

Chapter 9

LEARNING FROM EXPERIENCE

CHAPTER 9

LEARNING FROM EXPERIENCE

This chapter presents a summary of the main findings of the report, and identifies points at which the experience of the Mississauga emergency can provide more generally applicable lessons. Some of the conclusions reached lead to suggestions for improving the organisational response to emergencies. The detailed information obtained from public surveys also provides important data for modelling how the public will respond in an evacuation.

Many of the detailed findings are reported in the preceding chapters and are not given again here. The reader should therefore consult specific chapters of the report for additional conclusions.

9.1. ECONOMIC COSTS

In addition to the personal inconvenience and anxiety caused by the evacuation, it has been possible to identify a more tangible set of costs: the value of the lost opportunities for production and consumption that resulted from the evacuation. Estimates of these costs are summarized in Table 9.1 and further detail is given in Chapter 7.

Consumption losses suffered by households in the evacuation zone were identified by means of an extensive questionnaire survey. It was estimated that the total of such losses due to extra expenditures amounted to about \$16 million. The average household loss was about \$220. As well, many households in the evacuation zone lost income due to missed work. The average lost was \$90. Other households were not subject to this latter burden for there is evidence that many employers, whose businesses were closed down, continued to pay wages and salaries.

Analysis of the effect of the evacuation on the business sector was limited to the impact on businesses within the evacuated area. A measure of the potential loss of production due to the cessation of business activity is the average net value added, produced in Mississauga under normal conditions for a similar period. This was found to be in the neighbourhood of \$50 million, though this estimate must be viewed in the light of the qualifications which are discussed in Chapter 7.

A survey of businesses closed down by the evacuation showed that the burden of the closing varied widely. Roughly one-quarter of the firms sampled reported no effect on profits. Another 50% reported effects on their revenues and costs that imply a potentially significant reduction in profit. The likelihood of a firm's suffering profit reductions was seen

to depend on the length of time closed, and on the operating characteristics of the firms involved.

Table 9.1 Total estimated costs of the Mississauga evacuation

Sector	Source table	\$ million
Household ¹	7.2, 7.3, 7.5, 7.6	16.5
Public ²	7.13, 7.14, 7.15	2.0
Business	7.16	50.2
Total		68.7

¹ *Income losses of \$8 million are excluded. These are included in the business sector costs based on decline in value added.*

² *Direct damages to City of Mississauga buildings are excluded since these are not attributable to the evacuation per se.*

Finally, public institutions were led to expend some funds that would have been saved if the emergency had not occurred. These amount to approximately \$2 million.

It is important to reiterate that much of the cost analysis presented in this study relates specifically to what occurred in Mississauga. If one were to consider the cost of the evacuation to the province as a whole, the story (and the cost estimates) would be different and more complex. Business gains outside Mississauga would be set against business losses within the city. It would also be necessary to add costs borne by friends and relatives of evacuees, and by people in adjacent areas whose work and travel were

disrupted - in short, costs borne by anyone who was in any way burdened by the evacuation. The people who live and work in Mississauga carried the brunt of the costs, but these external effects can also be expected to be considerable.

9.2. SOCIAL IMPACTS

The time at which the derailment occurred, the fact that no one was killed, and the ability of the evacuees to communicate with their families, their temporary hosts, and with the authorities all helped to minimize the social impacts of the accident.

The most significant short term impact was widespread concern, during and immediately after, the emergency. The majority of evacuees were seriously concerned for their own and their family's safety while the risk of chlorine gas was still present. Some people are still concerned about the possibility of similar accidents in the future and almost everyone has become more aware of the risks of the rail transportation of hazardous goods.

During the emergency, concern about the danger, and stress related to the evacuation was most severe for pregnant women and mothers with young children, and for people, such as the sick and handicapped, who needed assistance to evacuate. Thus, family and personal situations were more important factors in degree of concern than were residential locations with respect to the accident. People who lived close to the derailment site were not significantly more concerned than others. In general, women were much more prone to anxiety than were men.

Perception also played an important role in the degree of anxiety felt. For example, some evacuees who felt no concern because they perceived themselves to be far enough away from danger were, in reality, living as close as were other families.

The emergency has sensitised the evacuees to transportation accidents, so that for a time, these are regarded as more important than environmental pollution and nuclear risks. The evacuees' concern about transportation accidents is related to their perceptions that these hazards have relatively high probabilities, they are risks to the public, and they are caused by human error. Compared to the control group, the evacuees' believe that major technological accidents are more likely to occur; that is, the experience of the emergency has increased their perceptions of the probabilities of future risks.

Nearly a quarter of the evacuated households report that they have suffered longer term effects of the emergency. Many of these are health related or concern pets that were lost or died during the evacuation. Other people say that they are more nervous since the accident.

However, not all the social impacts were seen as negative ones. Immediately after the accident, evacuees mentioned the social costs more often than the benefits, but almost one year later costs and benefits were being mentioned with equal frequency. In the short term, people felt that the emergency had been a good learning experience, they had met new and old friends, and they would be compensated (Table 9.2). In the long term, they saw *benefits* in their greater awareness of the risks, their increased confidence in government, and in their keener appreciation of life.

The most common longer term effects of the emergency are similar to the short term impacts: increased nervousness combined with increased awareness of the risks of accidents.

9.3. PROBLEMS AND PROPOSED SOLUTIONS

In many respects, the organisational response to the Mississauga emergency was a model of good emergency planning and the successful implementation of judicial and consensual decisions of the control group. The consequences of the derailment were contained, public confidence was maintained, and the largest peacetime evacuation in North America was concluded without loss of life, and with little injury or property damage.

However, there were some organisational and communication problems, most of which were related to the management of the evacuation, rather than to the control of events at the accident site. Evaluation of these problems can provide a basis for improved emergency planning and response.

9.3.1. Responsibility for technical experts on-site

The derailment also involved propane and chemicals, other than chlorine. In addition to emergency personnel, such as firefighters and police, several teams of technical experts were working at the site. As is recorded in the event reconstruction, these teams tended to work independently and sometimes at cross-purposes. One result was the much publicised "puff" of chlorine on Wednesday, November 14, which was accidentally released when firefighters were wrongly instructed by propane experts to hose around the chlorine car. The chlorine release focussed attention on an aspect of emergency response that is increasingly common in major technological accidents - the need for the Emergency Control

Table 9.2 Short and long-term social costs and benefits reported by evacuees one month and one year after the accident.

	SOCIAL COSTS % evacuees reporting		SOCIAL BENEFITS % evacuees reporting	
SHORT TERM	Inconvenience	28%	None	56%
	None	18	Met people	11
	Concern about losing income	16	Good learning experience	8
	Worry	14	Expected financial compensation	6
	Children missing school	9	Demonstrated good response	5
	Concern about home and people	9	Appreciate life	4
	Frustration	5		
LONG TERM	None	30	None	30
	Permanent effects	12	More aware	12
	More nervous	11	Greater confidence in government	9
			Appreciate life	8
			More prepared for emergencies	2

Note: Some evacuees mentioned more than one cost or benefit.

Group to understand, supervise, and ultimately to take responsibility for, the actions of technical experts.

The chlorine experts (CHLOREP team) sent by Dow Chemical Company of Canada Limited to assist at the site were subsequently strongly criticised for their failure to maintain a work-shift at the chlorine tank car, and third-party suits have been taken out against the company. Their role at the site, however, was not a statutory one and such recriminatory action could make other organisations and individuals unwilling to provide expertise on emergencies.

One possible solution is that the Emergency Control Group take responsibility for providing technical experts (from whatever sector) on-site and for integrating their work with that of emergency personnel; and that as long as the technical experts are acting according to accepted standards of professional practice, they (and their organisation) are protected from being held liable for damages caused by their involvement in the emergency response.

9.3.2. Co-ordination of social services

In addition to Peel Regional Social Services, many volunteer organisations and community groups were involved in meeting the needs of evacuees, such as food, shelter and nursing. This large network of agencies set up and ran 31 Evacuation Centres through which some 14,000 people passed, as well as serving the needs of other evacuees, including the sick and handicapped.

However, there was no planned structure for this inter-agency coordination and the huge voluntary response relied largely on the informal contacts of individuals. This led to internal difficulties for some organisations, and friction between agencies about their roles and responsibilities. Fortunately, the organisation problems only produced

inconsistency on the level of service, rather than any serious breakdown in social services.

There were also some communication problems between the Control Group and the organisations providing care for the evacuees. No one person or agency acted, or was appointed, as a link between the Control Group and social service organisations. These organisations were not asked for their advice before the Control Group made decisions affecting evacuees; nor were they advised, before the public were told, of decisions that they were expected to implement.

More attention needs to be paid in emergency planning to the provision of social services in an evacuation. The volunteer agencies which shoulder much of the responsibility should clearly be more closely linked to the Control Group during an emergency, and should have greater input to emergency plans. Since they undertake (unpaid) many emergency response tasks, consideration might also be given to some government support of their emergency response roles.

It is suggested that emergency plans should clearly identify one person and/or agency as responsible for assuring that necessary social services are maintained for the public (Coordinator of Emergency Social Services). This responsibility would include:

- a) alerting other agencies of an emergency;
- b) ensuring that tasks assigned to different agencies in the Emergency Plan (by prior agreement) are carried out;
- c) identifying gaps in social services and allocating resources to fill them;
- d) membership of the Control Group;
- e) coordination of information given to the public relating to social services;
- f) supervision of public inquiry system.

It is considered necessary that the person acting as Coordinator of Emergency Social Services become a member of the Control Group in order to provide the liaison needed between decisions affecting public welfare, and their implementation. Information should be passed through the Coordinator to other social service agencies before the public is told, in order to allow a planned and orderly response.

At the same time, the Coordinator will need to arrange for social service back-up, particularly for long emergencies, where volunteer involvement is over-taxed or peters out. For individual agencies to be effective on a large social services response structure, they need their own emergency response plans and internal communications systems.

9.3.3. Perimeter Control

The large evacuated area meant that there was a long outer cordon to seal off and maintain. Two problems arose in relation to the perimeter:

- a) communications between the Control Group and police officers manning road-blocks sometimes broke down, so that the officers were unaware for sometime of decisions that they were supposed to implement;
- b) there was inconsistency in decisions taken by individual officers about letting people in and keeping others out.

These inconsistencies were soon identified by more persistent members of the public who took advantage of them, to enter the restricted zone. Our interviews also revealed that police officers differed in how strongly they discouraged people from staying in their homes - some were reported to have been mildly encouraging.

Householders who lived outside the evacuation zone north of Burnhamthorpe Road particularly received inconsistent treatment at the road-blocks; some were refused access to their houses while others were let through. Part of the problem lay in officers not having been told exactly which streets in the area had been officially evacuated.

Another problem in maintaining perimeter control was that residents had better detailed knowledge of the configuration of streets and gardens than had most police officers. Residents were therefore able to enter the area undetected.

One important result of these difficulties in evacuating everyone and sealing the perimeter was that the area was never totally evacuated. In the Mississauga emergency, this problem was compounded later in the week by allowing some evacuees to return to their homes on Tuesday 13 November. Not only did the police have to make contingency plans to re-evacuate the area if a crisis developed (the chlorine tank car was still leaking), but the presence of citizens at risk inevitably influenced the decisions of those in charge.

In the case of the Mississauga emergency, it is not known how far the failure to completely clear and seal the evacuation zone affected the emergency response. The more rapid method of reducing the risk of the chlorine tank car, by introducing a large quantity of caustic solution to neutralize the chlorine, was rejected although it had been successfully used in Florida. It required a total evacuation for some kilometers.

The more general lesson to be learned is that a totally evacuated area is a very different basis for assessing risks than is an almost-cleared area.

9.3.4. Lack of warning to the public about the length of the evacuation

Many of the social costs, and some of the direct economic ones, can be traced to the failure of the authorities to warn the public that the length of the evacuation was uncertain. It is clear that initially, the Control Group was also unaware how long the emergency would last. However, not only is the overwhelming consensus of the public that, despite the uncertainties, they should have been advised to be prepared for a longer stay out of their homes, but the Peel Regional Police Force Major Emergency and Disaster Manual, (in force at the time of the derailment), specifies that:

Serious consideration shall be given to the following, prior to the issuing of an evacuation order:

- d) The probable period of evacuation (consult with Department of Social Services and other related agencies regarding facilities available.)*
- g) Necessary instructions to be given evacuees on such matters as clothing to carry, securing premises, etc.*

Relatively few people were evacuated immediately after the accident; for the majority of the evacuees, there was a period of several hours in which they could have adequately prepared to evacuate. A few citizens did this, on their own initiative. Many more would have done so had they been so advised by authorities. For some people the making of preparations, following an evacuation advisory, would have caused less anxiety than hours of uncertainty about whether they would be evacuated, and when it might take place.

The greatest potential social cost of inadequate advice to evacuees was to those people needing regular medication. These evacuees were placed at additional risk. They did not forget to take medications and prescriptions; like other evacuees, they did not expect to be away from home for more than a few hours. A similar problem arose for discharged hospital patients.

The experience of the Mississauga emergency suggests that in an evacuation, the public need specific advice about what to take, and what to check within their property. They should be advised to be prepared for, at least, an overnight stay away. There is no evidence that an expectation that they might be away for longer would have reduced public compliance with the evacuation. The evacuees believed themselves at risk, and would have left to avoid that risk. Better information would have simply reduced the numbers who left without pets, money, credit cards, and clothes as well as without medication.

One suggestion is to establish an 'evacuation alert' stage prior to an evacuation order. This alert could be used as an advisory for the public to be prepared to evacuate. The advisory could be accompanied by specific advice about what to take, what to do with animals, and how to secure the property. Similar alert systems are used in other countries.

9.3.5. Public Health Services

The problem of being evacuated with insufficient medical supplies was compounded for some evacuees by being unable to contact their doctors. No centrally organized system was set up for linking physicians and patients, all of whom had been evacuated (although one doctor did organize an emergency communication number by the evening of Wednesday, 14 November). Doctors were also separated from their medical records and were not allowed to retrieve them.

The result was that some evacuees could not get the medical supplies that they needed, because the doctors they could contact during the evacuation had no knowledge of their medical histories and were reluctant to prescribe drugs.

It is suggested that the establishment of an Emergency Health Communications System and Clinic (EMCSC) be part of an Emergency Plan. This would allow contact between physicians and their patients, and with pharmacists. The EMCSC should have a well publicised phone number (known, and perhaps listed in telephone directories, before an emergency). It would enable the public to make requests for information and access to medical services and advice. The EMCSC should have direct contact with the Emergency Control Group to provide accurate and up-to-date information.

A second issue is whether to allow doctors to enter the evacuation zone to collect their patients' medical records. In the Mississauga emergency, doctors were refused entry to do this, but at the same time Ontario Humane Society Officers were allowed to make nearly 2,000 house visits to look after pets. The doctors' requests to gain access to their medical records might have been more rapidly agreed to if police could have dealt with one organization, such as the Ontario Medical Association, instead of many individual doctors. It is suggested that during emergency planning appropriate medical bodies are consulted about the maintenance of physicians' services to the public during an emergency evacuation.

9.4.6 Evacuation Centres

The experience of housing up to 14,000 evacuees in 31 Evacuation Centres has provided valuable lessons in selecting and running Centres for emergency shelters. The agencies involved have made their own evaluations and recommendations for improvement. Our research leads to the following suggestions for emergency planning:

- a) Secondary schools, community colleges and recreation centres are most likely to house adequate facilities. Primary schools do not usually have the food service facilities needed and have furniture that is too small for adults.