 31 percent at Glanbrook and 33 percent at Milton (Table 5.1). Based on these two general measures of psychosocial health and well-being at baseline, the population around the Milton site, a site which had not yet begun construction and was not visible on the landscape, was generally consistent with the relatively low scores reported across all three sample groups. Elliott et al., (1993) concluded that there were no profound effects of the landfill on emotional distress or reporting of somatic complaints in the baseline study. However, Elliott et al., (1993) report a clear gradient in SCL-90 scores from zone one to zone four and, further, somatic sub-scale scores for respondents living in zone one at Milton of 0.46 which are comparable to scores achieved in a sample of individuals living within five miles of the Three Mile Island nuclear plant studied three years after the accident (Baum et al., 1983). A closer look at this interesting finding is warranted and will be addressed later in this section.

Two additional administrations of the survey instrument were undertaken and, as described in hypothesis 1, it is expected that the low levels of psychological distress as measured by the GHQ-20 and SCL-90 will not change in these subsequent rounds of data collection. As detailed in the previous chapter, data for this thesis were collected from the Milton baseline cohort ($n = 187$), a subset followed up in 1995 ($n = 108$) and a subset for whom data was collected in all three contact years ($n = 87$). Alpha reliability coefficients were generated using the group of 108 (1995) and were found to be .61 for the GHQ-20 and .66 for the SCL-90. Note that while Mahoney et al. (1995) report that alpha scores above .75 are generally thought to be appropriate for health measures, we cannot expect strong

scores given the nature of this study population compared to those typically administered this instrument in clinical settings. Table 5.2 contains descriptive statistics for psychosocial outcomes for both subgroups: 108 in 1990 and 1995, and 87 in 1990, 1992-3 and 1995.

On the GHQ-20, the percentage of the sample above the cut-point was virtually unchanged between 1990 and 1995. In 1990, 8 percent were above the cut-point and in 1995 this declined to 7 percent. Similarly, there is little change noticeable in the subgroup of 87 where the scores went from 8 percent in 1990 to 6 percent in both 1992-3 and 1995. On the SCL-90, the scores for the group of 108 changed from a mean of 0.26 in 1990 to 0.32 in 1995, although the percentage above the cut-point for normalcy (0.36) decreased from 32 percent in 1990 to 30 percent in 1995. In the group of 87, a gradient is evident as the percentage of respondents scoring above the cut-point decreased from 32 percent in 1990, to 29 percent in 1992-3 to 25 percent in 1995. Recall that at baseline in 1990, the residents of the Milton area were described as exhibiting no excess of emotional distress or reporting of somatic complaints (Elliott et al., 1993). The two additional administrations of these scales of general psychosocial health and well-being reinforce the conclusions drawn at baseline that there were no profound effects of the landfill on psychological distress. While there was a general decline in the percentage of respondents above the cut-point on the GHQ-20 and the SCL-90, in general these measures indicate that the population continues to exhibit normal levels of emotional distress and somatic complaints.

The results presented to this point have confirmed the expectations of the first hypothesis: the low levels of psychological distress reported by respondents in 1990 did not change by 1995. However, recall that zone one residents at baseline had SCL-90 scores

similar to those found in residents living near Three Mile Island. This finding signals that insight might be gained by considering changes in the major outcome variables over time by geographic zone.

The subgroup of 108 was used for this analysis to take advantage of the larger sample size (i.e., larger than the subgroup of 87) and because 1990 and 1995 are the principal outcome years. Table 5.3 contains variations in main outcomes by zone for the subgroup of 108 for 1990 and 1995. It would seem plausible that if detectable levels of psychological distress are present in the Milton study population, a gradient of effect from highest in the zone(s) closest to the site to lowest in the zone(s) furthest removed from the site should occur. If we consider the distribution of the two general measures (GHQ-20 and SCL-90) by zone, there is one significant gradient in the expected direction: for the SCL-90 mean score in 1995. An analysis of variance revealed a significant difference in means by zone ($P = .04$) with the highest adjusted deviations from the grand mean for zone 1 (.10) and zone 4 (-.15). In 1990, the zone with the highest percentage of people above the GHQ-20 cut point for normal was zone four (18 percent) while in 1995 the highest percentage was seen in zone one (11 percent). Individuals in all zones in 1990 reported mean scores below the cut point of 0.36 on the SCL-90 but individuals in zones one and two in 1995 (where a significant gradient was detected) had mean scores above the cut point at 0.42 and 0.40, respectively. The zonal pattern that emerges for these measures is not generally one of an expected gradient away from the site but rather one of inconsistency (with the exception noted above for SCL-90 in 1995). For these two outcome measures, the inconsistency of the results by zone as described above might indicate that the scales are not performing well in this context.

The issue of the appropriateness of these measures of psychosocial distress in non-hazardous exposure situations such as this warrants further consideration. The finding of no profound effects of the landfill on emotional distress or reporting of somatic symptoms could be interpreted several ways. It could indicate that in fact the landfill has had no effect on Milton area residents, or that the minor impact it did have was modest and therefore not detectable by these standardized measures. The inconsistency of the results when examined by zone gives further cause to question the appropriateness of these measures for situations of exposure to non-hazardous environmental stressors such as landfill sites. Two implications of this seem immediately apparent: first, that alternative measures more sensitive to subtle effects (e.g., the Environmental Appraisal Inventory - Fridgen, 1994; Schmidt and Gifford, 1989) should be considered and new measures should be developed; and second, that consideration of all of the results of the surveys at Milton should be framed by the fact that we are dealing with subtle, low-level effects in the study population that are focussed directly on the landfill itself (i.e., site-specific effects).

5.3 Perceptions of the Landfill: Hypothesis 2

The second hypothesis postulates that **negative perceptions of the landfill site will decrease over the study period** as Milton area residents experience the introduction of the site into their community. In order to tap into respondents' changing perceptions of the landfill site, the items that were added to the survey instrument for the 1995 administration only (section I in the instrument) will be examined. These items explore retrospectively respondents' perceptions of the site over time and are the only direct source of inquiry into

reasons for any changes that occurred. Changes were thus evaluated by respondents themselves and further if respondents had changed their views over time, they were asked to report what factors had influenced that change. Two additional items within the perception of the landfill construct will also be examined: responses in both 1990 and 1995 to what, if anything, respondents perceived as positive aspects of the landfill, and likes and dislikes expressed about the local area before mention had been made of the landfill in the survey instrument.

Respondents were asked to think back to how they felt when they first became aware that the Halton Regional Landfill Site had been approved to be located in their community. This was an open-ended question where respondents were given the opportunity to express, in a sentence or two, what they remember feeling. The majority of responses (82 or 76 percent) were negative; that is, most people recall unpleasant feelings towards the site initially. The words used to describe these negative feelings included, “devastated”, “angry”, “disappointed”, “concerned”, “disgusted”, “unhappy”, “upset”, and “scared.” Some of the negative responses related specifically to the landfill site approval process and community opposition (e.g., “killing time and wasting tax payers’ money”, “we didn’t approve; we felt that they had other choices”, “we fought so hard and had a good case and it just got blown out”, “we were angry, no one listened to our concerns, they just went ahead and did it”, “I was disappointed because of all the work I did to fight it”, “I thought it was absolutely deplorable. . . they had made up their minds fifteen years ago”, and “I felt bad for the people who spent so much time fighting against it”.)

Another source of negative reaction was the choice of site location. Respondents offered comments such as: “I thought it was ridiculous where they were placing it on a major highway between two growing cities”, “devastated because it is a waste of good arable land”, “I was not very happy; I did not want to see it be situated in this farm area”, “I was disappointed; thought it was a rotten place for it”, and “I was really frustrated; I just didn’t think it was a feasible thing; I didn’t think it was a suitable site”.

Potential impacts of the site were another source of negative reaction. Specific impacts identified included property devaluation, noise caused by trucks, decline in water quality, bad smell, increased traffic volume, environmental impacts, garbage flying around, health and agricultural impacts. Some respondents failed to identify specific impacts but offered general feelings of displeasure about the proximity of the site to their home (e.g., “not very happy, we’re only half a mile away”, “too close for comfort”, and “disappointed because it’s in my backyard”.)

There were several respondents who had negative reactions which were based on uncertainty. For example a respondent described his family’s feelings as follows: “We were not too happy about it then because we did not know what it was going to be like.” Others said, “I did not know what was going to happen, I was afraid . . .”, and, “I was a bit apprehensive.”

Nineteen (18 percent) of the responses could be considered neutral in that they displayed a certain amount of resignation to the inevitability of the site decision. This resignation is evident in the following selection of responses: “I was upset but realized there was nothing I can do; we fought it but lost.”; “I really didn’t have an opinion; I knew it had

to go somewhere, I just hoped it wasn't in my backyard.”; “nobody really wants a waste disposal unit close to their place but it is reality and inevitable.”; “I just thought that if they have to do it, they have to do it and besides we're not that close.”; “figured that they'd have to have it someplace.” ; “I wished it would go somewhere else, like everyone, but it has to go somewhere.”; and, “I thought that it was a reality that had to be dealt with and I felt that it had to go somewhere.” Other responses were labeled as neutral because they indicated relief that the years of community-led resistance were over. “I'm thankful that they finally made a decision; I'm fed up hearing about it.”, “I was not happy that it had come to the area, but I also felt some relief that the issue was resolved since we had spent many years fighting it; at least the whole ordeal was over with.”

Three people had positive feelings about initial site approval. One respondent indicated potential economic benefits attributable to the site (e.g., “jobs and money”). Another was relieved that there would be somewhere to put garbage and the third was simply grateful that a site closer to their property was not selected.

To summarize, when asked to think back to how they felt when they first learned that the landfill site had been approved for their community, most respondents recall having a negative reaction. Five sources of these negative sentiments were identified which related to: siting, location, specific impacts and more general impacts, and uncertainty. Some recall a more neutral first response to site approval based on the inevitability of the siting of the landfill or relief that the decision had finally been made. Few respondents indicated any positive reactions to site approval.

Respondents were asked whether they felt better, worse or the same in 1995 in comparison with the time they first learned that the site was approved for construction. Thirty-four (31 percent) reported feeling better about the site in 1995 than they did initially. Only two individuals reported feeling worse about the site. Over half (62 percent) indicated that their feelings had not really changed over time. It appears that for these individuals, the reappraisal process to date has not resulted in a change in their perceptions of the landfill site.

The respondents who had changed their views over time were asked to report what factors had influenced that change. The reasons provided by these individuals to explain their altered perceptions of the landfill allow for a closer examination of the individual and site related factors influencing reappraisal of the landfill site. The 34 respondents who reported feeling better about the site in 1995 mentioned a total of 49 different reasons for their change in perception. Approximately half of these reasons (25) relate to a favourable evaluation of the design and operation of the site which can be characterized by three interrelated themes.

The outward appearance of the facility is described quite positively with comments such as, “the site looks very nice”, “there are nice trees”, “it’s state-of-the-art in landfill sites”, “they’ve done a good job of fixing it up”, “they’ve done a great job of making it look presentable”, and “clean, [and] it looks nice [with] nice landscaping”. The fact that site was well hidden from view with large earth berms also appeared to be responsible for some favourable impressions. Respondents offered that hardly knew the site was even there, that “they’ve done a ‘wonderful job’ hiding it”, “I think it has been hidden well”, and “you can’t even see the dump.” The management of the waste disposal facility is described as “helpful”,

“efficient”, and “professional”. One respondent likes the fact that everything appears to be under surveillance with monitoring of water and control of pests with falconry.

The nonrealization of negative effects anticipated at baseline was mentioned by 15 respondents as having contributed to their feeling better about the site in 1995. Comments such as, “we never smell it, can’t see it very well, and there has been no increase in traffic”, “the problems that we thought would arise have not been an issue so far”, “there’s no blowing paper or smell”, “thought there’d be a steady stream of garbage trucks coming up to there but there isn’t”, and “no environmental problems have been identified” demonstrate how the residents explain their positive perceptions. The only other frequently mentioned factor was resignation or adaptation ($n = 9$) evidenced by comments like, “I got used to it and you can’t do anything about it”, “over time you get used to it”, and “it’s not because you like it any better; when nothing can be done anymore you accept it and go on.” Issues of convenience and the multi-use (with an emphasis on recycling) nature of the facility also emerged as reasons given for more positive appraisal.

The two respondents who reported feeling worse about the site in 1995 than they did at the outset both cited displeasure with the tipping fee charged to take their garbage to the landfill. These two dissenting voices expressed negative feelings clearly unrelated to the environmental, health or other impacts of the landfill facility on the surrounding community. This issue will be further addressed subsequently in the discussion of the concerns about the landfill.

Another indicator of increased positive perceptions of the landfill, part of the original and follow-up survey, is the number of respondents who reported positive things about the

facility. Nineteen (18 percent) agreed that were positive aspects of the landfill site in 1990 and this increased to 31 (29 percent) in 1995 (McNemar test $P = .06$). A comparison of the scope of the responses between 1990 and 1995 reveals consistency in the types of benefits mentioned with the exception that the 1995 benefits tend to relate more to site operation (e.g., friendly staff, well kept facility). When asked to list the positive things about the site, respondents were able to come up with two general categories of benefits: those of a personal nature (i.e., convenience) and those which are deemed to benefit the community or society at large (i.e., awareness of waste issues and sense of duty).

Responses that indicated convenience as a positive feature of the landfill include comments such as “convenient because there’s no rural garbage collection”, “it’s close to get rid of garbage because it’s just up the road”, and “it’s a good spot to have . . . you’ve got to take your garbage somewhere.” Prior to the location of the landfill in their community, residents were required to travel long distances for their garbage disposal, or burn or store garbage on their properties. The opening of the Halton Regional Landfill site provided a much better option for waste disposal. Comments such as: “it [the landfill] does something about the garbage”, “cuts down the cost of exporting garbage”, “we should be thankful there is someplace to get rid of our stuff”, and “it’s alleviated the garbage problem” demonstrate that, for some, the landfill represents a convenient solution to their personal problems of waste disposal.

Many of the respondents mentioned positive aspects of the landfill which accrued benefits to more than just themselves. Several people linked the introduction of the landfill site with heightened awareness of and opportunities for conscientious environmental

practices. For example, the landfill made people “more environmentally aware” and “introduced recycling boxes to the area”. Other comments noted that they were pleased that the facility “seemed to be doing more than just [taking] garbage” and “there is a depot for Salvation Army drop offs.” Others expressed a more profound environmental altruism with expressions such as “the garbage has to go someplace [and] it’s better to dispose of it as close to the generation point as can be”; “it’s going to be there and we have to accept it” and “we have to bear our share of responsibility and we have the space.” And finally, despite the negative responses related to the landfill site approval process and community opposition which was clear from the analysis above, one resident commented in 1995 that “the fight not have it [the landfill] put in brought the community together.”

In contrast to this increase in reporting of positive aspects related to the landfill, there was a significant increase in the percentage volunteering the landfill as something that they disliked about the local area. Respondents were asked what they disliked about their local area before any mention had been made of the landfill. In the baseline study, levels of reporting of voluntary dislike were relatively low (SWARU 5 percent, Glanbrook 14 percent and Milton 10 percent) (Table 5.1) despite high levels of awareness (62 percent, 93 percent and 92 percent respectively). In the group of 108, the percentage of respondents mentioning the landfill increased significantly (McNemar test $P < .05$) from 12 percent (13) in 1990 (before the landfill was actually in their community) to 21 percent (23) in 1995 (Table 5.2). An examination of the group of 87 reveals that volunteered dislike of the landfill was highest in 1992 at 28 percent, coincident with completion of site construction and the opening of the facility. Even at its highest point, less than one third of respondents volunteered the landfill

site as a negative feature of their local area, which is consistent with the results on the positive perceptions of the landfill.

Hypothesis 2 is supported as negative perceptions of the landfill site have decreased over the study period. It appears that the result of on-going reappraisal of the facility from its siting to its construction and operation has been a general shift to more positive perceptions of the landfill site for many respondents. However, this shift has not been expressed by all respondents - concerns about the landfill site and its impact on the neighbouring community persist for many Milton residents. A closer examination of concerns about the landfill site follows.

5.4 Levels of Concern: Hypothesis 3

As expressed in hypothesis 3, **it is expected that the level of concern reported about the landfill will diminish over the study period.** Indicators of the concerns about the landfill construct that will be examined in this section include changes in the levels of reported concern and changes in measures of the intensity of concern expressed by respondents.

Site concern was solicited by asking respondents directly if they had any concerns about the site. The percentage of respondents in the baseline survey reporting concern at Milton was 74 percent, higher than the levels reported around the existing landfill at Glanbrook (67 percent) and the SWARU incinerator (28 percent) (Table 5.1). Elliott et al., (1993) reported a gradient of concern in Milton at baseline, with the highest levels (91 percent

of respondents) reporting concern in the closest zone (within two kilometers) and the lowest levels (62 percent) in the furthest zone (4.5 kilometers from the site).

An examination of changes in the level of site-specific concern from 1990 to 1995 reveals a decline over the study period. As reported in Table 5.2, over 75 percent of respondents had concerns about the landfill site in 1990 in the group of 108. This was reduced to 50 percent in 1995, after the landfill had been operating for several years. This represents a statistically significant decline (McNemar test $P < .001$) in the level of site-specific concern. A gradient of diminishing concern is evident in the subgroup of 87 where the percentage of respondents reporting concerns about the landfill dropped from 79 percent in 1990, to 66 percent in 1992/3, to 50 percent in 1995. For both groups, then, solicited site concern was highest in 1990 before the landfill existed as a feature in the Milton community. While we see a diminishing trend over time for concern, it must be noted that in 1995 a full half of the respondents continue to have concerns about the landfill site.

When respondents were asked to list their three major concerns about the site (reported in hypothesis 5), an accompanying item inquired further whether they were slightly, moderately or extremely concerned about each of the items to provide an indication of the level of intensity of feelings about each of their site-related concerns. Intensity of concerns about the landfill site for the subgroups of 108 and 87 appear in Tables 5.4 and 5.5. In each case, there is a significant decrease in the intensity of concern which can be seen in the increase in the number mentioning no concerns and the decrease in the numbers reporting being extremely concerned. For example, the percentage mentioning no major concern increased within the group of 108 from 23 percent (25) to 52 percent (56), whereas the

number expressing extreme concern declined from 38 percent (41) to 23 percent (25). For the subgroup of 87, the number mentioning no major concern increased from 21 percent (18) at baseline to 37 percent (32) in 1992-3, to 53 percent (46) in 1995 - a steady increase in the number of respondents who reported no concerns about the landfill site over the three contact times. The intensity of concern for those who mentioned a major site concern remained constant in 1990 and 1992-3 (at 40 percent and 41 percent respectively) and then, similar to the group of 108, declined to 24 percent in 1995. The gradient evident in the subgroup of 87 indicates that the decline in intensity of concern did not occur until the landfill facility had begun operation.

Thus, hypothesis 3 is supported as levels of concern expressed about the landfill declined significantly over the study period. Further, for the half of the sample who remained concerned in 1995, the intensity of their concerns diminished over time. The next two hypotheses focus attention directly on the nature of the concerns expressed about the landfill site.

5.5 Health Concern: Hypothesis 4

Concerns about possible negative effects of the landfill site on the health of respondents and their families are distinctive among concerns given the legitimacy and importance society places on health and the fact that the two year operation of the site at the end of the study period is insufficient to address latent health impacts. Accordingly, concerns about health warrant separate consideration. The fourth hypothesis guiding this research is that **concerns about future health effects will persist over the study period.** Data

collected in the surveys about changes in general views of health, levels of health-related concerns, whose health respondents are concerned about and specific types of health concern will be analysed to address this hypothesis.

At the outset it is instructive to consider how the study population views its health. Respondents were asked two questions regarding their general health status. First, when asked to compare themselves with other people their own age, the majority of respondents rated their health as very good or excellent in both 1990 and 1995 (Table 5.6). This is consistent with recent national and provincial health surveys which report that self-rated health status is highest among those with higher household incomes and post-secondary educations (Health and Welfare Canada, 1988; Ontario Ministry of Health, 1992). Respondents were then asked how satisfied they were with their health in general. Again, the majority indicated that they were 'very satisfied' with their health in both 1990 and 1995 with very few indicating any dissatisfaction (Table 5.7). Considering the population has aged five years over the study, the minor decline in the high ratings is to be expected. Overall, therefore the 108 respondents have relatively high ratings of perceived health status and are generally satisfied with their health.

Interestingly, when respondents were asked to list up to three concerns about the landfill site, there were no explicit references to health in any of their open-ended responses. Respondents were then asked directly whether they considered any of their concerns to be health-related. At baseline, levels of health-related site concerns were highest at Milton (52 percent) when compared with SWARU (21 percent) and Glanbrook (49 percent) (Table 5.1), even though the facility at Milton had yet to be constructed at the time of the survey.

Consistent with the decline in overall concern, there was a decline in the frequency of health-related concern, as concerns about health form a major component of site-related concerns over time. For the group of 108, the percentage reporting health-related concerns drops from 50.0 percent in 1990 to 36.1 percent in 1995 (McNemar test $P < .01$). A gradient of health-related concern is notable in the group of 87 where the percentages range from 50.6 in 1990 to 48.3 in 1992 to 33.3 in 1995. In all cases, a higher proportion of respondents felt that the landfill was a threat to their health before the site began receiving waste.

Respondents were then asked directly whether the landfill site had affected their health or the health of any member of their household. When asked point blank to attribute poor health to the presence of the landfill site, 10 of the 108 respondents in 1990 and 5 of the 108 in 1995 would make that link. These respondents were then asked whose health had been affected. The few responses were evenly distributed among the respondent themselves, their spouse or their children. The types of health impacts reported in 1990 included: stress, loss of peace of mind because of uncertainty, anxiety, strain, irregular heartbeat due to stress and, as one respondent put it, "I am always worried about it and that takes its toll." In 1995, the five health impacts reported are as follows: "stress related health problems causing a heart attack", "put a lot of work into anti-landfill activism and got no response from the landfill people", "[my] daughter gets all red when she washes with the landfill water - doctor told [me] that the water is no good; that it is polluted", "allergies, psychological, . . . not happy at all" and, "the financial loss on our property caused stress which caused health problems." Although the frequency of reported health effects was low and dropped in half between 1990

and 1995, a small group did report psychosocial and somatic health impacts and attributed them to the landfill.

Hypothesis 4 is therefore not supported as concerns about health declined over the study period, consistent with the decline in overall concern. However, it must be remembered that approximately one third of respondents still report health related concerns in 1995. In order to understand this pattern, a closer look at changes in other types of concerns and at specific profiles of respondents follows.

5.6 Types of Concern: Hypothesis 5

The fifth hypothesis developed in this thesis is as follows: **the types of concerns expressed about the landfill site will change over the study period.** This is based on the change in the nature of the stressor from a proposed to an operating landfill site, and, on a shift from concerns based on anticipated impacts to those actually experienced which should accompany such a change. The survey instrument was used to record up to three mentions of specific concerns respondents had about the landfill site and asked directly about the effects of the landfill site on daily life.

The written decision of the Joint Board provides useful summary of landfill-related concerns based on evidence from 28 individuals from the Milton community (Province of Ontario, 1989). As can be seen in following excerpt, anticipatory concerns tend to be based on a traditional negative view of landfills (i.e., a worst-case scenario) even in the face of environmental assessments which would seem to reassure residents that their concerns would

not come to pass. Whether plausible to experts or not, the concerns expressed by area residents are valid concerns nonetheless and must be considered. The decision states:

Their concerns about the effect of a landfill on their relatively peaceful rural society centred around noise, dust, visual impact, litter and increased traffic, as well as the loss of valuable agricultural land in what is a predominantly agricultural community. The Board finds that a number of their expressed concerns did not correspond to the facts about the proposed undertaking, and that many nearby residents had not taken the opportunity to read the environmental assessment documents prepared for their use as well as for other official uses. This makes an already unpleasant situation unnecessarily traumatic; this creates a scenario whereby any decision this board makes will be rejected by those most affected on the basis that it places an unconscionable burden upon them. (p. 24)

In the surveys, respondents were given the opportunity to list three concerns that they had about the landfill site (Table 5.8). Fifty-one respondents provided interviewers with at least one concern in both 1990 and 1995; 32 listed concerns only in 1990 and 2 mentioned concerns only in 1995. Although the most useful insights into reappraisal can be gained through changes in concerns evident in the group of 51, it is also relevant to consider the nature of concerns mentioned by those residents who reported concerns in one year only.

The 32 individuals who voiced concerns about potential impacts of the landfill in 1990 but by 1995 mentioned no concerns, represent those for whom reappraisal of the landfill from a proposed to existing feature of their landscape alleviated their anticipated concerns. In 1990, the most frequently mentioned concerns of this group were: effects on water, increased traffic, and decreased property values. A variety of other less frequently mentioned concerns included: "it's going to be right across from our property"; "the appearance will be unattractive"; "aesthetic degradation of rural environment"; "deteriorating our life around

here”; “part of the cycle of congestion - the evils of modernization.” The two individuals who only reported concerns in 1995 were both worried about contamination of their well water.

Most individuals who were able to articulate concerns about the landfill did so in both 1990 and 1995. These concerns are ranked based on frequencies of mention in Table 5.10. In 1990 the two most frequently mentioned concerns were water quality and quantity (n = 33) and traffic (n = 33) followed by pests (n = 13), and agricultural impacts (n = 10). In 1995 water quality and quantity remained the top concern (n = 37) linked to the fact that the homes in the area rely on well water. As one resident commented: “We have a concern about water - not just the loss of water but the quality of water.”

The issue of ‘water’ is a recurring theme in the community for reasons unrelated to the landfill. At a public meeting held in 1996 to discuss a decision by the Province to institute continuous chlorination of the water supply in Milton, the importance of drinking water to this community was evident (Regional Municipality of Halton, 1996). In expressing their opposition to continuous chlorination of their water supply, their pride in the quality of Milton’s water emerges as an important defining characteristic for residents of this community. Ted Chudleigh, M.P.P. for Halton North comments: “everybody in the province does not have a ground source of water that is as pure as the Milton source”. Gord Krantz, Mayor of Milton explains: “Milton took upon itself a project known as ‘Destiny Milton’. And I want to share with the public . . . one of the things that was very, very high on that priority list of us Miltonians was the good, clear, clean water that every one of us has”. For a town that prides itself in and, in essence, defines itself by the quality of its water, it makes sense that

concerns about water as they relate to the introduction of a landfill site would emerge strongly.

Concerns about traffic in and out of the site, anticipated in 1990, were mentioned far less frequently in 1995 ($n = 6$), similarly concerns about pests such as seagulls, rodents and flies, declined ($n = 4$). In contrast, two related concerns which increased in light of operating practices were the imposition of a tipping fee ($n = 20$) and litter ($n = 14$). Residents could not have predicted in 1990 that a tipping fee of \$5.00 per use would be imposed on local residents who bring their garbage to the landfill. There is an air of 'adding insult to injury' as residents comment: "it cost us a lot to put it [the landfill] there and it should be free to take it [garbage] there", and "the taxes of the town of Milton are high and I have no garbage service and I have to take it [garbage] to the dump and pay \$5.00 for it." In essence, the tipping fee is seen as adding to a perceived inequitable balance between risks and benefits; that is, if these residents have to live with the perceived risks and annoyances associated with a landfill, why should they be further penalized by having to pay to use it?

The increase in mentions of litter as a concern is related to the tipping fee issue in that residents are convinced that people are, "dumping on the roadside because of the \$5.00 charge to bring the garbage to the dump", and "constantly dumping their garbage in the ditches because they do not want to pay the service charge." This impact also could not have been anticipated in 1990 and is less attributable to negative consequences of the introduction of the landfill in the community and more to the day-to-day administration of the facility. There was a small increase (from 3 to 8 mentions) in concern about property value effects, although attributing this to the site is also difficult because the property market in general was

in decline over this period. As will be discussed in section 5.8, property values data indicated the site had little if any effect on property values during the study period (Butany et al., 1996).

The landfill represents the introduction of an urban/industrial land use in the midst of a rural agricultural community. As such, agricultural impacts in the form of general concerns about the “taking over of farmland for this purpose [waste disposal]” as well as direct effects on the agricultural products of farms that continued to operate in the area (e.g., “if the water is polluted it will affect cows’ milk”) were anticipated in 1990. These agricultural concerns declined in prominence between 1990 and 1995 (down from 10 to 1 mentions). This decline is perhaps attributable to the fact that in 1990 residents hoped that they could still protect the agricultural resource from any encroachment. In 1995, the site was open, operating and existing farms continued to operate as usual and residents were resigned to the fact that the land was taken out of production.

To this point, the most frequently reported concerns have been discussed. There were, however, a number of additional issues that arose from the questioning. An examination of these less frequently mentioned concerns is instructive to create a more complete picture of landfill reappraisal. In addition to traffic and pests discussed above, other externalities anticipated in 1990 (e.g., air pollution, noise and odours) were mentioned less frequently in 1995 suggesting that the anticipated effects were not realized with facility operation. As well, comments offered in 1990 such as: “my quality of life will be decreased”; “disrupt way of life”; and “concerned about the lifestyle of the people near the site”, which indicate anticipation of negative impacts on quality of life, were not echoed in 1995.

Overall, concern based on anticipated events (e.g., traffic, pests and smell) were not realized once the site was functioning. New concerns that emerged (e.g., tipping fee, unauthorized dumping of garbage) could not have been anticipated and relate more to annoyance resulting from the operating policy of the facility than with more deleterious issues of environment and health. On-going reappraisal of the landfill site from proposal to construction to operation, has resulted in a shift in the types of concerns generated. Concerns elicited in 1990 derived from what Milton area residents had learned from dumps in other places or from individuals sharing their experiences about existing dumps. It is only natural to assume that a dump is a dump and that the negative impacts which plague them are universal. It seems clear that the landfill site which eventually became part of the Milton community, was not like other, older dumps and thus did not generate the anticipated impacts. The important issue of the state-of-the-art design and superior maintenance of the Halton Regional Landfill Site is critical to the understanding of this positive reappraisal.

While both level and intensity of concern decreased over time, reported effects of landfill concerns on daily life increased from 11 percent (12) in 1990 to 19 percent (21) in 1995 (McNemar test $P = .07$). When asked to specify how their concerns were affecting daily life, in 1990 respondents indicated such things as worry, attending meetings caused depression, being tired of talking about it, disruption of friendships, it being constantly on their minds and being angry. The ways that the respondents describe how these concerns have affected their daily lives in 1995 are very different, more related to the operating landfill than the siting process which dominated the 1990 responses. The most common responses in 1995 related to water (e.g., “drinking bottled water”, “running out of water so that you

can't have a bath, make supper or do laundry", "water used to be clear and now it is brown", and "we are always wondering if our water is safe to drink"). Other ways mentioned include increased noise, traffic and picking up stray garbage on the side of the road and in ditches.

Hypothesis 5 is thus supported as the types of concerns expressed about the landfill site did change over the study period as expected. Another way to consider concern is to look at how concern is experienced by different subgroups within the study population. This is addressed in the next hypothesis.

5.7 Characteristics of Respondent Sub-groups: Hypothesis 6

Another way to look at concern is by considering subgroups of individuals distinguished by their consistent or changing levels of concern throughout the study period. Hypothesis 6 anticipates that **characteristics of several sub-groups within the study population (e.g., those based on vulnerability, social support, community involvement) are related to changes in their levels of concern over the study period.** It is possible to analyze three subgroups: those concerned in 1990 and 1995 ($n = 51$); those concerned in 1990 but not in 1995 ($n = 33$) and those not concerned at either time ($n = 21$) (Table 5.9). A fourth group ($n = 3$) of those not concerned in 1990 but concerned in 1995 has insufficient numbers for meaningful analysis. Accordingly, nearly half of the respondents in the subgroup of 108 reported concern about the landfill in both years while 19 percent expressed no concerns in either year. There were 31 percent who switched from being concerned in 1990 to not concerned in 1995.

Based on the three subgroups identified above (the 51 who were concerned in 1990 and 1995; the 33 who were concerned in 1990 but not in 1995; and, the 21 who were not concerned at either time), it is possible to inquire as to whether there are any obvious distinguishing features of these three groups other than their differences in concern. Recall that three sub-hypotheses were developed: **6i proposes that vulnerable sub-groups will remain concerned over the study period; 6ii suggests that respondents who report strong social support will express fewer concerns over the study period; and, 6iii proposes that respondents who report high levels of community involvement will express fewer concerns over the study period.** These three groups were compared in terms of zone of residence as well as a range of demographic (e.g., sex, age and marital status) and social (e.g., education, income, employment status, social network and community involvement) characteristics identified in Chapter Three as plausibly associated with (re)appraisal of environmental stressors (Table 5.10). For the nominal variables (e.g., zone, sex, income and education), three-way tables were analysed using Pearson chi-square (χ^2) tests. For the continuous variables (age, years at address), analyses of variance were run.

In general, the groups expressing concern in both years ($n = 51$) and those concerned in 1990 but not in 1995 ($n = 33$) had very similar characteristics. Based on this analysis, it seems that there are no obvious characteristics that distinguish those Milton area residents who remained concerned in both administrations of the survey instrument from those who reported a change in concern between 1990 and 1995.

Although the profile of concerned respondents is similar regardless of whether their concerns persist or diminish over the study period, it is expected that these respondents will

differ from those who never reported concerns about the landfill. The analysis revealed that the group expressing no concern at either time ($n = 21$) differed in several respects from the first two groups, although for only two variables were the differences statistically significant. Those not concerned at either time were less highly educated (χ^2 test $P < .05$) and were members of fewer community groups (χ^2 test $P < .05$). This is consistent with the results reported in the baseline survey (Elliott et al., 1993) where these indicators also emerged as significant in models of concern about the landfill.

With respect to the three sub-hypotheses, indicators of vulnerability included in the survey instrument include: households with children less than five years old, and median years at address and in area. Based on the data collected in this study, those respondents who could be considered particularly vulnerable to the potential negative impacts of the introduction of a landfill site into their community because they potentially have the most to lose are not more likely to report concerns. Indicators of social support included in the survey were: how often respondents speak with or ask for help from neighbours, number of close friends and number of close relatives. Again, the sub-hypothesis which postulated that respondents who have strong social support will express fewer concerns over the study period is not supported. Finally, community involvement indicators include: belonging to social, environmental and other community groups and involvement in local events. As indicated above, respondents who were not concerned at either time ($n = 21$) were members of fewer community groups as compared with the concerned sub-groups. This is in contrast to the notion that higher levels of community involvement would reduce concerns and suggests perhaps, that individuals who are concerned tend to join a number of groups within the community to

gather information about their concerns. This suggestion leads to a consideration of coping strategies in the next hypothesis.

5.8 Coping: Hypothesis 7

Hypothesis 7 relates to actions that respondents may have taken in relation to the site, and predicts that the type of coping strategies employed will shift from problem-focused to emotion-focused over the study period. This shift is expected to coincide with the change in the stressor from a proposal which could be stopped, to a reality which must be accepted. Questions in the survey included a broad range of possible site related actions falling into three main groups: individual actions (e.g., contacting politicians or government staff about landfill concerns), group actions (e.g., belonging to a local citizens group), and actions related to a residential move away from the landfill area (e.g., contacting a real estate agent). Although no items related directly to forms of emotion-focused coping, a decline in problem-focused coping could indicate the switch as respondents regulate their emotional response to the inevitability of the landfill site. In addition, opportunities existed in some of the open-ended questions for statements about emotional response and coping to be provided by respondents, however, this was not probed for directly.

The frequency of reporting site-related actions in the baseline study was 21 percent at SWARU, 60 percent at Glanbrook and 71 percent at Milton (Table 5.1). Given that the siting process was still on-going at the Milton site, this heightened level of reported site-related actions is not surprising.

In aggregate, the frequency of site-related action reported by the group of 108 declined significantly (McNemar test $P < .001$) from 83.3 percent mentioning some form of action in 1990 to 62.0 percent in 1995 (Table 5.2). In the sub-group of 87, a gradient is evident from 83.9 percent of respondents reporting some type of site-related action in 1990, to 71.3 percent in 1992/3, to 62.1 percent in 1995. These results must be qualified, however, because of the way the questions were posed in the survey. Respondents were asked if they had *ever* taken actions related to the landfill. This would lead to results that are cumulative (i.e., the 1995 frequencies should have been greater or equal to the 1990 frequencies). Given this, the results on site-related actions cannot provide evidence for trends over time. The decrease in the number of mentions over time, therefore, most likely relates to recall bias or an emotion-focussed coping strategy consistent with leaving the siting process in the past and getting on with life. It is not possible on the basis of these data to determine which is the more likely explanation. Despite this bias, it is still instructive to look at the types of actions reported over time as there might be some pattern to the results that were generated.

There are a number of things that individuals can do on their own or with neighbours in response to the introduction of an unfamiliar feature such as a landfill into their community. These individual and group actions tend to be related either to gathering information about the issue or taking some sort of direct action to mitigate against its potential impacts. In 1990 and 1995, respondents report obtaining information about the HRLS from a variety of sources the most important of which were newspapers and local government or community agency publications. In July of 1991, the Regional Municipality of Halton began publishing a "Waste Management Site Newsletter" which includes messages from local councillors, results of soil

and water studies, updates on work in progress and contact names and numbers of waste management site advisory committee members. The 1995 responses reflect this new information source.

When asked about their activities relative to these various information sources, in 1990 21 (of 108) or 19 percent said that they read about the site in the newspaper. This increased to 42 (39 percent) in 1995. Sixty-two (57 percent) of respondents indicated that they had read books or reports about facilities like HRLS and their potential effects. This number reduced to 42 (39 percent) in 1995. Discussing concerns about the HRLS with friends and neighbours was an action engaged in by 32 (30 percent) of respondents in 1990 and 56 (52 percent) in 1995.

In 1990, 61 (57 percent) report attending a meeting organized by a local citizen's group at which the HRLS was discussed. This number declined to 40 (37 percent) in 1995 likely reflecting the fact that most of the meetings would have been held in the years leading up to and immediately after site approval. Membership in a local citizen's group which deals with the HRLS was claimed by 29 (27 percent) of the group of 108 but only 10 (9 percent) made such claims in 1995. This could be reflective of the disbanding of community action groups once the fight to stop the landfill had been lost.

Taking the time to telephone, write or speak to politicians or government staff regarding concerns about HRLS is another form of direct action. Thirty-seven (34 percent) of respondents in 1990 report contacting politicians or government staff and 4 individuals report speaking directly with staff at the future site of the facility. In 1995, 30 (28 percent)

report contacting politicians or government staff and 9 spoke directly to the staff at HRLS about their concerns.

The final category of site-related action addresses activities related to residential moves. Respondents were asked if they had, in the past two years, considered moving from their home. With this wording, the moving questions are not subject to the same type of recall bias noted to be problematic for the other site-related action items. The frequency of “considered moving” because of the site in the past two years declined from 25 (23 percent) in 1990 to 16 (15 percent) in 1995 (McNemar test $P = .08$). These individuals were further asked whether there were any reasons why it would be difficult for them to move. In 1990 the reasons offered included financial and personal considerations evidenced by the following quotes: “we may not get the amount we want for the house because of the dump”, “family roots”, “lived here for 26 years”, “grandchildren and friends”, “not able to find another farm for the price”, and “won’t feel as free or as happy in the city.” The reasons offered in 1995 are consistent with the 1990 responses - financial (“costs money to move”, “there would be a great financial loss”, “can’t sell the house unless I gave it away because no one wants to live by the landfill”) and personal (“the move itself with my age would be hard”, “our children are both in high school and it’s a difficult for them [to move]”, “we have been here for a number of years and we are comfortable”.)

The number having taken steps towards moving, however, remained the same for both contact years at 10 (9 percent). The steps taken toward moving include: contacting a real estate agent, looking for other housing, and actually trying to rent or sell their home. Of

those respondents who had considered moving because of the site, very few took action to genuinely initiate a move.

In an effort to explore more fully the impact of the landfill site on residential relocation, telephone interviews were conducted with 11 of the 22 respondents known to have moved from the study area between 1990 and 1995. The landfill figured prominently in the decision to move in 3 of the 11 households; two of these movers had their properties expropriated by the Region to make way for the landfill and the other lived further away in zone 3. As reported by Taylor et al., (1994), these two individuals reported that their families' "lives are finished" and that the Halton Region "took everything away", while providing insufficient compensation for expropriated land. The one resident who moved by choice but indicated that the landfill was the primary reason for moving cited concerns about water shortages, seagulls, frustration with the Regional government and property values "down by half." The landfill was a secondary consideration for two additional households, both of which were located in the zone closest to the site.

The eight other movers who were interviewed, including the two for whom the landfill was a secondary consideration, were primarily motivated by profit, access to amenities, or their first move away from their parents' home. The landfill had little bearing on their decision to move and furthermore, none of them felt that their property values were adversely affected by the landfill. The expropriated households were profoundly affected by the landfill site, so much so that they moved to other areas of south-central Ontario. Many of the other households for whom the landfill had little or no influence moved to the nearby town of Milton, primarily because of ties to friends and family or relocated for employment.

Telephone interviews were also conducted with 21 households who moved *into* the study area between 1990 and 1995. Four of the households were interviewed in July of 1992 and 17 in July 1995. The comments of these new residents are qualitatively different in that they chose to move into a community where a landfill site been approved, was under construction or was operating. They moved into the area after the 20 years of community-led opposition had concluded with site approval. Three of the four households interviewed in 1992 during site construction were aware of the site before they decided to move and the fourth indicated that prior knowledge of the site would not have significantly influenced the decision to move (Taylor et al., 1994). For the most part, these new residents were not concerned about possible property value loss as two were renters and thus have no personal investment at stake, one felt that they lived far enough away (zone 3) to be insulated from effects and the other was optimistically waiting for the site to open before passing judgment. When asked about concerns about the landfill, these four respondents mentioned water quality and truck traffic - concerns not unlike those of long-term residents.

The 17 in-movers interviewed in 1995 shared similar impressions about the landfill in their new community. Only three mentioned the landfill when asked to list things they disliked about the area. However, when asked directly about it, concerns attributable to the landfill included: water availability and quality (11 mentions), truck traffic (5 mentions), and property values (4 mentions). Unrelated to the landfill, the issues of safety, coyotes, the new Highway 403 extension, and taxes were expressed. Here again, we see consistency in the nature of concerns held by new and long-term residents alike.

The findings from this selection of movers (both in and out) appear to reinforce the conclusion from the main survey that the landfill has had very little effect on either considering moving or actual decisions to move from or into the area. Further, while households perceiving the (proposed) landfill to be a threat may have moved out of the area very early in the process (i.e., prior to the baseline survey in 1990), data on real estate transactions and property values within the 4.5 kilometer study area indicate that the landfill had little or no impact on the number or value of residential sales nor the amount of time on the market during the 1984 to 1995 period (Butany et al., 1996).

Given the problem with the wording of the questions in the survey and the fact that types of emotion-focussed coping were not specifically addressed, it is not possible to definitively determine if the hypothesized shift from problem-focussed to emotion-focussed coping occurred. However, the evidence that was obtained in this study suggests that Milton area residents were (and likely remain) engaged in a variety of forms of coping and that the types of coping have changed in response to changes in the nature of the stressor. These changes are likely to be consistent with a change from problem-focussed coping to emotion-focussed coping as the site changes from a proposal to a reality.

5.9 Neighbourhood Satisfaction: Hypothesis 8

The final hypothesis contends that when considered in the broader context of respondents' lives in the Milton community, the introduction of this landfill will not adversely impact on overall quality of life as **respondents' overall satisfaction with the neighbourhood will remain unchanged over the study period**. Recall that this hypothesis

is based on findings from other neighbourhood research which showed that positive attitudes held by residents toward their neighbourhood are resistant to change (e.g., Greenberg et al., 1995). Indicators from the survey instrument which can be analysed to determine whether this hypothesis is supported include: likes and dislikes about the area and its people; ratings of area satisfaction; what one thing respondents would change about the area; whether they would stay in the area should they move; and whether the landfill had changed perceived satisfaction with the area.

Respondents were asked to provide up to three things that they like about the area where they live. This was the very first item on the instrument and was asked well in advance of any mention of the Halton Regional Landfill site. The responses shed light on attributes of the Milton area that residents value and want to protect and, collectively, capture the essence of the community as a place to live. Overwhelmingly, respondents cite the “quiet”, “peaceful”, “spacious”, “rural countryside” as the thing that like most about the area where they live in both years. Phrases such as, “open space and peacefulness; trees and grass”, “away from the rat race”, and “nature trees and abundance of green” evoke images typical of a pleasant rural way of life.

For these people, the rural nature of their community is made more appealing by other attributes specific to their neighbourhood. These include family roots and attachment to place (e.g., “this land’s been in the family for four generations”, “it’s where we were born and raised”, “it’s home for me, I’ve lived here all my life”), friendly neighbours (e.g., “it’s a people-friendly, neighbourly place”) and the ex-urban location of their tranquil community (e.g., “farm, rural close to conveniences of city”, “I like being in the country but still being

close to the city”, “we live in the country but we have lots of shopping centres close by”, and “the location is good - it is accessible to town yet it is also private.”) These comments paint a picture of their community as having the ‘best of both worlds’; “it’s country and city at the same time.”

If these are the values of the Milton area that residents like and therefore value and want to protect, of interest from a research perspective is, are these things they value challenged or threatened by the introduction of a noxious facility like a landfill? There are three items on the instrument which help to address this question. They are: expressed dislikes about the area, what one thing residents would change about the area if they could and a specific question asking whether the landfill had changed their satisfaction with their neighbourhood as a place to live.

Recall previously that an increase in unsolicited dislike of the landfill site was seen over the study period. In 1990, 12 percent listed the landfill site as one of their three dislikes about the area and this increased to 21 percent in 1995. An examination of the other dislikes mentioned reveals consistency between years but somewhat of a contradiction when compared to the features of their community that they prized. For example, the most frequently mentioned dislike in both years (far in excess of the mentions of the landfill site) was the lack of municipal services such as water, sewage, garbage pick-up, policing, cable television and road maintenance and access to urban amenities such as public transportation, shopping and even pizza delivery. The relatively high volumes and speed of traffic along the rural concession roads, was mentioned frequently in both years as a dislike about the area. For some, the privacy that their rural addresses afford, also brings with it other challenges of

isolation, including the need to drive their children everywhere, lack of social opportunities for their children and high long distance telephone bills. The types of dislikes elicited reveal the inconveniences of living in the country which must be balanced against the benefits.

When asked “if you could change just one thing about this area, what would it be?”, respondents were obliged to select the most notable of their dislikes. These are summarized in Table 5.11. The proposed landfill was the most frequently mentioned feature of their community that residents wanted to change in 1990. Eighty of 108 people provided a response to this question and 22 (28 percent) of them indicated that they wished the landfill gone from the Milton area. This had declined significantly by 1995 (McNemar test $P = .02$), where 88 of 108 people responded, to 12 (14 percent) and was equaled or exceeded by four other concerns. The issues mentioned more frequently in 1995 included water (quality and access to), traffic, urbanization (encroachment and proximity of urban area), and access to amenities other than water such as sewage and cable television. In keeping with the previous findings, the landfill’s prominence as an undesirable feature of the Milton area decreased between 1990 and 1995.

There was little change in response to the question, “If you were to move from this address would you stay in the area?” The frequency of affirmative responses dropped slightly from 62 (57 percent) to 57 (53 percent) and reasons other than the landfill predominated as factors for moving elsewhere (e.g., retirement moves or relocation to northern, more rural areas). When specifically asked, “Has the site increased, decreased, or not changed your satisfaction with this area as a place to live?”, the number reporting that the landfill had not changed their satisfaction increased from 58 (54 percent) to 74 (68 percent) over the study

period. Most of the others reported decreased satisfaction as a result of the landfill but the frequency declined from 47 (44 percent) to 32 (30 percent).

Despite the dislikes, the things they would change and the introduction of a landfill site, ratings of satisfaction with the Milton area as a place to live are very high. Eighty-five (79 percent) in both 1990 and 1995 describe themselves as “very satisfied” with their neighbourhood. This high level of satisfaction is typical of the results reported in many neighbourhood attitude surveys (Michelson, 1977). The effect of the landfill has clearly not been profound enough to change perceptions of the neighbourhood.

Taken together, these indicators of neighbourhood satisfaction imply that although the landfill has had some influence, its effects are marginal in relation both to other factors and the very high and consistent levels of overall neighbourhood satisfaction reported. Hypothesis 8 is supported as respondents’ overall satisfaction with the neighbourhood has remained unchanged over the study period.

5.10 Summary

This chapter presents a detailed examination of the results of the longitudinal study of psychosocial effects, reappraisal and coping in Milton area residents as they experience the introduction of a landfill site into their community. In general terms, these results reveal a community which has, for the most part, overcome their initial fears and concerns about the possible negative impacts of a proposed landfill site as the proposal became a reality and the reality, to this point at least, has not fulfilled their negative expectations. The main findings of this analysis will be summarized in the final chapter. In addition, Chapter 6 will discuss

the implications of these findings both for understanding how the Milton community has experienced the introduction of the landfill site and to assess the Lazarus and Folkman (1984) framework's utility in this research context.

TABLE 5.1: Baseline (1990) Results for SWARU, Glanbrook and Milton

Outcome Measure	SWARU (n = 254)	Glanbrook (n = 255)	Milton (n = 187)
GHQ-20 % above cutpoint	17	13	9
SCL-90 mean score	.39	.30	.31
SCL-90 % above cutpoint	38	31	33
% Unsolicited Dislike	5	14	10
% Concern	28	67	74
% Health Concern	21	49	52
% Actions	21	60	71

TABLE 5.2: Descriptive Statistics for Psychosocial Outcomes

Outcome Measure	1990 (n = 108)	1995 (n = 108)	1990 (n = 87)	1992 (n = 87)	1995 (n = 87)
GHQ-20 % above cutpoint	8	7	8	6	6
SCL-90 mean score	0.26	0.32	0.26	0.30	0.31
SCL % % above cutpoint	32	30	32	29	25
%Unsolicited Dislike	12.0	21.3	11.5	27.6	21.8
% Concern	77.8	50.0	79.3	65.5	49.4
% Health Concern	50.0	36.1	50.6	48.3	33.3
% Actions	83.3	62.0	83.9	71.3	62.1

TABLE 5.3: Variations in Main Outcomes by Zone (n = 108)

OUTCOME/zone	1990	1995
GHQ-20 (% above cut point)	8	7
zone 1	7	11
zone 2	0	10
zone 3	6	6
zone 4	18	0
SCL-90 (mean score)	.26	.32
zone 1	.28	.42
zone 2	.34	.40
zone 3	.23	.32
zone 4	.22	.17
Unsolicited Dislike	13	23
zone 1	8 (62%)	10 (44%)
zone 2	2 (15%)	5 (22%)
zone 3	2 (15%)	6 (26%)
zone 4	1 (8%)	2 (9%)
Concern	84	54
zone 1	24 (29%)	17 (32%)
zone 2	18 (21%)	13 (24%)
zone 3	22 (26%)	13 (24%)
zone 4	20 (24%)	11 (20%)
Health Concern	54	39
zone 1	14 (26%)	11 (28%)
zone 2	14 (26%)	7 (18%)
zone 3	13 (24%)	11 (28%)
zone 4	13 (24%)	10 (26%)
Actions	90	67
zone 1	25 (28%)	19 (28%)
zone 2	19 (21%)	16 (24%)
zone 3	25 (28%)	15 (22%)
zone 4	21 (23%)	17 (25%)

TABLE 5.4: Intensity of Concerns about the Landfill Site: Group of 108

Frequency (percent)	Major Concern		Second Concern		Third Concern	
	1990	1995	1990	1995	1990	1995
No concern mentioned	25 (23)	56 (52)	54 (50)	82 (76)	79 (73)	99 (92)
Slightly concerned	12 (11)	7 (7)	7 (7)	4 (4)	4 (4)	0 (0)
Moderately concerned	30 (28)	20 (19)	13 (12)	7 (7)	7 (5)	3 (3)
Extremely concerned	41 (38)	25 (23)	34 (31)	15 (14)	18 (17)	6 (6)

TABLE 5.5: Intensity of Concerns about Landfill Site: Group of 87

Frequency (percent)	Major Concern			Second Concern			Third Concern		
	1990	1992-3	1995	1990	1992-3	1995	1990	1992-3	1995
No concerned mentioned	18 (21)	32 (37)	46 (53)	43 (49)	49 (56)	67 (77)	62 (71)	67 (77)	80 (92)
Slightly concerned	10 (11)	7 (8)	5 (6)	6 (7)	6 (7)	2 (2)	2 (2)	3 (3)	0 (0)
Moderately concerned	24 (28)	12 (14)	15 (17)	9 (10)	10 (11)	4 (5)	7 (8)	7 (8)	2 (2)
Extremely concerned	35 (40)	36 (41)	21 (24)	29 (33)	22 (25)	14 (16)	16 (18)	10 (11)	5 (6)

TABLE 5.6: Perceived Health Status 1990 and 1995

Health Status Rating	1990	1995
Excellent	45 (42%)	41 (38%)
Very Good	38 (35%)	42 (39%)
Good	19 (18%)	18 (17%)
Fair	5 (5%)	6 (6%)
Don't know	1 (1%)	1 (1%)

TABLE 5.7: Satisfaction With Health 1990 and 1995

Satisfaction Rating	1990	1995
Very satisfied	60 (56%)	58 (54%)
Somewhat satisfied	41 (38%)	39 (36%)
Not too satisfied	6 (6%)	9 (8%)
Not at all	0 (0%)	1 (1%)
Don't know	1 (1%)	1 (1%)

TABLE 5.8: Reported Concern about Milton: 1990 Versus 1995 (n = 108)

<i>Do you have any concerns about the landfill site?</i>	No in 1995	Yes in 1995
No in 1990	21 (19%)	3 (3%)
Yes in 1990	33 (31%)	51 (47%)

TABLE 5.9: Respondents Mentioning Any Concerns in 1990 and 1995.

All Concerns Ranked	1990	1995	TOTAL
water quality and quantity	33	37	70
traffic	33	6	39
tipping fee/charge	-	20	20
garbage/litter	5	14	19
pests	13	4	17
air quality	7	6	13
site operation	7	5	12
property values	3	8	11
agricultural impacts	10	1	11
location	7	4	11
pollution (general)	7	3	10
noise	6	2	8
proximity	5	2	7
odour	5	1	6
environmental degradation	3	3	6
quality of life impacts	5	1	6
waste generation/disposal	1	5	6
mistrust/powerlessness	1	3	4
concerns about the facility	0	3	3

TABLE 5.10: Characteristics of Concerned Respondents

1990 Characteristics	Concerned in 1990 and 1995	Concerned in 1990 but not in 1995	Not Concerned in Either 1990 Nor 1995
Zone			
zone 1	17 (16%)	7 (6%)	3 (3%)
zone 4	10 (9%)	10 (9%)	7 (6%)
Sex (# female)	30 (28%)	14 (13%)	13 (12%)
Age (mean)	50	51	52
Education (# high school grads)	38 (35%)	21 (19%)	9 (8%)
Income >30K	37 (34%)	25 (23%)	14 (13%)
With Partner	38 (35%)	28 (26%)	14 (13%)
Employed full-time	19 (16%)	15 (14%)	3 (3%)
Retired	14 (13%)	12 (11%)	9 (8%)
Median yrs. at address	15	13	11
Median yrs. in area	28	29	30
Households with children <5	8 (7%)	7 (6%)	4 (4%)
Belong to a social group	17 (16%)	12 (11%)	5 (5%)
Belong to an environmental group	14 (13%)	7 (6%)	2 (2%)
Belong to two or more groups	35 (32%)	22 (20%)	8 (7%)
Involved in local events	13 (12%)	12 (11%)	4 (4%)
Often talk with neighbours	31 (29%)	17 (16%)	12 (11%)
Often ask for help from neighbours	18 (17%)	14 (13%)	7 (6%)
Median number of close friends	7	6	9
Median number of close relatives	9	8	6

TABLE 5.11: If you could change one thing about this area, what would it be?

One Thing Respondents Would Change . . .	1990 80 people responded with 82 things	1995 88 people responded with 94 things
landfill site	22	12
traffic	14	19
water	10	21
amenities	12	12
urbanization	14	14
rural qualities	3	3
other	7	13

CHAPTER SIX

CONCLUSIONS

6.1 Introduction

This thesis examined psychosocial impacts in a population living in close proximity to a landfill site near Milton, Ontario. The data described and analyzed in this thesis were collected between 1990 and 1995 and capture key events in the landfill site's history - site approval, construction and operation. The longitudinal study, which collected indicators of stress, reappraisal and coping at three different points in time from the same individuals, was designed to document and examine the process whereby these people have experienced and come to live with the landfill facility over time.

The theoretical basis for understanding this process of appraisal, reappraisal and coping was derived from environmental stress and coping theory generally, and from the framework proposed by Lazarus and Folkman (1984) specifically. Five constructs derived from environmental stress and coping theory guided the examination of changes in individual responses to the landfill over time: psychological distress, perceptions of the landfill site, concerns about the landfill, actions and neighbourhood satisfaction. A series of hypotheses, which captured expectations about how Milton area residents have experienced the

introduction of a landfill site into their community over time, were generated from the constructs and guided the analysis.

The thesis had three research objectives as follows:

1. To document changes in psychosocial effects in Milton area residents between 1990 and 1995;
2. To explore the processes of reappraisal and coping among Milton area residents;
3. To evaluate the appropriateness and usefulness of the Lazarus and Folkman (1984) framework in the context of a population living proximate to a solid waste facility.

These objectives were addressed through repeated administrations of a survey instrument comprised of a combination of pre-validated scales and open- and closed-end items. Taken together, the responses collected provide an understanding, albeit incomplete, of this community's experience with the introduction of a landfill site. This understanding is necessarily incomplete because it is limited by all of the typical shortcomings of social survey research (Babbie, 1992). Based on the information captured by the data, it is possible to come to some conclusions about the Milton area residents' experiences. For the most part, the nature of that experience is what one would expect given the literature reviewed in Chapter 3. A detailed review of the main findings as they relate to the theoretically informed expectations follows.

This chapter will review the psychosocial effects that remained consistent and those that changed over time. This is followed by an examination of the determinants of change in psychosocial effects according to the general conceptual model of Taylor et al., (1994).

Recall that these determinants could be broadly classified as factors related to the stressor, individual, social network and community. This chapter will conclude with a discussion of the implications of the study for theory (i.e., the Lazarus and Folkman (1984) model), for practice (i.e, siting, design and operation of landfills) and, for future research in this field.

6.2 Changes in Psychosocial Effects at Milton

One of the unique features of this research is that it was designed to allow for a consideration of *changes* in levels of psychosocial effects in “exposed” individuals. This responds to the need to go beyond cross sectional case studies which typify research into low level non-hazardous exposure settings such as landfills, to an explicit focus on change over time. Most importantly, this longitudinal design provides an opportunity to examine the ongoing processes of reappraisal and coping as these individuals experience the introduction of a landfill into their neighbourhood. The results presented in Chapter 5 portray a community that has changed from one actively opposing plans to locate a landfill in its midst to one that has, for the most part, accepted the presence of the new facility. This shift is evidenced by a decline in some measures of psychosocial effects (perceptions of the landfill site, concerns about the landfill and actions) and consistency in others (psychological distress and neighbourhood satisfaction).

6.2.1 Psychosocial Effects That Did Not Change

There were two constructs that showed no change over the study period: psychological distress and neighbourhood satisfaction. Psychological distress is comprised of the general measures of psychiatric and emotional distress (GHQ-20) and somatically manifested psychosocial effects (SCL-90). The analysis of this construct was designed to provide a general indication of changes in levels of psychological distress in individuals in the study population attributable to all of the stresses in their daily lives including the introduction of the landfill site. In the baseline survey at Milton conducted in 1990, no profound effects of the landfill on emotional distress or reporting of somatic complaints were detected. Two additional administrations of these scales reinforce the baseline findings that there were no profound effects of the landfill on psychological distress and, based on these measures, the study population continues to exhibit normal levels of emotional distress and somatic complaints.

The results for the psychological distress construct are consistent with expectations based on the literature as the low levels of distress reported at the conclusion of the landfill siting process in 1990 persisted through the construction and early operation of the site to 1995. If the introduction of a landfill site is an event capable of elevating rates of emotional distress or the reporting of somatic symptoms in nearby residents, the most likely time to detect the elevated rates in the current research would be in 1990 at the start of the study period. This is based on the concept of anticipatory anxiety (Edelstein, 1988; Collins and de Carvalho, 1993) which was evident in the Milton study population both in the parallel case study at baseline and in the longitudinal study. In the parallel case study, rates for site-specific

outcomes (e.g., concern) were highest in Milton as compared to the two other operating waste facilities, SWARU and Glanbrook. In this longitudinal study at Milton, a decline in site-specific outcomes was revealed from 1990 to 1995. Given that these measures of psychological distress did not detect profound effects in Milton area respondents when anticipatory anxiety about possible negative impacts of the landfill site was highest, it was unlikely that the construction and early operation of the facility would change this.

Reservations about the sensitivity and thus the appropriateness of standardized measures of psychological distress such as the GHQ-20 and SCL-90 in situations of exposure to low-level, non-hazardous environmental stressors such as landfills must be taken into consideration. The lack of profound effects on emotional distress or somatic symptom reporting could be interpreted as an indication that the introduction of the landfill site indeed had no effect on psychological distress in this study population. In a population exposed to a radiation leak at Three Mile Island, the SCL-90, for example, was able to detect elevated somatic sub-scale scores (Baum et al., 1983). However, it is possible that these standardized measures are not sufficiently sensitive to detect the subtle types of impacts a stressor such as a landfill could have on those experiencing it. As suggested in Chapter 5, this points the way for the consideration of alternative measures and the development of new measures more sensitive to subtle effects of non-hazardous exposures. Regardless, it seems clear that the impacts of the introduction of a landfill site on this population at Milton are not those of general and profound psychological distress but rather of low-level, subtle effects focussed directly on the landfill itself.

The final construct is neighbourhood satisfaction which was designed to contextualize the processes of reappraisal and coping with the landfill site within day-to-day life in Milton. Indicators from the survey instrument inquired about respondents' likes and dislikes of the area and its people, ratings of satisfaction, and things that they would change about their community. Based on the findings of other neighbourhood research which show that positive attitudes held by residents toward their neighbourhood are very resistant to change, it was predicted that residents of the desirable Milton area would maintain their high levels of neighbourhood satisfaction despite the introduction of a landfill site.

In fact, the large majority of Milton area residents describe themselves as very satisfied with their neighbourhood throughout the study period. Perhaps more importantly, the effect of the landfill on local area satisfaction decreased over time, indicating that the landfill is posing less of a threat to satisfaction than once was the case. It seems, therefore, that the negative features of the landfill site, whether anticipated or experienced, have not been sufficiently profound to have a lasting impact on their overall satisfaction with Milton as a place to live.

The two findings of no profound measurable psychological distress on individuals and no negative impact overall on their neighbourhood satisfaction provide important parameters on the range of possible impacts the location of the landfill in this community have generated. The impacts which have been identified (concern, health concern and actions), therefore, must be considered in the context of the lack of both profound individual psychological impacts and the continued high levels of satisfaction with the neighbourhood. It makes sense that levels and changes in the impacts of the introduction of the landfill site on the Milton area

population over time are both subtle and related directly to the specific nature and features of the landfill facility itself.

6.2.2 Psychosocial Effects That Changed

Of the five constructs, change was noted in three: perceptions of the landfill site, concerns about the landfill site and actions. Perception of the landfill site included items addressing positive aspects of the landfill site and a retrospective assessment of reasons for changes in opinions about the site. Recall that this was the one construct which included items directly related to reappraisal, as respondents were able to comment on factors which they felt most strongly influenced their changed perceptions. Overall, negative perceptions of the landfill site decreased between 1990 and 1995. This is evidenced by the fact that there were fewer negative opinions expressed about the landfill in 1995 and, more importantly, that nearly one-third indicated that they felt better about the site in 1995 than they did at the initial contact. Furthermore, in 1995, many respondents spoke about the benefits of having the multi-use site located conveniently in their community. The overall decline in negative perception was generally attributed to favourable evaluation of the design and operation of the facility.

Once it has been established that no profound psychological distress was attributable to the landfill, and that initial negative perceptions of the landfill site are based primarily on anticipated undesirable externalities typically attributed to dumps, changes in the type and level of concerns take on increased importance. For if we hope to understand how residents came to reappraise the landfill more favourably over time, we need to be able to get at exactly

what their opinions, perceptions and appraisals are based on. In the context of the current research, the concern construct appears to be the principal avenue to gain such understanding as the items that comprise it best allow residents to express exactly what worries them.

There was a significant decline in the level of site-specific concern over the study period. This was accompanied by a significant decrease in the intensity of those concerns which remained. Concerns directly related to the effect of the landfill site specifically on the health of respondents and their families also declined. As for types of concerns expressed, these changed from those of an anticipatory nature (e.g., traffic, pests and smell) to those related to the operation of the facility (e.g., tipping fee, unauthorized dumping of garbage). Factors such as vulnerability, levels of social support and community involvement did not help to distinguish between groups of individuals identified by their consistent or changing levels of concern. With regard to socio-demographic characteristics, those not concerned at either time were less highly educated and members of fewer community groups.

Questions in the survey addressed a broad range of site-related actions taken in response to the introduction of the landfill site including contacting politicians about concerns, belonging to a local citizens' group and moving from the area. Lazarus and Folkman (1984) suggest that problem-focussed coping is more probable when the environmental situation is appraised as responsive to change. Conversely, these authors propose that emotion-focussed coping is more likely to occur when the situation is appraised (or reappraised) as one in which nothing can be done to modify the environment. Although no questions related directly to forms of emotion-focussed coping were posed in the current research, an anticipated decline

in problem-focussed coping once the decision to locate the landfill in Milton was finalized, could reasonably suggest a switch to the more passive emotion-focussed coping strategy.

There was a statistically significant decline in the frequency of site-related action reported by respondents over the five-year study period. Recall, however, that there was a problem with the wording of these items as respondents were asked if they had *ever* taken actions related to the landfill. But for the category of site-related action where the wording was not an issue - moving - respondents were asked if they had *in the past two years* considered moving from the area and a decline was also revealed. This evidence seems to support the hypothesized switch from problem-focussed coping when the landfill siting decision could still be stopped to more passive forms of emotion-focussed coping when nothing could be done to stop the landfill. The most dramatic action which can be taken in response to the landfill is to move out of the community. The results of telephone interviews with in- and out- movers combined with the survey data confirm that the landfill has had very little effect on considering moving or actual decisions to move to or from the area. Real estate transaction data, furthermore, showed that the landfill had little or no impact on the housing market.

In order to draw some conclusions about why these changes in psychosocial effects occurred, it is necessary to consider the nature of changes that have taken place in the study area and among the study population. It is to the likely determinants of changes in psychosocial effects that this chapter now turns.

6.3 Determinants of Change

The organizing framework of Taylor et al., (1994) conceptualizes that psychosocial effects can be mediated by four sets of factors: characteristics of the stressor, the individual, the social network and the wider community. The conceptual framework provides an effective way to determine the most important influences on the change that was observed. The findings of this study are instructive in terms of these characteristics on changes in effects in the relatively short period between the decision to site the landfill and the first two years of full operation. These sets of mediating factors are, of course, all operating simultaneously and it is therefore impossible to attribute what has happened in Milton residents over time to one set of factors. Despite this positive outcome, the emotional and confrontational nature of the environmental assessment process did put the community through a difficult experience that it will not soon forget.

The most obvious change occurring during the study period was in the nature of the landfill site itself. Therefore, changes in the characteristics of the environmental stressor emerge as the most important factor in the interpretation of the observed changes in perceptions of the landfill site, concerns about the landfill site and actions. The change to fewer negative perceptions was expected given the findings of Collins and de Carvalho (1993), Sandman (1993) and Edelman (1988) about anticipatory stress and the tendency to overestimate risk in the emotional time before siting. At the time of the baseline survey, the Halton Regional Landfill Site existed only on paper - the sod had not yet been turned. Perceptions expressed by respondents were based on expectations of what the landfill site was going to be like. These perceptions were influenced in large part by images of old 'dumps'

and their accompanying negative externalities. By 1995, the time of the final round of data collection, a 400 acre, state-of-the-art, multi-use waste disposal complex buffered by extensive landscaping, was a feature of the landscape. Respondents' perceptions in 1995 were no longer based on anticipated impacts but rather on their reactions to the actual landfill facility.

As described by Lazarus and Folkman (1984), the process of reappraisal can result in a threat being reassessed more favourably. Since respondents were reacting to a very different environmental stressor at baseline and follow-up, and given that the actual landfill facility was constructed to eliminate and control for most of the common bothersome externalities typically associated with landfills, as expected, their negative perceptions decreased.

The finding of the decrease in the levels of concern is also consistent with the process of reappraisal as conceptualized by Lazarus and Folkman (1984) who explain that the feedback of new information from the environment results in a changed appraisal of the stressor. The change in the nature of the stressor from a proposal to an operating facility resulted in a decline in reported levels of concern about the landfill as was expected. This change also resulted in the expected shift in the types of concerns expressed, from those based on inappropriate images of old landfills to those related more to the actual operation of the facility.

What was not expected was that the level of health concern would also decline. It was anticipated that the level of health-related concern would persist given that potential threats to health are treated very seriously and that insufficient time would have elapsed to assess

possible latent health effects. One could surmise that because the anticipated nuisance externalities did not occur, the link between the landfill site and ill-health is not obvious. Should residents living proximate to the facility experience either a noticeable increase in things such as litter, pests or poor water quality or a cluster of illnesses of unknown origin but plausibly connected to the landfill, concerns are likely to quickly re-emerge.

The above discussion reveals the salience of changes in the characteristics of the stressor as a key determinant of changes in psychosocial effects. Add to this the decline in site-related actions reported as the stressor changed from something that could be stopped to an inevitability, and the significance this set of determinants from the conceptual framework is substantiated. This should not, however, completely overshadow the relevance of the remaining three sets of factors as determinants of psychosocial effects given the inherent interrelatedness of the determinants.

The remaining sets of mediating factors which have been suggested to influence the experience of psychosocial effects involve characteristics of the individual, the social network and the wider community. These remaining factors are necessarily secondary given that the study was designed around the changes in the stressor itself (i.e., data were collected at the three key points in the landfill site's history.) It is extremely unlikely that the characteristics of these individuals, their social networks and their community could undergo such a radical transformation as a change from a greenfield to an operating multi-use landfill facility. In fact, as described in the community profile (Chapter 2) and sample characteristics (Chapter 4), individual, social network and community characteristics were essentially unchanged between 1990 and 1995.

One of the hypotheses from Chapter 5 (hypothesis 6) focused directly on these other three sets of determinants. The results did not support an expectation that characteristics of certain groups of individuals within the study population would be related to changes in levels of concern about the landfill. There were all types individuals among the group of 51 who remained concerned throughout the study period and so the hypothesized differences did not emerge. For example, it was predicted that respondents who could be classified as more vulnerable by virtue of having small children or strong ties to the area would be over represented in that group. This was not the case. It must be remembered, however, that there were only 108 respondents in the longitudinal study and the power to detect differences with this sample size is questionable particularly given the homogeneity of the community. The small sample size also likely creates limitations with respect to social support and levels community involvement as mediators of stressful life events. Based on the results of this research it is not prudent to discard ideas about vulnerability, social support and community involvement as important mediators of the stress-response relationship. A study designed to specifically address how individuals with these different characteristics experience an environmental stressor over time would have to sample these groups strategically in order to ensure their adequate representation in the study.

Characteristics of the community as determinants of psychosocial effects must be considered in historical context. Although there were no major political or socio-economic changes affecting the wider community during the five-year study period, the community profile in Chapter 2 portrays Milton as a community which had undergone considerable and dramatic change in the 20 years prior to the study period as it experienced the lengthy but

unsuccessful battle to stop the landfill. The profile of Milton revealed a community which enjoys a high standard of living and excellent quality of life, located in an area that has been undergoing a rapid transformation from small-town to suburban Ontario. Worried about threats to their cherished small-town quality of life, Milton residents became increasingly politicized and mobilized. The direct involvement of these residents in the emotional and confrontational environmental assessment process resulted in the imposition of a comprehensive set of conditions of approval for the new landfill site by the Joint Board. The terms and conditions required by the Joint Board effectively put some power in the hands of the community and to this extent one might argue that political, and hence community level, factors were decidedly important even though the community characteristics *per se* were essentially unchanged. In this way, community residents were able to positively influence changes in the nature of the stressor - the landfill site that was eventually constructed conformed to the highest standards and eliminated many of their anticipated sources of concern.

6.4 Implications of the Study

6.4.1 For Theory

The third objective of this thesis was to evaluate the utility of the Lazarus and Folkman (1984) model for use in environmental research contexts. This section will address this research objective by reviewing the decision to employ the Lazarus and Folkman model and assessing the strengths and weaknesses of the model in the context of the study at Milton.

As detailed in Chapter 3, the decision to use Lazarus and Folkman's 1984 transactional model of stress and coping as the principal theoretical referent for the longitudinal research at Milton was based on reviews which revealed it to be the most widely applied and the most useful psychological model of response to environmental stress. The stress and coping theory of Lazarus and Folkman is inherently longitudinal as it is based on examining the continuing process of appraisal, reappraisal and coping. As such, the longitudinal research design of this thesis provides a unique opportunity to evaluate the utility of the framework in an appropriate research setting. It must be remembered, however, that Milton became the setting for further rounds of data collection only after the baseline parallel case study and therefore the present study was not a longitudinal design from its inception. Despite this, we have survey data collected at three different points in time from the same individuals which makes possible the assessment of changes in levels of psychosocial stress, reappraisal and coping. These features make this study the first longitudinal application of Lazarus and Folkman's model from social psychology in a non-hazardous environmental setting and as such, represents a true test of the framework in this research context.

The litmus test for a theoretical model is how well it allows one to address a particular research question. In the current research, the research question of interest was how have Milton area residents experienced the introduction of a landfill site into their community. The model facilitates a reasonable exploration of this experience in several ways. The model allows one to isolate several distinct stages in what is a very complex process occurring in this community. It does so by providing a useful set of well-defined concepts (appraisal, reappraisal, emotion- and problem-focussed coping) which capture these distinct phases in

the community's experience. It is imperative when trying to understand change over time to have the ability to pin-point specific facets of the experience for analytic purposes and the conceptualization put forward by Lazarus and Folkman makes this possible. Once the environmental stress concept is unpacked and the underlying process is revealed, a number of additional strengths of the model in the context of this research at Milton can be identified.

The feature of the Lazarus and Folkman model which allows for the identification of distinct concepts and stages as residents experience the introduction of the landfill, made an important contribution to research design. In addition to underscoring the need for a longitudinal assessment, the stages in the model provide the basis for generating hypotheses. The eight hypotheses were essentially theoretically-informed 'hunches' about what was going to happen to individuals in this community over the study period. The analytical approach in this work was strengthened by the testing of these informed hypotheses and the Lazarus and Folkman model was, therefore, instrumental in allowing for a more rigorous and deductive approach to the investigation of the experience at Milton.

Another strength of the model relates to its conceptualization of the process of (re)appraisal and coping as an iterative one. Feedback is an integral part of Lazarus and Folkman's model, as individuals continually re-evaluate the stressor, their available resources to cope with it and potential strategies to deal with it in response to changes in the characteristics, conditions and context of the stressor or in the individual's coping abilities. Through the feedback of this new information from the environment or the individual's own reactions, the complex two-way transactions between the person and the environment is a process of changing emotions and appraisals as, for example, threat can be reappraised as

unwarranted or conversely, a benign appraisal may turn into one of threat. Recognition of this process of continual re-evaluation in the Milton context, helps to understand how the landfill could change over a short period of time from a stressor which was perceived as threatening to one which no longer evokes such a response. The Lazarus and Folkman model also leaves open the possibility that further re-evaluation of changes in the environment or the individual could, in future, result in the landfill being perceived as a threat once again.

The model's treatment of coping is particularly useful and has been generally supported by the research presented here. As Lazarus (1993) points out, coping must be viewed as a process which changes over time and in accordance with the situational contexts in which it occurs. The switch between problem-focused coping when the stressful situation is amenable to change to emotion-focused coping once the situation can no longer be modified is one of the few instances where Lazarus and Folkman predict an outcome based on given circumstances.

Another way the model proved useful for the current research relates to its flexibility in terms of allowing for the introduction of other relevant theoretical concepts. The model is not presented as a closed system which claims to capture every nuance of the stress-response relationship. For example, in the Milton case it was desirable to include concepts such as anticipatory anxiety (Edelstein, 1988; Collins and de Carvalho, 1993), outrage (Sandman, 1992) and to include the Taylor et al., (1994) conceptual framework which describes four sets of factors (characteristics of the environmental stressor, the individual, the social network, the wider community system) which mediate the exposure-response relationship.

The incorporation of these additional concepts into the Lazarus and Folkman model greatly enhanced its ability to achieve a better understanding of Milton area residents.

The flexibility of the model could also be viewed as a weakness. It would be preferable to have a theory that is comprehensive enough to take on board all of the components of the experience of the people at Milton. Further, the Lazarus and Folkman model does not explain how certain types of individuals when confronted with certain types of stressors will react. In essence, then, other than predicting a change in coping strategy as described above, it does not offer expected outcomes of the stress-response relationship. It is so general that it is applicable in the Milton case where the environmental stressor became less threatening over the study period but would be equally valid in a situation where a benign stressor became more of a threat. The model does not discriminate between different types of stressors nor different types of reactions by exposed individuals. In fact, it must be remembered that Lazarus and Folkman's model is a psychological one and does not encompass the complex social processes embedded in the context of any community study.

To conclude, the Lazarus and Folkman (1984) model proved to be a useful guiding framework for the longitudinal research on community response to an environmental stressor in Milton. It was a suitable and appropriate analytic tool which was successfully tailored to address the research objectives in this thesis. The application of the Lazarus and Folkman model in this instance has implications both for public policy and for future research directions. These issues will be addressed below.

6.4.2 For Practice

This thesis made several substantive contributions which have practical application for the siting, design and operation of municipal landfills. The findings reveal that, over time, most Milton area residents have adapted to the location of a landfill site in their community. No profound psychological distress was detected in individuals living proximate to the landfill at any time during the study period. Negative perceptions of the landfill decreased over time as did concerns about its potential impacts. Residents appeared to switch from problem-focused to emotion-focused coping as the landfill became a reality. High levels of satisfaction with the Milton neighbourhood as an excellent place to live were not adversely affected by the addition of this landfill site.

These findings imply an ongoing process of reappraisal whereby negative perceptions and concerns expressed by residents at the beginning of the study period, largely based on images of antiquated landfills, decreased as they came to realize that their landfill was different. Outrage turned into resignation. It is not surprising that negative perceptions and levels of concern would be highest when ambiguity, uncertainty and perceived loss of control are highest. The timing of the initial survey in 1990 coincided with the unsuccessful termination of a 20 year battle to stop the siting of the landfill in Milton. Given the length of the siting process, it is likely that reappraisal for many residents was ongoing for a considerable period of time prior to the baseline survey. Over time, as residents resigned themselves to the loss of the battle and they began to live with a state-of-the-art facility, uncertainty and ambiguity are reduced and a sense of perceived control may be restored for

most residents. In the context of their lives as a whole, the landfill remains a source of annoyance for some, but is no longer perceived as the threat it once was.

These findings are supported by ongoing qualitative research (Sly, 1997). This research involves a parallel comparison between a “sensitized” community (Milton) and an “unsensitized” community in the same general area (Georgetown) which to date has not revealed any clearly predictable differences in the residents’ perceptions and meanings of risk. Of more relevance to this thesis are the depth interviews conducted with 13 of the original Milton 1990 respondents. This longitudinal comparison, on the other hand, yielded results confirming that changes had taken place in the respondents’ view of the landfill site and of the hazards that they associate with it. According to Sly (1997), the 1990 responses about the landfill are negative and predictable, probably arising from the longstanding and bitter battle against the facility’s siting. In 1996, however, respondents admit that the site is not as bad as they had feared, and in several instances the comments include what must be considered something approaching “pride” in this landfill because it is so much better than landfills in other areas.

The findings presented here would suggest that acceptance of a landfill can be achieved much more easily when residents’ concerns are directly reflected in the design and operation of the facility. This can be achieved, it would seem, without a lengthy, costly and confrontational hearing process. This research demonstrates that residents have no difficulty identifying and explaining the aspects of the proposed facility they were concerned about outside of the highly charged atmosphere of the hearing room. These concerns about the design and operation could be dealt with proactively rather than in response to conditions

imposed by the Joint Board. With the ubiquitous concerns of landfills addressed in the engineering of the facility (e.g., control for litter, odour, pests, leachate) the public hearing process could focus more directly on the location decision. Future landfill siting decisions should automatically take into account the fact that technology is available to alleviate many of the pervasive problems associated with older landfills. A shortened, more focussed hearing process could result in a reduction of the uncertainty and ambiguity that generates outrage and anger and, in turn, influences risk perception.

6.4.3 For Future Research

Arising from the consideration of implications of this research for theory, several avenues for further research become apparent. A more explicit focus on coping (Lazarus and Folkman, 1984; Bachrach and Zautra, 1985) is warranted. Studies should be designed to examine various forms of both problem- and emotion-focussed coping and the determinants associated with a switch from one type to the other. Further, studies of populations undergoing exposure experiences similar to that at Milton should be designed to be longitudinal from their conception, rather than repeated administrations of an instrument designed for cross-sectional application. As well, the addition of several retrospective items to the 1995 survey at Milton demonstrates the value of questions designed to elicit responses about experiences over time. Finally, the apparent inappropriateness of the pre-validated, standardized measures of psychological distress (GHQ-20 and SCL-90) in situations of exposure to non-hazardous environmental sites such as municipal landfills points to the need for the consideration and development of alternate measures.

It appears that the siting process itself is perhaps the most important component of a community's experience of the introduction of a noxious facility such as a landfill site and, as such, warrants more research attention. Others are beginning to take a keen interest in this area (e.g., Baxter, 1997; Elliott, 1997). This study was unable to get a firm handle on the various determinants of psychosocial effects of waste facilities other than changes in the nature of the stressor. More research involving larger sample sizes and more communities is necessary to determine the influence of individual, social network and community factors as mediators of the stress-response relationship.

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APPENDIX A: THE SURVEY INSTRUMENT

FINAL QUESTIONNAIRE FOR PHASE III OF THE SURVEY

JUNE 1995

Do you still live on ...? [address verification]

SECTION A - ATTITUDES TOWARD THE AREA WHERE YOU LIVE

(a1) I'd like to begin by asking you about the things you like about the area where you live. First, what is the most important thing you LIKE about the area where you live?

- mention
- no mention
- mentions site
- don't know
- refused

And what is the second most important thing you LIKE about the area where you live?

- mention
- no mention
- mentions site
- don't know
- refused

What is the third most important thing you LIKE?

- mention
- no mention
- mentions site
- don't know
- refused

(a2) Now I'd like to ask you about the things you DON'T LIKE about the area where you live. First, what is the most important thing you DON'T LIKE about the area where you live?

- mention
- no mention
- mentions site
- don't know
- refused

And what is the second most important thing you DON'T LIKE about the area where you live?

- mention
- no mention
- mentions site
- don't know
- refused

What is the third most important thing you DON'T LIKE?

- mention
- no mention
- mentions site
- don't know
- refused

(a3) In general, how satisfied are you with your area as a place to live?

- very satisfied
- somewhat satisfied
- not too satisfied
- not at all satisfied
- don't know
- refused

(a4) If you could change just one thing about this area, what would it be?

- mention
- no mention
- don't know
- refused

(a5) If you were to move from your present address, would you stay in this area?

- yes
- no
- don't know
- refused

If 'no', why not?

- mention

- no mention
- don't know
- refused

(a6) Would you tell me if you've been involved in any of these local activities in the last two or three years?

(a6a) ... attended meetings of the city council or school board?

- yes
- no
- don't know
- refused

(a6b) ... signed a petition for or against a local issue?

- yes
- no
- don't know
- refused

(a6c) ... worked with others or joined an organization in your community to do something about some community problem?

- yes
- no
- don't know
- refused

(a6d) ... spoken to or written to an official about some local issue?

- yes
- no
- don't know
- refused

(a7) How often do you talk with your neighbours?

- never
- seldom (once a year)
- sometimes (1 or 2 times a month)
- often (1 or 2 times a week)

- very often (daily)
- don't know neighbours
- don't know how often
- refused

(a8) How often do you help any neighbour or ask for help from any neighbour for such things as borrowing tools or food, watching each other's houses while away, or helping each other in home repairs, etc.?

- never
- seldom (once a year)
- sometimes (1 or 2 times a month)
- often (1 or 2 times a week)
- very often (daily)
- don't know
- refused

(a9) Are you helping neighbours or being helped by neighbours MORE or LESS frequently or ABOUT THE SAME as you were a few years ago?

- MORE than a few years ago
- LESS than a few years ago
- ABOUT THE SAME as a few years ago
- don't know
- refused

(a10) In general, how would you describe the people in your area? Would you say they are:

- very friendly
- friendly
- unfriendly
- very unfriendly
- don't know
- refused

SECTION B - SOCIAL AND COMMUNITY NETWORKS

(b1) How many relatives do you feel close to, NOT COUNTING the people you live with?

- no relatives

- __ # of relatives
- don't know
- refused

(b2) Not counting the people you live with or your relatives, how many close friends do you have? (By close friends, we mean for example, people whose homes you visit, people that you feel at ease with, can talk to about private matters and can call upon for help).

- no close friends
- __ # of close friends
- don't know
- refused

(b3) How satisfied are you with your social activities?

- very satisfied
- somewhat satisfied
- not too satisfied
- not at all satisfied
- don't know
- refused

(b4) Do you belong to any of the following groups?

- social or recreational group
- labour union, commercial group or professional organization
- church or religious group
- group concerned with children such as boy scouts/girl guides or home and school association
- group concerned with community service, charity or neighbourhood improvement
- group concerned with the environment
- any others (specify) _____

(b5) How involved have you been in local community events?

- very involved
- somewhat involved
- not too involved
- not at all involved
- don't know
- refused

(b6) Is there someone in your family or a close friend that you can confide in or talk to freely about your problems?

- yes
- no
- don't know
- refused

(b7) Is there someone among your friends or in your family who can help you if you need it?

- yes
- no
- don't know
- refused

SECTION C - GENERAL HEALTH STATUS

To help us understand the quality of life in a community, we like to find out how people have been feeling lately and to ask about their health in general.

(c1) Compared to other people your age, would you say that your health is...

- excellent
- very good
- good
- fair
- poor
- don't know
- refused

(c2) How satisfied are you with your health in general? Would you say you are...

- very satisfied
- somewhat satisfied
- not too satisfied
- not at all satisfied
- don't know
- refused

SECTION D - GENERAL HEALTH QUESTIONNAIRE

Now I'd like to know how you've been feeling over the past **two** weeks.

(d1) First, over the past **two** weeks, have you:

... lost much sleep over worry?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say **MORE THAN USUAL** or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d2) ... felt constantly under stress?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say **MORE THAN USUAL** or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d3) ... felt that you couldn't overcome your difficulties?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say **MORE THAN USUAL** or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d4) ... been feeling unhappy and depressed?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say MORE THAN USUAL or THE SAME AS USUAL for you?

- more than usual
- same as usual
- don't know
- refused

(d5) ... been losing confidence in yourself?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say MORE THAN USUAL or THE SAME AS USUAL for you?

- more than usual
- same as usual
- don't know
- refused

(d6) ... been thinking of yourself as a worthless person?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say MORE THAN USUAL or THE SAME AS USUAL for you?

- more than usual

- same as usual
- don't know
- refused

(d7) ... been taking things hard?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say MORE THAN USUAL or THE SAME AS USUAL for you?

- more than usual
- same as usual
- don't know
- refused

(d8) ... found everything getting on top of you?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say MORE THAN USUAL or THE SAME AS USUAL for you?

- more than usual
- same as usual
- don't know
- refused

(d9) ... been feeling nervous and tense all the time?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say MORE THAN USUAL or THE SAME AS USUAL for you?

- more than usual

- same as usual
- don't know
- refused

(d10) ... found that at times you couldn't do anything because your nerves were too bad?

- yes
- no
- don't know
- refused

[IF YES] ... Would you say **MORE THAN USUAL** or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

Over the past **two** weeks, have you:

(d11) ... felt that you are playing a useful part in things?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d12) ... felt capable of making decisions about things?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d13) been able to enjoy your normal day-to-day activities?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d14) ... been able to face up to your problems?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d15) ... been feeling reasonably happy, all things considered?

- yes
- no
- don't know

- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d16) ... been managing to keep yourself busy and occupied?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d17) ... been getting out of the house as much as usual?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d18) ... been satisfied with the way you've carried out your tasks?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d19) ... been able to concentrate on whatever you're doing?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

(d20) ... felt on the whole you were doing things well?

- yes
- no
- don't know
- refused

[IF NO] ... Would you say that you've been feeling this way **MORE THAN USUAL** for you, or **THE SAME AS USUAL** for you?

- more than usual
- same as usual
- don't know
- refused

SECTION E - SOMATIC COMPLAINTS

Now I'm going to list some general health problems. For each, please tell me if it has bothered you over the past **two weeks**.

(e1) First, have you been bothered by headaches in the past two weeks?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e2) ... faintness or dizziness?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e3) ... pains in the heart or chest?

- yes

- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e4) pains in the lower back?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e5) ... nausea or upset stomach?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately

- quite a bit
- extremely bothered
- don't know
- refused

(e6) ... soreness of your muscles?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e7) trouble getting your breath?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e8) ... hot or cold spells?

- yes
- no/not at all bothered

- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e9) ... numbness or tingling in parts of your body?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Has it bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e10) ... a lump in your throat?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Has it bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately

- quite a bit
- extremely bothered
- don't know
- refused

(e11) ... weakness in parts of your body?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Has it bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e12) ... heavy feelings in your arms or legs?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e13) ... rashes or other skin conditions?

- yes
- no/not at all bothered

- don't know
- refused

[IF YES] ... Have they bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e14) ... poor appetite?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Has it bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

(e15) ... fatigue or tiredness?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Has it bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit

- extremely bothered
- don't know
- refused

(e16) ... trouble getting up in the morning, even if you've had enough sleep?

- yes
- no/not at all bothered
- don't know
- refused

[IF YES] ... Has it bothered you a little bit, moderately, quite a bit, or have you been extremely bothered?

- a little bit
- moderately
- quite a bit
- extremely bothered
- don't know
- refused

SECTION G - IMPORTANT LIFE EVENTS

Sometimes major events in our life can affect our quality of life, so I'd like to ask you about some of the important things that have happened to you in the past twelve months.

(g1) First, over the past twelve months, did you lose your job?

- yes
- no
- don't know
- refused

(g2) Were you divorced or separated from your spouse (or partner)?

- yes
- no - includes not married
- don't know
- refused

(g3) Did you have a serious illness?

- yes
- no
- don't know
- refused

(g4) Did your husband, wife or partner die?

- yes
- no - includes not married
- don't know
- refused

(g5) Did anyone else very close to you die?

- yes
- no
- don't know
- refused

(g6) Is there anyone close to you who you have been worried about, for any reason, over the past twelve months?

- yes
- no
- don't know
- refused

SECTION H - AWARENESS, CONCERN, ACTIONS

Now I'd like to ask you a little bit more about the area you live in.

(h1) When we talked about things you like and don't like about your area, one of the things you mentioned was HALTON REGIONAL LANDFILL SITE. I'd like to ask you more about that.

OR

(h2) When we talked to some people about the things they like and don't like about your area, one of the things that was mentioned was environmental problems; specifically one of these was HALTON REGIONAL LANDFILL SITE (HRLS). Are you aware of the HRLS?

- yes
- no
- don't know
- refused

(h3) Do you have any concerns about the HRLS?

- yes
- no
- don't know
- refused

(h4a) What is your major concern about the HRLS?

- mention
- no mention
- don't know
- refused

(h4b) Would you say you are **SLIGHTLY** concerned, **MODERATELY** concerned or **EXTREMELY** concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h4c) Do you have any other concerns about the HRLS?

- mention
- no mention
- don't know
- refused

(h4d) Would you say you are **SLIGHTLY** concerned, **MODERATELY** concerned or **EXTREMELY** concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h4e) Do you have any other concerns about the HRLS?

- mention
- no mention
- don't know
- refused

(h4f) Would you say you are SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h5) Do you consider any of the concerns you just mentioned to be HEALTH related?

- yes
- no
- don't know
- refused

(h6) Have any of these concerns you mentioned affected your daily life in any way?

- yes
- no
- don't know
- refused

[IF YES]

(h7) How have these concerns affected your daily life?

(h8) [ASKED ONLY OF THOSE RESPONDENTS UNAWARE OF THE HRLS] Do you have any concerns about environmental problems in your area?

- yes
- no
- don't know
- refused

(h9a) What is your major environmental concern?

- mention
- no mention
- don't know
- refused

(h9b) Would you say you are SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h9c) Do you have any other environmental concerns?

- mention
- no mention
- don't know
- refused

(h9d) Would you say you are SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h9e) Do you have any other environmental concerns?

- mention
- no mention
- don't know
- refused

(h4f) Would you say you are SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned

- moderately concerned
- extremely concerned
- don't know
- refused

(h10) Do you consider any of the concerns you just mentioned to be HEALTH related?

- yes
- no
- don't know
- refused

(h11) Have any of these concerns you mentioned affected your daily life in any way?

- yes
- no
- don't know
- refused

[IF YES]

(h12) How have these concerns affected your daily life?

(h13) I'd like to ask you in a little more detail about whether the HRLS has affected the health of any member of your household.

(h13b) Has the HRLS affected your health or the health of any members of your household?

- yes
- no
- don't know
- refused

(h13c) Would you please tell me whose health has been affected by the HRLS?

(h13d) In what way do you think it has affected [individual's] health?

(h13e) Would you say you were SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned
- moderately concerned

- extremely concerned
- don't know
- refused

(h13f) Has the health of anyone else in your household been affected by the HRLS?

(h13g) Who would that be?

(h13h) In what way do you think it has affected [individual's] health?

(h13i) Would you say you were SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h13j) Has the health of anyone else in your household been affected by the HRLS?

(h13k) Who would that be?

(h13l) In what way do you think it has affected [individual's] health?

(h13m) Would you say you were SLIGHTLY concerned, MODERATELY concerned or EXTREMELY concerned about this?

- slightly concerned
- moderately concerned
- extremely concerned
- don't know
- refused

(h16) Has the HRLS increased, decreased or not changed your satisfaction with this area as a place to live?

- increased
- decreased
- not changed
- don't know
- refused

(h17) Over the past two years, have you considered moving because of the HRLS?

- yes
- no
- don't know
- refused

(h18) Have you taken any steps toward moving such as contacting a real estate agent or putting your house up for sale?

- yes
- no
- don't know
- refused

(h19) If yes, what steps have you taken?

(h20) If you were to move, would you move:

- to another location in this area
- to a location outside this area
- don't know
- refused

(h21) Are there any reasons why it would be difficult for you to move?

- yes
- no
- don't know
- refused

(h22) If 'yes', what are the reasons?

(h24) What was your MAIN source of information about the HRLS?

(Do not read list)

- TV or radio
- Newspapers
- Doctor or other health professional
- Local or community government agency
- Friends or neighbours
- Other, please specify

- Don't know
- Don't remember

(h25) Have you read about the HRLS in the newspaper?

- yes
- no
- don't know
- refused

(h26) Have you read books/reports about these types of facilities and their potential effects?

- yes
- no
- don't know
- refused

(h27) Have you discussed your concerns about the HRLS with friends and neighbours?

- yes
- no
- don't know
- refused

(h28) Have you attended a meeting organized by a local citizens' group at which the HRLS was discussed?

- yes
- no
- don't know
- refused

(h29) Do you belong to a local citizens' group which addresses the HRLS as part of its mandate?

- yes
- no
- don't know
- refused

(h30) Have you telephoned, written or spoken to politicians and/or government staff about your concerns regarding the HRLS?

- yes
- no
- don't know
- refused

(h31) Have you spoken to staff at the HRLS about your concerns?

- yes
- no
- don't know
- refused

(h32) In your opinion, are there positive things about the HRLS?

- yes
- no
- don't know
- refused

(h33) [If 'yes'] What are the positive things?

SECTION I - REAPPRAISAL - NEW ITEMS ADDED IN 1995

(i1) In what year did you first become aware that the HRLS had been approved?

- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- don't know
- refused

(i2) Thinking back to that time, how did you FIRST feel about the site approval?

- mention
- no mention
- don't know

- refused

(i3) Would you say that you feel better or worse about the site NOW, or have your feelings not really changed since that time?

- better
- worse
- not really changed
- don't know
- refused

(i4) What do you think is the MOST important reason that you feel [insert i3] about the site?

- mention
- no mention
- don't know
- refused

(i5) Is there any other reason that you feel [insert i3] about the site?

- mention
- no mention
- don't know
- refused

(i6) Is there any other reason that you feel [insert i3] about the site?

- mention
- no mention
- don't know
- refused

SECTION SD - SOCIO-DEMOGRAPHIC QUESTIONS

Now I'd just like to ask you a few final questions about your background.

(sd1) In what year were you born?

(sd2) What is the highest level of education you have completed?

(sd3) At present, are you married, living with a partner, widowed, divorced, separated, or have you never been married?

(sd4) Are you presently working for pay in a full-time or in a part-time job, are you unemployed, retired, a homemaker, a student, or something else?

(sd5) What is your main occupation?

(sd6) Is your spouse or partner presently working for pay in a full-time or in a part-time job, is s/he unemployed, retired, a homemaker, a student, or something else?

(sd7) What is your spouse's or partner's occupation?

(sd8) Could you please tell me how much income you and other members of your household received in 1994? Be sure to include income from all sources such as savings, pensions, rent, and unemployment insurance as well as wages.

To the nearest thousand dollars, what was your total household income before taxes and other deductions were made?

(sd9) We don't need the exact amount; could you tell me which of these broad categories it falls into . . .

- less than \$20,000
- between \$20,000 and \$29,999
- between \$30,000 and \$39,999
- between \$40,000 and \$49,999
- between

Skipped in 1995:

(sd9a) What language do you usually speak at home?

Skipped in 1995:

(sd9b) To what ethnic or cultural group did you, or your ancestors, belong to on first coming to this continent?

(sd11) How many years have you lived at your current address?

(sd12) How long have you lived in your area?

(sd13) Is your dwelling OWNED or being BOUGHT by you or a member of this household?

(sd14) Is your dwelling part of a condominium or cooperative?

(sd15) Is your dwelling:

- single family detached
- single family attached (e.g., townhouse, semi)
- duplex, triplex or quad. or apartment building < 5 stories
- apartment building, > 5 stories
- other
- don't know
- refused

(sd16) Was this property owned/rented by another member of your family before you moved here?

(sd17) Is your house or property used for any business activity?

(sd18) [If yes] What type of business?

(sd19) [If yes] How long has it been used for a business activity?

(nper) Including yourself, how many people live in your household?

(n1a) In order to get a better picture of your household, we would like to ask you a couple of questions about each person in your household. This information will allow us to compare different types of households.

Starting with the oldest person in your household (remember to include yourself), what is their relationship to you?

(n1b) What is their gender?

(n1c) How old is ...?

THIS CONTINUES FOR UP TO 10 HOUSEHOLD MEMBERS

(sd20) In general, would you say these questions were VERY interesting, SOMEWHAT interesting, or NOT VERY interesting?

(sd21) Can you tell me how many minutes you think it took to complete this questionnaire?

(sd22) Would you like to add anything about this topic that we have not covered?

Skipped in 1995:

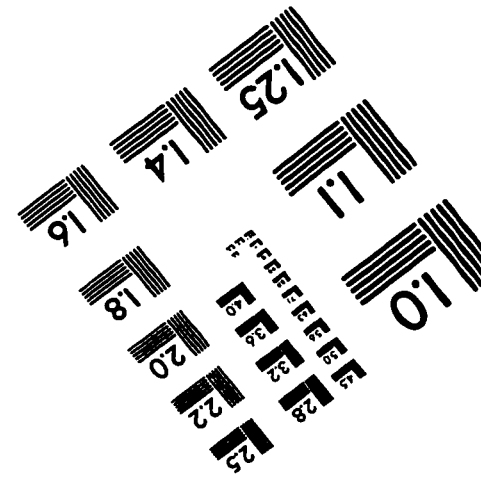
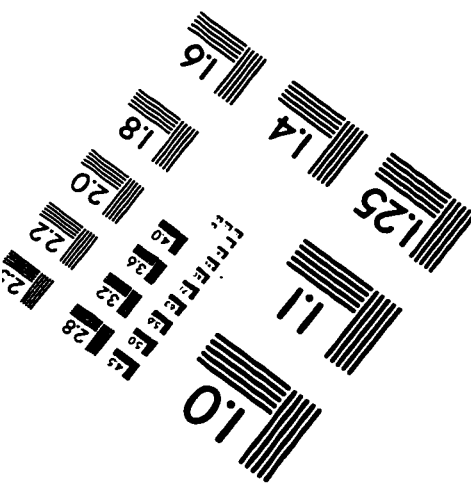
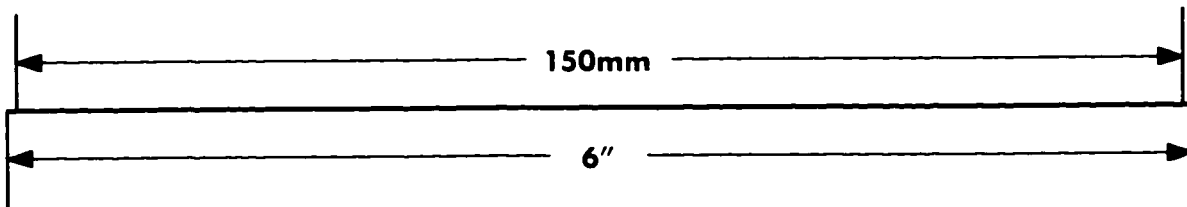
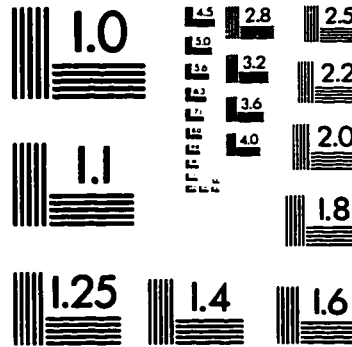
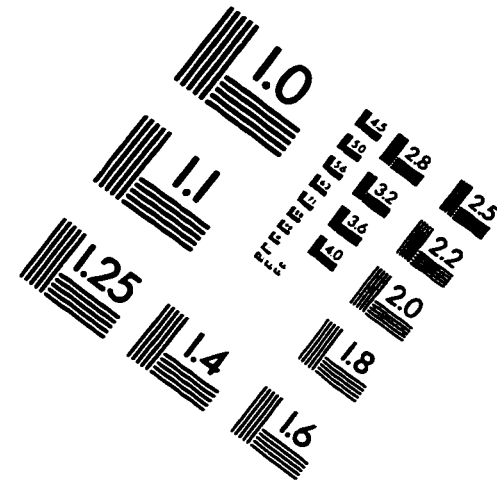
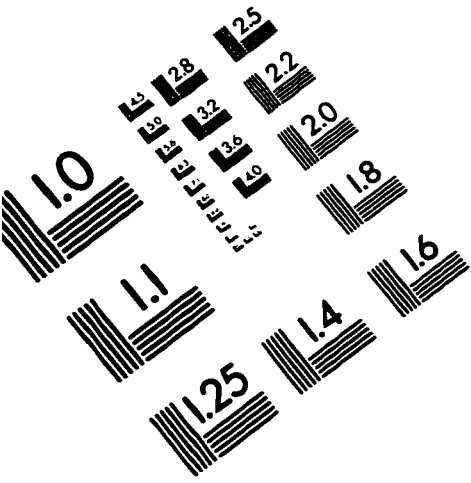
(sd23) A researcher from McMaster University may be contacting you in the future to ask you to participate in a face-to-face interview so you can talk more about the quality of life in your area?

Would you be interested?

- yes
- no
- don't know
- refused

END

IMAGE EVALUATION TEST TARGET (QA-3)



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