

A list of suitable places should be drawn up, together with appropriate telephone numbers to call, and widely distributed to all relevant agencies as part of the Emergency Plan.

b) Centres should be chosen with due allowance for the possibility that the evacuated area may be extended. This will avoid the re-evacuation of people from centres and the associated social and economic costs of the dislocation.

c) Centres should be set up before the public is informed, and evacuees start to arrive. This includes the establishment of registration, food and hygiene services, and sleeping accommodation

d) The number of evacuees accommodated should not exceed a Centre's capacity.

e) Day care workers are experienced in working with young children, and day care centres have special facilities for them. Use might be made of these services during evacuations, if they can be made available.

f) Arrangements should be made for doctors to be in attendance at Evacuation Centres in addition to Public Health Nurses and volunteers. Doctors are needed to prescribe drugs as well as to examine patients.

g) Evacuees should be involved as much as possible in helping run the Centre. This increases public morale, reduces the dependency of evacuees on others, and lightens the work burden of the volunteers and officers.

In addition, the Evacuation Centres need to be coordinated in terms of volunteer deployment, provision of services, regulations (e.g. relating to pets), and information given to evacuees. It is suggested that in the Emergency Plan, one agency should be designated to perform this coordination function for all Centres. This agency should have pre-arranged local contacts for marshalling manpower and

other resources, and would be responsible for informing the people and agencies running individual centres.

In the final analysis, it was good organization rather than better facilities or small numbers of evacuees that marked the best Evacuation Centres from the rest.

#### 9.3.7. Compensation

It has come to be accepted that people affected by disasters not of their own making, should receive compensation for at least part of their loss. Where disasters are of natural origin (floods, tornadoes, forest fires, snowstorms, etc.) it is presumed to be the governments' responsibility to help. Under the Ontario Disaster Relief Assistance Program, some \$4 million has been paid out to victims in 12 disasters in the period 1979-80.

Where man-made disasters occur, the situation is complicated by the question of liability. It is now common practice, although not mandatory, for private companies involved in emergencies to pay out-of-pocket expenses. They are careful, however, not to admit liability.

In the Mississauga evacuation, four problems of equity arose in relation to the compensation paid by C.P. Rail;

(a) Some people living just outside the perimeter of the evacuation zone were denied access to their homes once they had left for work or for other purposes, because they needed to go along Burnhamthorpe Road to reach home. They were effectively evacuated, but were denied compensation on the grounds that they were not officially evacuated;

(b) many property owners living close to the accident, who suffered property damage from the derailment, have so far received no compensation from C.P. Rail or their house insurance companies.

(c) people have received no compensation for lost income.

(d) people who stayed in private homes during the evacuation, and who contributed to household expenses were not compensated, nor were the people with whom they stayed. In contrast, people going to hotels received compensation for their rooms and meals.

Present compensation practices for losses suffered in man-made emergencies need to achieve greater fairness and consistency. The distinction between "natural" and "man-made" disasters or emergencies is itself hard to sustain in practice. The origin and course of a forest fire may have as much to do with human action as the train derailment and chlorine threat at Mississauga.

The need for a fair compensation or disaster assistance policy extending across natural and man-made emergency situations is growing and is becoming steadily more evident. The design and creation of such a policy requires careful study. It should be equitable, provide for the necessary and important role of private insurance, and should protect both government and the private sector from excessive claims. Most important of all is that a good compensation policy should encourage, and not undermine, self-reliance and local initiative in reducing risks and damages.

It is suggested that a broad look be taken at compensation practices in public and private sectors for all emergencies, both natural and man-made.

#### 9.4 PREDICTING PUBLIC RESPONSE TO EVACUATION

The large scale of the evacuation, and the detailed information obtained about the behaviour of evacuees allows some more general conclusions to be drawn about public response to evacuation orders. These data are not available for any other major peace-time evacuation and make the experience in Mississauga of international significance for evacuation planning.

The direct applicability of the findings in Mississauga to other emergencies, and to other countries, is dependent on the degree to which the following assumptions are valid elsewhere:

- (a) the hazard is airborne;
- (b) the hazard is perceived by the public to be a serious risk to human health;
- (c) the evacuation takes place between urban areas which are connected by good roads;
- (d) people are evacuated from their homes rather than from their places of work;
- (e) families are united at the time of the evacuation order;
- (f) households have access to their own cars and telephones, and to up-to-date information about the emergency;
- (g) people believe that they are evacuating for a few hours.

Where these conditions do not apply elsewhere, the findings of the Mississauga study would need to be modified or may be irrelevant, for predicting evacuation behaviour.

#### 9.4.1. Preparations

Few people will prepare to leave their homes until they are given a specific evacuation order for their street despite being aware that other nearby areas are being evacuated.

#### 9.4.2. Time delays before departure

If they believe that they are at risk, and if the family is together, people can evacuate their homes rapidly. The evidence from Mississauga shows that 50% of households will leave within  $\frac{1}{2}$  hour, and 80% within one hour, of being told to evacuate.

The time delays before departure are least for those households closest to the accident and for those who are individually asked to leave by police at the door (60% left within 15 minutes). Households farther away are likely to put up more resistance and will take longer to leave.

#### 9.4.3. Reception areas and destinations

The distances and directions travelled by evacuees are mainly a function of social networks, expected time away from home, and the location of major urban reception areas. In the Mississauga evacuation, 25% of evacuees stayed within 5 kms, 60% within 10 kms, and 95% within 100 kms, of their homes.

Households will tend to head for specific destinations (mainly in private homes with friends and relations). Prior to this choice of emergency accommodation, they are likely to have had a family discussion and telephone contact with the receiving family.

#### 9.4.4. Traffic flows

The number of evacuation journeys is likely to be greater than the number of households. In the Mississauga emergency, two correction factors were found to be necessary to calculate the number of outward evacuation journeys.

These were:

- a) the average number of vehicles used by households to evacuate ( $\approx 1.24$  in Mississauga);
- b) the average number of journeys to reach evacuation destinations. This number is greater than one because some households are likely to move on to second and third destinations.

In the Mississauga evacuation, almost a third of the households re-evacuated as the zones were progressively

extended, and people found that they had not evacuated far enough away. The average number of outward journeys per household was 1.37.

Thus, the total number of outward evacuation journeys generated by 75,500 households was about 130,000 in the Mississauga emergency. For a given number of households, the number of outward journeys and time delay data can be used to predict the traffic flows per hour that are likely to be generated.

#### 9.4.5. Demand for Evacuation Centres

Where households have their own transportation, and can contact friends and relatives who live nearby, the demand for accommodation in Evacuation Centres is likely to be low (of the order of 5% in Mississauga).

Official accommodation in Centres is most likely to be sought by teenagers and by families in lower income categories. Old people living alone are likely to be brought to Centres by others.

#### 9.4.6. Non-compliance with evacuation orders

A certain number of households can be expected to refuse to leave their homes. Some of these people will conceal their presence from the authorities. In the Mississauga evacuations, others also openly refused to leave. The households who remained were mainly composed of older people, without very young children, in the upper socio-economic groups. Their main reasons for not evacuating were not fear of looting, but:

- (a) a personal risk assessment that the danger was insufficient to justify leaving;
- (b) a belief that they could get away in time, if the situation deteriorated.

In order to encourage such people to leave, they would have to be dissuaded from these beliefs with advice directed specifically at them.

9.4.7. Demand to re-enter zone

After people have been evacuated for two days, the demand to re-enter the evacuation zone is likely to increase rapidly, particularly when the sense of immediate danger has been lulled.

Evacuees will be persistent in trying to cross road blocks, and their detailed local knowledge of the neighbourhood will enable some of them to enter unnoticed. They will enter a restricted zone for various reasons, such as tending to animals, collecting clothes and theatre tickets, and will quickly identify times and places where officers manning road-blocks are most likely to let them through.

The Mississauga emergency demonstrated the need for dealing with large numbers of pets owned by people in urban residential areas. It is estimated that the evacuation of 75,500 households affected the welfare of some 38,5000 animals. Some of these pets were taken with the evacuees; others were left behind and necessitated their owners or Ontario Humane Society officers re-entering the evacuated area during the emergency.

It is clear that, in order to reduce the pressure on police manning the outer perimeter, the evacuation of a residential area should include explicit instructions to the public about what to do with their pets.

#### 9.4.8. Evacuation by households outside the perimeter

Just as a few people living inside the evacuation zone can be expected to refuse to leave, so can a larger number living outside the zone be expected to leave voluntarily.

These households need to be considered in predicting traffic flows, in delineating evacuation areas, and in providing precise information about which sheets along the perimeter are inside or outside the zone.

In the case of the Mississauga emergency, 60% of the households located close to the accident but to the north (away from the direction the wind was blowing) evacuated either voluntarily or because they could not return to their homes. Some were not reassured about the "safe" wind direction and others were confused about the location of the evacuation zone perimeter. While this high proportion of households outside the evacuation zone leaving their homes is probably due to the particular circumstances of the Mississauga emergency, some voluntary evacuation beyond the zone perimeters can be expected in any evacuation.

### 9.5 RISK ASSESSMENT AND EMERGENCY RESPONSE

#### 9.5.1. LOPHIC risks

The Mississauga train derailment came close to being a disaster; or a low probability-high consequence (LOPHIC) risk. With the growth on the scale of industrial operations, transportation and urban systems, the danger of LOPHIC accidents is almost certainly increasing. Even if it could be shown that the overall risk to society is not increasing but is being redistributed, there remains the need to respond to increasing public concern about LOPHIC hazards.



The traditional approach to public safety in Canada, and in many other countries, of relying on experience and incremental improvements in safety, is not adequate for LOPHIC risks because experience of them is (fortunately) rare, and the prospect of even one such disaster is unacceptable to the public. There is thus increasing demand for risk analysis in Canada of major industrial and transportation systems.

It is suggested that there is a need for a broader examination of risks in Ontario than has been previously undertaken. This will first require a review of data sources and record-keeping procedures. Risk analyses conducted in other countries for the transportation of chlorine by rail suggest that although the risk to the public is very low the potential consequences can be catastrophic.

#### 9.5.2. Responsibility for emergency response

When an emergency does occur, the best defence is clearly a well planned and executed emergency response. The management of the Mississauga train derailment and evacuation, in addition to the many "lucky" circumstances, shows what a good emergency response can achieve.

It is appropriate to ask, therefore, how the response demonstrated in Peel Region could have been achieved elsewhere in Ontario. Peel Region is recognised as being well advanced in emergency planning and response capability compared to many other parts of the Province. In general, emergency planning needs to be strengthened throughout Ontario.

It has been a general principle of emergency response policy in Ontario that emergencies are handled by the most local and on-the-spot authority capable of dealing with the situation. The first level of emergency response is

therefore the municipalities. They have emergency response services (police, firefighters, ambulance, hospitals etc.) and can best rely on cooperation between individuals and agencies who know each other already. Only when the emergency becomes too large for municipal resources, or when more than one jurisdiction is affected, do provincial or federal agencies usually become involved.

The status of emergency planning at the municipal level in Ontario is very variable; some municipalities have detailed plans, others do not; some are kept up to date, while others include useless telephone numbers and names.

It is suggested that the Province should require municipalities to develop, and maintain, adequate emergency plans.

The Mississauga emergency demonstrated the need for many different kinds of technical expertise in dealing with the derailed chemicals, expertise that is beyond the resources of a single municipality, or of one provincial ministry. It also demanded that the people in the Control Group become sufficiently familiar with the technical aspects of the derailment that they could make assessments about the risks of alternative technical solutions.

The implications for emergency planning are that technical and scientific expertise are important resources in emergency response, and should be readily available from wherever they exist - in government, the private sector, and the universities. Such experts should also be consulted in planning for emergencies and should themselves be familiar with the organisation of emergency response. In short, emergency planning in Ontario can be strengthened by:

- (a) involving more groups of people beyond the emergency services - technical experts, voluntary organisations and the public;
- (b) providing greater resources to the development of emergency plans and response capabilities.

9.5.3. The declaration of emergencies

Although the municipality of Peel Region had a well worked-out Emergency Plan, it was never formally invoked during the Mississauga emergency. The Peel Regional Police Major Emergency and Disaster Plan remained the operational basis for the response, and in a formal sense, the Peel Regional Police Chief was "in-charge" of the situation. At the same time, the Solicitor-General of Ontario chaired the Emergency Operations Control Group, and created a consensus for all the key decisions taken.

Had the situation with the Control Group been different, and agreement not reached on a major command, it is unclear what the legal position would be and who would have been considered "in-charge", and by whom.

There is an urgent need to clarify the law with respect to responsibility and control in emergency situations. No amount of emergency planning can ultimately hope to anticipate, in detail, the emergency situations that will arise. Within a clear structure of responsibilities and roles, there is much to be said for retaining flexibility. The best emergency response is one which is built upon trust and confidence in government, and a cooperative attitude from all parties concerned. This is what the Mississauga emergency demonstrated in good measure.

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