The NIMBY (“Not In My Back Yard Syndrome”)

Reader 2004

A Survey of Expert Contributions

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Most people agree that the reduction of pollution is one of the major challenges facing today’s consumer-driven world. Many also recognise that governments need to implement more effective and environmentally acceptable policies for the management and disposal of waste.

Public support for environmental issues is, nevertheless, severely tested whenever we are faced with the prospect of a new transfer station, incinerator, landfill, or other waste facility being built near where we live or work. It is at times like this when even the most public-spirited citizens are likely to adopt the principle of Not-In-My-Back-Yard (NIMBY).

This may result in the project being blocked or seriously delayed as the planners and plant operator deal with the objections of the local residents, environmentalists, and any other parties who believe they will be adversely affected by the proposed facility. It is a situation that is equally apparent in other public and privately funded projects involving the use of land for sensitive developments like power stations, airports, motorways, quarries, and chemical works.

With opposition to waste management projects now commonplace throughout the industrial world, the sponsors of these projects are becoming much more sensitive to the concerns of the people they are likely to affect. Often, the public is now considered a stakeholder in the projects, along with the companies and regulatory bodies that are responsible for their developments. Involving the public at every stage of the planning and consultation process enables them an opportunity to voice their concerns and at the same time, gain a better understanding of what is being proposed.

The success of these activities is always dependent on the existence of an effective communications strategy. These strategies must encompass management of the project perception, while providing the timely and accurate information that is needed to overcome the objections of the NIMBY lobby.

The following papers provide an insight into the strategies that the waste management industry is using to overcome the Not-In-My-Back-Yard (NIMBY) syndrome. They are all presented by experts in their field and include a comprehensive background to the NIMBY syndrome; and a number of case studies in which waste planners explain how they have handled public concerns and objections. In each case, they emphasise how an effective communications strategy should be a key element in the risk and social management of any waste project.
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1. Introduction

The ‘NIMBY’ (Not In My Back Yard) syndrome is the name for negative responses received from people against the establishing of activities in their neighbourhood with positively appreciated social functions linked to potentially negative consequences for the surroundings. In essence, the response by the neighbours has an individual character despite the fact that, often in such cases, pressure groups arise that start offering organized resistance. Sometimes it is an expression of distrust against the initiators, and specifically against the authorities that grant permission, rather than resistance against the activity in itself. Many examples can be stated in which people living in the neighbourhood have been informed in an incomplete or incorrect manner about the potentially negative consequences of such projects. Not infrequently, attempts have also been made to lead them up the garden path or even to put them under pressure (see, for example, the establishment of an international business park at Heerenveen [Knorren, 1994]). In this respect, the syndrome is an expression of protest due to hard feelings.

We should also consider here that in several cases the concept of ‘neighbours’ must be taken in a much wider sense than just those people who live at a relatively short distance from the activity. In this respect, one may think of the contamination of agricultural products0 at larger distances, causing also farmers and retailers to experience the negative consequences of an activity, even if they are far away from the activity in question (Liebow, Branch and Orians, 1993). For the decision-making concerning the integration of the (proposed) activity in the area, including its execution, it is important to take the NIMBY syndrome into account at an early stage because otherwise much delay may be caused by large numbers of objections and protracted appeal procedures.

1.1 What is ‘NIMBY’?

Wolsink (1990) distinguished three types of resistance by population groups against proposed activities of initiators, including government bodies:

- Pure NIMBY, in which the appellants do agree with the social purpose of the activity, but do not agree with the activity taking place in their neighbourhood.
- Complete repudiation of the activity because, from a societal point of view, there are great objections to the activity (e.g. nuclear energy). This can be called: NIAB: Not In Any Backyard, or even stronger: BANANA: Build Absolutely Nothing Anywhere Near Anyone.
- Impartial attitude, changing into a negative attitude because during the (social) discussion about the activity and its location, there arises a feeling of distrust towards the initiator and/or the licensing authority.

The first form of resistance can be approached by offering the persons involved sufficient compensation for the loss experienced by them, if the activity takes place in their neighbourhood. This is not quite as simple as it appears to be, certainly not in those cases with potentially negative health effects.

The second form requires a discussion at society level the disadvantages of the activity are recognized as being too great compared to the advantages expected. The importance of this form is that NIMBY is being affected by perceived advantages and disadvantages of new technology.

The third form of resistance occurs relatively frequently and thus means a ‘lost opportunity’ for the initiators. The question is then relevant what the causes of this lost opportunity are. An important cause is that many decisionmakers use a unicentric decision-making model which is, to a considerable extent, characterized by a top-down structure. In such a case, a more pluricentric decision-making model which approaches a complicated decision from various sides will be more effective, even if the decision-making process is under time constraints. (Spijksma, 1994)
The evidence, however, shows that initiators and administrators behave more and more like 'managers' who for the sake of a possible success in the short term do not care about the damage that is thus done to the continuation of the process and to the subsequent decision-making processes -let alone, the (future) damage to their image. This increasingly enlarges the 'Hindermaacht', (power to obstruct something) of the losers. In particular the petitions of activists against the procedure followed, are often well-founded.

1.2 General consideration of 'NIMBY' in its context

As stated above, NIMBY can have various causes and thus the approach must vary. In any case, NIMBY is an expression of a conflict between initiators, permit issuers, and the people who expect mainly to have to deal with the negative effects of the proposed activity. Here, two matters are involved:

- content
- process.

Content deals with the characteristics of the proposed activity. With (hazardous) waste disposal, this concerns:

- The nature and quantity of the waste in relation to the perception of the ward "waste incineration"
- The state of the art
- The manner of transport
- Risks for the direct surroundings
- Role of parties concerned
- Quality of decision-making
- Legislation and measures with respect to environment, spatial planning, etc.

Process deals with:

- Implementation of (imposed) procedures, etc.
- Development and implementation of decision-making process
- Selection of location(s)
- Selection of technology
- Looking for alternatives.

1.2.1 Content

Association with waste incineration. The association with hazardous waste is of great importance with respect to the nature and the quantity of waste for which incineration offers a solution. Literature states about the meaning of the ward waste incineration that the technical developers generally have a positive association with this ward because (specifically at elevated temperatures) incineration contributes to relatively clean disposal. The citizens, however, usually make a negative association with 'hazardous' (Fuchs & Fisch,).

The state of the practice

Both initiators and permit issuers promote the usage of the technology that can be used as well as possible, economically speaking. This leads to the fact that very rarely 'state of the art' technology is used, but rather 'state of the practice' technology. The result of this is that the impact on the neighbourhood, in the form of emissions, sound and/or odour and safety risks, will not be as minimal as possible. Due to all kinds of causes, safety and environmental management are not as good as may be required. If criticism of the technology is valid, then quite readily aspects other than the ones referred to above, come to the fore in the discussions. The people in the neighbourhood who offer resistance are then all too easily rebuked for attempting to block employment and economic development. In general, our society has a high level of appreciation...
for research and technology, but simultaneously there is much scepticism in public opinion and the press about the contribution of specific scientific and technological developments to the solutions of social problems (Fisch). This discrepancy simultaneously leads to dependency on and fear of specific technological applications.

The manner of transport
The effects of waste incineration are not only limited to concerns about health and the environment as a result of the plant. The supply and disposal of waste, fuel, etc. should play an important part in the assessment. Cases in the United States of America show that only minor attention is paid to the safety of people in the neighbourhood, particularly children. Conflicts revealing themselves in NIMBY have to do both with the social acceptance (or, on the contrary, the lack of it) of technological solutions to social problems and with the perceived advantages/disadvantages relation of a specific application in a spatial framework. This is the reason that, in general, linear planning processes with stage-wise planning, etc. do not work.

Risks for the direct surroundings
By way of risk analyses, an understanding is gained of the safety aspects of an activity for the surroundings. These analyses are always limited in scope and depth which sometimes causes emissions to be higher than calculated. When during the operating time, the waste or the plant is not always dealt with in the correct manner, deviations arise which are not directly observed. A well-known example is the dioxin emission of various waste incinerators in the Netherlands caused by a combination of type of incinerators and supply of specific kinds of waste.

Role of parties concerned
Three parties can be distinguished here:

-initiator(s)
-policy-maker and permit issuer
-people living in the neighbourhood.

Each of these groups has its own role, the problem being that there is considerable difference in position of power between the three groups. In waste incineration and other activities as well, quite often the role of policy-maker and permit issuer is not always separate from that of initiator. In addition to their role as enforcement officials for legislation and measures (neutral with respect to the interests of the other groups), government authorities have another role in which they are responsible for the disposal of (hazardous) waste. This may lead to an entanglement of interests, and to the third group ('the people living in the neighbourhood') ending up in a weakened position. In the group of citizens and their (local) representatives, this entanglement leads to distrust and uneasiness rather than to acceptance of the intended activity. This was also noticeable with an activity in which the government authorities was willing to meet the citizens wishes by taking sound-resistant measures around Amsterdam Airport. The strong relationship between the Ministry of Transport, Public Works and Water Management and Amsterdam Airport (as former state enterprise) greatly affected the attitude of the persons involved with respect to the quality of these provisions (Schwarz et al, 1994).

Quality of decision-making
The quality of the decision-making process with respect to activities such as waste incineration is particularly controlled by legislation and measures. There is a growing uncertainty in this matter. There is not something like justice for all. Depending on the basis of the prevailing fight, there is more or less an eye for the weakest. Davy (1995) distinguishes, in this respect, three forms of legal principles, i.e, 1) the liberal, 2) the utilitarian, and 3) the social. The first form specifically favours the strong in society. The second principle particularly aims at the majority principle, while the third form is specifically aimed at the weak groups in society. Apart from the last form, the other forms allow relatively few rights of 'people in the neighbourhood'. Because of the pressure of economic and efficiency purposes, a negotiation element is more and more taking its place, as it exists in the 'market' for the principle of justice. So justice is increasingly being replaced by effects that, quality-wise, are hard to check by external parties. Repudiation of the decisions by specific groups of citizens then has less effect on the general considerations to perform that activity. This is often
revealed in matters that run ahead of the real decision-making process. It is known that in:

**Selection of locations.**
Since for the establishment of activities, which are economically important and positively affect the employment in a specific region (quite often, however, this works out badly), locations are offered in mutual competition by various local government authorities, those decision-making processes threaten to prevail in which speed beats carefulness. If one realizes here that for many locations, usually various sectoral uses are possible (such as infrastructure, housing, etc.), it is not difficult to understand that the citizen's influence is experienced as being irritating and must thus be minimized. The current development of legislation in the Netherlands is a clear example of this.

**Selection of technology.**
In waste incineration, we can select from various technologies. Depending on the nature and the quantity of waste, the selection for a specific technical system is usually made by the initiator in an early stage. A good example of this were the plans in the early 1990s to establish a large waste incinerator plant near Ypenburg Airport. Before anything had been decided as to the necessity of such a large waste incinerator, a design order for the plant had already been granted, and thus the incineration technology been determined. The question may be asked whether it is necessary, in relation with the neighbours' responses, to take into account the technology selection. This, however, is indeed recommended. In view of what is stated above, concerning the association with 'waste incineration', convincing arguments must be produced, i.e. that the waste will be incinerated at elevated temperatures causing fewer emissions. If compensation is considered, it is also of importance to use WTE (Waste To Energy) technology. This opens up the possibility of supplying cheap energy to the 'neighbours'. We will revert to this when describing the situation in the United States of America. For that matter, other considerations also play a role in selecting the technology, including aspects such as nuisance and disturbance in terms of odour, sound, destruction of the skyline, etc.

**Looking for alternatives**
Many projects for establishing waste incinerators start from one type of plant, and often one (or at maximum few) siting choice. This is caused by the idea of many initiators that offering various alternatives makes it possible for the opponents to torpedo the plan. After all, there are other 'backyards' where the activity may very well take place! This fear, however, is only one side of the matter. The other side is that if only one possibility is offered and if this becomes apparent, the initiator is easily accused of negligence, He is easily incriminated of forcing the plan through, thus causing increased suspicion and distrust about his precise intentions and those of the deciding authorities. Unintentionally, a strong process in favour of NIMBY then gets going in the form of protest due to hard feelings. Once there is distrust, little co-operation can be expected from 'neighbours' for a long time.

2. Situation in a few selected countries

2.1 Situation in The Netherlands
The General Administrative Law (Awb) provides the Dutch citizen with a specific legal protection against changes in his surroundings. Requirements following from this Law include:

- Information about the intended decision-making
- Possibility for interested parties to make their views known;
- Setting a deadline;
- Publication and motivation;
- Possibilities for petition and appeal.

Despite these requirements, there still appears to be little room for real participation by citizens in the decision-making process. Information about the intended decision-making often comes in late, is incomplete and/or unclear. The possibilities for citizens to bring their views to the fore are often
restricted to a minimum. Deadlines are often tight, while publication and motivation only reaches the citizens late, certainly if assessed against the background of the available possibilities. Possibilities for petition and appeal are limited, certainly if one considers that appeal procedures can only be started once the authorities have made decisions with legal consequences. This often happens at a stage in which, for example, land has been purchased or subsidies have been granted, thus making it very difficult for the judge to reverse the decision, if citizens would ask this on the basis of the Awb. Yet there are examples in which this has happened, specifically there where politicians did not keep to the approved legislation and measures. Another example is the attempt made in 1992 to perform drillings for gas in the Wadden Sea; in this, the judge stipulated that this was not done in conformity with the relevant legislation. The intended decision was therefore declared null and void.

The NIMBY Act, as introduced in The Netherlands, has another problem with respect to the participation of (organized) citizens. It is intended more to bring to heel obstructive local authorities than to have concerned citizens participate in the decision-making process. The major result is namely a restriction of the term in which participation is possible. Participation of citizens, however, cannot be comprised in such a term: consciousness, assessment and actions have their own dynamics. The NIMBY Act is specifically meant to realize those projects that city councils would rather not see being implemented in their own territory. In the Province of Gelderland, for example, it was said that in this province alone, 30,000 petitions would be lodged against the construction of the Betuwe Railroad. Obviously there is hardly any support for this railway construction. The NIMBY Act is Chapter 6 of the Spatial Planning Act (WRO). Using article 43, the Provincial Authority (GS) or the Ministry of Housing, Spatial Planning and Environment (VROM) can enforce the issuance of exemption and/or construction and establishment permits. Article 43b streamlines all other permits related to the project. This tendency can be observed with more new legislation and measures such as the Planned Route Act. The starting-point of this Act is that, within the scope of the WRO, decision-making with respect to the panning and the decision will have the same guarantees at national level as at provincial and municipal levels, both content-wise and formally. For projects of national significance such as the High-Speed Railroad (HSL) and the Betuwe Railroad, the Minister will be given the authority to grant a permit for the construction of a motorway or a railroad which under the law is required from. provincial or municipal authorities if the latter does not grant the permit at all or not timely enough.

Also in preparatory procedures -notably the Key Physical Planning Decision (PKB) -, the national government is inclined to have as few contributions from lower authorities as possible. The decision-making concerning the Amsterdam Airport sound insulation, is a good example of this (Schwarz et al, 1994). Surrounding municipalities were invited by the committee only to be informed about the progress of the consultations, not to take part in them. For the implementation, the national government addressed itself directly to the individual citizen with a contract in which the latter approved of the construction of sound-insulating measures. Later on it appeared that there was rather a lot of resistance, also due to the fact that, halfway into the implementation, the national government decided to economize measures, without involving the citizens in this process. This had been built in within the contract.

Another example is the siting of several windmills in the Province of Friesland. Protesting citizens were reproached by the national government for stopping environmental improvements. However, within the framework of 'landscape improvement', that same government had just over 1,500 trees cut down in the same area.

2.2 Situation in the United States

In the United States, people have been dealing with NIMBY for a longer period of time. This was also caused by the fact that legislation was clearly disadvantageous for local authorities and their inhabitants concerning decision-making with negative consequences for them. Because of long-lasting juridical processes in which the initiators and authorities were regularly sentenced to
improve their decision-making and implementation, including indemnification, there is now a situation in which participation of the citizens is regulated, also after the plants came into operation. This had become necessary after the evidence had shown that LULUs (Locally Unwanted Land Use) seriously delayed the establishment of plants such as waste incinerators, or even completely stopped them. In addition to prevention, the plants were often located in strongly industrialized areas ('Brown Fields'), with a predominantly poor and non-white population. Within this framework, Carr (1995) refers to the implementation of the National Law Journal Study (1992) which included the following results:

In areas with a predominantly poor and non-white population, polluting companies that had been sentenced paid about half the fines, etc, compared to polluters in richer, white areas. Within the framework of Superfund, dumping sites to be remediated were considerably lower on the priority listing if they were located in the neighbourhood of disadvantaged areas. In many cases, less far-reaching measures than remediation were taken there (confinement instead of disposal).

The findings from this study were contested by other studies such as those from the New York Law School (1993) and the University of Massachusetts (1994). One of the explanations from the New York study is that the people came to live there after the establishment of the polluting activities, probably because of the lower price of the houses.

An exception is the establishment of WTE plants which are for the most part situated near less poor areas with a mainly white population.

Citizen involvement in decision-making (Luly. 1988)

The citizen's participation in decision-making was regulated by law by the authorities back in 1940. However, the purpose of this legislation was that the citizen would tell what was bothering him. Interrogation of officials or politicians was not permitted nor was any effort undertaken to explain the consequences of the activity to the citizens in a language that was understandable to them. As far as this is concerned, the current legislation has a better structure. It has both a corrective and preventive character. The first category is known as 'Superfund', formally falling within CERCRA (Comprehensive Emergency Response Compensation and Recovery Act). It was established to tackle unexpectedly occurring emissions that are hazardous to health and environment, and to remediate (abandoned) dumping sites. There is wide participation of people living in the surroundings, ranging from research, sampling to selection of (alternative) solutions. Apart from several problems with respect to rate of improvements, interaction between bureaucrats and citizens, and financial cut-backs, many problematic and dangerous situations have been dealt with since the institution of this fund.

More of a preventive nature is the legislation that deals with citizen involvement under the RCRA programme (Resource Conservation and Recovery Act). This Act dating from 1976 was completed with amendments in the field of solid waste (HSW A) in 1980 and 1984. It now contains regulations with respect to:

- Stringent operational standards for industries; now these industries are required to subject environmental measures, taken to meet these standards, to government supervision - Detailed proposals with respect to permits;
- Publication of such proposals;
- Gathering of public response to this and, if required, processing this response into the final permit.

This legislation was first applied to dumping sites, but later also to municipal solid waste incinerators.

Citizen participation within the framework of RCRA and HSW A comprised the following steps:

- Citizens and officials work together to identify and designate those plants that are
controversial because of their danger and/or nuisance-producing properties. In order to establish this co-operation, questions are raised such as:

- Will the plant be located in or near a residential area?
- Does the company have a bad reputation with respect to safety and pollution?
- Will the plant process waste from elsewhere, within the framework of Superfund?
- Is the company an important local employer, this in collection with possible permit denial.

The public must be taught what important aspects of the RCRA legislation play a part in the granting of permits. Denying a permit to an industry is quickly associated with loss of employment. RCRA legislation is much more specific than Superfund, therefore providing fewer alternatives. This must be made clear to the public.

Finally, the interaction between the technical government officials and the citizens involved must be improved, if only for the sake of avoiding, as much as possible, misunderstandings about the meaning of terms and expressions used. Insensitivity on the side of the enforcement officials for the concerns of people living in the neighbourhood gives to the public a feeling of powerlessness and ultimately leads to hostility which, in turn, gives rise to delays in the implementation of measures.

Some cases
The Illinois Environmental Protection Agency (IEPA) has the authority to bring about the implementation of the RCRA in the state of Illinois. In the first 18 months, many things went wrong and some successes were achieved. A comparison of various municipal solid waste incinerators shows that in most cases a permit within the framework of the RCRA is required. It also appears that the effect on employment is relatively low. In particular, an area south-east of Chicago comprised a number of environment-polluting activities, in combination with serious soil pollution. Pressure groups were well organized, frustrated by the lack of government action, frightened because of the high death rate as a result of cancer and anxious to have the waste incinerator closed, and ready to take any action. This was a situation of many disadvantages and only few advantages for the people living in the neighbourhood.

The Environmental Protection Agency (EPA) and the IEPA received little support because the public was of the opinion that the activities in question had to be stopped immediately. There was little point in explaining to them that the activities in question could not be stopped since they met the legal standards. When politics and the press started interfering, at the hearings the representatives of the two organizations had to be put under the protection of the police. Concentrating on the two waste incinerators located there (as to emissions hardly different, for that matter), the evidence showed that the public was very hostile to the One incinerator, whereas the public response to the draft permit for the second incinerator, within the framework of the RCRA/HSWA was practically absent. Research showed that at the place with little response, the occupants rented their houses from an influential family in the region and that many of them worked in those industries.

When the management of the companies involved heard that their draft permit was published, they were shocked. When it became clear that rumours would gain the upper hand if they themselves would not give any explanation of their factory operation, they started to convene meetings themselves. Meanwhile the IEPA consulted with representatives of the citizens, including local government officials and the lawyer of the pressure groups. When another hearing was held, the majority of the citizens involved were informed about the conditions for the permit. There was little noticeable resistance. Much opposition could have been avoided if the parties involved would have participated in the process at an earlier stage. Another important result is that paid ‘guard dogs’ were selected from the pressure groups in order to prevent transgression of the RCRA/HSWA as much as possible. These ‘guard dogs’ were trained to supervise the operation of the installations involved, to notify the IEPA of suspicious actions and to keep in touch with the people living in the neighbourhood. To the surprise of the companies involved, they were able to
give sound advice for plant operation improvement. The 'Consent Decree' was drafted to safeguard the continuity as much as possible; this, however, cannot prevent parties from going to court.

During research held in the Newark area, Greenberg, Schneider and Parry (1994) found that, depending on the location of the waste incinerator and the socio-economic position of the 'neighbours', various responses to such an incinerator can be distinguished:

- Anger because of the addition of the incinerator to the already existing (risk-producing) activities (airports, oil storage facilities, busy thoroughfares, chemical industry, etc. There was already a pressure group called RAGE. This response also indicates the importance of the history with respect to the establishment of new risk-producing activities.
- Mitigation of this response as the distance to the plant increases.
- The multiple risk perception in which the appreciation for the neighbourhood as such (crime, drug abuse, etc.) is stronger or just as strong as the industrial risks.

For the first two responses, a clear relation was found with the presence of the waste incinerator. As many as 46% of the inhabitants close to the plant wanted to move. In a district farther from the waste incinerator, this percentage was 18; close to this district, however, there was an airport, an obvious reason for wanting to move. For districts with a multiple risk perception, the aversion to the waste incinerator does not decrease strongly; rather, there is a clear relation between the appreciation of the neighbourhood and the stress experienced by the presence of the waste incinerator. In their appreciation of the neighbourhood as such, the waste incinerator is 'taken along'.

Both cases show that there is a relation between the socio-economic and racial status of the 'neighbours' and the establishment of danger-producing companies, including waste incineration. Carr (1995) investigated this further, but was not capable of separating environmental factors from other health-threatening factors such as bad food. After a literature search, however, he reached the following recommendations for the EPA:

- In risk analyses, principles of justice should be considered (equal division of advantages and disadvantages).
- Within this framework, when risk-producing activities are established, risk-reducing measures should be taken for groups that are exposed to increased risks.
- Improved communication between the initiators, the licensing authorities, and the 'neighbours'.
- The principles of justice should be included in the long-term planning.

Chertoff and Buxbaum (1986) (see Reams and Templet, 1996) found a number of general characteristics with municipalities that are prepared to allow the establishment of waste incinerators:

- Lack of physical space to further expand the storage facilities;
- High costs of transport to storage facilities further away;
- Observation of deteriorating on-site ground water quality.

Municipalities that are inclined to deny the establishment did not see the need for establishment (so do not meet the characteristics referred to above), while the citizens offering most resistance come from the economic middle-class. Apparently, depreciation of real estate plays an important part here.

Ladd and Laska (1991) point out that research into participation by citizens is performed after the actual decision-making has taken place or the activities have started. Because of this, it is only afterwards that one hears what has happened and what the response of the 'neighbours' has been.
It is usually not clear what has happened previously. This produces two elements that significantly contribute to the development of NIMBY-like response:

- A discussion about the technology as such, a discussion that also continues during the decision-making with respect to the place of business of risk-producing technical plants. Waste reduction by reuse, recycling, etc. will have to be included in the process for establishing waste incinerators.
- Changes in social conditions that take place before a specific place of business is actually selected.

Schnaiberg (1986) has indicated that NIMBY is imbedded in concerns about the deterioration of the environment in general. Important subjects in this collection are topics for the press, including the damage to the ozone layer, global warming, etc. NIMBY cannot be solved satisfactorily without taking into account these elements.

2.3 Situation in Germany

Also in Germany, the discussion with respect to the acceptance of technical plants is taking place in a wider framework than just the establishment of a plant in a specific area. In this context, Schutz and Wiedemann (1993) speak about the ‘Quality’ of a technical solution. In politics, the term ‘social compatibility of technical plans’ is used to indicate that a technology should not be assessed only based on technical and/or economic qualities.

Legislation with respect to waste incineration or landfill

Many criteria are used for the location of waste incinerators. These criteria stem from the relevant legislation. Three important acts are of significance when dealing with waste:

1. The Waste Act. This act aims at regulating the acceptance of locations and waste treatment. This mainly concerns preventing the generation of waste, reducing the quantity of waste, and classifying the various kinds of waste.
2. In case of measures and planning with spatial consequences, the 1989 Spatial Planning Act (Rap) imposes an investigation of the impact on the environment.
3. The Environment Compatibility Act works in the same direction as the Rap. Before establishing waste treatment plants, the potential impact on the environment must be stated as precisely as possible (compare the Environmental Impact Assessment in The Netherlands).

Within the scope of the Acts stated under 2. and 3, a location analysis (Standortanalyse) should be drawn up for selecting the location. Based on six aspects, an assessment is made whether the proposed plant meets the criteria with respect to spatial planning.

Within the framework of plan definition, the public nature in licensing procedures has been regulated through public participation. This in turn has been regulated in the procedure for the proposal and making available for public inspection of the documents to be investigated, including documents like explanation, calculations and measurements, plans and expert advice. At the incentive of the official bodies, the plan is subsequently explained in the municipalities where the proposal is further worked out. Every person whose interests are affected by the proposal now has the possibility of depositing changes in writing or of proposing changes in documents (minutes, reports, etc.) with the relevant body. The bodies involved will also collect attitudes of people. After completion, the act prescribes a period of time for explanation during which time there is once more the opportunity to bring to the fore objections and complaints. After the new or changed viewpoints have once more been investigated in relation to the filed plan, the latter is officially established. Under the influence of changes in legislation, the active participation by the citizen on
the decision-making no longer occurs at the end of the process. However, because of the large number of bodies involved and the various ways in which they participate in the process, the active participation of the citizens often remains marginal.

In addition to this, the citizen is often rebuked for not having any understanding of waste incineration, for responding emotionally, and for only concentrating on his own interest.

Another aspect of importance is that the German administrative law prescribes that, before an official order is issued that affects the interests of third parties, this third party has the right to express himself before the decision is made. To this end, the body treating this matter must go over and explain the matter to the persons involved. A period is stated for this in the law (Erörterungstermin). This, however, gives no guarantee whatsoever that the persons involved are not confronted with a 'fait-accompli'. Hufen (1991) and Kopp (1986), quoted in Gleim-Egg, page 208 (.), therefore point out that in applying this act all public and private interests are to be recorded and that also the alternative solutions must be stated and explained. A good term of explanation should meet the following conditions:

- Spokesmen of all parties involved should be present.
- The sequence of contributions by the spokesmen should be made clear both before and during the hearing. Attention should be given to the fact that all persons involved get a chance of speaking at the time desired by them.
- The hearing should take place, as much as possible, based on subjects.
- The chairman of the meeting must operate strictly neutral, must keep fully to the rules and only intervene on formal or business grounds. It is of great importance that all parties have equal chances to raise their problems.

Some cases
Scharpf and Fisch have followed and analysed the following case.

In the period 1987-1992, the Baden-Wurttemberg government has tried to establish a waste incinerator for special waste in Kehl/Rhein. Location analyses performed long before showed that this location was favourable. However, despite the great input by the participants, the efforts were not successful. This result was caused by several concurrent developments. In the course of the process, changes were made in the planning that caused NIMBY-like response. First of all, this concerned the idea to construct the incineration plant in collaboration with France. This would mean the closure of the already existing plant at Strasbourg. Later, the same attempts were made with respect to a plant elsewhere. In 1990, organized citizens proposed a draft plan in which incineration of special waste would become superfluous (Vermeidungszwang).

At the end of that same year, the Umweltministerium issued the ‘Sonderabfallkonzept 2000’ in which, besides avoidance of this kind of waste, provision was made for two incineration plants, one of them to be established in Kehl. In 1991, a working party of experts proposed to set up a temporary storage facility (with potential waste disposal elsewhere) in anticipation of better technology. At that moment, EU delegates proposed a one-year moratorium. In the negotiations for the formation of a new county government in 1992, it was decided in the same year to interrupt the planning procedure and meanwhile to intensively look for a new German-French location. All proposals (13) together show the difficulty of establishing such a plant, from a political viewpoint, specifically if the government commits itself to a specific location in an early stage and becomes simultaneously the largest shareholder (because of lack of interest by other parties).

A survey of all measures and events recorded indicates that between 1987 and 1992 156 of the total 202 responses were brought in by the opponents in Kehl, as opposed to 24 by the government of Baden-Wurttemberg. The initiator accounted for only 1 of the responses. The method of working was of a dialectic nature rather than that it tried to find solutions. Remarkable in this respect is that the opponents shot their bolts only in the last six months of 1992, in terms of public fighting of the plans. An explanation for this was given in research conducted by Peters, Schutz and Wiedemann in which they found that the knowledge level with respect to the problem of opponents and doubters strongly increases only after some time, while the level of the
supporters is higher in the beginning, but increases at a less intense rate later on. Acceptance management and/or conflict management used by the official and administrative bodies can hardly work, the more so since the fighting was done at several levels.

In collection with this case, Schalpf and Fisch reached a number of propositions to which we will refer later.

In the Nordschwarzwald region, citizen participation in a waste treatment project was built in in three stages. In the first stage, it concerned the destination of the waste quantities to be expected. The second stage concerned the manner of technical processing of the residual waste, while the third stage dealt with the location for the selected technical plants.

The first stage.
The first stage dealt with comprehensive organizational matters, including project definition and recruiting of participating groups which would be utilized in a mediation process. A scientific group and a regional consultative body were created as advisory bodies.
The first group came about through an advertisement in the regional newspapers. The criterion for participation was a lengthy involvement in the execution of the project. Based on the work load itself, many people opted for an observer's status as informed group. By separating this group from the ones that really wanted to be kept involved, the groups participating in the discussions were considerably limited. In the "consensus conference", all participants only received the forecasts (specifically with respect to the waste quantities and composition) of the engineering consultants’ office called in, although everybody could investigate the starting-points. During the sessions, however, the majority of the participants regarded the forecasts given as too uncertain.

The second stage.
In this stage, all groups were requested to reveal their views and criteria under lying their opinion about the residual waste treatment technologies. In consultation with the group representatives, a "value tree" was drafted, from which a long list with criteria was derived. Simultaneously, the necessary expert knowledge was transferred through information exchange. The meetings were also open to the colleagues of the persons participating in the mediation groups. At each session, the differences in the propositions were thus bit by bit "minimized". It concentrated on the selection from four basically different options:

- Purely biological-mechanical treatment;
- Only thermal treatment;
- Incineration with preliminary biological-mechanical plant (volume reduction);
- Treatment as to type of waste, each according to "hot" or "cold" (splitting).

All groups established that both the "cold" treatment and "incineration" had its advantages and disadvantages. The majority advocated the biological-mechanical treatment at a high technological level These people were conscious of the fact that a former alteration of the law forces the "Gebietskörperschaften" to find locations for waste incinerators. Three groups could not fit in with this and advocated regional waste incineration.

Stage three.
Therefore, suitable locations had to be found for both the biological-mechanical treatment and the incineration plant. As soon as the engineering consultant office has selected 12 locations for the biological-mechanical treatment and five locations for incineration, the lay advisers of the potentially involved municipalities can select the locations. From each municipality with a potential location for residual waste treatment, approximately 20 people, divided among the working parties, will participate. These people will function as a citizen panel in the recommendations for a location. The opinion of the citizens will be taken along as a recommendation in a conference of delegates from the groups. It is expected that the participating citizens will also bring their own municipality up for discussion as a potential location. From this it can be derived that the demands on the alternative chosen are high. The result is always made public.
Scientific support
The process has been supported by external and internal observers. External people, for example, did the reporting on the relation between the mediation groups and the delegates. The project will be a success when the different groups and citizens concentrate on the business aspects, but remain value-oriented. During the third phase, a "Group Delphi" method was used in selecting between "cold" and "hot" treatment. This is a way to confront experts (who have been pushed forward by the various parties) with each other in a reasonable manner. The disadvantage of consulting experts (i.e. that they always disagree) may thus be circumvented.

2.4 Situation in the United Kingdom

The Development Plan in which the location of waste treatment has been incorporated, falls within the second part of the 1990 Town and Country Planning Act (TCPA). The term refers to two documents that must be dealt with together, i.e. the structure plan drawn up by the County Council, and the local plan drawn up by the District Council. The first plan concerns the county's strategy, the second to the individual districts within the county, and gives a number of recommendations and prepositions relating to specific locations. Additionally, the County Councils outside Greater London and urbanized areas are responsible for the plans with respect to the local winning of raw materials and waste storage facilities in their areas. In Greater London and urbanized areas, there are "unitary development plans" drawn up by the London Borough of Metropolitan Borough Council. These plans are a combination of structure plans and local plans including those for waste treatment. The characteristic here is a decentralized and integrated working method.

The status of the development plan should be evaluated in conformity with the same Act which makes it impossible to deviate from it, without specific explanation. In addition, an article has been implemented {section 70 (2)} that aims at concentrating on the acceptance of the development that has already been started off.

A second important Act is the "Environmental Protection Act, EPA" (1990). This act provides two forms of environmental protection. Industries and large incineration plants fall within the "Integrated Pollution Control, IPC" executed by "Her Majesty’s Inspectorate of Pollution, HMIP". When the pollution is limited to the air, the activity falls within the "Local Authority Air Pollution control, LAAPC", using the HMIP standards. Each permit issued by one of these bodies takes it that the initiator uses the "Best Available Technology not Entailing Excessive Costs, BATNEEC"; this means that economic considerations are also a factor. With respect to the testing of the two forms of legal control, a legal testing was performed by the "High Court" causing a number of imperfections in the EPA to become visible.

Provisions with respect to "Assessments of Environmental Effects" (in the Netherlands: Environmental Impact Assessments) have been included in the "1988 Town and Country Planning Regulations". A waste incinerator for hazardous waste and special waste (e.g, hospital waste) always requires such a procedure.

Procedural and judicial aspects
Generally speaking, the structure of the investigations (four cases) regarding the" procedures followed provides a correct description. It is, however, remarkable that a distinction is made between important parties (initiators and planning and local authorities) and other interested parties, including eco-activists and people living in the neighbourhood, organized or not. In contrast to the German approach, importance is attached exclusively to the input by other parties at the local level although their contribution is designated as "important". In their research into the legislation and the procedures with respect to the application of the EPA Act, Cuckson and Wells (1995) reached the following conclusions:

-Lack or want of "environmental statements";
Late changes in complicated prepositions;
-Question marks with the possibilities, or their lack, of people living in the neighbourhood and other parties with respect to their fights to be heard,
-Doubts with respect to supervision of the planning and the pollution under the EPA regime, considering the problems that have arisen about the procedures and judicial aspects in a number of cases, resulting in discontent, delay, and extra costs.

One case in relation to others
An illustration of the difficulties experienced by local planning and waste policy bodies because of fierce public opposition is the preposition made by the Hampshire County Council for a large-scale waste incinerator with energy recovery in Portsmouth. This case is presented in detailed in a report to ETSU by the Centre for Hazard Risk Management of the Loughborough University of Technology. This report states that the fiasco was caused by a combination of:

- Policy, institutional and procedural problems;
- Problems related to “people” in the sense that it was not sold in the right manner to the people so that a basis was lacking.

The County Planning Officer, in this respect, made the following statement.
3,902 petitions were filed against the local plan to establish a WTE plant. These petitions indicated an obviously deeply felt public concern for a WTE plant, and the way in which the public was informed about it. The opposition was clearly organized and there was a widespread misunderstanding about the role of this plan as a land use plan document in relation to the Waste Disposal Plan (in preparation) and the Waste Disposal Contract -despite the fact that these are clearly separated in the plan. As a result, the Waste Disposal Contract did not take place, and the City Council had to revise its policy regarding waste disposal. Seddon-Brown (1997), however, states in 1997 Environment Strategy Europe that the Community Advisory Forums established by the Hampshire County Council are making progress.

These forums are composed of people living in the neighbourhood, pressure groups, and members of the business and health sectors. Hampshire conducted research using questionnaires and discovered that 82% of the respondents had the feeling that the quantity of waste was increasing, that they personally were not capable of improving the situation, and that the manufacturers were to blame for the large quantities of packaging material. After consultation, 96% of the respondents supported the Council's strategy, having a preference for waste incineration instead of landfilling. Further studies made by Cuckson and Wells showed that the public perception/response to preservation of the surroundings in assessing plans for waste incineration, strongly depend on the locations’ observed vulnerability and its surroundings. This includes the visual impact of waste incinerators.

2.5 Situation in Belgium

Within the scope of this study, there is only little information available. Nevertheless this information indicates that there is such opposition against waste incineration that for the time being landfilling must continue.

2.6 Situation in France.

In this country most planned projects in which waste incineration is incorporated, consist basically of a complete waste disposal facility connected to separated waste collection. This approach is seldom realized in this complete form, due to practical problems.

Legislation with respect to waste disposal and treatment

The definition of waste is extensively described in the Law of 1975. The following components are important:
-residues of a process, transformation or use, 
-substance, material or product that is abandoned or does not (anymore) belong to a proprietor (s), 
is disposed of.

The disposal of this waste is assured by the community and this should be done conform up to date technologies and in a correct manner in order to avoid unwanted negative side effects on health and environment. Munsch-Koch (see: Barbier 1996.) remarks that in the framework of this law it is relatively easy for the producer of waste to dump it with the help of others like transporters. The numerous exceptions in this law ment to avoid 'negligence' are making it relatively obscure by contradictory declarations and agreements. The collection of waste is most of the time licenced to a public organisation, which in its turn contracts a private enterprise.

Unfortunately the law is unclear about the organisation of reuse and recycling. This leads to a situation in which disposal is dominant to reuse and recycling. Important actors like the industry are in this way directing the costs of waste disposal to the state.

In 1992 the law has been changed and extended. The organisation of waste disposal and treatment provides a framework and is promoting modernisation in which the opportunities of diverse actors can be used to obtain a stable process with the priority for control by local communities.

The general purpose of the valuation of waste is to replace landfill by disposal. The law provides a planning organisation called ADEME (l' Agence de l'Environnement et de la Maitrise de l'Energie). Waste is now substance etc. which is in compliance with criteria of dumping with regard to state of the practice technology and /or economic drives. So the collected waste has to be divided over different treatments (composting, incineration an dumping). This will undoubtedly lead to a socially less acceptable treatment of that type of waste, which is economically not making sufficient returns. The economic driven waste disposal will often evoke negative public reactions, because the preservation of the environment has moral value in itself (Thorgensen, in: Barbier, 1996).

With respect to procedures for the establishment of an incinerator, the public enquiry (Enquete Publique) means an improvement of the law of 1983 with regard to the democratisation of public decision making and the protection of the environment. There is still a problem, however, with regard how to deal with private interests and the state of nature. The principle of legitimacy, which is embedded in this law, is the political aspiration to contribute to a 'renewed citizenship' (responsibility), combined with a democratic debate and the power to 'propose' (L-ascoumes1994). The public enquiry is often executed in such a way that added private interests are declared to represent the general interest. Contra-expertise is not allowed also, although this is the best moment to use it in the preparation phase of decision making. So distrust is built-in this procedure.

Despite the improvements of 1983 ,the public enquiry contains a procedure which regulates the information and consultation between the decision -makers and the public in such a way as if they were partners. Supportive studies are mostly not really independent and often of a very technical nature. These studies are not supposed to evaluate prior decided solutions.

Some cases.
Barbier (1996) has analyzed a number of cases of the establishment of waste disposal facilities including an incinerator. These analyses were not just directed at the NIMBY syndrome, but merely at the socio-political aspects of waste production and handling in our society. A number of his findings are relevant for the understanding of NIMBY, especially those where causes for NIMBY -reactions can be expected.

In Vernon-Grosseville was the focus of the resistance against the establishment of an incinerator was on the possible emissions of dioxin. According to the chairman of the 'Association de Defense du Cadre de Vie de Vernon' (ADCVV ) is the emission of dioxin no reason to ban the proposed incinerator, because, although there is considerable scientific doubt about the effects, administrative procedures will take care of the problem (remark of Barbier: so it is not taken care
Eight days before a public hearing there was a program on TV in which German physicians had found a correlation between the operation of a waste incinerator near by Strasbourg and the incidence of respiratory diseases and cancer in the region. During this hearing a representative of the syndicate admitted that there was no guarantee that there would be no emission of dioxin from the proposed incinerator. After the hearing the acceptance of the incinerator was much less than before, so the chairman of the ADCVV contacted one of the German physicians who sent a lot of literature among others a TNO-report on dioxin releases of Dutch incinerators. A letter from him to the French minister of the environment to set new standards was never answered. A request to the syndicate to adopt the Dutch and /or German standards for emissions of dioxin was denied. When the conflict started there were already two sites chosen. The first in relation to a large cleaner and dryer of wet residues, which would lead to extra odours next to the emissions.

This project was cancelled during the public enquiry; the second was withdrawn also because the municipal council voted against it. Finally the highest magistrate of a third village agreed to have the incinerator within his community. This was Vernon. Residents of a near -by living area immediately organised themselves to stop the project. They had two main arguments:

- The incinerator is not necessary, if there is an effective waste treatment,
- the health risks, of Dioxin!!! (see the above mentioned remark of the chairman of the ADCVV)

After a long and hot summer the major of Vernon declared that his village was no longer a candidate for the establishment of the incinerator. The argument given was that incineration did not add value to waste. This argument was in line with the French opinion that waste treatment should contribute to (economic) valuation of waste, incineration with recuperation of energy (WTE) is in line with this opinion. The planned incinerator was not of this type.

In Lyon-Rillieux incineration of waste should take care of half of the urban waste. It was proposed to be sited near by a living area called Neyron. A well organized opposition started quickly because there was already a waste dump which gave nuisance on noise and odours. The area was nicely situated and had a lot of villas. At the first public hearing there weren't many questions and nobody from Neyron was present to look at the plans. Protests arised during the installation period and continued during testing. Normally testing takes place during wintertime when most people keep their windows shut. The association for the preservation of the living area in Neyron (EPDEN) was already founded when a highway and railroad for fast trains (TGV) was constructed near by. Two aspects are contributing to the intensified protest:

- The siting of the incinerator came on top of the already existing waste dump, the highway and the railroad.
- The initiator criticised the residents of Neyron being against a project which is for the benefit -of the larger community! With respect to the first aspect this is a rather improper remark.

The incinerator near by Villeneuf d' Ascq (Lille) was planned according to a new waste disposal policy of the Communauta Urbaine de Lille (CUDL). This policy was approved by environmental organisations. This incinerator, with a capacity of 300,000 tons per year, would replace three incinerators which got obsolete. New technology would be applied (WTE) and for the siting a decision support system would be used to have minimum political interference and a maximum of alternatives. According to the newspaper Voix du Nord (17-12-1992) the following aspects are important:

- There is a need for 9 hectares of terrain,
- High electrical power should be available ,
- consumers of the generated electricity should live near by,
- good access by road should be guaranteed,
- living areas should be at a considerable distance.
- There is no differentiation between groups of people with regard to consultation.

To the surprise of the local authorities three sites were selected the same year. Because the CUDL
is for 90% owner of the territory on which the new town of Villeneuf d’Ascq is founded, this town is very dependent of the CUDL. Next to this the town is gaining approximately FF 15 million tax income a year when the incinerator is established in the community. In the mean time a feasibility study is accepted and the choice, made on a non political and technical basis was integrated in a document of a very political nature. It has been announced that, after approval of the town council, an extended public enquiry would take place in which every body could bring in its own experts and even remove expert opinions of others. The enquiry is guided by the 'Commission Locale d'Information et d'Etude Faisabilite', chaired by the deputy major. The whole operation is characterized by:

- responsibility (prescribed by law),
- to defend the interests of the town and its inhabitants.

Soon after the start of the enquiry the first protests emerge, and the deputy major has the impression he could not run the process anymore. A first negative qualification of the opponents is taking place after:

- the bad results of elections about legislation in 1993 interpreted by the deputy major as an omen for the next elections in the Canton, where the majority of the opponents were living, in terms of 'punishment' by the voters. After the elections the opponents were able to use the meetings to bring forward other subjects related to the quality of the living area. The opposition consists of two groups:
  - the gypsies living in the area in which the selected Sites are situated,
  - the adjacent residents. This group is the most important with respect to the loss of votes.

- One of the sites is 'rediscovered' as an area for the establishment of industrial activities. The combination of waste disposal and WTE is contributing to the valuation of waste and therefore acceptable. The representatives of the CUDL would not commit themselves to WTE however, so the choice for a incinerator without WTE was still possible. Despite this opportunity and the increased tax income the site was not selected for the reasons that a living area was situated downwind of the incinerator, and the site could be used for other public activities. In the end the incinerator was established on the site of one of the obsolete incinerators. A working group of politicians together with representatives of farmers, whose land would be expropriated, prepared the realization. A year after this an evaluation was performed and the results show that all the good ideas formulated at the start of the project were forgotten. There was no trace left of the 'collectivity' in the approach, only specific interests remained.

Assuming a 10% increase in waste, a collection of communities (Agglomeration Annemasse) was founded in 1986. About 100 communities participated in a plan to solve the waste problem. Eight out of twelve years it took to complete studies and to acquire the proper permits for treatments (including incineration) and siting. From the beginning there was emotional opposition from residents, citizens and environmental associations. Individual reactions were different in type and scope:

- Citizens who's opinion could be easily influenced, but in principle distrust the allocation of costs especially with regard to themselves,
- residents who become environmentalists if it serves their case. Their worries and demands are nevertheless legitimate, and should be dealt with.
- Organisations, active during the decision making period, can be divided in two types:
  - Environmental groups who have committed themselves to the protection of the local environment. They see in this case an opportunity to bring themselves into the news.
  - Environmental organisations with a structural approach and experience who are able to contribute to better solutions:
- political and individual opponents. With the first group everything is possible. The second has often a restricted approach, for instance scientists who are obsessed by the CO2 and NOx issue.
An important aspect with the emissions is the frequent formation of fog in the siting area, a second is the accumulation of polluting substances. The following effects have been looked at:

- the increase of traffic by trucks, especially safety and fumes,
- pollution of the site and surrounding agricultural areas,
- health risks, more specifically respiratory diseases, cancer, weakened immunity, and less fertility.

The health risks, being the most severe threat to people, are difficult to assess because there is not much epidemiological research in relation to incineration available in France. For cancer incidents there are only partial studies performed. Same reassuring results could be produced, however. This means that communication with the public about this subject remains difficult, because of lack of reliable data. These uncertainties should be revealed as quick as possible. On the other side standards must be tightened, based on scientific criteria, not on political pressure.

The following elements can be distracted from NIMBY in France:

- Most reactions from opponents are characterized by the expression of critics and refusal instead of reasoning on basis of arguments,
- As far as economic aspects are playing a role (loss of value of real estate), not only the loss itself is important but the perceived lack of respect for individual properties by initiators and licensing authorities,
- the establishment of a waste disposal facility or incinerator without sufficient attention for the needs of the residents is experienced by them as a 'breach of contract' between voters and chosen local representatives,
- Information of the public by enquiries has often a sudden nature, and feelings of insecurity by neighbours are, most of the time insufficiently taken into account,
- democratisation of public participation and the protection of the environment in decision making are lacking proper criteria and standards.

3. Analysis of the cases

Although the cases presented above in a concise form are rather different because of specific legislation, policy, location and history, similarities can also be found NIMBY with respect to solid waste incineration is often the result of three factors (Palmquist, 1986; Wasson and Pollack, 1987; Chiristrup, 1988; Lester and Lipset, 1988; Stump and Dorion, 1989):

- The potential health risks connected with both the ash and the stack emissions during operation;
- The negative, economic impact of incineration plants on real estate of people in the neighbourhood; this does not apply to socially and economically underdeveloped areas;
- The observed social stigma concerning unfair distribution of advantages and disadvantages for the ‘neighbours’ with respect to the initiators and other communities whose waste is being incinerated. Specifically ash treatment constitutes the largest obstacle for acceptance (Butterworth and Haikala, 1988).

In relation to what is stated above, Ladd and Laska (1991) arrive at the following conclusions:

- Neither the general concern for the environment, nor the preference for alternative technologies or techniques are in themselves good predictors for the generation of NIMBY: However, they play an important part in the assessment and first appreciation of the proposed plant.
- The opposition in the preparatory phase is usually of a rational character, in which cognitive rather than demographic factors play a role. Socio-economic and racial factors are therefore less important than was found in earlier investigations.
- What is needed is more understanding of the perception of risks connected with technical
dangers and of the role of information in the materialization of the responses during the
preparatory stage. Important factors in this respect are: 1) the level of technical understanding,
and 2) the scale of the plant.
- Considering the perception that is increasingly present among the population, i.e. that waste
incineration is a threat to both public health and safety, and also impairs economic, ecological
and aesthetical values, we should gain more insight into the social and political aspects of waste
incineration, in relation to future social developments, including waste minimization. German
literature brings to the fore that the negative perception of citizens regarding waste incineration is
often caused by the fact that they often feel victims of:
- the burden of the past, in terms of uncontrolled landfilling, the negative impact of which is left to
be solved by them;
- the waste disposal industry that aims at ‘profits’ and is supported by the licensing authorities;
- the spatial planning principles that regards matters such as accessibility, population density,
etc. of more importance than good living conditions for all.

From both the American and the Dutch literature it appears that NIMBY responses usually
become fewer, as:

- the citizens involved have an interest of their own in the activity (employment);
- the distance to the waste incinerator increases. The exception to this, however, is that
agricultural products from within the immission area are quite often regarded as suspicious;
the technique is better known and it becomes clear that once in use there are advantages for
the ‘neighbours’ (WTE);
- in the construction, attention is focused on a nice exterior of both the plant and the
surroundings.

Acceptance of municipal solid waste incinerators
In relation to the acceptance of waste incinerators (reduction in NIMBY), Scharpf and Fish (‘.)
arrive at the following propositions:

1. Early concentration of the waste problem on one or few possibilities for solutions bears the risk
that the project completion may take longer (acceptance takes longer than necessary).
2. Proposals for problem solving, starting from a concept and where a positive coupling with
various value judgements is lacking, are hard to materialize.
3. Acceptance of large-scale plants for the treatment or disposal of special (hazardous) waste is
only feasible as passive toleration by the ‘neighbours’. Acceptance and decision-making
processes will have to run parallel and must be tuned to one another.
4. Political arenas have a dominating significance in decision-making and acceptance processes,
specifically in problems connected with special waste. Because of this, official bodies have only
limited room to make changes.
5. The measures recommended in literature to increase acceptance are hardly applied. They are
regarded as unrealistic.
6. Measures aiming at the public to reach increased acceptance only work if they are taken before
the formal discussions concerning the decision-making (spatial planning, plan definition). These
measures do not work if they are taken simultaneously with public-oriented actions by
opponents. The latter group can bring to the fore their arguments more easily and more
emotionally and thus find a willing ear with the press.

The importance of the attention for the acceptance of measures is also emphasized by the results
of the research conducted by Peters, Schulz and Wiedermann (..) in which the credibility of the
various actors when assessing their pronouncements and actions has been considered. It is
remarkable that concerning the knowledge of matter and the influencing of the public opinion there
is hardly any difference between the initiators and the opponents of the establishment of a waste
incinerator. On the other hand, the opponents generally have a larger credibility with respect to the
observance of the public interest than the initiators; apparently, the latter have the image of only
striving after their own interest. The pushing through of the decision to establish a plant usually gives rise to more resistance, and thus to NIMBY responses. Participation is therefore necessary, but not a cure-all for every disease, since participation itself asks for problems (Wiedemann, Ferners and Hennen, 1991).

4. Potential approaches to reduce NIMBY

The United States of America have the most experience with NIMBY or LULU, i.e. since the 1970s. Therefore, it is no wonder that they also have the most experience with approaches aimed at avoiding and/or reducing NIMBY responses. Elsewhere too, approaches have been tried out. Quite recently, for example, in the Netherlands, the local referendum was introduced by which citizens in a town could speak out on certain policy proposals. The most important approach in this field is known under the name "Mediation". It is an approach based on mediation which goes beyond other forms such as "round table" and "forum". Conflict management has become of importance since opponents of certain plans, in relation to spatial planning, have gone to court. Because of this, procedures were at least lengthened; the costs of the entire procedure increased considerably, and quite often the initiators were faced with uncertainty about the possibility of success in achieving their plans.

The major consideration is to stop the mechanisms that lead to a situation in which business discussions are no longer possible. Here it no longer concerns the contents, but the action itself. In order to achieve this, mediation must satisfy a number of points:

- It must start at as early a point in time as possible; there must be some margin in order to be able to affect the outcome of the conflict;
- Mediators must be able to actively make contact with the persons involved; the team must be constantly available to take over the dissemination of information;
- During the course of the discussions, existing differences are stated and the discussion becomes objective;
- Breaking open a close group of insiders is done by early publicity; the planning is made public: long before the official term. This is done in "round table" discussions with representatives of relevant groups;
- To enlarge the margin of the "round table", it can be established that the decision concerning the granting (of permits) is available for persual by advisors;
- Regular circular letters or brochures can clarify the results. The entire Mediation process is under the management of a chairman who can communicate very well, can mediate, and specifically is and remains neutral. In his work, he is assisted by a team of experts of various disciplines. Subjects and proposals are narrowed, in a number of stages, to the decision to be made.

The application of this working method has gone well in a number of cases (e.g. the Alaska Pipeline), but may also fail sometime in the future. It is important to recognize that there is no general approach that is applicable to all cases. In addition, be sure that the participation is voluntary. The approach is successful if it leads to a win-win situation for the entire plan. The purpose of Mediation is and remains to break open the 'black box' of the planning and co-ordination stage between the initiators, authorities and citizens, and to clarify the decisions (Fisch,..) (Gross, Kleesiek and Herger, 1995-96).

Forum is a form of discussion in which independent experts concerning the subject try to reach clarity about their views. This discussion is often held via a journalistic approach. Articles obtained through interviews are published in (local or regional) newspapers and responses are expressly requested {Duffy and Craven, 1997}. In general, this approach is not penetrating enough to solve problems about the establishment of municipal solid waste incinerators or to lead to good compromises. It is mainly considered to be a supportive tool.

Focus group is an approach that is used in case of a large number of various groups participating. Use is made of a small group of delegates per group of people involved; the larger the
involvement, the larger the effect on the procedure.

"(Group) Delphi" can be used to consult experts in a sound manner. The characteristic point in this approach is that the delegates concerned do not meet each other. Each group or individual member draws up his/her view which is submitted to the other members. Therefore, there are no direct discussions. Again and again, the views submitted are commented on, and thus "refined", until a more defined picture comes into being. The question, however, is whether this method also works with non-experts and whether in the long term there will be a way-out for emotions not spoken.

5. Conclusions and suggestions for further approach

From the above, it can be concluded that the NIMBY happening is a complicated matter in which not only specific demonstrable shortcomings in decision-making concerning the establishment of municipal solid waste incinerators play a role. Although successes are certainly at stake, there is also the consideration that, in many cases, the opponents have lost because the intended plans (ultimately) have often been realized. On the other hand there are indeed real successes in the sense that many of the initial plans, under the influence of opposition, have been modified. In those cases where no consensus could be reached, this was mainly a matter of (sometimes considerable) delay. Because of these consequences, a number of processes have again been put into operation, i.e.:

- Adaptation of relevant legislation and measures, usually leading to shortened periods for public enquiry procedures, but also enforcement of the principle of justice, in addition to negotiations;
- The policy emphasis more on waste avoidance/minimization than on treatment and disposal;
- Utilization of representatives of 'neighbours' in as early a stage of preparation and planning as possible;
- Increased acceptance by developing various alternatives; special attention should be devoted to conflicts emerging from different choices.
- Reduction of NIMBY by as equal as possible a distribution of advantages and disadvantages, compensation playing a major role here, especially when loss of private value is recognised.
- From the beginning, an open and honest communication about the plans and their consequences for the surroundings. As soon as this starts one should be prepared for increasing involvement of people.

It is important to recognize that planning and decision-making processes cannot proceed unanimously and linearly, if one wants to take into account the responses of the 'neighbours' and opens opportunities for changes in the plans once introduced. In that case, ‘feedback’ in the processes should be considered so that stations that have been passed must be visited again. The schedule below indicates how such a process could look like (see also: Schwarz et al, 1994). In this respect, it is essential that one does not primarily start from the goals desired but rather that the consequences to be expected are the starting-point for the process. This must be followed by room for exploration, also with respect to the responses to be expected from the 'neighbours'. This room will have to lead to the development of alternatives, after which suitable projects (solutions) can be selected. It may very well be that the first selection does not provide the desired solutions (that are acceptable to all people involved); in that case, the process must be carried through once more. After this selection, one can focus on the acceptance of the proposed solutions. As a first step, the room for involvement of the various groups should be investigated; this room should be as large as possible. If this has happened, the real cooperation to potential projects will then be organized. This gives insight and commitment to the further course of the process. Insight and commitment give the possibilities for a promising realization. Sometimes this stage may also have to be carried through twice. The stage ends with decision-making about the project to be conducted, followed by the implementation stage. In this stage, there is a need for controlled introduction leading to the organization of the selected project. This is followed by a realization of all aspects relevant to the selected project. As much experience as possible is gained, in the sense
that information is gathered from experts and that an assessment is made of the manner in which the operation will take place (see, for example, Brown Fields where an inspector designated by one of the occupants evaluates the daily operation of the waste incinerator).

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Abstract

In the realisation of waste facility projects, waste managers are sometimes confronted with massive resistance by the local population. At first glance, the position of project managers and the attitude of the local population seem irreconcilable and incompatible. Even though most people acknowledge that waste treatment plants are necessary in today's society, nobody wants to live in the vicinity of such a facility. On the following pages, the author outlines the reasons for this so-called NIMBY behaviour and describes several possible solutions to the problem. It is up to the facility planners and waste managers to create and promote acceptance for a project. The key word in this context is communication.
1. Introduction

In the planning and realisation of waste management projects - and especially when it comes to siting – we may often experience an attitude of disapproval manifested by the public regarding the facility and the location in question. This attitude is wellknown as the not-in-my-backyard syndrome or more commonly as its acronym – the NIMBY syndrome.

However, the phenomenon is not limited to the field of waste management but occurs quite often in various forms in infrastructure-enhancing projects. It is obviously not specific to siting a waste treatment facility but may be experienced in the planning of highways, railway lines, industrial plants, shopping centres, high-voltage lines, jails, refugee camps and other facilities.

Furthermore, the NIMBY syndrome is not restricted to structural questions on a local level. Instead, it is sometimes even characteristic of the behavioural pattern between regions and entire nations (considering, for instance, the transport of waste from industrialised nations to economically developing countries).

Empirical evidence indicates that there are certain characteristics of the NIMBY syndrome which can be generalised. In this presentation, some strategies and techniques for dealing with this phenomenon will be developed, structured and depicted in an abridged form as they relate to waste management.

2. Preconditions

It seems that the negative attitude on the part of the population is not an automatic social reflex but a behaviour that is conditioned by several factors.

2.1 Division of Labour

The existence of the NIMBY syndrome may be attributed to our system of divided labour. Only in such a functionally divided system a group has to accomplish tasks for the benefit of the general public that are undervalued or considered disadvantageous. In an autarkic system with small structures and local self-sufficient solutions, contributions to the prosperity of such small communities are usually divided equally. The critical inequality of charges does not occur.

2.2 Cumulative Effect

Waste management projects are normally designed for a relatively long-term period. The long operating life of a waste treatment or final disposal facility has a lasting effect on the area in question. The inhabitants of the affected region do not simply have to face an interim solution that will disappear in the foreseeable future. Moreover, experience has shown that the first step towards devaluation of a location brings about another unpleasant effect: since the area is already adversely affected and devalued, it is predestined to be chosen as the location for even more unpopular projects - with resulting additional strain and further devaluation. This seems easier than burdening other, so far unaffected areas, but it leads to an undesirable cumulative effect.

In addition, such an area is subject not only to an economic but also to a social devaluation. After some time, the area in question is therefore likely to be increasingly inhabited by social groups with less political influence. Project managers may proceed on the assumption that they will encounter less resistance against their project in such an area.

1 Cf J. Petts et al.
2.3 Economies of Scale

Growing returns to scale or – inversely – the unit-cost reduction as capacities and volumes increase act as economic incentives for the construction of large, high-capacity facilities with supra-regional catchment areas. This development reinforces the effect of an unbalanced allocation of burden and leads to a reference loss and to alienation: the public is too vague a notion and too hard to identify to be the recipient of such a sacrifice. At the site, the general feeling of well-being and contribution to a public policy is lessened and people complain about waste tourism.

2.4 Democracy

One of the preconditions of active disapproval with an actual influence on the results is that people have a say in the planning and realisation of a project, be it legally constituted (e.g. in the form of legislation regulating the construction of such plants or in the form of environmental impact analyses) or as a result of public articulation. As soon as people assume, discover, or take for granted the existence of a connection between their negative attitude and the successful prevention or modification of a project, they are much more motivated to put up resistance. Contrary to autocratic systems, democratic systems provide their citizens with various legitimate instruments to reach their goals and protect their interests.

This aspect of democracy is also obvious when considering that there is seldom a simple "right" or "wrong" position as siting decisions and its refusal are concerned. Projects are not considered objectively as long as there is no consent on a political and social level about common values and objectives the significance of the project, its quantitative targets as well as about criteria for evaluating alternatives.

3. Characteristics

3.1 Subjective Disadvantage

The NIMBY syndrome is characterised by the subjective feeling of being put at a disadvantage due to the realisation of a specific rejected project. It is expressed in the endeavour to redirect the disadvantage and strain to other, mostly unspecified individuals or groups. Almost as a rule, no reason can be given as to why another group should accept the disadvantage or why another location is actually more favourable than the proposed one.

The feeling of being put at a disadvantage remains as a net effect as possible subjective advantages are counterbalanced by the negative overall impression. There is no need for the existence of an ascertainable objective disadvantage for the NIMBY syndrome to occur. Nor does the rejection of the facility simply dissolve into thin air after the dice have been cast, e.g. with a positive result of the approval procedure, with the beginning of the construction of the plant or after starting up operation.

3.2 Connotations

The general public regards waste treatment processes and waste management projects not merely as technological or economic processes. Instead, they are associated with concepts and emotions. The connotations are in many cases unfavourable.

The term „waste incineration“ for example, does not only refer to a waste treatment process or a facility, but is inextricably linked to a number of more or less vague notions: people believe the plant will lead to an increase in the volume of traffic and an increase in exhaust fumes and noise exposure due to waste delivery. They are afraid of resulting emissions of unknown harmful substances, e.g. the formation of dioxins. They fear that nobody will care for waste reduction any more. They associate the term with waste barons, power industry, large-scale industrial groups and conglomerates, profiteering and a specific economic, eco-political and socio-political attitude.
Waste incineration - originally just a waste treatment process – is very often associated with a whole complex of troubling concepts and forms a connotative system.

3.3 Leverage Effect

On the strategic level it makes a substantial difference whether the inhabitants of the affected area basically accept the problem and the proposed solution and are just trying to avert negative effects on themselves or, on the other hand, deny the problem as such or reject the solution in question. The connotations mentioned above often intensify the natural inclinations of the individuals. Those who reject the project want to prove a point that goes well beyond the question of location. They use the specific occasion to produce a far-reaching result and lasting effect. The negative attitude turns into political leverage.

There is a popular acronym for this sort of attitude, as well: BANANA – Build Absolutely Nothing Anywhere Near Anything.

In the field of waste management, the topic of waste avoidance and waste minimisation is a well-known phenomenon in this context. Some people claim that an increase in waste treatment capacities (not only in the case of the plant in question, but in general) removes the very obstacles to an unimpeded increase in the quantity of waste. In their view, the construction of new waste treatment plants is not a viable solution. Instead, they believe in waste prevention by creating disposal bottlenecks.

However, this point of view does not take into consideration the fact that new plants do not necessarily increase treatment capacities but sometimes simply replace older facilities that do not meet existing environmental standards, redirect mass streams to more favourable disposal methods or, by reducing, relocating and pooling capacities, create a decline of unit cost or produce economic and ecological synergistic effects. Moreover, waste reduction as such is not so much a goal of sustainable waste management as it is an instrument or a policy, although an important one.

4. Policies and Strategies

During the last decade, waste managers in several industrialised nations have increasingly realised the need to create wider acceptance for their projects. Hence, the concept of waste management has been enlarged to cope with its functions in the economic and social environment.

While the commercial sector of waste management mostly uses standard processes of service marketing, specific strategies have been introduced in the siting process to enhance acceptance of the treatment facilities.

4.1 Change of Perception

The way in which people perceive the project in question is a central basis for their feelings and attitude. Perception is filtered through knowledge and assumptions respectively. It is evaluated with the help of the personal structure of values. Thus, it can not be independently controlled but actively influenced from the outside.

4.1.1 Aesthetics of the Project

The systematic use of aesthetics is so fundamental that it should be considered as a communicative factor of hygiene. This factor does not necessarily result in the success of a project. If it is neglected, however, failure seems to be guaranteed.

With the help of the external appearance, the facility planner is able to communicate contents and associations such as openness, transparency, cleanliness, professionalism, modernism, or
environmental awareness and responsibility. "Clear stack"/ "White stack"-considerations for MSW incineration, for example, apply to this domain. In this context, it seems to be essential that there is no difference between the declared attributes and the technical performance of the facility.

In addition, new architectonic concepts of waste facilities follow a perception-oriented facility design that - as opposed to superficial embellishments - actively and systematically reduces the visual impression on the surroundings. A complex aesthetic approach goes even beyond the physical appearance of the facility: The "striking solution" fascinates through its farsighted and responsible approach, its innovative methods and through the aesthetic design of its interplay.

4.1.2 Trust-creating Measures and Objective Assessment

Successful examples of site planning show the importance of confidence-building measures and of imparting serious information from reliable sources. Both elements – confidence-building measures and imparting knowledge - aim at making the NIMBY group's perception of the project more objective.

Knowledge constitutes the cognitive element in the perception process. To impart information about the project, its background, its effects and the expected disadvantages is one way to make people differentiate between subjectively felt and objectively recognised disadvantages, thus encouraging a more objective point of view and, consequently, a changed perception.

The project manager who discloses detailed information about the project gives less reason for insecurity, assumptions and distrust. An unbiased presentation of facts does not deny detrimental effects but presents them in their context. A mere visit to a similar plant and open discussions with neighbouring residents can help put individual subjective positions into the proper perspective guided by the reality and perception of others. In the end, knowledge about the context and the purpose of a project is one precondition to understanding it. Comprehension is therefore a vital element in the process towards acceptance.

4.2 Change of Emotions

Whenever emotions are involved, all strategies and tactics must react to this fact in order to be successful. Any effort to remove emotions will invariably fail as long as the actors involved are human beings. It is a futile attempt to deny, ignore or combat the phenomenon of personal feelings. Thus, a strategy will only be successful if the importance of emotions and the connotations of the project are acknowledged.

4.2.1 Notional Re-assessment

Both interest groups, planners and those who oppose the particular project, use language and terminology as tools to promote their cause. The perception of a project can be changed by simply modifying negative connotations and substituting them with more positive expressions.

In many cases, synonyms are not exact equivalents: the process-related term „waste incineration plant“ conveys a different message than „waste combustor“ (primitive, obsolete), „toxic waste incinerator“ or „major polluter“ (threatening), „thermal residual waste treatment“ (technocratic, euphemistic), „waste-to-energy-plant“ (emphasising a single positive aspect), „district heating facility“ (does not belong to the waste management sector), etc. Similar metamorphoses can be found in the field of hazardous waste (special waste, toxic waste, problematic waste etc.) and in various other fields.

4.2.2 Extended Solidarity

Increasing the individual feeling of solidarity aims at extending the feeling of unity to a larger group and to the service area of the plant. Proceeding from the assumption that the need for solving local
problems is more widely accepted, an expanded community concept can utilise this feeling of solidarity to make people accept the facility.

4.2.3 Compensation

Compensation aims at creating a counterbalance to objective and certain subjective disadvantages. In the case of overcompensation, it can even result in real or assumed advantages. In the field of waste management, compensation measures may be preferred treatment of infrastructural projects (bypasses, motorway connection), direct measures (waste disposal free of charge for the host community) or transfer payments (siting fee as part of the treatment fee).

4.3 Values and Target Change

The attitude towards a project may be seen as the result of the individual value system. The NIMBY group’s value system may be determined by values like clean air or less waste. Reducing air pollution or waste minimisation will, therefore, constitute targets of this group. But when the value system and the targets are determined by elements like disposal security and disposal self-sufficiency, job security and unemployment rates, market positions, technological lead or returns on investment, conflicts between both groups are not only possible but highly probable, though not inevitable.

Catch phrases are not enough, however, to define economic operational targets. The use of language, the notion of “target” and the degree of precision are all group-specific and often give rise to dissent. Opinions are prone to diverge when it comes to defining the difference between “target” and “measure”.

Different values and targets may, at least, be partly reconciled with the help of communication, by bringing the different positions into a constructive relation. This may also be achieved by defining priorities. Clean air as a value and clean air maintenance as a target may be integral parts of a concept for air quality conservation and purification, in which waste treatment plants contribute positively to the realisation of the target.

However, reconciliation is not always achieved. In those cases, it is still possible to aim at a modification of the value system and the priorities of the NIMBY group instead of making goals compatible. The modification of the values and attitudes of the NIMBY group is a tactical approach to surmount the obstacle of selective perception which makes them see the project purely from within their personal frame of reference. People will accept a formerly combated project when it makes sense to them (meaningfulness).

4.4 Majority Vote

Democracy is one of the preconditions for the existence of the NIMBY syndrome, and democratic instruments are legitimate tools for dealing with it. Thus, it is possible to seek the support of a majority backing one’s own position in a controversial project and to have them vote in a referendum.

Even though this way seems a mature solution, it requires careful handling: one critical question is the decision of how large the circle of persons inquired or entitled to vote should be. If there are more advantages for all other residents of the catchment area than disadvantages for the host community, the outcome is a foregone conclusion provided that all residents of the catchment area are entitled to vote. If only the host community (that may even enjoy an economic advantage through financial compensations) is consulted, but not the neighbouring community which is affected by the transit to the facility, the result of the referendum is also quite predictable.
4.5 Participation

One feature common to the methods mentioned in the previous paragraphs is their manipulative character: An endeavour is made to shift the opponents’ priorities, not the operators’ or planners’. And the formation of a majority does not question the basic design of the project, as well.

When we abandon this point of view, an entirely new field of possible behaviour opens up. Another way to try and reach agreement is the involvement of all affected parties in the planning process from the very beginning on. The group of concerned persons is not necessarily restricted to the NIMBY group. The project manager is in fact in a bargain situation. He seeks acceptance for the plans and has to decide which *quid-pro-quo* he is prepared to offer in exchange (active civil participation in planning or modification of existing plans). The success of participation models lies in the identification of planners and residents with the result.

4.6 Revision

Resistance to our plans makes us revise our own position. The NIMBY syndrome confronts the project manager with another, contrary point of view and with arguments against his own position. The attitude of the project manager will not necessarily remain plausible even to himself in all aspects since we cannot assume that every waste management project is sensible, appropriate and flawless as such.

The project may undergo major changes in the long period of planning, filing and approval procedure. Obligations will be imposed and modifications made, so that the project is embedded in an environment that has changed in the meantime, as well: factors like legislation, markets, competitors and potentials may change in the planning and construction phase. This fact is often used as an argument by the NIMBY group. Considering such arguments objectively helps overcome deadlocked individual positions that have already become obsolete and can lead to a consensual synthesis.

5. Summary

The facility planner finds himself in a confusing situation: when he raises his eyes from the flat screen and the blue prints, he sees a whirling, streaming and noisy environment where hardly anybody takes any notice of the intricacies of waste management. It is a painful awakening when his focus does not reappear in the centre of public interest since it "always worked well, anyhow": no generally recognised waste problem to which the future-oriented solution has now been found. The economic interest of the project leader will not be questioned; but the work of the engineers and their creativity as well as the visible contribution to public welfare constitute essential elements in the entrepreneurial success of the project. It must be seen as the epitome of ingratitude when people do not appreciate this but put up resistance against the project: no common language, no common targets, no common visions.

The NIMBY syndrome is one of the interfaces of waste management and the general public where the difference between planning and reality becomes evident and where reflective and communicative deficits are felt. Six basic strategies to overcome the obstacle may be the following:

**Perception:** We can make people perceive the project in a different way with the help of two factors: The design of the facility serves as communicative element and imparting detailed information about the project makes people understand the project in its context.

**Emotions:** Changing the NIMBY group’s emotions in connection with the project is another important means to make them accept it. This can be achieved by substituting terms with a negative connotation with neutral or even positive expressions, extending the feeling of unity to the catchment area of the plant, and compensation measures to counterbalance the feeling of being put at a disadvantage.
Values and Targets: We may also aim at introducing new elements in the NIMBY group’s value system so that the project makes sense also to them.

Majority Vote: Seeking the support of a majority in a referendum is another legitimate, if uncertain, method to handle the problem.

Civil Involvement: The involvement of the local population in the planning process will contribute to the desired effect of acceptance, as well.

Revision: Last but not least, we may have to revise our own plans to reach our goal.

If this experience and knowledge is incorporated in the self-image of waste management, there is a reasonable chance that we will arrive at the Happy End of the Waste Site Story.
Effective waste management is dependent upon achieving informed consensus amongst interested parties. Public concerns and opposition present a challenge to this consensus which must be tackled. This paper reviews our understanding of the basis of public concerns about waste management activities and suggests some means for dealing with these. The paper identifies a need for better understanding of the complexity of concerns, which are based not only upon risk perceptions but also a lack of trust and credibility in waste managers, decision-makers, and the decision processes and control mechanisms for waste facility siting and operation. Suggestions for dealing with these concerns are discussed relating to risk communication, improving decision processes, the control and management of waste activities, and improvement in "expert" understanding of the risks.

Key Words - Public concerns, public perceptions, risk perceptions, risk communication, waste management.

1. Introduction

While society demands responsible and environmentally acceptable waste management, governments and waste managers continue to meet opposition to the implementation of effective policies through the construction and operation of appropriate treatment and disposal facilities. This apparent divergence between the priorities of society in general and the willingness of local communities to accept facilities "in their own back yards" presents a continuing challenge to waste management strategy development: not least to the effective implementation of the proximity principle and the concept of regional and national self-sufficiency in waste treatment and disposal facilities.

Public opposition to waste facilities is usually referred to as the "Not in My Back Yard" (NIMBY) response. However, it is not only waste facilities that engender such a response. All kinds of "locally unacceptable land uses" (LULUs) (Popper, 1983) have been affected over at least the last three decades-reservoirs, power stations, radioactive waste disposal sites, motorways, airports, chemical installations, etc. Two primary characteristics influence reactions to LULUs:

(i) they are perceived as providing few direct benefits to the individual, but to present many risks; and
(ii) when proposed as new facilities in an area they are seen as presenting an unacceptable change to the status qua.

*This paper is based upon a presentation to the 1993 ISWA Annual Conference Better Waste Management-A Global Challenge, Jönköping, Sweden, 28th-30th September 1993.
Dealing with public concern over waste operations is an issue of learning to manage this unacceptable change more effectively and of minimizing risks. Over the past 10-15 years, considerable research effort has been directed to attempting to explain NIMBY reactions to waste facilities, more particularly those handling hazardous wastes (e.g. O’Hare et al. 1983, Farago et al. 1989, Wiedemann & Ferners 1990, Armour 1991, Portney 1991). The resulting large literature indicates that the NIMBY syndrome is complex. This complexity is often either not recognized by regulators and practitioners or they attempt to simplify the concerns so as to more readily identify specific management tools. Some of the fallacies about public concern include the view that there is "a public" and a "public perception" of risk, that public concern is primarily based upon irrational fears of threats to health and safety (in contrast to the supposed rationality of the "expert"), and that providing the public with more information will, help to improve the situation. While a psychological and social element is identifiable in public concern, it is primarily a practical manifestation of deeper problems, in particular a loss of trust in industry and regulators, a failure to communicate information effectively by the latter, and problems in decision-making processes which either exclude the public from decisions or involve them too late. Examination of these areas will reveal that greater attention needs to be paid to communication with, and involvement of, the public in waste management. However, the title of the paper is not meant to imply that public concerns can be dealt with to the extent that they are completely dispelled, and indeed at some point decisions will have to be taken in the interests of environmental protection and effective waste management which may not be acceptable to everyone. Nevertheless, there is an overwhelming requirement for more open debate and a greater effort to achieve a degree of informed consensus amongst interested parties. This paper is primarily based upon experience of public opposition to, and concern about, waste facilities in the U.K. The decision-making procedures of the U.K. and the extent to which they provide for direct public involvement in waste management planning and in the siting of specific facilities differ from that in some other countries. However, the fundamental nature of public concerns is unlikely to differ significantly.

2. Who is the public?

In any environmental management issue the stakeholders usually include a proponent (e.g. a developer of a new facility; a local or national government in relation to a waste management policy or plan; an operator of an existing site), and a range of interested parties, some of whom have statutory and regulatory responsibilities, some of whom have responsibilities to protect certain interests (e.g. nature conservation), and many informal "groups" and individuals who have identified that they could be affected by the issue. There will also be many people who remain unaware of the issue, or who are aware but who are simply not interested. The latter category often forms the majority of any affected "community". Figure 1 depicts the potentially interested parties in a siting decision for a new waste facility, where the proponent is a private sector operator and the siting decision is to be taken by a local planning authority. Figure 1 serves to illustrate the large range of different interests in such a decision and also attempts to show the multiple routes by which information may be communicated during such a decision. What is apparent is that much information is actually communicated outside of the direct influence of the proponent and that many people will be gaining information which might not have been initiated by the proponent and could be "second" or "third" hand by the time that it reaches them.
While it is easy to characterize everyone other than the proponent and the statutory authorities as "the public", in practice this suggests a uniformity of group, interest, knowledge, and concern that is rarely (if ever) apparent. What is usually evident is a spectrum of interests which, while they may appear to have a common theme (e.g. opposition to handling imported wastes in a local area; concern about vehicle movements on local roads), will actually be underpinned by a complex array of perceptions, experiences, and concerns, some related to waste management and some related to completely separate (local and political) issues with the waste issue merely providing a suitable vehicle for expression of these concerns. A tendency to believe that everyone in a local community will have the same agenda can lead to a misunderstanding of information requirements, and a failure to communicate concepts and plans effectively.

As different issues come to the fore, whether involving different projects or plans, or different locations, the interested parties will change. Therefore, it is not possible to approach every new issue in exactly the same manner as the last, and even during the life of a single proposal, or operation, issues will change and different groups or interests will leave or join the discussion.

3. The psychological and social dimension

3.1 Psychological and sociological research

The psychometric literature has, over a period of about 20 years, provided a valuable insight into how people perceive risks. Some of the research has to be evaluated with caution, as it has often involved surveys of small, discrete groups, and has sought to elucidate fears and perceptions, i.e. cognition, rather than to seek other explanations and examine behaviour, and has failed to take account of the context specificity of risk concerns (Slovic 1992). However, it is possible to identify common themes from this literature:
- Risks are considered to be greater for hazards which are involuntary, uncontrollable (by the affected individual), potentially catastrophic, fatal, delayed and therefore pose a potential threat to children, created by technology rather than "natural", and not off-set by any perceived benefits.
- These characteristics of risk are highly correlated. For example, risks, which are regarded as voluntary are also regarded as controllable and beneficial. Conversely risks regarded as involuntary are usually seen as being uncontrollable and a threat to future generations. Factor analysis of these interrelationships has been successful in reducing this broad set of characteristics to two or three higher-order characteristics or factors, the most important being "dread risk" (see Fig. 2).
- While risk analysts tend to apply equal weight to consequences and probabilities others tend to place more weight on consequences.

![Factor Analysis Diagram](image-url)

Fig. 2. Public perceptions of risks and influencing characteristics. Adapted from Slovic, 1987.
The public tend to view current risk levels for most involuntary risks as unacceptably high and are dissatisfied with the way in which decision-makers have made risk/benefit choices.

Alongside the psychometric literature, and partly in response to the deficiencies of the latter: there has been a developing social science consensus about risk issues which has examined the Influence of social and cultural processes on perceptions (e.g. Douglas & Wildavsky 1982, Thompson et al. 1990). The social literature not only identifies the different values and concerns of men and women, the old and young, and the influences of class and education, but also the strong influence of the cultural and social setting in which people live and where information is gained, including the influence of the media.

In one study for the California Waste Management Board, Cerrell Associates attempted to predict NIMBY reactions to a proposed facility by reference to such sociological factors. A chart was presented which identified demographic characteristics according to groups which would be most or least resistant to a proposal to site a waste facility in their community (see Table 1). The Board was advised that the people most likely to accept a facility are older, rural, farmers, while those least likely to accept a facility would be urban, young to middle-aged, liberal democrat, professionals (Glaberson 1988).

Once people believe that they are living in a situation of risk they can experience psychological and social effects, the most important of which are stress, social conflict, and direct opposition (Petts in press). Many factors will exacerbate such stress, including:

(i) fears about potential health problems (not simply a dioxin issue);
(ii) experience of environmental nuisance such as dust, odours, noise, water pollution, vegetation and plant damage, pests, etc;
(iii) fears of accidents, including involving traffic. In relation to waste activities it is apparent that materials classified as "hazardous" are often perceived by the public to be more dangerous than pure chemical products, and that any industrial (but not domestic) waste is perceived as hazardous;

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Least resistant</th>
<th>Most resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>South: Midwest</td>
<td>Northeast: West</td>
</tr>
<tr>
<td>Size</td>
<td>Small, under 25 000 population</td>
<td>Large, over 250 000 population</td>
</tr>
<tr>
<td>Community</td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>Politics</td>
<td>Conservative free market orientation</td>
<td>Liberal welfare state orientation</td>
</tr>
<tr>
<td>Age</td>
<td>Above middle age</td>
<td>Young and middle age</td>
</tr>
<tr>
<td>Education</td>
<td>High school or less</td>
<td>College</td>
</tr>
<tr>
<td>Occupation</td>
<td>Rancher or farmer; Business related; Technology related</td>
<td>Housewife; Professional</td>
</tr>
<tr>
<td>Income</td>
<td>Low</td>
<td>Middle to high</td>
</tr>
</tbody>
</table>

Source: Glaberson, 1988
(iv) decline in property values, which is usually blamed upon the industrial or waste facility or contamination issue. There are scarce data on this subject which are inconsistent and contradictory, although generally providing little or no evidence of an identifiable cause-effect relationship (e.g. Greenberg et al. 1984, Price 1988). A primary problem with any research on this issue is the difficulty of isolating specific influences upon property values and in the UK there is no known work which has been successful in isolating the effects of proximity to industrial activities;
(v) feelings of anger and frustration about the way in which the situation is handled, particularly where no-one is apparently responsible or will accept responsibility, or provide a solution.

3.2 Expert perceptions

The risk perceptions literature has tended to refer to public perception of risks with relatively little recognition that every stakeholder in a risk decision will have perceptions. The concentration upon the public has helped to engender a view amongst some experts that their view of the risks is "real", equating knowledge with reality. In practice all "estimates of risk are perceived risks as at some point someone has to make a judgement as to the likelihood of an event based upon incomplete knowledge and understanding. Different experts will make different judgements based upon their training, experience, interests, etc. (Freudenberg 1992). Overconfidence in the ability to foresee all possible failure modes, a failure to foresee all system interactions and interdependencies, overconfidence in technology, and a tendency not to acknowledge the statistical vulnerability of low-probability estimates, have been readily identified in critiques of expert judgements. This overconfidence of the expert has contributed to the logs of credibility in industry and governments, and highly visible (albeit understandable) disagreements amongst experts of risk estimates serve to support this.

4. The trust and credibility dimension

4.1 Trust and institutional control

In a discussion of the influence of NIMBY on the siting of waste facilities in the U.S.A. Hirschhorn (1984) referred to the "confidence gap" between lay people and industry and regulators. He saw the resolution of NIMBY as requiring restoration of public trust and confidence in regulatory control and management ability. A decade later the same observation still holds. In the U.K. this problem of a lack of trust has been seen to involve three components (Petts 1992):

(i) A lack of trust in the private sector waste industry to consider safety and the environment as seriously as making a profit;
(ii) A lack of trust in fragmentary policy and regulatory systems to produce any coordinated and coherent strategies for managing risks; and
(iii) A lack of trust in different regulatory agencies and plant operators to monitor facilities effectively.

The first problem has been manifest in at least one U.K. siting dispute when members of the local community expressed a preference for an incinerator to be operated by the local authority rather than a private company (NOP Market Surveys 1990), even though there has been expert concern about the operation of some municipal incinerators in the past. There has also been
evidence that "in-house" waste facilities designed to handle only the particular producer's waste are more acceptable than merchant facilities.

When there are few opportunities and requirements for regulatory authorities to develop coherent, coordinated, consistent and interrelated plans, programs and guidelines for managing waste, the resulting fragmentary regulatory systems can lead to jurisdictional conflicts about which agency or authority has the ultimate responsibility, managing a risk (Covello 1992). In the U.K. some conflicts have been evident between the local land-use planning regime which provides for direct public access to, and involvement in, both plan formulation and individual siting decisions, and the system of authorisations and licences for waste facilities, which while open via a register public consideration, provide for more passive public scrutiny. Some planning authorities have attempted to duplicate the controls of the pollution control authorities, aware of the direct accountability of their decisions to the public and the need to be seen dealing with pollution issues effectively (Department of the Environment 1992). Certainly it is clear that planning authorities cannot ignore the implications of new developments in favour of available pollution controls which in the main do not provide for the same extensive preventative consideration of all environmental impacts.

A refusal by the local authority of an application for a hazardous waste incinerator at Seal Sands, Teesside (north-east England), included as one of the reasons the fact that the granting of planning permission was premature until waste regulation ad monitoring was improved and the waste disposal plan for the area was reviewed. The incinerator has subsequently been granted permission by the Secretary of State following an appeal by the applicant and a public inquiry (see Petts & Eduljee 1994).

Concern over the ability of authorities and operators to adequately monitor facilities has been seen to contribute to opposition to both the siting of new plant and the continued operation of existing plant. Compliance monitoring is generally restricted to the monitoring of process and equipment conditions, performance against agreed standards, and selected (limited) environmental variables. Monitoring for impact detection and as a basis of a detailed understanding of the nature and severity of environmental impacts and changes has suffered a number of problems: (i) it has tended to be intermittent in response to particular problems; (ii) resource allocations have been subject to change as different issues and priorities have come to the fore; (iii) where potential impacts are of multi-agency interest there can be conflicts of purpose; and (iv) the timescales required for the detection of certain impacts may extend to decades (e.g. health impacts) or even to centuries (e.g. certain hydrological changes). Operators and proposers of plant often place much emphasis on the role of monitoring to detect potential problems, yet local communities do not necessarily view this as an effective method of control (Petts & Eduljee 1994).

4.2 Trust and individua/s

Trust and confidence in industry and governmental sources of information derive from perceptions of competence and expertise, honesty and openness, and dedication and commitment (Covello 1992). An understanding of how different parties, and individuals representing these parties, are viewed and judged is essential to improving information provision and risk communication. Perceptions of competence and expertise are largely influenced by an organization's environmental record, and by the spokesperson's merit factors such as track record, experience, presentation skills, education, professional recognition, and independence. "Who" is communicating is as important as their message. Covello (1992) refers to a 1991 US study which reveals some interesting information as to who the public regard as credible. The survey results split various stakeholders into three groups - from the most trusted (the top third) to the least trusted (the bottom third)-as follows:
• **Top third** - physicians and other health or safety professionals; academics, especially from respected local universities; local citizens who are perceived to be neutral and well informed; non-profit making voluntary organizations; non-management — employees.

• **Middle third** - the media; environmental groups

• **Bottom third** - industry officials; government officials; environmental consultants from profit-making firms.

The groups of people who appear to be least trusted in this US study interestingly include the very group who industry often chooses to use in order to boost its perceived independence, i.e. environmental consultants. It is possible that a similar study in other countries may not reveal such lack of trust in environmental consultants. However, experience of the growth of the consultancy market and problems in maintaining quality in a large market are problems with which other countries are familiar.

As a lack of confidence accumulates over time the willingness of the public to assess new proposals and risks decreases (Armour 1991). Once trust and credibility is lost experience indicates that it is extremely difficult, if not impossible, to regain. Covello (1992) questions whether the loss of trust in government can ever be regained.

### 5. The information dimension

#### 5.1 Information and NIMBY

Many industrialists have (in the past at least) seen the NIMBY syndrome as a public relations problem, the answer being to provide people with information. However, some recent research which has tested this theory indicates that the more people know, in terms of non-technical but issue-relevant information, the more likely they are to exhibit NIMBY attitudes: i.e. knowledge and awareness increase public resistance to waste facility siting (Wright 1993). Environmental values and concerns are preexisting and knowledge and information are not going deter or change concerns. This would appear to have serious implications for the potential success of any attempt to deal with NIMBY which is based purely on presenting people with information. However, this is not to suggest that providing no information is a solution. Rather there is a need to consider the type and form of information which is provided and the extent to which people can be involved in discussing and analysing information, rather than simply being passive recipients.

The World Health Organisation’s guidance on hazardous waste facility siting identifies five common mistakes in dealing with the public: i.e. (i) use of the "hard sell"; (ii) attempting to redefine the public agenda; (iii) approaching the public too late; (iv) leaning too heavily on the facts; and (v) failing to tailor the information to the audience (Sloan 1993). These mistakes indicate fundamental flaws in information provision, relating to both the manner in which information is framed (i.e. providing what the expert wants the public to hear) and the inherently one-way nature of information provision.

In dealing with any waste management issue, or indeed any other substantive issue, interested parties often have to deal with more detail and nuances than they can readily handle at any one time, simply because it will usually be one of many different issues which they are having to consider (Hall & Crawford 1992). For any person who is not directly involved in, or responsible for, the design and assessment of the proposal, or who has to consider and weigh all of the issues, there is a tendency to simplify the situation so as to be able to cope with all of the information. Thus, rather than considering safety as a continuous variable, the public want to know whether the plant is safe or unsafe, or whether the landfill will or will not pollute the...
groundwater. In handling information they tend to rely on past experience, the media, friends and colleagues, etc., to provide some general rules and to help delineate the boundaries of the issue.

However, this simplification of specific issues does not correlate with a limitation on the number which in combination contribute to perceptions. There is evidence that the public want more than just risk information (Wiedemann & Femers 1990, Petts 1992). Information on technical aspects such as safety systems and operational detail; on the risks versus the benefits; on if, and how, the public can be involved in influencing the operation of the facility; and whether the facility is actually needed, and the alternatives for waste management are also important.

An understanding of the breadth of such information requirements is essential in both the production of effective Environmental Impact Assessments and Statements as part of the planning permission process for new facilities as well as in provision of information to the local community around an existing facility (Petts & Eduljee 1994)."

5.2 Risk assessment

The increasing attention to the use of risk assessment in waste management is important in providing a more structured and rigorous approach to facility design, siting, and control. However, a view that it helps to put risk information into perspective particularly when risk comparisons are used is an oversimplification on the part of risk analysts. Risk comparisons (e.g. a one in one million increased risk of dying from cancer in any one year is equal to the risks in that year of being killed by lightening) are widely utilized, but with little appreciation of their limitations. Risk comparisons fail to consider the broad set of qualitative dimensions which underlie people's concerns about the acceptability of risks and in concentrating on discussing risk probabilities to deal with the question "is this plant safe?", there has been a tendency amongst risk analysts to fail to explain the inputs to, and the uncertainties inherent in, the risk estimates (Covello 1991). In the U.S.A. there has been a reported loss in credibility of risk assessment as a decision-making process, with continuing reassessments within the regulatory control system (for example in relation to dioxins) merely promoting public suspicion of the validity of the numbers being generated (Silbergeld 1992).

6. The decision-making dimension

Examination of U.K. siting decisions and also of cases of public opposition to existing waste facilities, reveals considerable debate about a number of key issues:

- The volumes and types of waste that require management.
- The best practicable environmental option for dealing with certain wastes.
- The best available or proven technology.
- Which regulatory standards should be applied to control operations (Petts 1992, Petts & Eduljee 1994).

This list suggests a number of fundamental waste management issues discussion and resolution of which frequently either excludes the public or only involves them after initial decisions have been taken by waste managers and regulators. Facility siting in particular often follows the "decide-announce-defend" model (Ducsik 1978), whereby decisions about the choice of process and technology and also the consideration of alternative sites are often taken without direct involvement of interested parties. Fundamental policy issues are usually not open to direct public consideration. Consideration of acceptable environmental and health standards and criteria is usually an entirely internal regulatory agency function with some opportunity for comment and
input by key agencies, but exclusion of other interested parties. Therefore, not only are the public excluded from direct involvement in key waste management decisions which concern them, but these decisions are taken by parties which the public fundamentally mistrusts.

7. Dealing with concerns

Most decision systems in Europe and North America provide for public participation in decision-making for new facilities, particularly through requirements for Environment Impact Assessments, and for the provision of information to the public on the existence and control of facilities (e.g. in the U.K. public registers of waste licences). However, it is clear from the preceding discussion that providing for public participation and for public access to information will not in itself deal effectively with public concerns. A number of more extended requirements for dealing with public concern can be identified relating to: (i) improving the decision processes for the siting of facilities and implementation of waste management strategies; (ii) improving risk communication; (iii) improving the management of waste operations; and (iv) improving expert understanding and assessment of the risks. These requirements have to be applied in concert not individually.

7.1 Improving decision processes

In the U.S.A. mediation, or conflict-building, decision approaches have been proactively adopted in relation to waste facility siting decisions (Susskind & Cruikshank 1987). Other countries have followed more slowly. However, it has become apparent that adopting traditional consultation and public participation approaches within a primarily adversarial decision process can be a high risk strategy. Public participation has to be viewed as a means of improving the quality of decision making, not as a goal in its own right (Wiedemann & Femers 1993). A key feature of conflict management is ascertaining how the individual stakeholders frame the risk problem and process information about the hazards. This is the first step in the decision process to be undertaken before the assessment process commences, before the decision as to type of facility is finalized and before a site is chosen. The next step is to involve all the interested parties in developing decision-making principles and criteria to be followed in the assessment process. The latter is the approach favoured by proponents of decision analysis (von Winterfeldt 1992).

Conflict management approaches have been used in some U.S. States to site both radioactive and non-radioactive waste disposal facilities (Susskind 1992). They appear to be particularly relevant to the situation where a public authority is a proponent, but more difficult to apply where private sector companies are planning new facilities. Nevertheless, even in the latter case there is greater scope for more proactive involvement of different interested parties (not necessarily individual members of the public) earlier in decisions such as in the scoping of issues to be considered in an Environmental Impact Assessment, in the derivation of site selection criteria, and in the identification of acceptable criteria for assessing the impacts of a facility (Noble 1992, Petts & Eduljee 1994).

The greater challenge for the application of decision analysis or conflict management approaches is in the derivation of waste management policies and strategies at both the national and local level. In many countries more active participation of interested parties in policy development and in the process of determining the BPEO for managing different waste streams would require changes to existing regulatory and decision making systems. The New South Wales (Australia) Intractable Waste Panel is an interesting example of direct involvement of interested parties in the decision as to whether a strategic hazardous waste incinerator should
be provided (Independent Panel on Intractable Waste 1992). In this case a NIMBY reaction could be viewed as the outcome, as the Panel concluded that public opposition to the siting of an incinerator combined with the problems of transporting waste to a strategic location meant that such a facility would not be acceptable despite the fact that for many wastes the technology is the only environmentally acceptable option currently commercially available. If NIMBY is the result of an informed and open decision process it may not be viewed as a negative outcome, although in this case it could be questioned as to whether siting concerns could lead to other environmental problems if wastes have to be stored over an extended period.

7.1.1 Risk compensation

Proponents of risk compensation see financial or other direct benefit packages (e.g. improvements to local roads, provision of leisure facilities, etc.) as a decision-process means of dealing with the NIMBY syndrome. Such measures have been used in a number of European countries in relation to the siting of waste disposal facilities (including radioactive waste) (Kemp 1989). In Japan it has been noted that local communities who would normally oppose a new incinerator, have used their opposition to strengthen their bargaining position with regard to obtaining free hot water, free use of swimming pools, etc. where plants are generating energy (Patel & Edgcumbe 1992). The reverse Dutch auction concept (Inhaber 1991) suggests that communities should be allowed to bid for facilities, thus setting their own level of compensation and this has been tried in the U.S. However, others see risk compensation as more akin to bribery, not least for socially disadvantaged communities or countries. Certainly it is difficult to see how risk compensation could deal with some of the more fundamental issues underlying public concern and it is debatable as to whether it could provide for a long-term improvement in general public response to waste management activities.

7.2 Improving risk communication

The term risk communication is relatively new to the risk management literature, replacing Information provision and public participation concepts with the view that the exchange of information, ideas and opinions, between proponents, risk experts, decision-makers and others is important and should directly contribute to management decisions (National Research Council 1989). Risk communication utilizes the tools of public information campaigns, such as information leaflets, telephone help-lines, exhibitions, open days, videos, etc., but with more careful attention to ensuring that opportunities are given to different interested parties to respond to the information and to have their views incorporated into decisions.

This requires contact with interested parties to be made much earlier in decisions: waiting until a site has been chosen for a new facility and the Environmental Impact Assessment is nearly complete, before information provision activities commence has been seen to be far too late. For existing facilities it requires attention to communication with a local community on an on-going basis and not just in response to requests for information, or when an incident has occurred or a new activity on-site is planned. Perceived secrecy over activities on sites has been seen to engender exaggerated fears and a recent report by the U.K.’s Royal Commission on Environmental Pollution (1993) on incineration of waste, has commended company liaison policies and disclosure of information and also called for a requirement on operators of incinerators to disclose information about wastes incinerated as well as emissions data. Communication requires the public to feel that they are directly influencing decisions and to be able to see that management practices and proposals are changed in response to their views. Extended communication could provide for involvement of interest groups in site monitoring, for example, providing for local schools to collect environmental monitoring data.
7.2.1 *Improving the skills communicators*

Risk communication requires more attention to the effectiveness and skills of communicators. Risk communication is effective to the degree that all actions and communications (verbal and non-verbal) convey caring and empathy, competence and expertise, honesty and openness and dedication and commitment. Interesting research suggests that in the U.S. there are male/female differences on these dimensions of credibility which can be pronounced: i.e. a women who is perceived as competent and expert outranks most men in credibility as women generally receive much higher ratings than men in terms of the other credibility factors (Covello 1992). Whether these findings would be replicated in other countries is not clear, nevertheless it serves to highlight the importance of the individual in communication.

Non-verbal communications, even on a relatively minor scale are also important. Thus, a communicator who comes to meetings, is prepared to star late to answer concerns, and who is prepared to be available to the community after hours, will be judged more diligent and caring than one who is not. In the U.K. the failure of a statutory authority to reply quickly to written consultation or to attend meetings in relation to specific issues has been seen to contribute to concern over the ability of the agency to control a facility with consequent negative impacts upon public acceptability of the proposal.

Risk communication is a skill which has to be acquired and should be an inherent component of the training of managers and others in companies and regulatory authorities. At the agency and authority level prospects for establishing high levels of public trust and credibility seem modest even with major proactive attention to risk communication training and activities, although they are likely to be better at the local rather than national level. The U.S. Environmental Protection Agency has published a set of seven rules or guidelines for effective communication (Covello & Allen 1988) which are summarized in Table 2. The Agency has also initiated a programme of enhanced community relations and extensive field testing of communications material.
7.3 Improving waste management

If treatment and disposal facilities are to be seen as the solution to inappropriate wastes handling rather than as a problem then they must be adequately controlled. While there are poorly run facilities they will help to provide the foundation of opposition to new facilities in other locations. The power of the media image of inappropriate and unsuccessful control cannot be underestimated. The required improvement in waste management has three dimensions: (i) control of specific facilities in terms of day-to-day good management practice to minimize nuisance problems and on-going control to prevent accidental occurrences; (ii) effective facility (at source), and ambient environmental, monitoring which goes beyond simple data collection for

TABLE 2
Seven rules of risk communication

<table>
<thead>
<tr>
<th>Risk communication rules</th>
<th>Considerations and guidelines</th>
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<tbody>
<tr>
<td>1. Accept and involve the public as a legitimate partner</td>
<td>Demonstrate respect for the public</td>
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<tr>
<td></td>
<td>Involve stakeholders early</td>
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<td></td>
<td>Emphasize sincerity of effort</td>
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<tr>
<td>2. Plan carefully and evaluate effort</td>
<td>Begin with clear objectives</td>
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<td></td>
<td>Evaluate risk information</td>
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<td></td>
<td>Know own strengths and weaknesses</td>
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<td></td>
<td>Classify and segment audience</td>
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<td></td>
<td>Recruit &amp; train good communicators</td>
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<td></td>
<td>Pretest effort and then evaluate effect</td>
</tr>
<tr>
<td>3. Listen to people’s concerns</td>
<td>Listen carefully and attentively</td>
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<tr>
<td></td>
<td>Take time to find out what people are thinking</td>
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<tr>
<td></td>
<td>Identify with the audience</td>
</tr>
<tr>
<td></td>
<td>Recognize people’s emotions and hidden agendas.</td>
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<td>4. Be honest, frank and open</td>
<td>State credentials</td>
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<td></td>
<td>If you don’t know, say so</td>
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<tr>
<td></td>
<td>Admit mistakes</td>
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<td></td>
<td>Disclose risk information</td>
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<tr>
<td></td>
<td>Speculate with caution</td>
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<tr>
<td></td>
<td>Discuss data uncertainties, strengths and/or weaknesses</td>
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<td></td>
<td>Identify worst-case estimates</td>
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<tr>
<td>5. Co-ordinate and collaborate with other credible sources</td>
<td>Develop good working relationships</td>
</tr>
<tr>
<td></td>
<td>Co-ordinate with other organizations</td>
</tr>
<tr>
<td></td>
<td>Use credible and authoritative intermediaries</td>
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<td></td>
<td>Use the best qualified authority</td>
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<tr>
<td>6. Meet the needs of the media</td>
<td>Be open and accessible</td>
</tr>
<tr>
<td></td>
<td>Provide risk information tailored to media needs</td>
</tr>
<tr>
<td></td>
<td>Prepare and provide background material</td>
</tr>
<tr>
<td></td>
<td>Establish long-term media relationships</td>
</tr>
<tr>
<td>7. Speak clearly and with compassion</td>
<td>Use simple non-technical language</td>
</tr>
<tr>
<td></td>
<td>Acknowledge and respond to people’s emotions</td>
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<td></td>
<td>Acknowledge the public view as important</td>
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<tr>
<td></td>
<td>Discuss actions that are under-way or can be taken</td>
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<tr>
<td></td>
<td>Tell people what you cannot do</td>
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<td></td>
<td>Promise only what you can do</td>
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</table>

compliance purposes to provide good long-term records and analysis sufficient to determine and predict environmental impact; and (iii) direct promotion and encouragement of waste minimization, recycling and recovery activities with scope for public involvement in decisions about the costs and benefits of promoting such activities.

7.4 Improving risk information and understanding

At the heart of public opposition to waste facilities is mistrust of the extent to which operators and regulators have adequately and rigorously assessed the potential environmental impact (including risk to health) and understand the nature of impacts. In the U.K., risk assessment has been used for the siting of new incineration and treatment plants as part of the Environmental Impact Assessment process (and hence tested in public) to consider both public health risk from continuous and fugitive releases and also the impact of accident events (Petts & Eduljee 1994). It has become increasingly unlikely that any new proposal for such a facility would be acceptable to a local authority (or the public) without reference to such issues. While new landfills in the U.K. have been subject to increasingly rigorous environmental assessments they have generally been designed and operated on the basis of experience and general guidance on good engineering practice, rather than as the result of site-specific risk assessments (Petts 1993). The timescales for management of landfill engineering extend beyond those for other systems and it is clear that there is a need for both operators and regulators to receive more guidance on a risk management approach to landfill with continuing attention to improving understanding of landfill processes and engineering robustness over the long-term (perhaps centuries).

While there is considerable public pressure (and need) for a more structured approach to ascertaining the nature and extent of the relationship between cause and effect, there is also a need for assessors to be more open about the data inputs, the transport and fate models used, the basis of the dose-response extrapolation, and the uncertainty inherent in the risk estimate. There is also a need for more open public discussion about criteria of acceptable risk. In the U.K., the acceptability of risk in relation to health risks from waste treatment and disposal operations has been discussed by reference to environmental quality standards derived for various different purposes and by analogy to acceptability criteria for major hazard accidents and to internationally accepted cancer risk criteria. In public decision-making fora there has been confusion and argument about relevant criteria to use, and to a large extent the art of risk assessment for waste facilities has been developing through the machinery of the public local inquiry for planning purposes. There needs to be more concerted attention to developing and discussing criteria away from such adversarial arenas, as was undertaken by the U.K.’s Health and Safety Executive (1989) in relation to major accident hazards.

The objective must be to improve the quality and availability of data and information on the environmental impacts of waste management activities and the effectiveness of operational, equipment and design measures. The view that public concern is misplaced, and that the impacts are minimal is not going to deal with the problem. Public concern exists, is perfectly rational given the information (or lack of it) available and has to be acknowledged. For example, “expert” understanding that dioxins from incinerators are not a health problem has to be proven to the public by sound monitoring and auditing of facilities and rapid and open response to concerns that arise around particular sites.
8. Conclusions

We are all capable of NIMBY attitudes where change appears to be being forced upon us with few perceived benefits. If as individuals we stop to think about the characteristics of issues that worry or annoy us when they affect us as members of the public, we stand a better chance of understanding the basis of concerns of individuals when they have to respond to our proposals as waste managers. These concerns are complex and also often site and issue specific. Dealing with these concerns requires a move away from the reactive approach to information provision as different proposals and issues come to the fore, and more attention to proactive means to involve all interested parties in decisions. As waste managers there is a need to improve communication skills, but also a fundamental requirement to actually improve waste management and to take a more rigorous approach to understanding and assessing the impacts of waste treatment and disposal strategies. Improved and extended risk communication will not guarantee that there will be no public concern. However, a failure to improve risk communication could jeopardize any opportunity to achieve greater consensus and more informed decision-making. There is a need for continuing research into the basis of public concerns in different countries as results in one country cannot always be translated directly into different cultures and political systems. However, there is an even greater need for the effectiveness of consensus-seeking approaches to both plan making and siting decisions to be tested to provide relevant case studies for waste managers and decision-makers.

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Title: A comparative Analysis of public Concern over Solid Waste Incinerators

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Despite a recognized need for additional waste disposal capacity in many communities, public concern over siting new facilities is at an all time high. There exists a substantial literature relating Not In My Back Yard (NIMBY) reactions to siting proposals. However, much less is known about individual and community level impacts around existing facilities. This paper presents the results of a comparative analysis of psycho-social impacts (i.e. concern and distress) in two Canadian populations living in close proximity to municipal solid waste incinerators. Results show relatively low levels of impacts reported in both incinerator communities, contrary to what might be anticipated given the NIMBY literature. Determinants of impacts in the two communities highlight the need to recognize the role of community context in attempts to understand or mitigate impacts. Comparative analyses substantiate this finding, but also point to areas of similarity between the two communities studied. These and related findings have to date been incorporated into waste management decisions in local areas. However, additional comparative, as well as longitudinal, research is needed to fully understand how individuals and communities respond to waste facility sitings, and how these responses change over time.

Keywords - Public concern, incinerators, comparative analysis, community context, waste management decision-making

Introduction

Public concern over the possible toxic effects of exposure to environmental contaminants continues to grow in the wake of past highly publicized events (e.g. Love Canal, Three Mile Island, Bhopal, Chernobyl and St. Basile-le-Grande). Recent disclosures regarding polychlorinated biphenyls (PCB) disposal sites, radon gas emissions, electro-magnetic and nuclear radiation all contribute to uncertainty, concern and anxiety over potential health risks for self and family. This is evidenced in the public opinion literature which indicates firstly, that worry and concern about environment and health have increased steadily over the past two decades and secondly, that the increase is associated with widely publicized environmental desasters (e.g. Three Mile Island, Bhopal; Baxter 1990). The prospect of the future siting of solid, liquid and hazardous waste disposal facilities compounds public fears and generates negative community reaction, typically referred to as the Not In My Back Yard (NIMBY) syndrome (Anderson 1987, Elliott et al. 1993; Munton 1996; Petts 1992). According to one source, “Existing sites are closing, new sites are scarce, and there is widespread public perception that landfills represent unacceptable risks to human health and the environment” (Washburn et al. 1989:181). It has even been suggested that public opposition to proposed waste disposal facilities represents the greatest barrier to successful siting (Furuseth 1990; Petts 1994; Munton 1996; Pratt 1996).
This formidable barrier stands in stark contrast to a real and increasing need, in North America particularly, for additional waste disposal facilities as existing landfills reach capacity. Given the potential environmental effects of landfills, the scarcity of large parcels of land near urban centres, and growing public opposition, many municipalities have developed complex, integrated municipal solid waste management plans which combine a variety of approaches (i.e. recycling, composting and incineration) in order to lessen the dependence on the landfill option (Barlishen & Baetz 1996; Furuseth & O'Callaghan 1991). It is the incineration component of this equation which appears to draw the loudest shouts of NIMBY (Baxter 1990; Furuseth 1991; Gattrell & Lovett 1992; Petts 1992; Wiedemann 1991). The literature focusing on concerns related to proposed incinerators indicates that community opposition is focused primarily on worries or concerns related to the potential environmental, economic and health impacts (Gattrell & Lovett 1992; Furuseth & O'Callaghan 1991; Petts 1992; Portney 1991). Despite this fact, North American researchers suggest that the role of incinerators in waste management has increased substantially over the past few years (Furuseth & O'Callaghan 1991) and will continue to do so (Alter 1991; Lober 1993; Pratt 1996), particularly given the above noted constraints on the utilization of the landfill option. One can only assume, therefore, that NIMBY reactions to proposed incineration facilities will increase in parallel.

While a substantial amount of literature focuses on NIMBY reactions to siting, much less is known about individual and community impacts around existing facilities. We are therefore unable to answer any questions related to the level and/or persistence of impacts over the life of a facility. Furthermore, it is not possible to answer questions related to the tale that community context might play in the process of facility impacts (Petts 1994). Filling these knowledge gaps is essential in the current context of waste management decision-making; these insights may provide direction in terms of the need for mitigation measures, as well as serve to reduce the resource inputs (financial and otherwise) necessary to the siting process. On a broader scale, such research would address the larger issues of individual and community well-being.

Specifically, this paper presents the results of a comparative analysis of psychosocial impacts in two Canadian populations living in close proximity to municipal solid waste incinerators in Duncan, British Columbia and Hamilton, Ontario, in order to document the prevalence of psychosocial impacts, their determinants and to examine the role of community context in the process of psychosocial impacts.

Psychosocial impacts research

This research is part of an on-going interdisciplinary research program focused on psychosocial impacts of exposure to environmental contaminants (Elliott et al. 1993; Elliott & Taylor 1996; Eyles et al. 1993; Taylor et al. 1991). The scope of the research is based on: (a) the awareness and prevalence of psychosocial impacts of exposure; (b) the relative absence of theory and empirical evidence to explain their determinants; and (c) uncertainty as to ways to intervene effectively to reduce their adverse effects on individual and community well-being. While past research has concentrated mainly on the physical health effects of exposure to environmental contaminants (e.g. cancer and adverse reproductive outcomes), increasing attention is now being turned to the psychosocial impacts of exposure, 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. Although psychosocial impacts are known to occur at different levels of social organization, the focus of this analysis is on individual level effects. These may include emotional (e.g. worry, cancer, anger, loss of control, guilt, etc.), behavioural (e.g. task performance, help-seeking, etc.), and somatic (e.g. headaches, fatigue, depression, etc.) effects.

A useful theoretical framework for this research comes from the environmental stress and coping literature (Evans 1982; Evans & Cohen 1987; Lazarus & Folkman 1984). Baum et al.
(1985: 186) define environmental stress as "a process by which environmental events threaten, harm or challenge an organism's existence or well-being and by which the organism responds to this threat." Lazarus and Folkman (1984) suggest a useful psychological model which contends that individual response to environmental stress is divided into two stages: primary appraisal, whereby the individual perceives an environmental stressor as a threat, a harm, or a challenge; and secondary appraisal, whereby one of two coping strategies is selected, either: (1) problem-focused coping (e.g. joining a citizen's action group); or (2) emotion-focused coping (e.g. adjusting attitudes towards the stressor). Reappraisal occurs as the perception of the stressor or available coping resources changes over time; for example, across the proposal, approval, construction and operation stages of a waste facility siting process.

The occurrence of environmental stress, the experience of psychosocial effects and the choice of coping response have been shown to be dependent upon four sets of mediating factors related to: (i) the nature of the stressor (i.e. hazardous versus non-hazardous; landfill versus incinerator; see Evans & Jacobs 1982; Sims & Baumann 1983; Vyner 1988); (ii) the type of individual (e.g. locus of control; see Evans & Jacobs 1982; Pearlin & Schooler 1978); (iii) the characteristics of social network (e.g. strong family/community ties; see Edelstein 1988; Flynn 1978); and, (iv) the wider community context within which the stressor is located (Buttel 1987; Sims & Baumann 1983). Of these, least is known about the role of community context (Petts 1994) and most of what we know comes from the qualitative literature (e.g. Edelstein 1988).

![Map of SWARU Incinerator](Fig. 1. Location of the SWARU Incinerator.)
Measuring psychosocial impacts

A cross-sectional parallel case study design was used in two sample populations living in close proximity to non-hazardous solid waste incinerators in Hamilton, Ontario (Fig. 1) (see also Elliott et al. 1993) and Duncan, British Columbia (Fig. 2) in order to address the following objectives: 1) To determine the prevalence of psychosocial impacts among exposed individuals; 2) To investigate the determinants of individual level psychosocial impacts; and 3) To investigate the determinants of individual level actions taken in response to psychosocial impacts.

Although the parallel case study design made within-site analysis the primary analytical approach, the role of community context is explored in a combined analysis in order to address a fourth objective: 4) To determine the role of community context in the process of psychosocial impacts.

Study sites

The Solid Waste Reduction Unit (SWARU) is an incinerator for non-hazardous municipal solid waste from the City of Hamilton (population approximately 320,000; Fig. 1), operated for the Region of Hamilton-Wentworth by a private corporation, 24 hours per day, five days per week. It has been operating since the early 1970s.
The ash produced in the incineration process is disposed of in a regional landfill. A combination of commercial and light industrial land use immediately surrounds the SWARU site, with dense residential development to the south-east. The land use immediately beyond the area is primarily heavy industry (particularly steel production) with scattered residential land use throughout.

Until very recently, the political climate in Ontario for municipal waste incineration has been a particularly negative one. In fact, a social democratic government implemented a ban on incineration in 1991, essentially for two reasons. First, incineration was seen to be inconsistent with the philosophy of a parallel ‘three Rs’ policy, given that successful incineration relies on a large, steady stream of mixed waste. Second, public pressure regarding potential (long-term) health impacts of exposure to incinerator emissions was increasing in Ontario. This was essentially driven by an increased recognition that the combustion of municipal solid waste releases varying amounts of air pollutants, the effects of which on (long-term) human health are not yet well understood (e.g. Levin et al. 1991). This climate changed drastically with the election of a neo-conservative Provincial government in the spring of 1995 which resulted in a complete reversal in waste policy. There was a virtually immediate (i.e. within a few months) lifting of the incineration ban, coupled with the introduction of a series of operation standards based on maximum achievable control technology (Pratt & Ziegler 1996). The role of incinerators as a waste disposal option in Ontario under the new climate is yet to be determined, but given the existence of landfilling constraints (e.g. the lack of large tracts of suitable land close to urban centres and the high costs of exporting waste), one can only speculate that they will increase in number, concomitant with increased community opposition.

The Koksilah Road Incinerator near Duncan, British Columbia (Fig. 2) has been in operation since 1978. It is one of three solid waste incinerators operating in the Cowichan Valley Regional District (CVRD), which has a population of approximately 60 000. The major population centre, Duncan (population approximately 4500), is known in the British Columbia tourist industry as the City of Totems because of its impressive outdoor collection of totems created by local First Nations -primarily Cowichan- artists. It is set against a back drop of panoramic views of the Coastal Mountain Range, Lake Cowichan, and the Georgia Strait, which separates Vancouver Island from the mainland of British Columbia.

The primary economic activities in the Region remain linked to the forest industry, although this sector has experienced substantial declines over the past two decades (Aldridge 1992). At the same time, the Region has experienced a 15% increase in population, although the distribution clearly indicates an aging population commensurate with the retirement enclave that the CVRD represents to British Columbians as well as other Canadians (Aldridge 1992).

The incinerator is located in the Koksilah area of the Region, just south of Duncan between the Koksilah and Cowichan rivers. With the exception of an area devoted to industrial park use, much of the area belongs to the Cowichan Indian Reserve. Incineration has been the only form of solid waste disposal in Cowichan for almost two decades; there is no operating landfill or curbside pick-up of recyclables. The ash produced by the incineration process is dumped into unlined, open pits on site. Anecdotal reports suggest that all three regional incinerators have a checkered history with respect to their ability to operate within the British Columbia Ministry of Environment air quality standards.

Public opinion toward waste disposal alternatives in British Columbia consistently rates incineration as the least preferred option (Malatest & Associates 1990; Burns 1995). In a recent survey of the people living in the CVRD, waste management was an area of great concern, with close to 100% of respondents agreeing that the public should be more aware of the garbage that it creates (Sawin & Carrier 1993).

Although the two waste disposal facilities studied are similar in type, the community contexts in which they are placed are not. This raises interesting questions about the role of community
context in the process of psychosocial impacts and the, as yet undetermined, potential for arriving at some level of generality through the use of comparative analyses.

Data collection

A telephone survey was administered to a stratified (by distance) random sample of residents living across four distance zones around each incinerator site. Instrument development, content and format are discussed in detail elsewhere (Elliott 1992). Briefly, it was introduced as a general quality of life survey and essentially consisted of five sections: (1) attitudes toward the neighbourhood or home area, including factors liked and disliked, and ratings of satisfaction; (2) social networks and their possible mediating influence on psychosocial effects as well as past community involvement. (e.g. signing petitions and attending public meetings); (3) measures of general psychosocial health and well-being (a 20 item version of the General Health Questionnaire (GHQ-20) (Goldberg 1972), the somatic symptom checklist from the Symptom Check List-90 (SCL-90) (Derogatis et al. 1973), and a subset of items from the Critical Life Events Scale (Holmes & Rahe 1967) ); (4) a combination of closed -and open-ended items to determine residents' levels of awareness, knowledge, concern and action regarding the site; and (5) standard socio-demographic variables, as a check on the representativeness of the sample and as potential explanatory variables in subsequent multivariate analyses. The scales included in section three were selected from a larger set of instruments (Elliott 1992), based on their appropriateness for use in a general population, their previous validation, the existence of published population norms against which to compare results, and their previous use in an environmental context.

A stratified (by distance) random sample of households was drawn from four concentric zones centred on each of the incinerator sites (Table 1). The obvious differences in zone sizes at the two sites reflect differences in population density between an urban and non-urban area. Stratification of the sample by distance allows for the use of internal controls in subsequent analyses thus allowing one to determine the relationship between reported levels of effects and increasing distance from site. All households were enumerated using city directories and assessment maps and rolls. Households selected at random from this sampling frame were sent a letter of introduction to the study informing them that an interviewer would be telephoning in the next few days. Eligible respondents were adult members of households, selected randomly to ensure approximately equal numbers of males and females. The SWARU surveys were administered in May and June of 1990 by the Institute of Social Research at York University and averaged 27 minutes in length. The Duncan surveys were administered in September and October 1993 by Malatest and Associates and averaged 25 minutes in length. Response rates achieved were 57% and 72%, respectively. The obvious difference reflects perhaps the urban (SWARU) versus rural (Duncan) character of the two areas, given that telephone surveys typically achieve higher response rates in non-urban areas.
Table 1. Sample size.

<table>
<thead>
<tr>
<th>ZONE</th>
<th>SWARU Site</th>
<th></th>
<th>Duncan Site</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KM</td>
<td>N</td>
<td>n</td>
<td>KM</td>
</tr>
<tr>
<td>Zone 1</td>
<td>0–1.0</td>
<td>244</td>
<td>77</td>
<td>0–1.5</td>
</tr>
<tr>
<td>Zone 2</td>
<td>1.0–1.5</td>
<td>2612</td>
<td>55</td>
<td>1.5–2.5</td>
</tr>
<tr>
<td>Zone 3</td>
<td>1.5–2.0</td>
<td>3195</td>
<td>58</td>
<td>2.5–3.5</td>
</tr>
<tr>
<td>Zone 4</td>
<td>2.0–2.5</td>
<td>1504</td>
<td>64</td>
<td>3.5–4.5</td>
</tr>
<tr>
<td>Total</td>
<td>2.5</td>
<td>7555</td>
<td>254</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Table 2. Sample characteristics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SWARU</th>
<th>Duncan</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Female***</td>
<td>54</td>
<td>62</td>
</tr>
<tr>
<td>Mean age</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>% Households with income &lt; $30 000</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>% Partner*</td>
<td>55</td>
<td>66</td>
</tr>
<tr>
<td>% High school</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>% Employed full-time</td>
<td>49</td>
<td>36</td>
</tr>
<tr>
<td>Mean # persons/household</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>% Households with children &lt; 5 years</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>% English at home</td>
<td>89</td>
<td>95</td>
</tr>
<tr>
<td>% Own dwelling***</td>
<td>53</td>
<td>89</td>
</tr>
<tr>
<td>Median # years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>at current address</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>in area*</td>
<td>13</td>
<td>20</td>
</tr>
</tbody>
</table>

*** $p < 0.001$

** $p < 0.01$

* $p < 0.05$
The sociodemographic characteristics of the two sample groups (Table 2) are similar in most instances. Significant differences indicate a higher proportion of female respondents among the Duncan sample, a higher proportion living with a spouse or partner, a higher proportion of owner occupied dwellings, and greater median number of years in the area. While it is important to note these differences in sample composition, it is equally important to note that both sample groups are representative of the communities from which they were drawn and their differences do not affect the within-site analyses.

**Analysis**

Data analysis proceeded in three stages. First, descriptive analyses were conducted to address objective 1: to determine the prevalence of psychosocial impacts among exposed individuals. Thus, results are reported for general measures of emotional distress (i.e. GHQ-20 and SCL-90 (somatic sub-scale) scores by site and as well as distance from site (i.e. zone), as well as site-specific psychosocial effects: concern, health concern and actions taken in response to site concerns. Second, logistic regression analyses were conducted for a series of outcome variables in order to address objectives 2 and 3: to investigate the determinants of individual level psychosocial impacts and individual level actions taken in response to psychosocial impacts. The outcomes are related to the processes of primary (concern and health concern) and secondary (actions) appraisal of an environmental stressor. Finally, logistic regression analyses combining data from both sites was conducted for concern in order to illustrate the influence of 'site', or community context, on psychosocial effects. Throughout these analyses, attempts were made to model the exposure, individual, social network and health status determinants of psychosocial effects.

**Results**

**General measures of psychosocial health and well-being**

The GHQ-20 scale (Goldberg 1972) measures 'emotional distress' by soliciting responses to 20 items related to stress and worry. If respondents responded positively to any, they were further asked to report if these feelings were being experienced 'more' or 'much more' than usual. Thus, items emphasize change in experiences, as opposed to absolute levels. Goldberg (1972) dictates that a score of 4 or more indicates a 'probable case of emotional distress'.
When compared with other studies, the percentage of respondents scoring above the 4+ cut-point (Table 3) was relatively low at both Duncan (13%) and SWARU (17%) and although a wide range of scores is in evidence, there appears to be no pattern attributable to distance from site. Prevalence of emotional distress in a general population has been shown to range from 16% (Shapiro et al. 1985) to 24% (Ford et al. 1989). This comparison suggests that these results are toward the lower end of the range reported for general population samples. In addition, they are similar to rates reported around other waste facilities, including an existing (13%) and proposed (9%) municipal waste landfill (Elliott et al. 1993).

The 12-item symptom checklist taken from the SCL-90 was used to measure distress as manifest in somatic symptoms. Four items related to sleeping and eating disorders as well as rashes and other skin conditions, commensurate with an exposure to environmental contaminants, were appended to the sub-scale. Respondents rated how bothered they had been by a symptom over the past 2 weeks on a 5-point scale from 0 ('not at all bothered') to 4 ('extremely bothered') (Derogatis et al. 1973). Mean scale scores on the 16-item version were calculated for purposes of comparison with population norms (.36; Derogatis et al. 1973). Again, the percentages of sample groups scoring above the cut-point (Table 4) were low when compared with general population norms (Derogatis et al. 1973), as well as environmental exposure studies including a hazardous waste facility in California (Horowitz & Stefanko 1989), Three Mile Island residents one year post-accident (Baum et al. 1985), and proposed and existing municipal waste landfills in Ontario (Elliott et al. 1993). Although percentages above the cut-point for normal appear high in some site/zone combinations (Table 3), no clear pattern emerges with respect to distance from either site.

**Site and situation specific impact measures**

Results of the site-specific analyses are reported for outcomes concern, health concern and actions taken in response to site concerns. Attention to the latter moves the investigation beyond the stage of primary to secondary appraisal of exposure. In addition, combined multivariate analyses using data from both sites were generated for concern in order to investigate the influence of community context in the process of psychosocial impacts.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Site</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary dislike</td>
<td>Duncan</td>
<td>4 (9%)</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>7 (4%)</td>
</tr>
<tr>
<td></td>
<td>SWARU</td>
<td>10 (13%)</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>13 (5%)</td>
</tr>
<tr>
<td>Awareness</td>
<td>Duncan</td>
<td>27 (80%)</td>
<td>35 (76%)</td>
<td>25 (68%)</td>
<td>36 (79%)</td>
<td>133 (76%)</td>
</tr>
<tr>
<td></td>
<td>SWARU</td>
<td>57 (74%)</td>
<td>35 (44%)</td>
<td>30 (58%)</td>
<td>36 (56%)</td>
<td>158 (62%)</td>
</tr>
<tr>
<td>Concern</td>
<td>Duncan</td>
<td>12 (26%)</td>
<td>7 (15%)</td>
<td>8 (22%)</td>
<td>4 (9%)</td>
<td>31 (18%)</td>
</tr>
<tr>
<td></td>
<td>SWARU</td>
<td>29 (38%)</td>
<td>16 (29%)</td>
<td>9 (16%)</td>
<td>16 (25%)</td>
<td>70 (28%)</td>
</tr>
<tr>
<td>Health concern</td>
<td>Duncan</td>
<td>8 (17%)</td>
<td>5 (11%)</td>
<td>7 (19%)</td>
<td>3 (6%)</td>
<td>23 (13%)</td>
</tr>
<tr>
<td></td>
<td>SWARU</td>
<td>21 (27%)</td>
<td>13 (24%)</td>
<td>7 (12%)</td>
<td>12 (19%)</td>
<td>53 (21%)</td>
</tr>
<tr>
<td>Actions 1+</td>
<td>Duncan</td>
<td>11 (24%)</td>
<td>7 (15%)</td>
<td>7 (15%)</td>
<td>5 (11%)</td>
<td>30 (17%)</td>
</tr>
<tr>
<td></td>
<td>SWARU</td>
<td>23 (30%)</td>
<td>14 (26%)</td>
<td>5 (9%)</td>
<td>12 (19%)</td>
<td>54 (21%)</td>
</tr>
</tbody>
</table>

*All percentages are based on total sample size at both sites (Duncan: n = 175; SWARU: n = 254)*
While a large percentage (76%) of the Duncan sample reported being aware of the incinerator (Table 4), a very small percentage (4%) volunteered a dislike for the site when asked early in the survey: “what don’t you like about the area where you live?” Most (n=4) respondents volunteering the site as a dislike live in zone 1. A smaller percentage of SWARU respondents reported being aware of the incinerator (62%), but a similar percentage (5%) volunteered the site as a dislike. Again, the majority of the latter (10 of the 13) live in zone 1. Despite a lower level of reported awareness, measures of site specific concerns were higher at SWARU, although the overall percentages at both sites are low relative to other published sources (Dunn et al. 1994; Elliott et al. 1993; Ostry 1993). Although levels of reported concern exhibit no obvious distance gradient, both concern and health concern are reported with the greatest frequency in the closest zones at each site.

Respondents were asked to specify the nature of their major concern. Not surprisingly, the most frequently mentioned concern about both incinerators was air pollution/odour. Site operation was also a major concern (no. 2 at Duncan, no. 3 at SWARU). Included in this category were issues of uncertainty regarding safety, regulations and the nature of the waste stream. At SWARU, the remaining top five ranked major site concerns were related to the environment (other types of pollution and environmental degradation), while Duncan respondents focused more on personal impacts (i.e. the aesthetics of the site and wishing it was ‘elsewhere’).

The role of community context in understanding impacts evident in the characteristics of respondents at each site more likely to report site related concerns. Logistic regression models (Table 5) for concern yielded rho-square values of .27 at Duncan and .16 at SWARU (rho-square values of .2 to .4 represent a very good fit of the model (Wrigley 1985)).

The model for Duncan respondents (Table 5) indicates that respondents more likely to report site-related concerns: (i) were younger; (ii) were female; (iii) live in zone 1 as opposed to zone 4; (iv) rent as opposed to own a home; and v) report greater past community involvement. In addition, the significant interaction effects indicate that respondents were more likely to report concern if they were an environmental group member living longer at their current address, and were home owners (as opposed to renters) living longer at their current address.

The model for SWARU (Table 5) indicates that those more likely to report site-related concerns were: (i) satisfied with their current health status; (ii) scored above the cut-point on the GHQ-20; (iii) belonged to a union or commercial group; and (iv) were owners living closer to the site.
The frequency of reporting health-related concerns was lower than for general concern (Table 4), but a similar pattern emerged, i.e. higher levels of health related concern reported at the SWARU site, and the highest levels of reporting in the closest zones at both sites. The profiles of respondents more likely to report health-related concerns again show distinct differences between sites (Table 6). Respondents at Duncan more likely to report site-related health concerns: (i) had lived longer at their current address but fewer years in the area; (ii) asked for or received help from neighbours never or often as opposed to very often; and (iii) did not belong to a community group but had greater community involvement. In addition, Duncan respondents were more likely to report site-related health concerns if they were male and had fewer years in the area.

The model of health related concerns at SWARU (Table 6) generated only two significant explanatory variables: (i) belonging to an environmental group; and (ii) having a household income in the $60 to $70,000 range.

The frequency of reporting site-related actions (Table 4) was higher at SWARU (21%) than Duncan (17%), but relatively low compared to the published literature (Dunn et al. 1994; Elliott et al. 1993). Again, the highest levels of reporting were in the closest zones, but no distance gradient emerged.

The profiles of action-related characteristics again differ between sites (Table 7). Based on the significant explanatory variables in the model, respondents at Duncan more likely to report taking one or more actions in response to site concerns: (i) belonged to an environmental group but not a religious group; (ii) were very satisfied with the area where they live; (iii) perceived themselves to be uninvolved in their community (despite high levels of reported actual past community involvement); and (iv) had a GHQ-20 score below the cut-point for normal. In addition, based on significant interaction terms, respondents were more likely to report taking one or more actions if they did not belong to an environmental group but had greater actual (versus perceived) past community involvement.
The SWARU model indicates that those more likely to report taking action in response to site concerns: (i) lived closer to the site; (ii) own vs rent; were not employed full time; (iii) were not satisfied with the area where they live; and (iv) belonged to several different community groups.

Table 6. Logistic regression results - site related health concern

<table>
<thead>
<tr>
<th>Variable</th>
<th>Duncan Relative Odds (95% Confidence Interval)</th>
<th>SWARU Relative Odds (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.97 [0.70; 1.32]</td>
<td>Age</td>
</tr>
<tr>
<td>Gender</td>
<td>2.11 [0.36; 12.41]</td>
<td>Gender</td>
</tr>
<tr>
<td>Zone</td>
<td></td>
<td>Zone</td>
</tr>
<tr>
<td>Zone 1</td>
<td>2.25 [0.75; 6.73]</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Zone 2</td>
<td>0.93 [0.30; 2.92]</td>
<td>Zone 2</td>
</tr>
<tr>
<td>Zone 3</td>
<td>3.55 [1.13; 11.20]</td>
<td>Zone 3</td>
</tr>
<tr>
<td># Years, current address**</td>
<td>1.18 [1.07; 1.21]</td>
<td>Income*</td>
</tr>
<tr>
<td># Years,occurrence**</td>
<td>0.92 [0.85; 0.99]</td>
<td>&lt; $20,000</td>
</tr>
<tr>
<td>Frequency ask for/receive help</td>
<td></td>
<td>$20-30,000</td>
</tr>
<tr>
<td>Never*</td>
<td>0.13 [0.02; 0.97]</td>
<td>$30-40,000</td>
</tr>
<tr>
<td>Seldom</td>
<td>0.77 [0.18; 3.23]</td>
<td>$40-50,000</td>
</tr>
<tr>
<td>Sometimes</td>
<td>1.04 [0.33; 3.30]</td>
<td>$50-60,000</td>
</tr>
<tr>
<td>Often**</td>
<td>8.29 [0.07; 9.92]</td>
<td>$60-70,000</td>
</tr>
<tr>
<td>Member, ‘other’ group*</td>
<td>0.25 [0.07; 0.92]</td>
<td>Health Rating</td>
</tr>
<tr>
<td>Past community involvement**</td>
<td>2.43 [0.60; 1.28]</td>
<td>Member, Environmental Group*</td>
</tr>
<tr>
<td># Years, current address x gender</td>
<td>0.95 [0.91; 0.99]</td>
<td></td>
</tr>
<tr>
<td>Gender x involve</td>
<td>1.86 [0.91; 3.79]</td>
<td></td>
</tr>
</tbody>
</table>

\( R^2 = 0.43 \)

\( \% \text{ correctly classified: } 90\% \)

* income in Canadian dollars

*** \( p < 0.001 \)

** \( p < 0.01 \)

* \( p < 0.05 \)
In order to investigate the role of community context in the process of psychosocial impacts, logistic regression analysis combining data from both sites was conducted for concern. In so doing, 'site' was used as an explanatory variable. This is consistent with the conceptual framework outlined earlier which includes community context as a determinant of psychosocial impacts.

The significant individual variables in the model (Table 8) indicate that those more likely to report site-related concerns: (i) live in zone 1 as opposed to zone 4; (ii) live in Duncan as opposed to SWARU; (iii) live in a detached dwelling as opposed to any type of attached dwelling; (iv) had been worried about someone over the past twelve months; (v) asked for or received help from neighbours 'often' as opposed to 'very often'; (vi) belonged to a labour union or commercial group; and (vii) belonged to an environmental group. There were also several significant interaction terms in the model which indicate that those more likely to report site-related concerns: (i) lived in a detached dwelling in zone 3 as opposed to an attached dwelling in zone 4; (ii) were SWARU respondents satisfied with current health status; and (iii) were older SWARU respondents.

The role of 'site' in the concern models is a particularly interesting one. That is, while SWARU respondents reported higher levels of concern than Duncan respondents (Table 4), the logistic regression results indicate otherwise. Prior to the introduction of the interaction terms into the model, respondents at SWARU were more likely to report concern than Duncan respondents (relative odds, 1.36; confidence intervals: 1.15 to 1.89). However, this relationship appears, on the basis of the significant interaction terms, to be mediated by non-site related variables (age and perceived health status).
Discussion

The objectives of this research centred on the prevalence and determinants of psychosocial impacts in two incinerator communities, as well as the potential role of community context in helping us to understand psychosocial impacts. Several issues arise from the results presented. First, the scores obtained in the emotional distress scales (GHQ-20 and SCL-90) are low relative to scores obtained both in general populations, as well as communities exposed to other types of environmental stressors, including municipal landfills, both existing and proposed. In addition, no pat-

Table 8. Combined model results for site-related concerns

<table>
<thead>
<tr>
<th>Variable</th>
<th>Relative Odds</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.98</td>
<td>[0.97; 1.00]</td>
</tr>
<tr>
<td>Gender</td>
<td>1.11</td>
<td>[0.82; 1.49]</td>
</tr>
<tr>
<td>Zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 1*</td>
<td>1.72</td>
<td>[1.14; 2.58]</td>
</tr>
<tr>
<td>Zone 2</td>
<td>1.04</td>
<td>[0.64; 1.69]</td>
</tr>
<tr>
<td>Zone 3</td>
<td>0.83</td>
<td>[0.50; 1.39]</td>
</tr>
<tr>
<td>Site*</td>
<td>0.35</td>
<td>[0.13; 0.92]</td>
</tr>
<tr>
<td>Detached dwelling*</td>
<td>1.37</td>
<td>[1.04; 1.80]</td>
</tr>
<tr>
<td>Satisfied with health*</td>
<td>1.45</td>
<td>[0.93; 2.27]</td>
</tr>
<tr>
<td>Not worried about someone*</td>
<td>0.72</td>
<td>[0.55; 0.95]</td>
</tr>
<tr>
<td>Ask help for/from neighbours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1.69</td>
<td>[0.51; 5.68]</td>
</tr>
<tr>
<td>Seldom</td>
<td>0.61</td>
<td>[0.29; 1.30]</td>
</tr>
<tr>
<td>Sometimes</td>
<td>0.42</td>
<td>[0.14; 1.26]</td>
</tr>
<tr>
<td>Often*</td>
<td>3.35</td>
<td>[1.32; 8.52]</td>
</tr>
<tr>
<td>Member, labour union/commercial group*</td>
<td>1.39</td>
<td>[1.03; 1.87]</td>
</tr>
<tr>
<td>Member, environmental group**</td>
<td>2.06</td>
<td>[1.19; 3.55]</td>
</tr>
<tr>
<td>Detached dwelling × zone 1</td>
<td>0.87</td>
<td>[0.58; 1.31]</td>
</tr>
<tr>
<td>× zone 2</td>
<td>1.24</td>
<td>[0.77; 2.00]</td>
</tr>
<tr>
<td>× zone 3*</td>
<td>1.82</td>
<td>[1.09; 3.05]</td>
</tr>
<tr>
<td>Satisfied with health × site*</td>
<td>1.68</td>
<td>[1.08; 2.61]</td>
</tr>
<tr>
<td>Age and Site*</td>
<td>1.02</td>
<td>[1.00; 1.04]</td>
</tr>
<tr>
<td>Member, labour/commercial × sex</td>
<td>0.78</td>
<td>[0.58; 1.04]</td>
</tr>
<tr>
<td>Ask help × Member, Environmental Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>2.61</td>
<td>[0.79; 8.65]</td>
</tr>
<tr>
<td>Seldom</td>
<td>0.58</td>
<td>[0.28; 1.20]</td>
</tr>
<tr>
<td>Sometimes</td>
<td>0.36</td>
<td>[0.12; 1.05]</td>
</tr>
<tr>
<td>Often*</td>
<td>2.08</td>
<td>[0.83; 5.20]</td>
</tr>
</tbody>
</table>

p² = 0.18
% correctly classified = 78%

*** p < 0.001
** p < 0.01
* p < 0.05
tern emerged with respect to increasing distance from either site. Thus, living with a municipal waste incinerator does not appear to be affecting levels of emotional distress in these two communities. Further, as an explanatory variable, higher emotional distress emerged only once: SWARU respondents scoring above the levels of GHQ-20 cut-point for normal were more likely to report site-related concern.

Second, most respondents at both sites reported being aware of the incinerator in their area, but only when prompted. The percentage volunteering the site as a dislike was very low at both sites, indicating there were other factors operating in these communities which influenced individual perceptions more so than the incinerators. Those who did volunteer the site as a dislike live primarily in the closest zone (zone 1) indicating a distance-decay relationship with respect to incinerator perceptions.

Third, despite high levels of awareness at both sites, levels of reported concern, health concern and action were low relative to results obtained in other studies. This finding raises intriguing questions, particularly in light of earlier discussions around levels of community concern raised in the (NIMBY) context of siting new waste disposal facilities, particularly incinerators. There are (at least) three potential explanations for this finding. The first relates to a ‘rationalization’ process on the part of the individual. For example, in the context of SWARU, the incinerator simply represents one more smoke stack on an urban-industrial landscape. The presence of industrial land uses keeps housing prices low, thus offering affordable home ownership for those who would otherwise not have that option. To a certain degree, individuals in these incinerator samples are self-selected, in that those who could afford to make a different choice would likely choose to live elsewhere (Greenberg & Schneider 1994). Those remaining must rationalize their choice and get on with their lives (Eyles et al. 1993; Ostry et al. 1995).

A second potential explanation relates to ‘benefits outweighing costs’. The area in Duncan, for example, offers an idyllic retirement enclave, surrounded by mountains, lakes, ocean views, and moderate temperatures for much of the year. This is evidenced, perhaps, in the nature of site-related concerns many Duncan respondents mentioned related to the ‘aesthetics’ of the area and wishing the incinerator was ‘elsewhere’. However, within the wider community context, the incinerator takes on a relatively low priority. Indeed, respondents may not have even known of the incinerator’s existence when choosing their current residence. However, given half the Duncan sample had lived in the area for at least 20 years (Table 2), lack of awareness is an unlikely explanation.

The third potential explanation for these findings has to do with individual capacity to cope with an environmental stressor. That is, there is some literature (Vyner 1988; Elliott & Taylor 1996) to suggest that individuals are better able to cope with a known environmental stressor (i.e. an existing incinerator) than an unknown environmental stressor (i.e. a proposed incinerator) surrounded by uncertainty. This is the basis of much risk assessment (e.g. Gregory et al. 1996) and some psychosocial impacts (e.g. Portney 1991) research, where individuals are reporting levels of risk associated with hypothetical environmental stressors. By extension, this argument suggests that levels of concern and other psychosocial impacts are high at the time of siting due to high levels of uncertainty and the anticipatory anxiety (Breznitz 1984; Cook 1984) associated with a (potential) future exposure. Once the waste facility is constructed and operational, anticipatory anxiety decreases, psychosocial impacts decline, and the ever-adaptable human agent begins again to ‘get on with life’ (Eyles et al. 1993; Fureseth 1990). While the latter makes sense, we have little empirical evidence to support this argument. However, see Elliott and Taylor (1996) for one longitudinal case example. Longitudinal research which follows individuals through the key stages of the siting process is needed to investigate this explanation further.

With respect to the determinants of impacts identified in the logistic regression models, ‘zone’ was a significant explanatory variable in several of the models. This points to the importance that distance from the site plays in the process of psychosocial impacts but, given the number and
diversity of explanatory variables in all the models, a simple cause-and-effect relationship due to exposure is not supported.

Another group of variables which emerged as significant across both sites relates to one's stake in the area (i.e. home ownership and length of residence). These are closely related to the social network variables emerging as significant at both sites (i.e. (environmental) group membership, interaction with neighbours and community involvement). Thus, it appears that respondents with a strong sense of, and commit-ment to, community are those more likely to report impacts and take action in response to those impacts. These findings are similar to those reported in other communities (Elliott et al. 1993).

Finally, although gender and life cycle factors (e.g. age, parents of young children are typically reported in the literature as significantly related to levels of concern and distress in environmental exposure situations, they rarely emerged as significant in the analyses reported here. This finding is most likely explained by the nature of the exposure itself; that is, much of the existing psychosocial literature focuses on acute, hazardous exposures (e.g. Three Mile Island, Love Canal) while the exposures under investigation in this analysis are non-hazardous and chronic. This is consistent with the conceptual framework informing this research which identifies ‘characteristics of the contaminant source’ as one set of factors influencing the process of psychosocial impacts.

Overall, the logistic regression results confirm that a combination of factors are associated significantly with concern and action but that the specific factors involved vary by outcome and site. The implication is that strategies aimed at mitigating psychosocial impacts need to be specific to the characteristics of the populations in particular situations.

The pooled analysis of concern represents an attempt to explore the role of community context further. In so doing, 'site' was used as an independent variable in the logistic regression model. The results of the model indicate firstly that 'site' is significant explanatory variable. However, given the shift in direction which results from the inclusion of interaction terms in the model, it is also apparent that the role of 'site' in predicting concern is mediated by non-site related variables. The variables which emerged as significant in the combined analysis again point to the importance of proximity to site, social network/community involvement, and factors related to one's 'stake' in the neighbourhood (e.g. owning a detached dwelling).

Conclusion

Potential applications of the research findings are linked to the purpose of the larger research program: to determine the impacts of exposure to environmental contaminants on individuals and communities and to develop strategies to reduce their adverse effects. This paper documents the prevalence and determinants of psychosocial impacts in two communities living in the midst of a municipal solid waste incinerator. These findings can contribute to our understanding of community reaction to, and experiences of, municipal waste facilities and can be used to inform the processes used to site much needed new facilities. Indeed, the results obtained in the SWARU community in Hamilton, Ontario have already been used to inform decision-making around extending the hours of operation of this particular site and, by extension, extending the life of the local landfill (Regional Municipality of Hamilton-Wentworth 1995) . In addition, psychosocial impacts in the Region of Hamilton-Wentworth became a legitimate area of community concern to be addressed formally as part of a recent environmental assessment review of a proposed industrial waste landfill (Minister of Environment and Energy Ontario 1996).

However, what these findings also highlight is the unique combinations of site- and situation-related variables which obtain in each exposure community. The experience of psychosocial impacts cannot be divorced from the wider community context within which they occur. While the analyses presented here begin to point to same similarities across sites, much more
A comparative analysis is needed in order to extend the current inventory of lessons learned. Longitudinal analysis of psychosocial impacts across key points in the siting process will fill another major gap in our knowledge. The waste facility siting literature emphasizes the need to better understand the 'stress' impacts of both the siting process and beyond (Petts 1994; Portney 1991; Wheatley 1994). The research presented in this paper begins to address that need, and provides direction for additional research.

References


Emotional public reaction and media sensationalism resulting from inadequate waste disposal practices of the past have made hazardous waste one of the hottest political issues in the U.S.A. Everyone wants the hazardous waste problem solved, but no one wants a hazardous waste facility in their "backyard"-the NIMBY (not in my backyard) syndrome.

The State of Florida has taken a major step to try to reverse this attitude by educating the public as to what hazardous waste is and demonstrating that hazardous waste can be safely managed. The program, entitled Amnesty Days, was established by the Water Quality Assurance Act of 1983. The Florida Department of Environmental Regulation, working with a contractor, GSX Services, has established a system to collect hazardous waste from households and small businesses. The program is designed to bring a unique, fully-equipped mobile facility to various locations around the State. The program will reach every county over a three year period. The two phases, conducted in May, June, October and November, 1984 was extremely successful with over 6400 participants bringing in almost 600,000 lb of a wide range of chemicals, including DDT and PCB. Florida officials hope that the success of Amnesty Days will raise the awareness of citizens and ease the task of siting permanent facilities to provide long-term solutions.

Key Words – Amnesty Days, NIMBY syndrome, household hazardous waste, mobile facility, Florida Department of Environmental Regulation.

1. Introduction

Positive hazardous waste stories are not easy to find. Emotional public reaction and media sensationalism resulting from inadequate waste disposal practices of the past have made hazardous waste one of the nation's hottest political issues—all the way from the halls of Congress to town halls across America. The very term "hazardous waste" is so laden with negative connotations that many government officials and representatives of industry wonder if we will ever solve the hazardous waste problem. A bitter irony is at the core of the issue. Everyone wants the problem solved, but no one wants a hazardous waste facility in their "backyard". The NIMBY (not in my backyard) syndrome is a fact of life. Technology and resources are available to build the new advanced treatment facilities needed to handle wastes from old hazardous waste sites and to provide environmentally sound waste service to today's generators of hazardous waste. These facilities are not being built, however, for political, social and emotional reasons. Virtually all existing hazardous waste facilities, even those employing new technologies, are also under attack for the same reasons.
One of the sad aftermaths of Love Canal is that so few hazardous waste treatment facilities have been sited or permitted since that tragic story first awakened the public's outrage and demand for action. The same emotions and concerns that led to passage of tougher environmental legislation following Love Canal are now being directed against the proposed solutions to situations such as Love Canal. If the problem is to be solved something must be done to gain public trust and confidence in the ability of government and industry to manage hazardous wastes properly. One positive hazardous waste story coming out of Florida offers some hope that there is way to do just that.

2. Florida Amnesty Days

Last year the Florida legislature enacted a major comprehensive environmental law: the Water Quality Assurance Act of 1983. The law’s many provisions are aimed at protecting Florida’s groundwater—a vital and fragile resource of the State. One provision addresses an aspect of the hazardous waste problem that is attracting increased attention around the country: the large amount of hazardous waste generated by households, small businesses and institutions. Experts now believe that these “small quantity generators” account for a significant portion of the hazardous waste generated each year, and there have been no effective programs to collect, transport and properly dispose of this waste on a large scale.

Household hazardous waste includes materials such as pesticides, herbicides, paints, stains, solvents and cleaners. Much of this waste is improperly disposed of in regular trash collections, down the drain or onto the land. In Florida, where the groundwater is close to the surface, effects of such improper disposal can be particularly severe. To address this problem, the Florida law establishes a first-of-a-kind state program called Amnesty Days to provide the small generators with a convenient, environmentally sound opportunity to dispose of their hazardous wastes.

The law authorizes the Florida Department of Environmental Regulation (FDER) to develop and implement Amnesty Days to cover the entire state by 1986. FDER was given the charge to come up with an innovative program to accomplish the following: (1) provide households, small businesses and institutions with convenient temporary collection facilities for a one time purging of hazardous wastes from communities; (2) educate the public as to what hazardous wastes are; and (3) demonstrate that hazardous wastes can be properly managed.

The legislature appropriated $400,000 to cover the first phase of the project. FDER developed a Request for Proposal to seek contractor assistance from a qualified hazardous waste service firm. After a competitive bid process, SCA Chemical Services, now named GSX Corporation*, was selected by FDER to implement the program. Soon after GSX was selected, a series of meetings were held between company representatives and FDER staff to map out the strategy. The task was enormous. Not only were the time frames established by the law tight but developing the logistics for such a large effort were complicated. Even though GSX had a good track record of conducting household hazardous waste collections in several communities in New England, never

*In late 1984 SCA Services, including its Chemical Services Division, was acquired by two other companies. Approximately 40% of SCA, including the entire operation conducting Amnesty Days, went to Genstar Corporation. Genstar established a new company comprising the former SCA operations called GSX Corporation.
had so ambitious and comprehensive a program been attempted by anyone before. The concept developed jointly by GSX and FDER provided for a series of collection days in each of the counties specified in the law for May and June of 1984. Residents and small businesses would be allowed to bring up to 450 lb or one drum of waste to a collection site for free handling and disposal. Sites would be set up for a few days on a rotating basis. Multiple drum participants would be able to participate in a “Cooperative Services” program, with the first drum free and special discount rate for additional drums.

The next step required designing a collection system and facility to meet the requirements of safe and proper management of a large amount of small containers of hazardous waste. At the same time, the facility had to be designed with the necessary flexibility to handle even those wastes not included in Amnesty Days, such as explosives, and the mobility to move to many locations in a short time span.

In response to these needs, GSX designed a unique all-weather, mobile collection facility. The facility consists of two 45 ft trailers at each site 30 ft apart, connected by a custom-designed canopy. Tables are set up between the trailers under the canopy to receive, catalogue, categorize, separate and package all waste. A mobile laboratory for professional analysis of incoming wastes is located at the rear of one of the trailers. Packaging materials, labels and manifests needed to meet all regulatory requirements are available, and the site contains necessary protective gear for personnel as well as safety equipment such as portable showers, eyewashes and fire extinguishers. In addition, an explosives magazine is on site to handle shock sensitive materials.

The facility is staffed by 10 professionals, including seven chemists, an explosives expert, an industrial hygienist and a project manager. Each member of the facility team is highly trained in the handling of hazardous wastes. Finally GSX provided the liability insurance to cover any potential accident at the facility. In terms of resources, equipment and people, the mobile collection facility was ready for the job.

Obviously, the mechanics of locating specific sites for the facility required a great deal of discussion and planning. Such a large and complex project as Amnesty Days could not run smoothly without full cooperation and support from local officials and community leaders. Also, locating appropriate sites for the facility required the assistance and support of these local leaders. Because of the general fears and concerns over hazardous waste, FDER and GSX had to explain to county and municipal officials the nature of the proposed operations. FDER and GSX arranged local workshops to describe Amnesty Days in detail. Participants learned about the collection facility, personnel and equipment, and safety provisions. Community leaders were also asked to help in locating potential sites for the collection facility. Once officials were assured of the safe and professional nature of the operation, they were more than willing to do so.

Site selection presented an interesting challenge. Sites had to satisfy a number of conditions. They had to be flat, well-paved, well-drained, and not prone to flooding. Further, they required ample parking for Amnesty Days participants. They also had to be easily accessible to the public. Sites meeting these criteria included corners of ball park parking lots, highway maintenance parking lots, armory lots, shopping malls and college campuses.

The final step prior to kicking off Amnesty Days was to organize a massive educational and promotional campaign to inform the general public about the program. Without good publicity generating public participation, Amnesty Days could not work.
The message was two fold: (1) even small businesses and households are part of the hazardous waste problem due to improper disposal of potentially hazardous materials; (2) by participating in Amnesty Days, business and community residents can be part of the solution.

FDER developed brochures, newspaper advertisements and fact sheets. A toll-free hotline was established and newspaper advertisements were placed. GSX and FDER held numerous briefings and interviews with the media to generate interest. Hundreds of hours were spent by FDER and GSX staff in meeting with community leaders and reporters to help publicise the program.

With considerable advance publicity, including a well-attended press conference the previous week, the first Amnesty Days collection site opened in Dade County on 1 May 1984 on the campus of Florida International University. The public response was good and media coverage was extensive, with spots on all three network-affiliated television stations’ noon, evening and late night news shows.

All through May, the mobile facility moved to sites in Dade, Broward and Monroe counties, and, as the month wore on, participation by the public increased. In June, the program moved to the Tampa Bay area. During the month the facility moved to several sites in Manatee, Hillsborough, Pinellas and Pasco counties. Again the media covered the program extensively and the public participation exceeded all estimates. With additional State funding, Phase II of Amnesty Days operated during October and December 1984 in Central and Northeast Florida. This phase was even more successful than the spring collections, bringing the first year of Amnesty Days to a rewarding conclusion. Public awareness was definitely raised due to the substantial amount of newspaper and television coverage. In addition to local coverage, articles appeared in the Wall Street Journal, the New York Times and USA Today. A feature also appeared on CNN Cable Television News. Thousands of people learned that they indeed had hazardous wastes in their homes, and they witnessed for themselves that hazardous wastes can be safely managed. A great deal of hazardous waste was removed from the counties covered by the first two phases of Amnesty Days.

During the 2 months of Phase I in the spring, the facility was set up at over 20 sites in the seven counties. Totals for Phase I were as follows: 2963 participants brought a total of 229,180 lb of hazardous waste to the facility. During Phase II the facility visited locations in 14 counties. Phase II totals: 3497 participants brought a total of 370,765 lb of hazardous waste to the facility. Totals for the year: 6460 participants and 599,945 lb (over 272 tonnes) of hazardous waste.

 Approximately 40% of the waste brought to the facility consisted of such things as paints, solvents and cleaners that exhibit flammable characteristics. Another 40% included pesticides, herbicides and poisons. The balance was made up of corrosives, oxidizers and other regulated wastes. The more environmentally dangerous chemicals collected included 8500 lb of DDT, as well as quantities of lead arsenate, arsenic, toxaphene, and chlordane. About 850 lb of shock-sensitive material and 5050 lb of reactive material were also gathered. There were 2350 lb of PCBs in materials brought to the GSX facility. All of this material was handled safely, without a single mishap, and instead of ending up in Florida’s groundwater, was packaged and transported to licensed treatment and disposal facilities out of state.

Amnesty Days begins again in June 1985 and will continue each spring and fall through 1986 until the entire state has been covered. FDER hopes to build upon the initial success of the program as Amnesty Days moves across the state. Costs for the first two phases of Amnesty Days, including developing the mobile facility, and collecting, transporting and disposing of waste, were approximately $1.1 million.

3. Conclusion

Amnesty Days is a „one time” program. It is not, nor was it ever intended to be, a long term
solution for Florida’s hazardous waste problem. It is up to the leaders and citizens of Florida to determine the ultimate success of Amnesty Days. If the program is to be a lasting success, it must lead to the siting of hazardous waste transfer and treatment facilities to handle Florida’s hazardous waste on a permanent basis. If this happens, if state and local governments and the public can be spurred to effective siting action as a result of the positive „fallout“ from Amnesty Days, then it will prove to be the most successful of hazardous waste stories.
Sustainable entrepreneurship implies a balanced development and growth of a company in the fields of economic, social and environmental performance, without mortgaging the future of any of these three domains. Corporate performance indicators and variables are needed to make sustainable entrepreneurship transparent. The challenge facing is to make economic, social and ecological performance measurable.

Indaver uses the EFQM model as a framework for its sustainable entrepreneurship. This model shows how a company has to deploy its resources efficiently to enhance its results in all aspects. To quantify the results, Indaver has defined a number of performance indicators and communicates in the yearly Sustainability Report in all openness about them. Indaver uses the Report in all communication efforts to their stakeholders. Since many years, Indaver has established an ongoing dialogue with local residents. This is the best way to overcome the NIMBY syndrome.

OVERCOME THE NIMBY SYNDROME: A CONTINUING PROCESS

Sustainable entrepreneurship is crucial to become a permanent ‘license to operate’ and to overcome the NIMBY syndrome. This is not only important in developing new waste treatment processes and facilities but also for other activities and sectors. Companies with a bad reputation will loose confidence and their ‘space to operate’.

Overcoming the NIMBY syndrome is really a continuing challenge. It’s not only an important aspect in setting up and building new installations, but also for the future development of installations, implementing new techniques and extension of licences. Dealing with public concerns is a continuing process of open communication to build up confidence. Performance indicators and variables are needed to make sustainable entrepreneurship transparant. In the field of waste treatment, especially an open communication about the results in the field of safety and environmental performance is very important.
EFQM-BUSINESS-MODEL AS A FRAMEWORK FOR SUSTAINIBILITY REPORTING

The structure of the yearly sustainability report corresponds to the structure of the EFQM model. EFQM stands for 'European Foundation for Quality Management'. The EFQM model was designed to help companies enhance their performance. The model shows how an organisation can improve both its processes and its results in the fields of safety, the environment, employee satisfaction, customer satisfaction and business results, driven by critical success factors. The model is a good framework to determine objectives for a company. The model integrates the widely-known ISO management systems.

SUSTAINABLE APPROACH: POLICY

To Indaver, sustainability is a key pillar of all its activities. Indaver's sustainable approach is made concrete as follows: by paying particular attention to safety, in an ecologically-sound approach, in its rigorous search for and commensurate remuneration of motivated employees, in its quest for corporate stability, and in its high-quality approach.

Safety

The safety of employees, other persons on site and the people living in the vicinity of its processing sites is of paramount importance to Indaver. The safety principle has priority over importance or urgency. Every staff member is partly responsible for his/her own safety and for the safety of the neighbourhood.

Environment

In the field of the environment, Indaver is very keen to be accepted as a leader in its sector. For Indaver, environmental care mainly implies complying with the legal standards.
The Group has over 100 licenses for the legal treatment of a broad range of waste materials. All of its treatment facilities perform in compliance with the legal standards. Furthermore, Indaver also makes additional efforts to minimise the impact of its activities on the environment. By using state-of-the-art equipment and the Best Available Technology, the company ensures that it performs better than is legally required. Indaver has organised a strict monitoring system to secure environmental compliance. By means of an environmental care system that is in operation in every facility and which was developed on the basis of licensed measuring equipment, the company endeavours to prevent errors from the start and to respond effectively should any incidents occur.

Quality

Indaver pays major attention to internal processes, which need to be streamlined and/or optimised in order to provide customers with high-quality services. The twin goals of the Indaver Group are to meet the expectations of its customers and to anticipate present and future customer demands.

OPEN COMMUNICATION IS CRUCIAL TO A SUCCESSFUL OPERATION IN WASTE TREATMENT

Indaver has always advocated for open communication, both with its own staff and with people outside Indaver. The company is committed to an ongoing dialogue with its customers (private companies and public authorities), people living in the neighbourhood, its employees, the government, industry, the scientific world and the press. The company regularly distributes effective information about its activities. At neighbourhood councils and consultation committees, Indaver keeps neighbours, neighbouring companies and representatives of local authorities regularly posted. The website, which gets over 3000 visitors a month, provides more detailed background information on the activities and treatment processes. Indaver’s customers are kept abreast of the group’s latest projects and activities through periodical publications. In its annual and sustainability reports, the company describes the range of services that it is offering, but, more importantly, also provides an account of the operating results of the company’s activities (financial aspect) and its impact on the immediate area (environmental aspect). Every year, Indaver welcomes a considerable number of visitors at its different treatment units.

MANAGEMENT OF THE PROCESSES

Indaver is committed to achieve optimal management of the processes in all its production units. Consequently, the ISO environmental care systems are of paramount importance to Indaver. The group resolutely opts for integrated care systems because quality, safety and environmental care are inextricably linked to one another.

Indaver is committed to comply structurally with all permit requirements and to minimise the occurrence of incidents. In the Indaver care system, prevention is of key importance. If any incident should occur, the non-conformity procedures come into force, implying that Indaver immediately takes the right actions and communicates the incident coherently to the outside world.
All of the Indaver sites are ISO 9001 and ISO 14001 certified. Every year professional external audit companies carry out new audit rounds. The results of these audits have always shown Indaver complying with the standards of these care systems.

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Indaver ensures optimal process management through the winning combination of stringent, continual self-assessment and statutory external inspections. As a result, Indaver also attaches major importance to internal assessments, in addition to external audits. An internal audit team, consisting of approximately 20 people from different departments, freed up several days to carry out internal audits.

For its subsidiaries and foreign branches, Indaver has imposed a system of Service Level Agreements. The content of these agreements covers the most critical objectives and procedures for specific disciplines, as determined by the EFQM model.

OVERALL BALANCE SHEET FOR THE INDAVER ROTARY KILNS AT THE ANTWERP SITE

In two rotary kilns, mainly hazardous industrial waste and small hazardous waste that cannot be re-used or recycled is treated. This is the best available technological solution for a wide range of waste materials containing organic substances. The energy released during the incineration process is recuperated to supply steam and electricity for the Indaver treatment units in Antwerp.
The waste materials are supplied in various physical forms: gas, solid, liquid or viscous and in different packaging types: in bulk or in drums. Specific liquid or viscous waste (such as very toxic or stinking waste) can be fed from the receptacle into the incinerator by direct injection. The waste is burned at temperatures between 1100 and 1200 °C. The organic substances in the flue gases are further dissolved in the post-combustion chamber. The flue gases are then purified intensively. They are first dedusted in an electrostatic filter and then chemically purified in a four-step-gas-washing process. A dioxin filter filled with brown coals is used to remove dioxins and any other residual contaminated material such as mercury.

The overall balance sheet for the rotary kilns reflects the balance between the incoming and outgoing flows. The incoming flows are the supplied waste materials and a series of additives used for the treatment. The outgoing residual flows are composed of solid residual products, discharge water, emissions to the air and steam. The recuperated steam is re-used as a source of heat or piped to a turbine in order to generate electricity. In 2003, 95,056 tonnes of waste materials were treated in both rotary kilns. During the treatment process, 20,176 MWh of gross electricity was produced. The Antwerp site manages its own electricity requirements autonomically.
PERFORMANCE IN RELATION TO EMISSION LIMIT VALUES

To verify the conformity of the actual emitted concentrations against the emission limit values, on an annual basis, Indaver uses the ‘Cpk’ value. The following formula is used to calculate this performance indicator: \( Cpk = \frac{ELV - X}{3S} \). Whereby: \( ELV \) is the emission limit value for a certain parameter, \( X \) the average of all measurement values (daily averages and/or half-hourly averages) on an annual basis and \( S \) the spread on all measurement values (daily averages and/or half-hourly averages) on an annual basis.

If the \( Cpk \) value for a certain parameter is higher than 1, this implies that the actual emission meets the relevant emission limit value in a structured and secured manner throughout the entire year. The process can be considered stable and is obviously in compliance with the defined emission limit values. If the \( Cpk \) value for a certain parameter is lower than 1, this means that the actual emission does not comply with the relevant emission limit value in a structured and/or secured manner. The reason for this can be a temporary excess of the emission limit value or unsecured – strongly fluctuating – emission results, which is expressed as a large spread in the measurement values. The process is less stable and can lead to seriously exceeding the imposed emission limit value.

A \( Cpk \) value lower than 0 means that the actual emission exceeds the imposed emission limit value in a structured way. So in practice, a \( Cpk \) value is determined for every parameter, and those results are converted, using a formula, into a global \( Cpk \) value for each indicator. The purpose of this exercise is to simplify the legal interpretation and visualisation of a complex database into one representative factor or performance indicator. In this way, approximately 100,000 half-hourly average measurement values and/or approximately 2000 daily average measurement values, are statistically treated and expressed in terms of a \( Cpk \) value per incinerator.

In 2003, the total calculated \( Cpk \)’s for the average half-hourly emission limit values for the emission parameters dust, CO, TOC, SO2, HCl and N0x, which are calculated on the basis of continuous measurements, amount to 1.74 for rotary kiln 1 and 1.50 for rotary kiln 2. A \( Cpk \) higher than 1 confirms that all parameters meet the imposed emission limit values in a structured and guaranteed way.

The legal emission limit value for dioxins is 0.1 ng TEQ/Nm3. Indaver carried out 8 non-continuous dioxin measurements in 2003. The average annual emission of dibenzo-p-dioxins and dibenzofurans was 0.005 ng TEQ/Nm3 and 0.009 ng TEQ/Nm3 for rotary kilns 1 and 2 respectively, which is far below the legally permitted maximum emission levels.
RESULTS ON WATER QUALITY

Indaver uses a self-controlling measurement programme for the waste water. Around 30 parameters are monitored every day. The measurement data is based on 24-hour flow proportional samples. Consequently, the number of samples varies according to and in proportion to the discharged flow. The samples are analysed at Indaver’s own accredited laboratory. With the information obtained from the measurement programme, Indaver can – if needed – quickly adjust the water purification process.

Analogous to measuring air quality against emission limit values, a CPK value can also be calculated to verify the quality of the discharge water. In 2003, the CPK value of the waste water in Antwerp was (calculated on the basis of the parameters mentioned in the table) 1.75. This implies that the relevant limit values are met in a structured way for all the parameters.
SYSTEMATIC REVIEW OF SAFETY PERFORMANCE

Safety is the hallmark of Indaver’s activities; the company considers it a moral responsibility to safeguard the safety of internal and external employees and people living around its treatment sites. Consequently, Indaver maintains exceptionally high standards in every single step of the waste treatment process. Indaver’s safety policy is based on three concepts: training, monitoring and stimulating awareness.

Indaver uses three different index types to review the safety performance at all of its sites. The PPW index (Prevention and Protection in the Workplace) takes the number and type of accidents as a starting point, taking into account all the target groups that frequent the sites (Indaver’s own staff, contractors and others). The Kinney Index measures the global risk of an incident, taking into account the likelihood, the frequency and the seriousness of the incident. In addition, Indaver also uses a frequency index: the number of accidents with lost working time of own staff and contractor partners.

**PPW index** is a detailed indicator of safety performance. It allows Indaver to record accidents with lost work time and on-site or external first-aid accidents and apparent or near accidents, not only for its own employees but also for the group of contractors that are working at its premises. The PPW index is a weighted average of the number of accidents, whereby the type of accident (apparent, first-aid or with lost work time) determines the weight that is assigned to that accident in the formula; in other words, the more serious the consequences of the accident, the heavier the accident will weigh and the higher the result of the index calculation will be. The formula for calculating the PPW index is:
PPW-index = PPW index = \[(0.5*A)+(2*B)+(5*C)+(20*D)]*100/E*12
Whereby:
A = total apparent accidents (weight factor 0.5)
B = total on-site first-aid accidents (weight factor 2)
C = total external first-aid accidents (weight factor 5)
D = total accidents with lost work time (weight factor 20)
E = total number of employees, expressed in terms of full-time units per year
In line with this index, an accident with lost work time will weigh as much as 40 apparent accidents, 10 on-site first-aid accidents or 4 external first-aid injuries.

Kinney index is another safety performance indicator. The Kinney method measures the global risk of a situation or incident, taking into account the risk and the frequency of the event. To calculate the Kinney index, the risks first have to be identified. Subsequently, the possible damage is estimated according to scale E, the exposure according to scale B and the chance estimated according to scale P. The degree of risk is then estimated as R: R = ExBxP

Frequency rate is a legally determined safety indicator that only takes into account the accidents with own staff involving more than one lost work day. Every company is obliged to provide information on the frequency rate to the Belgian Federal Ministry for Employment and Labour, Occupational Safety Administration, once a year. The formula for calculating the frequency rate is:
Fr = (A * 1,000,000) / B
Whereby
A = total accidents with lost work time
B = total hours worked per year (sum of all the staff)
MORE INFORMATION

With firm roots in Belgium, where it plays a leading role in the implementation of the Flemish waste policy, the Indaver Group is an international independent waste management company with branches and operational sites over Europe.

http://www.indaver.com
Many companies experienced the NIMBY SYNDROME during the construction or management of waste plants. Here we present a case study from Portugal, where the populations and other entities found a way to deal with this kind of reaction.

In 1994, the multimunicipal system for processing and valorisation the Municipal Solid Waste (MSW) from Lisbon (North) was created, including the municipalities of Amadora, Lisbon, Loures and Vila Franca de Xira. This Law Decree established that the multimunicipal system of Lisbon Metropolitan Area (North) operation and management would be granted, to a public joint venture to be created. Valorsul, SA, as contracted to explore and manage a multimunicipal system, was given the mission of promoting actions that contribute to sanitation and welfare of the population assuring, namely:

a) The processing of MSW adjusted to the true necessities of the municipalities, in what concerns quantitative as well as qualitative features, in accordance with applicable national and communitarian regulations;

b) The promotion of the necessary actions in order to implement a proper policy of MSW management, namely in what regards its reduction and valorisation;

c) Cost control, efficiently and rationally using the available means in their activities.

The Integrated Management System of Valorsul, SA

According to the national residue management politics, a maximization of the valorisation of residues must be attained either energetically or through recycling. The guidelines given by the EC through its 6th European Environmental Framework are based in the following principles: residue production prevention, recovery of residues through separate collection, sorting and recycling, energy recovery and, finally, a safe elimination of the produced residues. Keeping this in mind, Valorsul SA has established an Integrated Management System to take care of the MSW produced in its intervention area (Fig.1). This system consists of several operational facilities: a Municipal Solid Waste Processing Plant (CTRSU) - a Waste to Energy Plant; a Processing and Valorisation of Bottom-Ash Plant (ITVE); an Organic Valorisation Plant (ETVO); a Materials Recovery Facility (CTE); a Collection Centre (EC); and a Sanitary Landfill (AS), to operate as a system fuse.
Municipal Solid Waste Processing Plant (CTRSU)

The Municipal Solid Waste Processing Plant (CTRSU), being a MSW combustion plant, is a supporting pillar of the Integrated Management System, because of its high massical capacity for valorisation of MSW. It is located in the municipality of Loures.

Figure 1 – Integrated Management System of Valorsul, SA
The combustion process of MSW is of the "mass burning type" with recovery of the generated energy. The Plant has three burning lines with a capacity of 28 tons of MSW per hour each (for a nominal low calorific value of 7 820 kJ/kg). This capacity allows the energetic valorisation of approximately 660 thousand tons of MSW per year, which accounts for a net production of about 300 GWh per year. An eventual extension of the Plant with one more line of the same capacity is possible. Being aware of the extreme importance of air emissions in what regards public health safety and respecting the established environmental quality levels, special care was taken with gases emissions at the chimney outlet, which clearly reflected on the investments made and exploration. Thus, it was an option of Valorsul, SA, to require at the project stage more demanding emission limit values than those imposed by the regulation in force at that time. Instead, Valorsul decided to follow the stricter Dutch and German regulations. The residual solids resulting from the combustion and from gas treatment (boilers-grate bottom ash and fly ash) have different final destinations:
- The bottom ashes (about 200 kg by ton of incinerated residues) are sent to the Bottom-ashes Processing and Valorisation Plant (ITVE), so that, after stabilization, the material may be used in civil construction (road base construction, preparing railway tracks) or as filling substance for landscape recovery of quarries and open air mines. In the landfill, a specific area was reserved to receive approximately 130 thousand tons per year. In this location the stabilization is monitored for 3 months, after what they can be marketed as filling material. When its delivery is not feasible, it will be adequately landfilled at the Sanitary Landfill. In the facility there also is a separation of ferrous and nonferrous metals, with a removal of 90% of ferrous and 70% of nonferrous metals.
- The flying-ashes (approximately 30 kg by ton of incinerated residues) are submitted to an inertization process inside the CTRSU area, being then sent to a specific landfill disposal cell at the Sanitary Landfill of Mato da Cruz. The inertized fly-ashes landfill cell has an area of 2,72 ha and a capacity of 336 000 cubic meters.

Monitoring

In association with the CTRSU, it was installed a Vigilance of Air Quality Net (RVQA), with four stations that, since March 1998, can immediately supply the measured data for the selected pollutants concentrations (SO2, NO2, CO, O3, particles), comprising the area around the Plant. These data can be seen by the population in the internet, at the web portal www.valorsul.pt. In order to follow closely the environmental condition around the CTRSU, and besides the above-mentioned RVQA consisting of a continuous monitoring, there were established seven monitoring programs with distinct periodical measurements. The monitoring program and the entities responsible for accomplishing it are:
- Air quality– IDAD, Instituto do Ambiente e Desenvolvimento;
- Water and sediments quality– Instituto Hidrográfico;
- Terrestrial and estuary ecosystems– Instituto de Oceanografia;
- Trace elements– Instituto Tecnológico e Nuclear;
- Noise – CAPS, Centro de Análise e Processamento de Sinais, IST;
- Public health vigilance– Instituto de Medicina Preventiva da Universidade de Lisboa;
- Residents attitude – Centro de Investigação e de Intervenção Social, ISCTE.
Sanitary Landfill (AS)

The Sanitary Landfill, located in Mato da Cruz, municipality of Vila Franca de Xira, operates as a system fuse, having also as mentioned above a cell for the inertized fly-ashes coming from the CTRSU and ITVE. The MSW disposal landfill cell has an area of 13.6 ha and a deposition capacity of 1.56 million tons of residues (3 million cubic meters). Leachates are collected and channelled to a holding tank, from where they are bombed to a treatment facility. The biogas is drained and, for the moment, burned in a flare. Valorsul SA is developing the needed studies in order to evaluate the possibility of installing a co-generation equipment. This Sanitary Landfill follows the European Community guidelines, present in the final project of the Landfill Directive, observing every environmental feature in what concerns impermeabilizations, biogas and leachates depuration. The Landfill environmental monitoring program includes the leachate treatment plant, the produced biogas and surface and groundwater quality.

Materials recovery facility (CTE)

With the objective of stimulating and making possible a higher degree of recycling, the materials recovery facility (CTE), located in Vale do Forno, municipality of Lisbon, receives the packaging materials separately collected by the five municipalities included in the Valorsul, SA intervention area (paper and cardboard, glass and other packaging residues). In the CTE the separation of recoverable materials is done according with the requirements of the recycling industry. In a first stage, the facility will have a 105 thousand tons capacity per year. The CTE operates through a combination of mechanical and manual separation processes, and consists of three different lines: 1) one for recovery of the paper and paperboard fraction, 2) one for reception, storage and delivery of the glass fraction and 3) one for separation of the remaining material (packages fraction). The latter includes plastic, metallic and mixed packages ("Tetra-pack"), while glass packages are selectively removed together with the glass fraction. In addition to the existing areas for receiving the material coming from the different recovery flows and respective sorting lines, there are the conditioning and storage areas where materials wait for transportation to industrial facilities.

Collection Centre (EC)

At the same location as the Materials Recovery Facility a Bring Collection Centre is in operations aiming the multimaterial recovery of:

- Municipal Solid Waste, that, because of its characteristics, are not included in the usual collection pathways, and is voluntarily deliverable by the producers at the facility,
- Hazardous Household Waste, which given its characteristics is advisable to remove from the processing materials flow
- Common Industrial Residues that can be in a practicable way recovered and recycled.
The EC includes the following collection points: paper and cardboard; glass; plastic packages; metals and metallic packages; computers and electronic material; white goods (used appliances); construction and demolition wastes; yard and garden wastes; wood and pallets. There will be also a possibility for the disposal of waste oils and batteries.

**Organic Valorisation Plant (ETVO)**

An Organic Valorisation Plant (ETVO) is being constructed in the community of São Brás, municipality of Amadora. It will process, through an anaerobic digestion process, the source separated organic fraction of residues collected in restaurants, hotels, supplying and retailer markets, and gardens, among others. The end-products are compost (fertilizer) for agriculture as well as for domestic uses and energy, through the valorisation of the biogas produced in the process. During the first period, 40 000 tons of organic matter per year will be processed in the ETVO. There is the possibility to have an increase in capacity up to 60 000 tons per year in the future. Valorsul SA opted for separate collection of Organic Matter (OM) as it allows the production of better quality compost.

**Where does it fit the NIMBY syndrome?**

In 1995, before the Processing Plant was constructed, Valorsul ordered an Environmental Impact Study around the Plant site. This study included a psychosocial analysis on the inhabitants in the surroundings of the Plant site.

When we asked what was their position on the construction of the incineration plant: 
- 11% answered that it shouldn’t be constructed any incineration in Portugal – which means a total refuse of the incineration (Not in Any Back Yard).
- 53% stated they should build the incinerator in another place – A NIMBY (Not in My Back Yard) answer.
- 12% answered, “I don’t mind that they build the incineration plant here.” – A position that reveals a passive acceptance of the situation.
- 23% stated, “I think that more incinerators should be constructed in Portugal.” – An answer clearly favourable to the incineration.

The study also revealed that the acceptance of the incineration plant would grow, as the inhabitants inquired would distance from the Plant site.

At that time, the expected consequences of the incinerator construction that were more relevant to the inhabitants were:
- The increasing of the trucks traffic;
- The increasing of the air pollution;
- The growth of diseases;
- The disturbance of the population quiet.

Moreover, there were 3 main problems Valorsul had to deal with:

1. **The majority of local population didn’t want the Plant.** They were afraid for their health and the increasing pollution. 
   Here are some of the headlines in the newspapers at the time. 
   *S. João da Talha against dangers of the incineration plant* – in: Correio da Manhã, 1995
Total revolt. Loures municipal assembly wasn’t carried out – in: Oriental, 1995

2. It was the first incineration plant in Portugal. There were many doubts and it was very polemic.
Is it worthy to burn waste? The uncertainty of the incineration. – in Público, 1994
The future urban waste plant. Many doubts, many doubts. – in: Vento Novo, 1994

3. The environmental associations disagreed with the government and were provoking fear in the press.
Quercus contests the incineration plant in Loures - – in Público, 1994
"Vade Retro" incineration – in: Público, 1994
Environmental Associations (NGO’s) against incineration in Loures – in: Correio da Manhã, 1994

Communication Strategy

Valorsul developed some communication tactics to face this contestation:

- There were regular meetings with local and central administration.
- Visits to similar Plants in Europe were organized for the responsible persons in municipalities and groups of the local population.
- Training course about waste to journalists, including a visit to incineration plants.
- Visits to the site during the construction and after being inaugurated were organised. Nowadays, we have about 4.000 persons visiting our Plants every year.
- Public sessions were promoted by Valorsul in public places around the Plant site to elucidate the local population and clear up any doubts, answering to every request made by the local communities. The most successful sessions were those where small groups were gathered, because it was possible to explain with more detail the Valorsul’s project and where all the persons could ask all the questions they wanted.
- Valorsul has had always a transparency policy towards the media and was always open to support their articles with information.
- There were established seven environmental monitoring programs in the area around the site Plant and we have compromised to reveal the results to all the interested parties. These results are now on-line in our web site.
- Valorsul compensates the local population by favouring the local associations when granting financial support. And we have a social and environmental patronage policy.
- Valorsul has developed partnerships with national and international public entities, which are a reference in environmental issues.

As a primary result of the Communication Strategies, it was possible to built a more familiar relationship between the responsibles of Valorsul and the most active persons of the community, facilitating the communication and the development of trust between the parties.
In what concerns to NGO’s, one of the key aspects was the development of an integrated waste management strategy, namely with the creation of a technical advising committee, where NGO’s were invited to participate. The recommendations made by this committee were partially integrated in the strategy developed on municipal waste for the Valorsul area.
A curious aspect: the newspapers gave a very special attention to the problem, but still, the television didn’t have a very important part at that time, they weren’t so aggressive like nowadays. Today, we have similar examples of the NIMBY syndrome (co-incineration, new waste plants), but now television is more interested and has different editorial policies, giving much more time to the situation.

Furthermore, and to change the perception and minimize the emotional reaction to the construction of the Plant:

- We named the Plant using a neutral terminology – “Municipal Solid Waste Processing Plant” instead of “Incineration Plant” as the word “incineration” had, at the time, a negative connotation.
- The architecture and design of the Plant was taken in account in order to reduce the visual impact in the surroundings.

**Psychosocial monitoring**

To know the development of the attitudes concerning the Plant, psychosocial monitoring has been made since one year before the beginning of the incinerator operation. In these studies, made by the CIS – Social Investigation and Intervention Centre, a series of psychosocial indicators are analysed as, for example, the knowledge of the incineration plant or the risk perception in the population. When treating data certain variables are considered, such as identity with the local community, the distance from the incineration plant and the visual impact. Here are some of the results during the last 4 years.

As we can see in figure 2, the knowledge of the Incineration Plant is very high in the close surroundings of the Plant site and it is not decreasing substantially with time.
As shown on Figure 3, we conclude that the inconvenience is relatively low in what concerns noise an a little bit higher in what concerns smoke and smell.

As we can see on Fig. 4, the perceived threat of the Plant is relatively low (below the medium point of the scale). In the more distant area (10 km from the Plant site), inhabitants make a much lower evaluation of the threat.
The NIMBY syndrome experienced in the Sanitary Landfill

In the site where Valorsul constructed the landfill, there was an old landfill, which the local population criticized. They were concerned that the landfill would bring more of the same problems, like bad smell and the contamination of the local rivulet. This disagreement was shown on the local and national newspapers, as it can be seen on these headlines of that time:

*Mato da Cruz Sanitary Landfill is generating polemics* – Público, 1996

**Communication Strategy**

Valorsul made a local information campaign, supported by the local municipality:
- It was given information in local magazines;
- Visits to the construction site were promoted;
- Valorsul’s corporate identity was applied to all communication materials.
- There were regular meetings between administration and the local opinion makers.
- A social and patronage policy was carried out.
- It was developed a monitoring programme for ground water quality, including more or less 50 walls belonging to the population in the vicinity.

For us, as probably for all waste plants, dealing with behaviors, reactions from the population and feelings like fear isn't easy. We believe that the policy should be held on a base of truth and transparency, being available to talk with all kinds of public, explaining what we are doing. Even when there are problems, the best thing to do is not to hide them. An example of this, in practice, is the web page – we put on-line the air emissions, and everyone can see what is going out of the chimney, on-line. Another important item is to assure availability to talk with the journalists, maintaining communication contacts and giving them useful and recent information about the operation of the waste plants.
Title: Public Perception of Healthcare Waste

Author: Sandra Schopf
Member and Past Chair of ISWA Working Group on Communication and Social Issues;
Linz, Austria

Waste is always a sensitive issue for the public, and healthcare waste especially so. A range of factors can complicate public understanding of such waste and the risks it poses, and although some of these are grounded in fact, others are more concerned with the way healthcare waste is perceived, and, in some cases, misperceived. This article looks at the relationship between healthcare waste and the public’s understanding of it, discussing the perceptions and misperceptions that exist and assessing what approaches can be taken to them.

Healthcare waste is not an easy topic. Although risk perception in general has been thoroughly investigated and is well represented in the literature on the subject, there is still very little official material available on public perception of risk from healthcare waste from hospitals and treatment facilities. Healthcare waste professionals are often very reluctant to provide information, because they are concerned that such information may be manipulatively used. As the topic is widespread, this article will concentrate on the more important details.

To give a clearer picture of this complex issue, an overview of some existing theories on risk perception is presented, followed by a description of a number of factors that may help to influence positively the way the public perceives risks.

Developments in public perception
In the past few decades, healthcare waste management has become subject to public planning and policymaking. The separation and handling of healthcare waste in hospitals and medical institutions has been improved, and proper technologies have been developed for its environmentally sound treatment. But the general public has become more environmentally conscious over the years, and so there is also a growing awareness of the negative impact of certain waste materials on human health. Healthcare waste has a high profile. The public views it as hazardous, perceiving a risk in used syringes, needles and blood packs, amongst other items. The public also perceives a risk to human health and the environment in the treatment of healthcare waste:

- Landfilling and composting are considered hazardous to the environment, because healthcare waste is seen as providing a culture medium for pathogenic micro-organisms.
- People in the vicinity of hospitals also tend to see hospital incinerators as a hazard to their health and environment.

Today, there is a practical need for greater democracy and public involvement in decision-making. The waste industry is aware that the public needs to understand more about risk perception, and that something needs to be done to improve the current situation.

In trying to reduce the negative image of waste and waste-processing facilities, the industry has also become very careful about the terms it uses to address them. We no longer speak of ‘incinerators’ but of ‘thermal processing facilities’, while ‘garbage dumps’ are now ‘sanitary landfills’ or ‘ultimate storage facilities’. The same applies to ‘healthcare waste’ with its positive connotations.
Nevertheless, the perception of risk still exists; besides, poor waste management performance in the past has created a lack of trust among the public, and it is difficult to restore that trust.

Definition of risk
When defining ‘risk’, it needs to be understood that there is not one single definition. Research psychologist Karl Dake suggests that a perceived risk is one of shared cognition; this means that risks are always socially constructed and politically negotiated. Individuals perceive risks and have concerns, but it is our culture that creates myths and systems of beliefs, which are internalized by individual citizens. Such beliefs become an integral part of how people view the world, and influence the way they interpret natural phenomena.1)

The best way of explaining this is to look at the way people have defined risk in the past, and see how this has changed over the centuries:

- In the 17th century, when probability theory was developed, risk was defined as the likeliness of an event occurring, combined with an account of the resulting losses and gains. Events were assessed in terms of their combined benefits or losses.
- By the 19th century, in the wake of the industrial revolution, technological applications became widely celebrated. Risk was now defined as an opportunity cost for the creation of wealth, and considered necessary for businessmen, while individuals were assumed to be risk averse. The general attitude of the time was reflected in the common saying ‘nothing ventured, nothing gained’.
- In the 20th century, terms like ‘industrial risk’ and ‘environmental risk’ emerged, and attention started to focus on the probable negative outcomes of industrial expansion and modern technology. Without doubt, perceived risk to human health and the environment has become one of the most important issues of our times. Many people in industrialized countries view themselves as the victims rather than the beneficiaries of technology. People feel that the great achievements in many industrial fields, including waste management, are now causing more problems than they are solving.1)

Throughout history, there has always been controversy over technologies, but what is new today is the depth of risk perception. We live in a world where the concern about risk pervades every aspect of our lives. This partly explains the fervour with which many citizens express their fears and discontent. People don’t want to live in a world with little risk – they want to live in a ‘zero risk’ society. Depending on the country and what kind of debate is on the daily agenda, this can be ‘zero emission’, ‘zero pollution’ or any other ‘zero’ demand. In Austria, for instance, the ecological movement of the seventies and eighties nourished a general distrust of certain materials, which also included PVC. Although much has been done to dispel public concern, the healthcare sector is still facing a debate over ‘zero PVC’ in medical equipment. Yet everyone in the field is aware that in some application areas there is no alternative material with the same properties as PVC. A reduction of risk would therefore require difficult trade-offs between conflicting goals, which cannot be realized in our modern-day economies.

The role of the media
The media plays an essential role in nourishing people’s fears, and offers a perfect platform to voice radical demands. There are two old sayings in journalism – ‘where there is the blood, there is the lead’ and ‘only bad news is good news’. The press is highly aware of the character of its readership, and reacts to existing controversies with a flood of stories about risks to people and their environment. To many journalists, human risk has all the features of a ‘good story’ – it provides tragedy and progress, dangers and benefits. Most importantly, however, risk occurs daily, and is therefore a reliable and constant resource for the print and broadcast media.

Healthcare waste is not really a public issue until something goes wrong, such as an incident which involves the health and safety of the general public. In many European countries, national health services are constantly criticized anyway, so people working in this

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field try to avoid drawing attention to problem areas, which naturally include waste management. Ask a facility operator or a waste manager about how they feel the public perceives a risk in healthcare waste, and they will begin to talk about their sound waste policies, reduction in the quantities of healthcare waste and so on – but they will not respond to the original question. Alternatively, they will deny that there are problems.

Spatial concentration of risk
One of the features of today’s environmental risks is that they are diffuse, and in many cases impossible for the ordinary citizen to perceive. Such places include facilities for the treatment of healthcare waste, and, to a lesser extent, places like hospitals, where this kind of waste is produced. So it is not surprising that such institutions become a social representation of the risks, insecurities and complexities of modern society, and must be seen as a physical focus for risks.2)  

Social amplification of risk
When the siting of a treatment facility becomes controversial or a waste-related infection case becomes known, opposition groups appear on the scene, public distrust becomes mobilized, previous cases of improper management are scrutinized, and media coverage expands. This all results in what Roger Kasperson describes as a ‘social amplification of risk’. The phenomenon provides strong signals to the public that things are worse than believed. Such a process of alarm can lead to secondary impacts – so-called ‘risk ripples’ – which may include public outrage over hospital or facility management, stigmatization of a facility, loss of patients, poor reputation of health service, loss of property value next to a facility, and so on. It is interesting that for certain risk problems, the amplified impacts may have a more detrimental effect than the direct impact on public health or the environment.3)  

Types of risk
In the framework of an EU Priority Waste Stream Project, a team was commissioned to investigate the risks arising from healthcare waste. Their conclusion was that risk could be divided into two groups, ‘actual risk’ and ‘perceived risk’.

• Actual risk
  An actual risk is one which is known to exist, and for which a probability can be measured or inferred.
  – Risk of infection – an actual risk due to contact with pathogenic micro-organisms
  – Toxic risk – an actual risk presented by any substance (whether drugs or non-drugs), exposure to which could provoke anatomical or functional harm
  – Physical risk – an actual risk such as needlestick incidents, which may lead to subsequent infection.

• Perceived risk
  A perceived risk is one which, whether real or not, is believed to result from healthcare waste or its disposal, separate from any scientific validation of the risk.
  – Emotional risk
    An emotional risk is a perceived risk; the level of risk is increased because people’s sensibility or ethics are offended.

A perceived risk may also be a real risk. While the majority of needle stick accidents do not result in a hepatitis B infection, some do. But the hazards most feared by non-professionals do not necessarily pose the greatest risk; subjectivity and emotion affect the perception of risk from healthcare waste. It is clear that healthcare waste has a different meaning to different groups of people. It is important to understand that there are different categories of people, such as hospital staff, treatment facility personnel, neighbouring communities and the general public, and as all these different groups will not develop a uniform judgement of the risk associated with healthcare waste, the resultant conflict of interests cannot always be resolved in a simple way.
If the people not working in healthcare perceive a serious risk from healthcare waste, it may be because, intuitively, waste is a plausible link in the chain of infection. Besides, those who are not experts cannot necessarily distinguish between what is basic information and what is sensational. It is also difficult for people to identify who or what is ‘responsible’ for the risk (person, institution or industry).4)

**Risk perception gap**
As mentioned before, the problem of risk perception is one of definition. In general, there is a gap in the perception of risk between experts and the public.

To experts, risk is identical to statistical mortality or morbidity. They view and define risk based on their technical knowledge, and tend to classify public perception as irrational. To ordinary citizens, however, the assessment of risk is modified by emotional response to a harmful event. They often lack the scientific knowledge and cannot logically analyze what risk is. They will tend to believe that all risks are high rather than low unless some scientific check is imposed.

Risk expert Peter Sandman provides a very simple and effective definition of what risk is. He defines what the expert means by risk as ‘hazard’, while all other factors are ‘outrage’.5)

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\text{Risk} = \text{hazard} + \text{outrage}
\]

The public does not pay enough attention to hazard, while experts do not pay attention to outrage. This naturally results in different assessments of importance, and hence a gap in the perception of risk. Sandman has also identified a number of ‘outrage’ factors that can influence our perception of risk, which will be discussed later.

This perception gap also tends to result in a communication gap. The public often has no access to technical knowledge. If people are provided with information, they have difficulty understanding it and cannot relate to what they are told. They then feel that their fears are not understood, and may feel belittled for not meriting a ‘satisfactory’ and honest explanation, and this in turn increases their frustration and distrust.

**Behavioural background**
Behavioural science can help to clarify many of the reasons for people’s perception of a risk even where they are a odds with the facts. When confronted with waste from the treatment of human beings, most people react with disgust or repulsion; as mentioned above, this experience has social and cultural connotations.

Anthropologist Mary Douglas argues that ritual cleansing plays an essential role in many cultures, and has always been a vital part of religious ceremonies. The drive for purity has throughout the centuries focused on different areas, such as doctrine or sex, and is now concentrated on the environment. Purity of the environment has a high profile, and although current technology provides us with excellent tools to treat our waste responsibly, minimize pollution and measure emission levels accurately, there is still a very primal response in all of us, which makes us talk about ‘impurity’ and ‘pollution’ in the way former cultures dealt with heresy and witchcraft. Douglas also stresses that ‘dirt is essentially disorder’ and that ‘dirt offends against order’. Our natural drive towards eliminating chaos makes us want to get rid of the waste. It is in some ways ironic that people want the benefits of better waste management, but do not want the infrastructure that brings those benefits close to them.6)

**Outrage factors**
In discussing risk and outrage earlier, the idea of ‘outrage’ factors was mentioned – these may shape our perception of risk. The more important of these factors are outlined below.5)

**Newness**
People tend to react more strongly to new risks than to old ones or to inconveniences that they have grown used to.
People tend to oppose risks that have no meaning to them; they are more prepared to accept risks that serve a purpose they can agree with.

**Free will**
A voluntary risk is more acceptable than an imposed risk. People are generally willing to take a risk they have chosen themselves, such as smoking, driving or bungee jumping, but they are far less prepared to accept a risk which is imposed on them from outside, such as a facility-siting procedure in which they haven’t been invited to participate.

**Control**
Someone who imagines they control the outcome of a situation is more tolerant of a risk; outrage is much more likely to occur when non-experts feel they are not in control of a risk.

The globalization of economies has confronted us with waste tourism and the trans-boundary movement of wastes. Waste management has moved from the local level to the global level. As it becomes a global issue, people feel that they are losing their traditional loci of control, and believe there may be an uneven distribution of benefits. The ‘Not in my backyard’ (or ‘NIMBY’) syndrome is in many aspects a direct result of this perceived loss of control.

**Fairness**
People who feel they are facing a higher risk than their neighbours, without having access to more benefits, will feel unfairly treated: they are more likely to accept a higher level of risk if there are greater benefits associated with it. In many countries, it is therefore common to compensate the community in which a waste treatment facility is sited, though it must be stated here that such compensation may not always be a solution. A new branch of economics called ‘behavioural economics’ challenges traditional beliefs; experts working in the field have demonstrated that people faced with the kinds of risk outlined would give more weight to what they lose than to what they gain. Sometimes, a significant overcompensation may be necessary to make up for perceived losses, and this can deal a deadly blow to the financial viability of a project. In some cultures, compensation is even regarded as a ‘bribe’, and therefore not used at all.

**Morality**
There are things that society would not only characterize as harmful, but ‘evil’. And even now, several decades after the first AIDS case made it into the newspapers, some diseases are considered to be more ‘evil’ than others. Today, although we know so much more about the real risks of HIV infection, the myths have still not lost their power. Not only can HIV infection lead to death – it is also perceived as immoral.

**Familiarity**
People tend to be a lot more concerned about the risk that emanates from large hospital incinerators or other high-tech facilities that they know nothing about. The analogy is that big technology entails big risk. However, people do not seem to have problems with risks they are familiar with: just think of the people who enjoy a packet of cigarettes every day without thinking of the risk of lung cancer, or simply the daily stress at work which brings us closer to a premature heart attack.

Healthcare workers, for whom the handling of infectious waste is a daily routine, often become careless of the dangers they are exposed to. Many of them choose not to obey the safety instructions, such as the requirement to wear gloves and masks, or to not smoke near dangerous areas.

**Memorability**
A memorable accident, like Chernobyl, makes it easier to imagine a risk. A potent symbol, like a skull and bones on hazardous containers, can achieve the same thing.
For instance, on a tour around an Austrian hospital, the author was shown the healthcare waste operations, which where being out in compliance with ISO standards. However, a new
complex was also under construction at the hospital, for which there was neither time nor money to upgrade existing waste installations; as a result, infectious waste was being stored outside the pathological department, in close proximity to a pedestrian route through the hospital site. The waste container was unlabelled, as, according to a member of staff, the skull and bones label that had previously been on display had attracted public attention and so been removed.

*Dread*
People are afraid of the 'unknown', whereas well known and well defined risks are more readily accepted. A comparison of different illnesses reveals that some diseases are more feared than others; for instance, cancer or AIDS are more feared than emphysema. One reason may be that we hear more about cancer and AIDS through the sensationalism of the media. What adds to the dread is the awareness that many carcinogens cannot be detected, and that the probable consequence of some diseases, such as AIDS, is death.

*Diffusion in time and space*
Let us assume that we have two different hazards with the same mortality. In hazard A, 100 anonymous people are killed in road accidents every year across the country. In hazard B, there is a probability of 1 in 10 that a local neighbourhood of 10,000 people is wiped out by an epidemic in the next ten years. Risk assessment tells us that the annual mortality of both hazards is 100. Yet, hazard A is more likely to be tolerated than hazard B.

*What can be done to change public risk perception of healthcare waste?*
In research for this paper, several health services in different countries were contacted. The responses suggest that some countries seem to have more problems with public healthcare waste perception than others, and that the scale of problems also seemed to vary within the different areas of the healthcare sector. This may in part be explained by the different structure of the health services in these countries. Asking whether public perception of healthcare waste can be changed is actually part of a larger question, which should be answered first – whether people’s perception of waste in general can be changed. Based on what was said previously about our cultural and social settings, it is, in the author’s opinion, very difficult to change the way people perceive things. If indeed it can be done, then it can certainly only be done in the long term. But there may at least be some basic steps that could be taken to move along the road to change.

*Best practice and proper training*
The first logical step is to keep the actual risks to a minimum. This can be achieved by best practices in management, which is the only long-term solution to the building of trust. One way of applying best practice is to ensure proper training of staff, to avoid accidents that result from improper waste handling.

Many National Health Services in European countries are struggling with tight budgets. This creates a hierarchy of investment priorities, where occupational health training often comes last. Insufficient training is provided for many healthcare workers at all levels, including nurses, doctors, porters and domestic staff; therefore they are not always aware of the potential risks they are exposed to when handling healthcare waste, and also the risks they can create for others in the waste management chain as a result of their actions. (The most common incidents that happen in healthcare are needlesticks. Not many are actually related to waste disposal, as many can occur when administering treatment.)

In the UK, for example, more guidance documents are being produced that address waste issues in hospitals and the community, and they do provide examples of good practice. The author spoke to a former Waste Minimization Officer at a National Health Service Trust in the UK whose work now covers auditing trusts on their existing systems, and making recommendations for improvements, which always includes better training. The training not only covers how to handle waste and dispose of it safely, but also environmental issues relating to minimization, reuse and recycling of certain types of waste produced in
healthcare. In addition, leaflets are handed out to patients and visitors that explain briefly the risks associated with the waste, and how they should segregate and dispose of it safely.

**Proactive waste management**

Waste managers need to maintain good continuous relations with the media. Although the waste industry could provide a hundred pages of empirical evidence that infectious waste at a hospital is managed properly, one simple hepatitis C infection story in the newspapers is enough to create fear among the public that their health at the hospital is endangered. This was the case in Austria earlier in 2002, when newspapers reported on three cases of hepatitis C infection at the General Hospital of Vienna. Immediate response to negative newspaper coverage and active press management helped to maintain the level of trust.

If the power of imagination works to generate outrage among the public, such as through newspaper coverage of needlestick incidents, it is worth considering how the same power can be used to build positive connotations and beliefs.

**Information and communication**

The only way to create a more realistic perception of risk among the public is to provide information. Transparency and public participation in decision-making does not always guarantee that a conflict can be avoided, and, ironically, a greater flow of information may contribute to a strong social amplification of risk. But when the right kind of information is communicated in a language the public understands, this will help to dissipate fears and build trust.

Risk communication experts recommend the following courses of waste industry:

- to acknowledge that there is a risk
- to explain what preventive action is taken and what plans exist to cope with negative incidents
- to stress that perfection is not realistic, and that progressive improvement is more important
- to ensure that scientists become more ‘human’ to build trust.

Kasperson, Golding and Tuler have identified four dimensions that may build or destroy trust:

- **Commitment** – trust relies on the perception that there is uncompromised commitment to a mission (such as protection of public health). The perception of commitment, in turn, rests on perception of objectivity and fairness.
- **Competence** – consistent failures and discoveries of an unexpected lack of competence can lead to a loss of trust. Waste experts need to show that they are technically competent in their field of responsibility.
- **Caring** – in cases where individuals depend on others with greater authority, perceptions of caring for the well-being of the dependent individuals are important.
- **Predicability** – trust is also built on the fulfilment of expectations and consistency of behaviour. If expectations are continuously violated, the result will always be distrust.

**Repetition**

It is important to have proactive press management, and ensure that there is more transparency in the entire process of healthcare waste management; but as suggested above, it is always important to achieve transparency through proper communication skills.

Public information and risk communication must also be an ongoing process, rather than a one-off campaign. Repetition is one of the most powerful devices in education and psychology. In its basic form, it is a childhood learning method, but it also applies to all performances and beliefs later in life. The more engrained things become, the less they are consciously thought about and the more they are accepted as part of daily life. The scientific explanation is that repeated listening and viewing establishes a neural pathway in the brain, which results in a mental activity that converts repetitive actions into a habit.
Looking at both sides

Finally, it may be useful to waste professionals to review their own attitude towards risk perception. Public opposition and outrage can also be viewed as a positive challenge and an incentive for improvement. In some areas, public resistance has been vital in forcing greater efforts towards waste minimization and recycling, and a greater focus on responsible management and proper staff training.

Towards the future

We must realize that the road to change is strewn with many cultural, social and political obstacles, and it is dependent on how seriously there is a desire for change, and how consistent and committed the public is collectively, as well as individuals. Wider education and understanding is probably the most sustainable way in which we can change and shape our future.

This article is based on a presentation made at the Healthcare Waste Intensive Course at ISWA’s Annual Congress, in Istanbul, Turkey, July 2002

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Further Reading


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