

Public participation in waste management decision making: Analysis and management of conflicts

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Abstract

In this study an empirical analysis is presented comparing four cases of public participation in risk-related decision-making. The cases selected all involved conflicts over waste management in which the official decision-maker was willing to cooperate with public interest groups, but the degree and nature of public participation was different for each case. Conflict in connection with public participation arose in all four cases. In response to the inadequacy of a traditional problem-solving approach (Section 1), we developed a broader analytic framework for interpreting these conflicts (Sections 2 and 3). Conflict analysis takes into account the history of the adversaries' relationship(s), power distribution, attitudes toward conflict resolution, hidden agendas, various negotiating strategies, and commitment (or lack thereof) to the negotiated agreement. Though developed for the purpose of analysis, we feel this approach has specific relevance for the resolution of such conflicts as well. Section 4 explores the concept of conflict management as an approach to improving the quality of public participation. The principle features of conflict management are (1) empowerment of the public; (2) a "good" (fair) solution; and (3) active support of the final decision by all parties. Section 5 describes a specific procedure for implementing conflict management in public participation settings.

1. Public participation: Problem or solution?

Waste management has replaced nuclear energy as the most controversial issue in the debate over health and environmental risk in Germany. The conflict involves developers, policy makers, and the public. The need to mitigate

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such conflicts has resulted in increased risk communication research and proliferation of guidebooks on conflict resolution, joint problem solving, and a public participation [1-3].

The recommendations found in most public participation literature consist of reworded platitudes and rules of thumb, based on ideology rather than rigorous empirical analysis [4]. The implicit treatment by the risk communication community of public participation as the goal, rather than as a means, for example, has led to suggestions such as involving the public early and including as many members of the public as possible [5], never questioning whether or not public participation is actually an appropriate goal. Furthermore, public participation is generally agreed to have the following benefits:

- considers all interests and issues at stake;
- reduces outrage and develops constructive working relationships;
- results in compromise resolutions and long-lasting decisions which are satisfactory to all parties [6.7]

Suspecting that these positive traits of public participation represent assumptions and hopes more than actual experience, we set out to do an empirical study of public participation in risk-related decision-making.

2. Public participation in action: Four case studies

In order to weigh the risks and benefits of public participation in controversies over waste management, we collected data on background, views, and tactics of the various parties involved, as well as on the group dynamics, working relationships, and developments in the negotiating process itself. Figure 1 gives an overview of our methodological approach.

Our selection process began with 59 telephone interviews with various stakeholder groups in the waste management business: environmental groups, ecological institutes, developers, waste facility managers, and government agencies.

Based on these interviews, we selected four cases (M, HL, L and A) in which (1) there was a conflict over waste management technologies or the siting of a waste disposal/incineration facility; (2) the official decision-maker was willing to cooperate with public interest groups; and (3) a specific public participation procedure was introduced in the planning and decision process. For each of the four cases, we observed discussions and negotiations in progress and interviewed each of the parties involved.

Table 1 for each case lists the type of technical project, its proponents and opponents, and the type of public participation procedure and the public's objectives.

Figure 2 organizes various participation procedures according to degree of public involvement, varying from the public right-to-know to public partnership in decision-making. In case M, "public participation" meant distributing information to concerned citizens about issues relevant to a planned waste disposal site. In case HL, citizen groups were invited to discuss and define

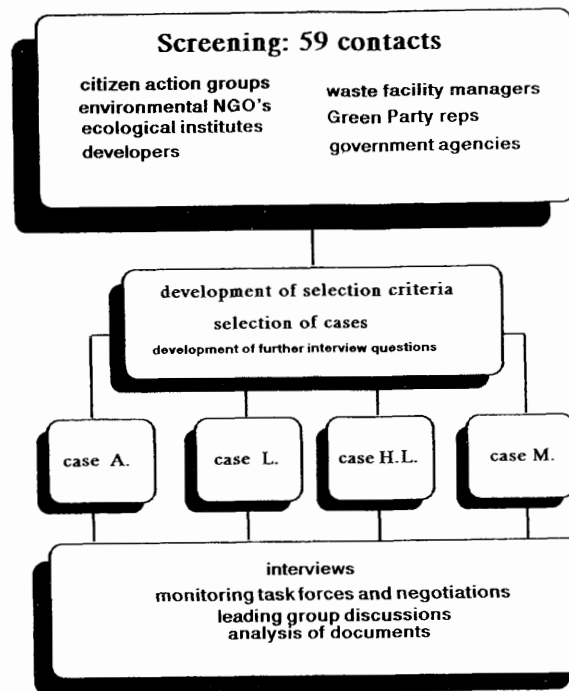


Fig. 1. Design of the study. (NGO = Non-Governmental Organization.)

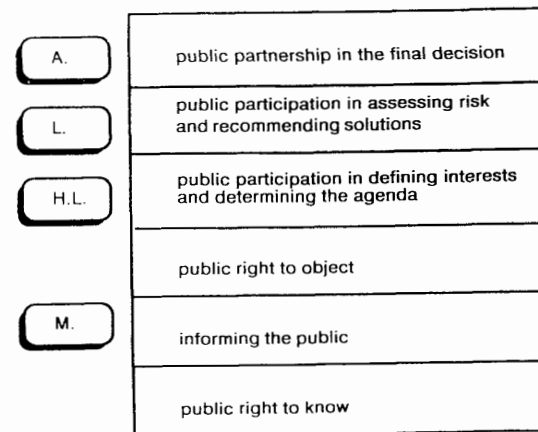


Fig. 2. Public participation ladder.

TABLE 1

Synopsis of case studies

Characteristic	Case A	Case HL	Case L	Case M
Type of technical project	Siting a municipal and hazardous waste disposal facility	Siting a municipal and hazardous waste disposal facility	Assesment of a new vaporisation technology for municipal and hazardous waste	Siting a municipal and hazardous waste disposal facility
Proponents	County government	City government (including Green party members)	Plant construction members, city council	County government (including Green party members)
Opponents	Citizen action groups, two concerned communities	Citizen action groups, residents	Citizen action groups, residents, environmental NGO's	City government, citizen action groups, residents, environmental NGO's
Type of public participation	Task force representing: county gov., citizen action groups, two communities, experts, counter experts (approx. 10 members)	Group discussion among experts, members of city government and citizen action groups (approx. 10 participants)	Task force representing: city gov., various political parties, community, citizen action groups, experts, counter experts, environmental NGO's (70 members)	Public meetings
Objective of public participation	Designing, environmental and social criteria for evaluation, decision about facility siting	Public input in decision maker's agenda	Assessment of health and environmental consequences	Informing the public

relevant issues on the decision-maker's agenda. In case L, the participation procedure sought to involve initiatives on part of citizens in assessing the risks associated with the new waste management technology. In case A, citizens were partners not only active in choosing criteria to evaluate waste disposal sites, but also in reaching and supporting the final decision itself.

3. Conflicts in public participation

In contrast to the beliefs found in most risk communication literature, the present empirical findings show that public participation procedures do not necessarily improve conflict resolution, or lead to better, more widely accepted decisions. On the contrary, in many cases the participation procedures themselves created new conflicts.

At first glance, the problems of public participation would appear to outweigh the benefits. Each party accused the other of hindering the decision process in pursuit of self-interest. The government officials blamed the citizen initiatives; the citizens blamed the developers. It is interesting to note that while focusing on its drawbacks, more or less all parties viewed public participation as inevitable.

Figure 3 lists the different types of conflicts which emerged in connection with public participation in the four cases presented in this paper. Conflicts arose throughout the decision process, from the implementation of a participation procedure to the commitment to support the final decision.

3.1 Implementation

The conflicts over implementing public participation fall into two categories: first, whether public participation is required or not; and second, if so, in what form, e.g. public hearings, public inquiries, public consultation, or public decision-making.

Different approaches to decision-making indirectly affect attitudes toward public participation. Three of these are the technical, market, and distributive justice approaches. The technical approach, preferred by industry, leaves decisions concerning technical issues in the hands of experts, with no role for public participation.

By allowing the market to determine a fair price for risky behaviour, the market approach attempts to compensate disadvantaged interests, i.e. risk acceptors, financially. One of the related ideas is the "polluter pays principle". According to this principle charges or taxes on the polluting product or output have to be paid by the 'polluter'.

The distributive justice approach seeks to minimize risk and distribute its impacts as fairly as possible by political means. Proponents of this approach see the state as best able to assess present and future risks objectively, take competing interests into account, and make responsible decisions which serve the public good. The general public tends to prefer and distributive justice approach, which is also the most conducive to public participation [8].

Politicians and other government officials have traditionally tended to favor the technical and market approaches, viewing public participation as a waste of time and money, preferring to leave the determination of acceptable risk and appropriate compensation to experts and officials. Confronted with more public protest and litigation in recent years, however, officials have become

start of the process

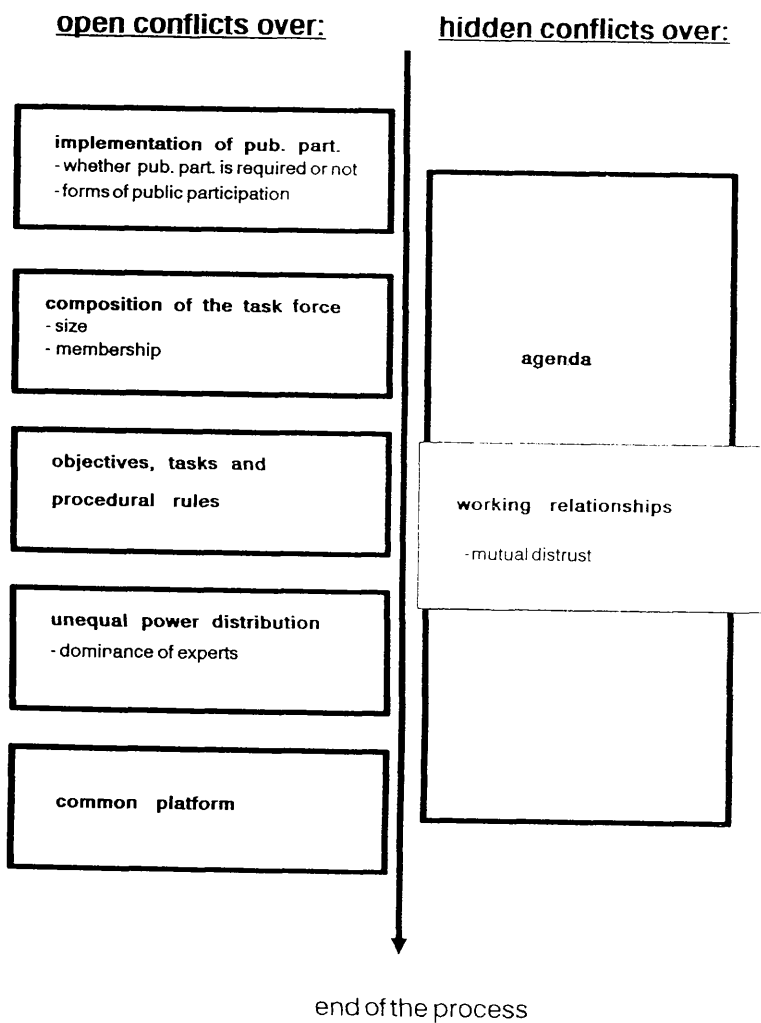


Fig. 3. Conflicts in the public participation process.

increasingly willing to involve the public. Green politicians have generally been at the forefront of encouraging public participation.

Behind the conflict over public participation in decision-making lie different interpretations of democracy. Officials stress the importance of representative democracy and the power of elected officials to make decisions based on public

mandate. Concerned citizens, on the other hand, see grass roots action as the essence of democracy. They see citizen participation as a check against expert elitism as well as a way to make sure their needs are met.

Viewing the issue of public participation in individual cases in terms of a greater ideological issue, officials often try to restrict public participation to a minimum merely on principle.

3.2 Hidden agenda

Hidden agenda in establishing a public participation procedure can also create conflict. In an attempt to pacify the general public without really including public interest groups in a meaningful way, officials may offer citizens a token role in the decision-making process to give the appearance of public participation. Conflict arose in case M when some of the citizen groups refused to take part in the discussion, complaining about a lack of any real decision power.

3.3 Composition of the task force

Another type of conflict centers around the questions of size and membership in the task force. While some believe the task force should be open to everyone, others prefer a small group in order to guarantee efficiency. Conflict over composition arises when one interest group tries to influence the membership in its favor, or when the person in charge insists on adherence to a tight schedule that excludes relevant interest groups from participating.

The issue of membership in the task force boils down to two questions of procedural justice: Are all relevant interest groups included? Does the composition of the task force represent a fair balance of these interests?

3.4 Objectives, tasks, procedural rules

Conflict can arise when different interest groups view the goals of the task force and the procedures for achieving those goals differently, particularly when no measures have been taken to iron out these differences and the purpose of the task force, rights and expectations of the participants are vaguely defined.

In case L, the technical experts considered the assessment of benefits derived from the new technology to be the main task, while the citizen initiative felt that discussion should center around consideration of resulting health risks. This example underlines the necessity of an organizational framework which ensures the clarification of goals, a course of action, and a time-frame.

3.5 working relationships

A climate of distrust hinders open communication and cooperation even in cases where win-win solutions might be possible. Opponents and proponents have biased assessments of the conflict and prejudiced views of their adversary's goals. Preoccupied with stereotypes and fearing manipulation, neither side accepts at face value the proposals and concessions offered them by the

other side. These conflicts are rooted in past experiences, broken promises, dishonesty, and unreliable conduct.

An example of this emerged in case HL. In previous decades over the siting of hazardous technologies, citizen action groups had been deceived by government agencies and political decision-makers, and so the citizens did not perceive the good will displayed by their adversaries as authentic.

Working relationships can deteriorate further during the negotiating process when parties approach each other as adversaries in a poker game rather than as partners in cooperative problem-solving. One side might enter into the task force without any intention of reaching an agreement, collaborating merely in order to get more detailed information which might be used later in litigation; or one party may try to appear generous and offer four small concessions in return for only one concession which later turns out to be very significant. Other tactics which hinder effective participation include focusing on irrelevant issues and hiding relevant information.

3.6 Power distribution

In the process of negotiation, certain arguments are given more weight, and certain interests receive special favour, not by virtue of their relevance to the task at hand, but because of the various participants' unequal financial, social, or political positions in the community. A public participation setting might simply reproduce the inequality of power inherent in society, rather than giving all interests equal consideration. Procedural justice must be followed if public participation is to achieve the fairness generally associated with it.

Dominance by experts is a common example of unequal power distribution which causes conflict. Experts define the issues, leaving no space to express everyday concerns. A lack of technical expertise on the part of the citizens leads to an inferior position in the negotiations. Frustrated and overwhelmed by technical jargon, citizens may react emotionally and withdraw from any collaboration in the task force.

In case L, the chairperson of the task force was a member of the district government, whose goal in leading the task force was to establish political influence. This led to protest from other parties.

3.7 Common platform

In an effort to increase the strength of their negotiating positions, small groups will often join to take a common position. Behind this common platform, however, lie several different interests, and when the negotiation process moves from discussing general positions to expressing specific interests, making concessions, and seeking compromises, these differences begin to surface.

This emergence of conflicting views within a common platform is the result not only of misunderstanding and bad communication, but of the simple fact that each side represents not only a "common interest," but also self-interests, conflicting values, and egocentric world views. Under such circumstances, concession may become counterproductive and the conflict intractable.

4. Conflict management: A conceptual approach

In view of the many problems associated with public participation which came out in our case studies, we can either abandon public participation completely as a viable tool in risk-related decision-making, or alternatively, approach it from a new perspective. Since it is our belief that the problems are not inherent in public participation itself, but instead, a result of treating public participation as the final goal, we have chosen the latter alternative. If public participation is viewed as a tool which must be fine-tuned rather than as a final product, its weaknesses can be acknowledged and dealt with, instead of ignored.

Most advice on improving public participation concentrates on communication based on a simple communication model, i.e. providing a forum for everyone to express his/her needs, wants, and interests. Communication is more than a simple exchange of ideas, however; it is the active accomplishment of mutual understanding. Critical is what happens before and after the exchange of messages. Improved communication must therefore aim not just at providing a forum for different ideas, but more importantly, at ways of learning to understand each other's positions.

With this idea of communication in mind, we would like to propose conflict management as a possible framework for improving the quality of public participation in risk-related decision-making. It has three features: (1) effective empowerment of the public; (2) a "good" (fair) solution or decision; and (3) commitment, or active support of the final decision by all parties.

4.1 Empowerment

Unequal allocation of knowledge and power lies at the root of public participation problems. Empowerment of the public requires access to information, technical competence, compensation for time and effort, and the right to participate in decision-making.

To close the knowledge gap between experts (developers, politicians, official decision-makers) and the general public, citizens must be given access to reliable and detailed information about the technologies at stake and the risks, benefits, and costs facing them. Simply providing this information does not suffice, however, if the public is not literate in scientific and technical fields. Empowerment consists not only of free access to information, but also includes the transfer of technical competency to the public. While improved education in the sciences may be a worthwhile long-term goal, a more practical and immediate solution may be to support the concerned public in choosing its own experts.

The public must also be informed about the political process of decision-making. Empowerment requires the development of interactional skills, needed in order to cope with critical situations in the negotiation process, and discourse ethics, a precondition for the effective use of these skills.

Developers and official decision-makers often view this type of empowerment as a waste of time and money. The cost of such an investment in the process as a whole, however, is likely to be far less than would be incurred in the long run by an escalation of conflict and the consequent deterioration of the decision-making process. (The issue of cost introduces a wholly separate question of which costs should be included. Financial investment in the project? Compensation for citizens' time and effort? External costs of natural resource consumption? Compensation for health and environmental damage? Social costs such as the erosion of trust in the community?)

Finally, public empowerment means power-sharing. The citizens must have the opportunity to participate in decisions effecting the participation procedure, the rules of negotiation, and the determination of objectives.

4.2 A good decision

This is the real goal of all decision processes, with effective public participation no more than a means. Ideally, the final decision would result in everyone getting exactly what they want. However in most situations, a win-win situation is not possible. In case L, for example, the citizen initiatives opposed any form of waste incineration whatsoever, because they felt even the best technology would be risky.

Two separate aspects of the decision need to be evaluated: the process which led to it and the outcome, or content, of the decision. The former can be evaluated according to the following criteria:

- *transparency* of the decision making-process: are outsiders clear about the objectives and activities of the task force?
- *equal access* to relevant information for all parties;
- *open-mindedness*: are the parties willing to reconsider their initial positions as a result of developments in the decision-making process?
- *unconditional right* of all stakeholders to make their concerns heard;
- *actual power*: does every party have more than a token role in the decision-making process?

The content of the final decision can be evaluated according to the following criteria [9]:

- *distributional justice*: are risks, benefits, and costs distributed equally?
- *sensitivity* to side effects: have health risks, environmental impacts, and economic and social consequences been considered?
- *suitability*: is the final decision appropriate to the original problem?
- *practicality*: is implementation realistic? is the decision politically acceptable? have resource constraints been considered?
- *openness* to re-evaluation, further consideration, and improvement;
- *impartiality*: does the decision avoid giving undue weight to one particular interest?

4.3 Commitment

The problem of commitment is two-fold: the final decision must be actively supported by both insiders (the members of the task force) and outsiders (those not involved in the decision-making). Internal commitment is a problem particularly when certain stakeholders feel their interests have not been met by the final decision. Active support for the negotiated decision is possible only if each party is convinced that its interests and objectives have been taken into account.

When the task force has successfully reached a decision agreeable to all its members problems can arise if outside parties, e.g. the broader public, or experts and politicians who were not involved in the decision, refuse to accept the final results. Outsiders may feel betrayed by the task force as a whole or even by their own representatives within the task force, or they might be overly demanding, insisting that all their interests be met, rejecting any solution that does not. Nothing has been accomplished if some parties refuse to uphold the final decision.

Internal commitment of the task force members to the collective decision might be enforced by formal contracts, provided that a fair negotiation process was realized. Determining "fairness" leads to more questions: Is it possible to separate fairness of process from outcome? What kind of fairness criteria should be used?, e.g. equal access to information, equal rights in the formulation of decision criteria, balanced losses and gains among the parties.

It is even more difficult to ensure outsider's commitment. When there is no authority who can impose the final decision on all groups, or in cases when this is not the desired way of achieving support for the outcome, the only chance is to make the efforts and developments of the task force as open as possible. The task force must foster relations with outside parties and stakeholders by informing them of intermediate results and agreements, via hearings, public meetings, newsletters, etc. However, there is no guarantee in getting the commitment of outsiders.

5. Conflict management: A practical approach

Reaching a good decision requires a good decision-making procedure which focuses on process more than outcome. Its aim should be to manage the (inevitable) non-consensus of the parties before it seeks consensus. We have developed a four-step conflict management procedure (Table 2) which incorporates the three features discussed in Section 4. This procedure is described in detail below.

5.1 Conflict situation

A project developer propose a site for a waste incinerator or a landfill. A conflict arises when a group of concerned citizens protests. The developer is willing to consider an alternative site, or a different incineration technology,

TABLE 2

Steps in conflict management

Step	Task	Team responsible
1	Defining the issue and outlining options	conflict management team
2	Choosing decision procedures and criteria	Decision team
3	Assessing the options and choosing the best one	Expert team
4	Implementing the decision	Conflict management team

but the citizens reject the construction of any waste disposal facility whatsoever, calling for waste reduction and recycling instead.

5.2 Step 1: What are we trying to decide?

Before the conflict escalates any further, a conflict management team should be set up. This team, whose job it is to examine the conflict from each party's perspective, should consist of two or three individuals who are not involved in the conflict and who are acceptable to all parties. The team should pay special attention to the different assumptions about the nature of the issue. For the developer, the issue is the construction of a waste disposal facility and the options are sites A and B and technologies C and D, but for the citizens, the issue is waste disposal period, and the options must include waste reduction and recycling, not just landfilling and incineration.

Using each party's "definition" of the issue at stake and the options to be considered, the conflict management team should develop a possible scenario showing the decision process, potential solutions and implementation of the outcome in as much detail as possible. These different scenarios should be shared with everyone.

The team should then put each scenario to the "reality test:" Is the process likely to develop this way or is this wishful thinking? Is the solution feasible? On how much uncertainty is this scenario based?

After evaluating each scenario, the team must come up with a definition of the problem which will be suitable to all parties. The newly defined issue and options to be considered will necessarily be different from the developer's original proposal.

5.3 Step 2: How are we going to decide?

Using the conflict management team's definition of the issue and options, the results of Step 1, a decision team (consisting of two or three decision analysts)

should help develop decision-making principles and criteria to be followed in the assessment process. The decision team can offer expert advice and guide the choice of decision principles (examples: multi-attribute utility, elimination by aspects) and decision criteria. These principles and criteria must integrate the interests of all parties.

The results of the decision team's analysis should be shared with the various parties and its recommendations opened for discussion. The parties must then agree on a decision principle and criteria which are acceptable to everyone.

5.4 Step 3: Which option is best?

The various options broadly outlined in Step 1 should be specifically evaluated according to the criteria and principles developed in Step 2. Each party should choose one expert as its representative, forming an expert team whose job it is to assess the various options, and ultimately to pick the best one.

5.5 Step 4: Where do we go from here?

Even though everyone agreed with the procedures which led to the decision reached in Step 3, the final outcome may not strike all parties as optimal. Precisely because no party gets exactly what it wants (an inevitable aspect of compromise), the question of commitment to the final decision is especially critical. The conflict management team must work with the final decision and implement it in such a way as to be acceptable to all parties. This might be done, for example, by compensating the party which faces the most disadvantages.

6. Conclusions

The purpose of our study was to analyze the problems which arise as a result of public participation in decisions concerning waste disposal facilities. We approached this analysis not from the point of view that public participation itself is the problem, but that an understanding of the problems which can and do arise as a result of public participation is a first step toward its improved use in effective decision-making.

Public participation must be viewed as a means, not as a goal. Unless it is approached in the right way, it will not lead to a good solution and furthermore, may create additional problems in and of itself.

Conflict management is a three-pronged approach for improving the quality of decision-making: (1) empowerment of the public; (2) a procedure which will lead to a "good" decision; and (3) follow-up considerations to ensure commitment by all parties to the final decision. These three points were developed conceptually in Section 4 and incorporated into a specific decision-making procedure in Section 5.

This case study is only the beginning of what we hope will be a fruitful empirical study of public participation and conflict in decision-making. More

studies on group dynamics, increased analysis of conflicts in the real world, and further empirical research must replace generalizations in this field. We have proposed *conflict management* as a possible approach for improving public participation and as a framework for further research in this area.

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Review

Photomicroelectrochemical detoxification of hazardous materials

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Abstract

The generation of hazardous wastes (chemical by-products) is endemic to most chemical manufacturing processes and to the large-scale users of many chemical-based materials. Approximately 300 million metric tons of hazardous waste under U.S. Federal and State regulation were generated annually according to the most recent estimates in 1984, and is a world wide problem. It is particularly acute in the United States. The petrochemical refinery industries produce about 70 percent of this waste on a national basis. Geographically, the greatest production of hazardous wastes occur along the Gulf Coast. Presently, land disposal is used for as much as 80 percent of the nationally regulated hazardous wastes, some of which may remain hazardous for years or even centuries. Inappropriate disposal of these wastes on land creates the risk of contaminating, particularly the ground water, causing adverse health effects. An effort will be made in this review to give an overview of coverage on the topic of photomicroelectrochemical detoxification of hazardous materials.

1. Introduction

The environment and everything connected with it has been a major concern of the public because most of our ecological systems such as air, water and soil are being continuously polluted by domestic and industrial pollutants. These pollutants have their origins from a number of sources such as domestic, agricultural, pesticides and herbicides, industrial wastes, chemical fertilizers,

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