IV INFORMATION AND EXPERIENCE TRANSFER

1 Purposes

1.1 Information for records

Chemical accidents fortunately are not an everyday occurrence and, as a result, there is not an extensive backlog of information for managers to draw upon in handling modern or exotic chemicals. Even less information exists relating to appropriate types of rehabilitation for each type of accident.

As an accident may be the first of its type, either because the circumstances of the accident are unique or because the probability of this type of accident occurring at all is low, it has great importance as a learning experience. The low probability or uniqueness puts a premium on information or procedures acquired in the course of the rehabilitation activities. Limiting that learning process to those involved in the accident substantially reduces the value of the experience.

As previously mentioned, accurate recording of practical and technical data is very important, to the purpose of rehabilitation management and experience transfer. Data relative to equipment, methods, procedures, number and characteristics of personnel involved, resources, performances, times and costs, need to be recorded. In particular, it is necessary to report in detail all the "know-how" developed. It may also be important to report the critical analysis of difficulties encountered and of procedures eventually abandoned, because they were impracticable or unreliable in the field.

Some practical rules may be proposed to be followed in recording information.

1.2 Experience Available

Probably the most important available information is that stored in the memory of the participants. The learning experience undergone by the experts and managers brought on-scene provides a means of testing and reshaping assumptions, plans, technologies, management strategies under actual field circumstances.

A second type of information is that obtained by participating groups who incorporate the lessens learned into organizational memories in the form of revised plans, new response mechanisms, new liaisons and new legislation.

A third type of learning experience is that undergone by the persons affected by the accident, such as the area residents. Their perceptions and priorities may be permanently altered by the process of recovering from an accident. Both individuals and groups may have valuable information to impart.

A fourth source of information is the site itself. The physical changes to the area may be the most important information that can be transferred from site-to-site and from accident to accident.

Although available, it is often difficult to access such information, at least in a usable form. Both access and utility of information depends upon its being properly and adequately recorded.

Recording personal experience, setting down what one has learned is a valuable exercise for several reasons. First of all, it may be the first opportunity to consider the ramifications of the experience; secondly, recording it may reveal gaps in knowledge that could be filled immediately but which may not in the future; thirdly it may trigger a new set of questions or concerns based on the lessons learned.

Records to be of maximum use must be complete, and collected throughout the rehabilitation process. Many emergency plans provide no mechanism for recording events as they happen. In an emergency it is often felt that "all hands" should be working on the emergency, leaving the future to take care of itself. The past cannot take care of itself, and the recording process may be eased by mechanical devices, such as call-activated telephone tape machines.

Following the initial emergency stages, some time should be set aside for systematic recollection. Personal diaries or reports should be maintained, perhaps at scheduled times during the days or weeks or months. The memory is not to be trusted.

Group recollection or organizational memory is even more difficult to obtain. Since much of the information may be scattered as the various teams of experts are disbanded upon completion of their tasks. Many jurisdictions try to prevent this by scheduling debriefing sessions, reviewing mistakes and sorting out the record. A rehabilitation process may take years to complete. It may therefore be more appropriate to schedule such debriefing sessions after specific phases of the process, rather than after a rather indeterminate end.

Some organizational memory may result in revised legislation. This change in response or responsibility is often the most useful result of the lessons learned. The experience can be reported by comparing "before" and "after" situations, including a historical description of the development of the new out of the old.

The physical characteristics of the site will take the form of sampling results and technical papers. One set of information which is usually absent is a post rehabilitation survey of an area. There is a reluctance to commit funds to assessing work already completed. The tendency is rather to move on to the next job. Valuable comparative data could thus be lost.

demonstrate the excellence of their proposals over the next few years and many lack competence to do this he told the meeting (Pollution Control Association of Ontario Newsletter, 1981).

1.6 Information for training

Training personnel who may be employed in rehabilitation following chemical accidents represents a complex problem: first, because of the high variability of chemical accident characteristics and consequences, and second, because of the limited number of experts who have any practical experience in this matter.

The problems to be faced therefore may be continuously changing or completely unique, while the information sources available are limited and sometimes have to be searched out at an international level.

A few general considerations are however possible in this respect. First, some basic techniques, procedures and protective measures can be easily explained in a training course. For instance, basic techniques such as soil scarification, toxic material removal and safe storage may represent a relevant subject for a general training course. It should be pointed out that errors in these apparently simple techniques may cause re-contamination of rehabilitated areas as well as an increase of risks, costs and time. Operators to be employed in contaminated environments need to be trained to use and work wearing personal protective garments. In particular, they need to learn how to enter a contaminated area, how to come out (passing though a decontamination centre if necessary), how to throw off possibly contaminated protective garments and so on. A full mastery of these skills must be attained.

Training in simulated conditions is also advisable. Efficiency in all practical field operations should be tested in advance whenever possible. In addition to this practical training, brief courses on general theoretical aspects and on main patterns of environmental contamination phenomena should be organized. The mechanism of release and dispersion of a chemical pollutant in the air, water and soil and its environmental fate can be generally described by some theoretical models (see Chapter II). Therefore, a training course for rehabilitation operators could profitably include such topics.

Further subjects of interest might be the basic procedures for public health and environment monitoring and surveillance. The list of topics may be extended to include practically all the matters discussed in the previous chapters. In any case, the training should be mainly oriented towards aspects that the operators may be expected to deal with. The main goal, to achieve with training of personnel, is an efficient reliable and flexible organization.

A second approach is also possible in training using case studies. These case studies will allow the identification of specific characteristics of particular classes of chemical accidents and of the

specific needs to deal with them. Moreover, such a study may be of help in the analysis of the relevant organizational aspects (management responsibilities, staffing, agency interrelationships, internal organization, cooperating with authorities and institutions, and with external laboratories, public health services and the local community, public participation, etc.

It has to be pointed out that the information required to provide appropriate training may be seldom obtained from only national experiences. Experience at the international level should also be pooled for this purpose. The available information has to be collected, analyzed and synthesized, with aspects relevant to training needs identified and proper manuals and publications produced. This task should be assigned to appropriate organizations, at national and international levels. Whenever necessary, these organizations should be able to immediately set up a training activity oriented towards particular problem solving, as well as periodic general courses.

1.7 Education at higher levels for engineers and managers

The section so far has dealt with information in various forms and for various purposes. Such information in its most comprehensive form should be admitted into a University curriculum to prepare professionals for the task of managing either the emergency phase of a chemical accident or the rehabilitation phase (or both).

2.0 Means

2.1 Permanent storage and retrieval systems

As a rule, the internal documentation service of an organization dealing with the rehabilitation of chemical accidents consequences should be able to provide immediately all the monitoring data (public health, soil, air, water, biota. . .) for the appropriate time period, population subset, environmental substratum and so on. Moreover, pre-processed data and simple statistics should also be available upon request. These important tasks require an adequate information storage and retrieval system. In particular, each datum should be stored according to time and location, so that maps, time series diagrams and other synthesized graphical displays might be easily produced whenever necessary. The use of a computer might be needed for this purposes. The contribution of a computer centre, accessible to the rehabilitation headquarters is desirable. Otherwise, an "ad hoc" computer centre might be required at a significant cost, in terms of personnel and equipment.

However, an efficient system for information storage must be established. Skilled personnel are needed for this purpose, a standard format should be adopted for information collection. Standard cards and/or questionnaires might be prepared to collect information concerning repetitive operations (monitoring activity, sample collection, etc.) or to obtain a quick information feed-back from the communities involved. Such a procedure is quick, simple and facilitates infor-

Data of the site before the accident is often unavailable; unless a site is especially noteworthy, an accident is often the first reason for any systematic analysis of an area to be undertaken. In such cases, the previous state of the site may have to be reconstructed by extrapolation from remnants of the original ecosystem.

Capturing community experience may be the most difficult and ephemeral information of all to gather. Certainly insurance payments, social surveys, and the claims on the political process will capture some of the experience, but the horizon of possible impacts is wide, and the learning experience may diffuse. Local organizations, such as local government and volunteer agencies, may be funds of knowledge. Court actions and settlements may measure community reaction. More intangible effects will however be difficult to assess in a structure that is not ordered by written rules and regulations. Special sociological studies may be required to understand the magnitude of the impacts of rehabilitation.

1.3 Information for legislation and standard setting

The impact of a chemical accident generally requires the setting up of appropriate temporary regulations, aimed particularly at preventing further damages and at reducing risks. An accurate analysis of regulations adopted in previous similar cases may be of great value in identifying basic aspects to be considered in this field. As a rule, in a large number of cases, standard regulations, as well as general protective and preventive measures, may be adopted to restrict or forbid human activities and food and feed uses in contaminated areas. Standard measures, to be adopted in either a contaminated or suspected territory, can therefore be studied in advance on the basis of previous experiences. These measures may be summarized by a set of regulations, which may be expected to be valid in most cases. Some national public health institution could be commissioned with a study of this kind. Moreover, previous experience may indicate important specific aspects and regulations to be considered in particular classes of chemical accidents.

Sometimes, in rehabilitation management, difficulties may arise in establishing what must be delegated to local authorities and organizations, and what to higher level authorities and organizations. A lack of regulation in assigning tasks and responsibilities may result in a loss of time and efficiency. Previous experience may be of help, not only with respect to the above, but also in defining the appropriate level of flexibility required for laws and regulations to be applied after a chemical accident (a lack of flexibility may cause unnecessary difficulties).

Naturally, information obtained from an accurate analysis of the causes, the dynamics and the effects of a chemical accident, may be essential to improve present laws and regulations and, whenever necessary, to define new ones aimed at preventing similar cases and at eliminating or limiting the effects of possible accidents. The study of the impact of a chemical accident may provide basic data for setting new or changing existing standards.

Providing information for legislation and standard-setting must be co-ordinated by a field expert. Experts involved in rehabilitation handling could be asked to re-consider their own experience from this point of view and to give their opinion. In any case, some basic questions should be posed, for instance: could the accident be avoided with different laws and regulations? Had some relevant aspect been omitted? May present standards be considered as still valid in the light of new experience gained?

1.4 Information for formal enquiry

Commissions of enquiry often designate their own experts, charging them with the task of gathering and evaluating data and information. However any information obtained from a chemical accident may be of interest to a commission of enquiry. No particular rules need be followed in providing this information; only clarification is necessary. However, some general rules are essential:

- first, the information must be complete;
- second, possible uncertainties in measurements, observations and data must be accurately reported and explained, indicating the precision of methods and the estimated measurement error;
- third, objective data and facts need to be appropriately distinguished from opinions and hypotheses;
- lastly, if information has to be summarized, all references and indications, useful for identifying further sources of data and information, should be given.

1.5 Information for Public Partipation

A properly structured public information system is a crucial component in any rehabilitation program following chemical accidents. The news media plays a pivotal role in the relaying of information to both decision-makers and the general public, following any such incident. As Figure IX.1 shows, some groups have much greater influence on the decision-making process than others (Third National Conference on Waste Management in Canada, 1981).

Many journalists are ill-equipped to assess the complexity, and consequently the dangers of chemical spills. Sensationalized news reporting - often by reporters having little understanding of the subject - have been known to inflame public fears and emotions to an extent that no amount of scientific reasoning can remedy. Interfacing with the general public within the government system is developing into one of the most important problems of our time. The problems are compounded by a general lack of awareness by scientists, of the structure and working arrangements of the news media.

Scientists use logical progression in their work, patiently assessing all the variables in a systematic manner, using accepted scientific methodology. Their data are painstakenly documented and rigorously refereed before being accepted for publication. Scientists find that news reports are published or broadcast in ways which are subjectively presented as opposed to the objective scientific methodology.

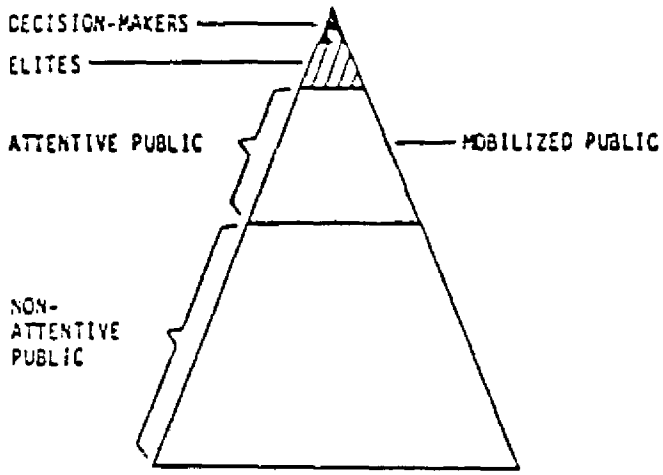

Figure IX.1. The Almond Model of Public Attitudes

Reporters in printed media, radio and television are usually highly motivated people whose daily work involves an extremely wide spectrum of complex events. In a single day, a reporter might cover a criminal high court case; or a complicated law suit in civil litigation where careless reportage could quickly invoke legal penalties. That same reporter might also attend the opening of a high technology factory, interview a learned scientist at a university, or cover a council meeting which is rich in the diverse issues of municipal policies.

Modern day media professionals work in a fast-paced, highly demanding environment where they are always aware that they are aiming at a purely voluntary audience who will quickly switch off, or turn the page, when the material ceases to be entertaining or dramatic. This has developed into an almost compulsive obsession by journalists to entertain as well as inform. Further compounding the problem is the definition of "news". Surprising as it may seem, there is no scientific or professional definition of what constitutes "news". The selection of the day's "news" inevitably hinges on the highly subjective judgement of the reporters, editors and producers in the electronic media.

In scientific coverage, certain topics become fashionable and this leads to many ironies. For example, Sweden's major presentation to the 1972 United National Conference on the Human Environment outlined the air pollution sweeping into Scandinavia from European and British factories, and warned that a similar situation could exist in Canada and the United States. This was an early warning of the acid

rain phenomenon. Yet, even though the Swedish scientists had alerted North America more than a decade ago, fish biologists were unable to get any media people interested in acid rain findings for many years. But acid rain has now become what reporters call a "hot topic" and the North American news media will dwell at length on any acid rain story, often at the expense of other legitimate areas of environmental concern. Acid rain has developed into the fashionable scare story, and politicians have not been slow to ally themselves against the cause of acid rain.

Ernest Siddall (Pollution Control Association of Ontario Newsletter, 1981) in researching public attitudes in Canada, shrewdly points out that the sinister and well publicized risk, no matter how small, will always dominate discussion and decision-making. Emotional pressures, often arising from man's primitive fear of the unknown, inhibits logic and the consideration of what really are the important risks. Expert and informed views are often disregarded, unless they conform to the conventional wisdom of the day.

Ironically, these factors may well result in decisions and actions likely to retard the development of public safety, and vast amounts of money are often spent to avoid small risks when society's money would be better spent if it were diverted towards areas where risks are demonstrably higher. These contentions are supported by many documented case histories.

In Mississauga, Ontario, the disposal of PCBs (polychlorinated biphenyls) contaminated waste in cement kilns was stopped following emotional confrontations by local residents. The method harnessed the thermal properties of the wastes during normal cement manufacturing. As well as saving valuable energy, while making a socially useful commodity, the kilns had several characteristics which made them ideal for the destruction of PCBs and other toxic wastes. Cement kilns provide a very stable incineration medium, have long retention times during combustion and have the high temperatures necessary for the complete destruction of these highly toxic wastes.

Following studies, experts reported that the cement kiln method safely destroyed over 99% of the PCBs, with the remainder broken down into harmless chemicals which were absorbed into the cement. In spite of the fact that scientists said that alternative technology in PCB disposal offered no better safeguards, that method was abandoned following public outcry. While local residents claimed a victory in this matter, legal PCB disposal has virtually been stopped throughout Canada while vast quantities of the highly toxic wastes continue to exist.

The spectre has been raised that "midnight dumpers" may be putting drinking water sources at risk by illegally disposing of PCB wastes where they could contaminate underground and surface waterways. What really happened was that an emotional outcry from an alarmed public stopped a scientifically acceptable way of dealing with

a most pressing environmental problem. A local political victory became a national environmental tragedy as few politicians, or their regulatory staffs, are now anxious to become embroiled in an issue which is certain to arouse public outcry.

Mississauga was also the scene of a recent derailment when cars carrying chlorine and other chemicals were involved in an accident. While thousands of citizens were evacuated, it's important to note that not one single death, or serious injury, occurred yet the incident is now continually referred to as the "Mississauga disaster". Countless articles and television programs emotionally referred to the severe risks involved in the transportation of chlorine while the incident was being covered by the news media.

Highly subjective news reports are not confined to Canada or North America. At the 1976 International Association on Water Pollution Research Conference in Sydney, an Australian television reporter confronted a learned scientist whose data had showed that industrial effluent discharged into a stream entering Sydney Harbour, had improved significantly in recent years. The fact that the scientist's data and methodology had been respectfully received by internationally renowned scientists made no impression on the reporter. He managed to stage a confrontation outside the conference between the scientist and a 14 year old school girl who had won an essay contest with a composition on the environment. Her 'scientific' rebuttal of the scientist's thesis hinged on the fact that she had not seen anyone fishing there. She, and the reporter, seemed oblivious to the fact that the scientific claims were based on systematic studies which used highly sophisticated instrumentation (Media Impact, 1975).

Clearly the problems of communicating scientific information, especially following chemical spills or other incidents, is a most difficult and challenging task. The Science Council of Canada highlighted some of the problems in a report entitled "Public Awareness of Science and Technology in Canada" (1980). The report contained information on government policies concerning public awareness of science and technology in the United States, France, Britain, the Federal Republic of Germany and Japan. The Science Council Report said that, in the long run, the educational system was probably the pre-eminent factor in developing an informed public. The council urged the Canadian federal government to commit itself publicly to a policy of enhancing the public awareness of science and technology. It noted that in an enlightened and contemporary society, such knowledge was a prerequisite to a full and effective citizenship.

But until that enlightened era arrives, there is an increasingly vital need for contingency and rehabilitation plans which will give the public accurate information on chemical accidents and subsequent rehabilitation plans, while minimizing opportunities for distortion

through poor, incomplete, or inaccurate information. Public information systems should be set up with experienced communicators who are trained to interface with the news media, while being able to draw on the expertise and resources of key scientific and technical personnel. The public information program is vital at all stages of any incident involving chemical accidents. It is especially important during any rehabilitation planning when the long-term public trust must be sought and maintained.

The public cannot participate in any rehabilitation programme without information, or data, which conveys the full implication of scientific and technological issues. This should be presented in an interpretative language: without "talking down" to the public, yet without oversimplification of the facts. In the past, public resentment often resulted when industry spokespersons presented data which failed to deal with the sensitive issues.

Adequate information must be continuously provided to public authorities, to the local community and to the whole public. New relevant data need to be immediately communicated to those authorities involved. The public and the mass media may be informed afterwards.

A chemical accident has in general a remarkable social-psychological impact on the community. A social demand for information generally arises, about the causes and effects of the accident, the rehabilitation resources and efficiency and the possibility to avoid future similar cases. A rehabilitation information system needs to be able to provide such information. It is vital to establish a collaborative atmosphere, in particular with the local community. The local community has to be clearly informed about protective measures required to minimize the residual risks, and about rehabilitation goals and daily progress.

Disaster information is, therefore, not only a matter of orders, recommendations, or technical information. It also meets a need for social care when people need to define their situation through the interaction with other people.

Victims always try to validate official information through discussions with their families, relatives and neighbours (a kind of social interaction which also gives them the social support and companionship they need). People are eager to discuss the disaster with others since they need a social understanding of its meaning. They need a collective definition of a situation which is new to them, and they can only get a functional understanding after having discussed their own experiences and official information with people close to them.

But people also want to see the disaster site by themselves. They will not get a full understanding unless they have seen their own

homes and property or the remains of it. People define their own lives through their daily routines in which their homes and property play an important role. It is not the monetary value which is of importance but its social and personal value: the fact that the victims are accustomed to their belongings. Many women are at first reluctant to visit a disaster site unless they know that all their family is safe. They leave their husbands to visit the site and to gather information. But sooner or later the women want to see for themselves, they too have a social need to see what has happened.

All information needs to be correct, true, and unambiguous. Many studies have shown that people will look for substitute information when the official information is incorrect, false, or ambiguous; victims will not follow the orders issued by unreliable organizations, which they do not trust. Studies have shown that really bad situations result when the victims neither trust the rescue-relief organizations or the organizations responsible for the occurrence of the disaster.

Ambiguous information makes people bewildered: they do not know what to do. That happened in a small Swedish town where a fire occurred in a store-house for textile fabrics and plastics. Social workers and policemen went from door to door telling nearby inhabitants that they should leave their homes because of dangerous smoke. But a physician had a few minutes earlier informed over the radio that the smoke was not dangerous. He had not said that people should not evacuate, but his message created an ambiguous situation. The solution was not simply to issue more information, but to link it to other types of social care.

Many of the persons at risk were old, and they knew the social workers who earlier had supported and helped them in various ways. The victims were not only informed about what to do, but they also received social support. The disaster situation was defined through interaction with people of good standing, and most old persons evacuated their homes; their need for social support was met during the interaction. Many of the evacuees also found comfort and support because they went to live with relatives and friends.

In any case, information has to be clear, complete, reliable and consistent. Simple language should be used which is intelligible to people without a specific scientific-technical background. To this end, the advice and the help of communications experts should be available.

Relationships with other agencies can have a direct impact on relationships with the public. Public information is the cornerstone of the relationship bet-ween the agency and the public, especially in a remedial activity that may take years to be completed. Confidence, once lost, may be impossible to recover.

For this reason, a single source of public information is preferable to any other kind of information dissemination. This requires, in turn, control over rumours, leaks of information, and a commitment to presentation of believable truth by spokesmen. In many incidents, disputes over technical questions are inevitable, but the damage caused to the image of uncertainty can be minimized in a number of ways. Firstly, it can be stated at the outset that there is no absolute certainty posited by the responding agencies. Secondly, the disputes can be contained within the larger management scheme overseeing the operation. Thirdly, a large number of technical disputes can be anticipated, and the public can be warned to expect some disagreement.

Whenever possible, uncertainties should be avoided in data provision. Sometimes this may be difficult: available data can be temporarily limited and uncertain and different interpretations are possible. Particular care has to be taken, if information must be made public before the elimination of uncertainties. In such a case, reasons of uncertainty and of possible variations in rehabilitation plans and execution, should be accurately explained in order to avoid loss of confidence in the rehabilitation management (people in general expect certainties and definite choices from official science and technology; it can be necessary sometimes to recall that absolute certainty may be non-scientific). In any case, a single information officer should be provided with information for the general public.

In addition, experience has shown that the public near an impacted site is very quick to spot anomalies and sloppiness in remedial actions. This can undermine both faith in the process and faith that the authorities have the best interests of the population at heart. What the personnel working on-site may regard as trivial alterations, the public may take in a completely different spirit, since they are not privy to the day-to-day management of operations from the inside.

A simple solution to the spread of suspicion is the flooding of the area with information. This can be quite deliberately done: at the outset of an emergency, many of the impacted population will want all the information they can acquire; but, as time passes, if they know that a lot of information on every aspect of the situation is freely available, much of the public will stop bothering to enquire.

The best way to disseminate this information and to stop rumours is to set up a "rumour centre" as part of a general media centre. Here again, the balance must be kept between putting out as much information as possible, and ensuring that none of it is contradictory. At the beginning of an emergency, it is obvious that this will be a more than full-time job, and a Media Officer will be required. As longer term remedial actions begin, some liaison with the media should be maintained, to explain what is being undertaken, and to anticipate

future concerns. It is vital to have someone who is continually prepared to say, "How will this action look, be understood, or misunderstood by the public?".

At some point, decisions may have to be made about the extent of public participation in the remedial process. Typically, the public is seen as an uncontrollable force or a marginal concern, with the result that organizations are reluctant to consider a long-term involvement of the public in the process. While there are valid reasons for this reluctance (e.g. intermittent interest, lack of expertise), a lot can be lost of value through excluding the public. Most importantly, the public is an inexpensive source of information. For example, in determining the boundaries of a chemical spill in an area, local residents may be able to give a good account of the flow of groundwater through an area, which can serve a a check on professional hydrogeologic surveys. Further, local residents can be used as monitors of deterioration in an ecosystem: they are always on-scene, and they have a vested interest.

Management of this kind of information is, of course, fundamentally a question of separating out the wheat from the chaff, but there is no doubt that traditional knowledge may have substantial value. There is a secondary benefit: local people feel themselves to be part of the remedial process, and are therefore less likely to polarize into "us" versus "them". A tertiary benefit, though more complex, is the mutual interaction of agencies and public, resulting in a less abstract and more concrete set of rehabilitation goals.

One last benefit can be noted. In a long-term operation, people will move in and out of a community. A community-based information system naturally educates newcomers into the ground-rules of the operation (e.g. zones of access, prophylactic measures) as they join the community. This eliminates the necessity of re-education on the part of the authorities over and over again.

To write scientific and technical material for lay audiences is a particular skill which, regrettably, few communicators have mastered. Failure to cope with this problem has caused serious concerns for health and environmental regulatory agencies throughout the world. This failure to communicate is probably the single most important issue in public information programmes.

Few case histories could better illustrate this failure than the proposal to convert a small redundant sewage treatment plant into a liquid industrial waste treatment facility at Ajax, Ontario. This facility was vitally needed to treat the growing volumes of industrial waste, generated in southern Ontario, Canada's industrial and manufacturing heartland.

The problems encountered in securing public approval for this site have been reported in detail (Third National Conference on Waste Management, Canada, October 1981).

It was reported that a lawyer for the citizen's group opposing the project made a number of assertions, including the following:

> "They are going to mix chemicals together and spew them into the air and water - your drinking water. They will come through the waste from where it is generated to your bodies." (Third National Conference on Waste Management, Canada, 1981).

The technical and scientific merits of the proposal were examined by the Ontario Environmental Assessment Board over a period of many months, with the proponent's cost alone being estimated at $400,000 (Canadian). This gives some indication that the proponents had backed their proposal with extensive technical and legal research and documentation.

After hearing the evidence from both proponents and opponents, the Board approved the project, subject to certain conditions, all but two of which had been part of the original proposal. Yet in spite of this approval, the proposals to construct the still needed waste treatment facility were abandoned. The Regional Municipality which was a proponent of the scheme withdrew its application to construct the facility from the Ontario Ministry of the Environment. A letter published in a local newspaper gives some indication of the pressures put on the local politicians during the protracted hearing process:

> "I couldn't care less if the upcoming report details this plant as the answer to Ajax's financial dreams - reports can be slanted to say anything they like, by errors or omission. I don't care if it says the plant will make Lake Ontario pure again, will be a boon to our local economy and employment, or whatever the proponents want us to believe. Everyone I know in Ajax does not want the plant here period. And if Mayor Clark Mason doesn't realize this, he should forget about re-election." (Third National Conference on Waste Management, Canada, 1981).

A proposal to rehabilitate a housing development which was found to have been contaminated by radioactive soil from a former industrial use has been frustrated for some two years, by citizens' groups. Whenever a site is proposed for the contaminated soil, local residents in that area join together and stop it. Both federal and provincial regulatory agencies seem unable to provide an acceptable solution.

A proposed site near Bancroft, Ontario, actually had higher levels of radioactivity than the problem soil in the Metro Toronto development. While the Bancroft City Council agreed that the proposed soil transfer would not be harmful to their area, they objected to a project which would have been accepting another community's wastes.

Commenting on this at a 1981 meeting of the Canadian Society of Civil Engineers, an official of the Ontario Ministry of the Environment Waste Management Branch said: "Public readiness to accept waste is declining and resistance is stiffening". Engineers will have to

mation storage, retrieval and analysis. Moreover, it may stimulate the habit of recording data as they are obtained. On the other hand, a possible defect is that cards and questionnaires with "closed" items (which imply "yes/no" answers or the choice among a limited and specific set of possibilities or the indication of a number) may limit the information obtained, may omit items whose importance was not evident when the card or questionnaire was prepared and may prevent the expression of ideas or opinions not reducible to a standard format.

Therefore, it may be advisable to use simultaneously "open" questionnaires or cards in whch people are requested to report their own comments, ideas, experiences, criticism and so on (these questionnaires or cards are not structured in fixed items; only general questions are proposed; the answers need not be in a standards form). These procedures, largely used in sociological surveys, may be of great help in rehabilitation management.

Clearly, a field expert is required, who is continuously in contact with the personnel involved in rehabilitation activity, to stimulate the flow of data to be recorded, to identify new possible needs and to check the reliability of the information systems. Daily reports on work going on, personnel employed, possible exposure levels and so on, should be requested from all rehabilitation organization officials. Moreover, experts charged with rehabilitation management should be asked to write down periodically the results obtained, the new findings carried out, their opinions and observations, as well as the descriptions of performances of internal organization, of apparatus, methods and procedures employed and of co-operating organizations, laboratories and so on. Moreover, experts dealing with specific aspects of rehabilitation activity (toxicological, biomedical, physical, chemical, technological and so on) should prepare extensive special reports periodically. As a consequence, continuous up-to-date records should be available for possible lectures, press conferences, scientific meetings, scientific publications, reports for authorities and so on. The matter should be treated, organized and stored in a suitable form, to be immediately utilizable for scientific documents and information for public participation.

It should be pointed out that the daily work of rehabilitation operators is often very heavy, and recording information may add to the burden. Whenever possible, this task should be made easier with the constant help of an expert in information recording, reducing the risk of information loss.

The internal documentation centre should establish contact with other documentation centres, in order to guarantee an efficient information exchange. In particular, all the material, published during and after the rehabilitation process, should be included whenever possible in general scientific documentation retrieval systems, to be easily found, diffused and utilized.