EPA/600/A-94/218

IMPACT OF DECISION-MAKING STRATEGIES AND COMMUNICATION PROCESSES ON THE PUBLIC ACCEPTABILITY OF MUNICIPAL WASTE COMBUSTION RESIDUE UTILIZATION IN THE UNITED STATES

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ABSTRACT

Of the identified current and proposed construction projects in which municipal solid waste combustion residues replace traditionally used materials, approximately half are located on landfills or other property controlled by project sponsors, one third are in publicly accessible areas, one is a commercial use that is categorized separately, and the remainder are to be located at undetermined sites. Proponents of projects in publicly accessible areas have had difficulty moving plans into action, primarily due to actual or anticipated public opposition. Most of these proposals remain in extended planning stages.

This study is being conducted to assess what factors are most critical in determining the outcome of public acceptability issues in establishing projects in which MWC residues are used. Literature in the fields of risk management and facility siting are drawn upon to analyze the efforts to establish MWC residue projects that must gain public acceptance. Systematic analysis of data collected to date reveals patterns which suggest that in projects where public acceptability is a critical factor, earlier inclusion of major interest groups; and open, two-way communication styles, produce a more effective, efficient overall effort.

INTRODUCTION

Construction applications using municipal solid waste combustion (MWC) residue which are located in publicly accessible areas frequently experience long delays and, in some cases, termination. Public acceptance has been mentioned most frequently by managers of projects and technical experts, as the primary obstacle to MWC residue utilization [1].

National consideration of utilizing residues from municipal solid waste combustion began in the early 1970's with experiments conducted under the auspices of the Federal Highway Administration . Seven road paving demonstrations were conducted to test the engineering or physical characteristics of asphalt which contained MWC residues in substitution for a portion of the traditional aggregate material. No environmental impact testing or monitoring was carried out.

In the early 1980's, landfill space scarcity, increased costs of landfilland disposal, and dwindling local availability of traditionally used aggragate, stimulated renewed interest in MWC residue utilization. Growing reliance on incineration as a component of solid waste management, and a desire to recycle waste steams were added motivations for utilization of the material.

The USEPA initiated several projects to provide information and guidance on the safe management of MWC residues. The work described in this paper is part of a larger USEPA study sponsored by the Risk Reduction Engineering Laboratory to analyze MWC residue utilization in the United States. The full set of data and the resulting analysis will not be complete until Fall 1993. Results to date show the emergence of a pattern that corresponds to hypotheses developed from facility siting, risk communication and risk perception literature. Modification of planning strategies and communication processes are suggested as potentially productive approaches for lowering costs and the level of frustration for all associated interest groups.

LITERATURE REVIEW

Locations for new waste management facilities are difficult, if not nearly impossible, to site. This has been the case in attempts to establish landfills, incinerators, temporary holding facilities, transfer stations, and even recycling centers. Siting such locally unwanted land uses (LULU's) has been a particularly critical problem since the early 1980's. [2, 3]

Factors such as population density, topographic and hydrogeologic characteristics, soil configuration, and land use patterns limit areas that can be considered initially. In addition, concerns about health, environmental, and financial impacts of proposed locations, and public policy help shape the debate over where or if such facilities should be placed. It is a complex phenomenon, often simplistically and erroneously referred to as the NIMBY syndrome.

Two parameters receiving much recent attention in facility siting literature are (1) the credibility of different participants in the process [4], and (2) the "outrage" that is felt by those who are excluded or alienated and have a stake in the outcome [5,6,7] . The first parameter focuses on the importance of who delivers the message. Who are the primary directors of the effort? How well are they known? What is their track record? Will they protect the interests of the concerned parties? In other words, can they be trusted?

The second parameter is an aspect of power, or power denied. "Outrage" is a reaction to being excluded from significant and respected input into decisions . It stems from not being permitted an entry into determining what questions are asked. For example, members of the general public are likely to feel "outrage" when they are told that their reactions opposing MWC residue utilization are "irrational", while opinions expressed by industry and technical experts, which may be based, in part, on uncertain data or improperly applied research data, are highly valued. In addition, technical consultants may feel "outrage" when their expertise is questioned by people without a detailed scientific understanding of the project.

Components of the risk management literature , particularly the areas of risk perception and risk communication have bearing on the concepts of credibility and outrage. Perception of the same risk situation varies according to the experience, interests, and values of different sets of observers. Risk interpretations by technical experts, industry representatives, and regulatory officials are more generally acknowledged as understandable or justifiable, than those expressed by members of the general public.

A set of factors that influence public determination of acceptability of risks has been identified. A risk is more acceptable if it is voluntary [8] , familiar and natural [9] , reversible [10], and immediate rather than chronic, except in the case of carcinogens [11]. A risk is more acceptable if it involves individual control rather than governmental control, and if the source of the risk and the communication agent are trusted entities [12].

The scientific and regulatory communities have supported work in the field of risk communication to address the difference in risk perceptions among groups. Much work focuses on strategies for getting a message out. This primarily one-way communication emphasis has generated "how-to" works prepared for government officials and risk analysts [13,14]. Others stress the importance of two-way, open communication in resolving debates between the general public and the regulatory, technical, and industrial communities [15,16,17]. This latter approach acknowledges the validity of each position, and enhances the opportunity for productive discussion.

METHODS

A study is being carried out to assess the reasons for public acceptance of some utilization projects and public rejection of other proposed projects. Summary information was collected on all identified projects in the United States in which the use of municipal waste residues has been proposed[18]. Six projects were selected for more detailed study, based on the following criteria. Initial planning should have taken place within the past five years, so that recollection of detail would be fairly accurate. Planning should be sufficiently advanced, and the development of the project complex enough to warrant this level of attention. In addition, diversity in geographic location and type of application was sought.

The following are the principal hypotheses being tested in this study.

Central Hypothesis:

Projects are more likely to be implemented when all major interest groups participate throughout the duration of the decision-making process and when the communication is open and two-way.

Subordinate Hypotheses:

1. Project implementation is more likely when all major participants are invited to, and in fact do, participate in the decision-making process, rather than attempting to impose their views from outside.
2. The general nature of debate concerning specific MWC residue utilization projects is more likely to be adversarial and confrontational, and the project is less likely to be implemented if the following factors are operative: if communication is primarily through the news media, if information is rarely provided, if it is provided under coercion, if participants have a history of environmental standard violation, or if the government officials are reputed to be lax in their enforcement of environmental regulations.
3. The general nature of debate is more likely to be consensual, and projects more likely to be implemented if communication is carried out directly, voluntarily, and frequently; if there is a recognized history of voluntary steps taken to lessen the negative environmental impact of the project; and if regulations are perceived to be credibly determined and reasonable.
4. Projects are more likely to be implemented when they are designed to have the least possible negative environmental impact.
5. Projects are more likely to be implemented in areas where costs of disposal are high due to scarcity of available landfill capacity, and where natural aggregate for which MWC residue may be substituted is expensive and not readily available.

A discussion guide was prepared to assist in gathering information. Key participants were identified in the following manner. An initial list contained names suggested by project managers. Each person on the list was contacted and asked to specify people who had active interests in the project. Proponents and opponents were included. These mulitple lists were cross-referenced, and a final group, representing each major interest was compiled. The categories included:

- Project managers or designated contact people - those in charge of coordination and/or responding to requests for information from outside entities;
- Technical experts - those responsible for designing and carrying out environmental and engineering performance testing and monitoring;
- Industry representatives- those from resource recovery facilities or residue processing facilities;
- Government regulators - state and local officials with permitting authority;
- Environmental advocacy groups - national, regional, and local;
- Elected and appointed officials - state legislators, county commissioners, municipal majors and commissioners; and
- Members of the general public - people living in the immediate vicinity of the proposed project and those living within the region.

Individual discussions ranged from one to two-and-a-half hours. In one case representatives from major interests were met with in a group at the request of the project sponsors. Visits to the actual or proposed sites, and collection and review of primary supporting written documents were conducted.

Analysis of data collected to date reveals patterns which are sufficiently strong to report at this time. Conclusive analysis and final recommendations cannot be made until all information has been collected and analyzed. These preliminary findings should be considered in that light.

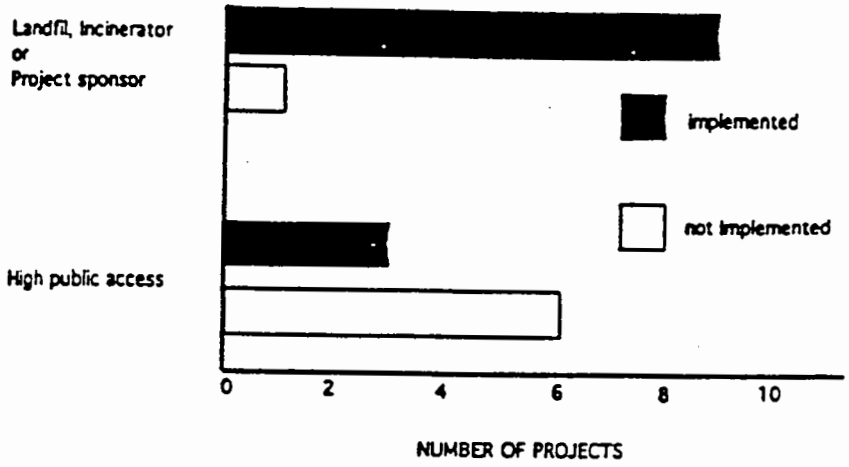

Figure 1. Sites of Current and Pending Projects (1983-1992)

FINDINGS

Twenty-three current or proposed projects were identified in the United States. This list is not exhaustive. Combustion industry vendors also are conducting proprietary experiments with MWC residues. In addition, it is possible that the author is not aware of some projects that exist. It is almost certain that new projects are being contemplated, because of the pressure on the industry and on municipalities to manage MWC residues using safe, but lower cost methods.

Eleven projects involve the use of MWC residues in concrete applications. Of those, five involve using residues in concrete blocks for buildings, four are marine applications, and two fulfill functions at landfill sites. Six of the remaining twelve projects are asphaltic road paving applications. Other projects include utilization of granular MSW residue aggregate as the base layer underlying a paved parking lot, a commercial scale substitution of air pollution control residues for a material in cement production, and use of combined residues as fill material for an inactive salt mine. The specific application for three proposed projects has not yet been determined.

Extreme variation in the development of projects was evident. Some were implemented within two years, while others had been in planning stages for four or five years, or in effect, halted. Several variables were examined to help explain this occurrence. The most reasonable factor that emerged from a simple, macro analytical level was "project site". Those projects that were located on landfills or other property controlled by project sponsors were implemented more rapidly and with greater frequency than those located in publicly accessible areas (Figure 1). Nine of the ten projects located at landfill sites or on property owned by a project sponsor have been implemented. The one remaining at a planning stage has been delayed because of the late discovery of high background levels of contaminants that would render monitoring tests meaningless.

In contrast, projects located in publicly accessible areas have not been implemented with comparable regularity. Nine projects are situated in publicly accessible areas. Only three have been implemented. Of the six still in planning stages, two are likely to be realized in the near future, while the other four are undergoing site and overall design reconsideration. Further investigation of the three existing demonstrations strengthens the location variable impact. Two are artificial reef projects, placed within the same immediate area. Although the ocean floor is technically accessible to the public, it does not function in that manner. The third project is in a warehouse district which is not used by the general public with great frequency, and should not be considered publicly accessible in the same way that a residential or consumer oriented commercial street would be.

In general, proponents of projects in publicly accessible areas have had difficulty moving plans into action, primarily because of actual or anticipated public opposition. Some project managers have participated in confrontations with community residents and representatives of environmental advocacy organizations, while others have worked their plans through in slow, guarded steps, keeping tight control of the flow of information. Public acceptability of a project appears to be a critical, if not the most critical, factor in siting and implementing a project in an area that is used in the general everyday life of a community.

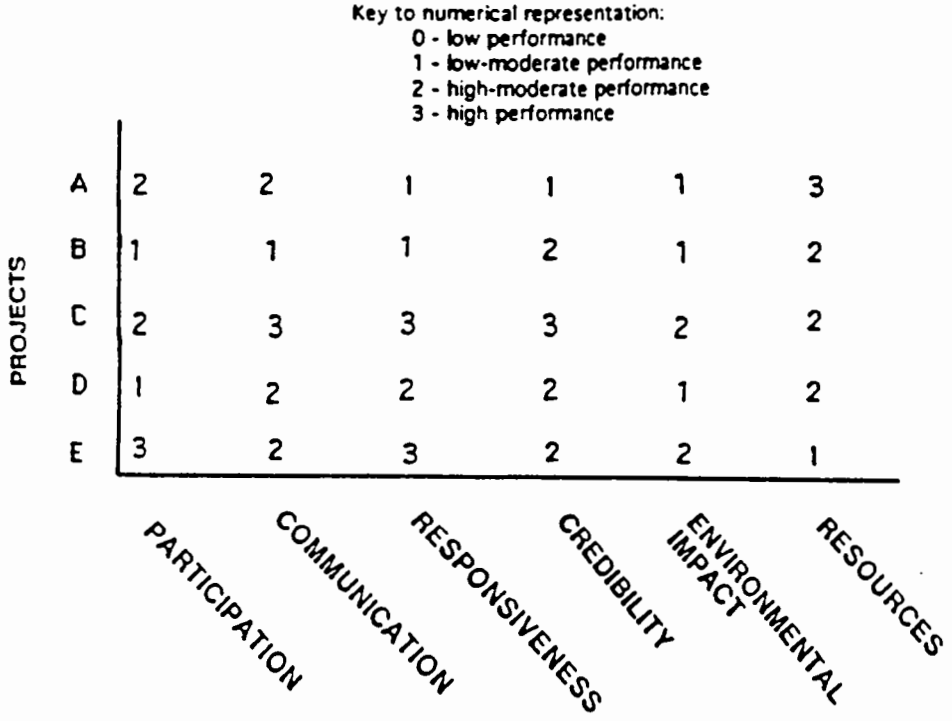

Figure 2. Performance of Projects With Regard to Selected Factors Influencing Public Acceptance.

Public Acceptability.

The five projects that have not yet been implemented and are proposed sites for publicly accessible locations were examined more closely. Figure 2 displays information characterizing the degree to which the dynamics of each project's development contributed to the public acceptability parameters set forth in the hypotheses. The rating of "0" indicates low performance with regard to the parameter. A rating of "3" represents strong activity in areas that generate public acceptance, and "1" and "2" are middle ratings for the parameter. It should be noted that data collection is not complete, and ratings may change as more detailed information is obtained.

In the following paragraphs the examples cited for different ratings on the 0 to 3 scales for different factors represent only a portion of those situations taken into consideration. Implementation practices present too wide a variety of circumstances to be individually described in a paper of this scope. The ratings summarize various activities, approaches, and events that, taken as a whole, form the basis of comparison of performance on each parameter.

The "participation" parameter includes the two variables of breadth of representation and time of involvement. A rating of "3" would be awarded if all major interest groups were invited to participate relatively early in the planning process. A rating of "2" would indicate a case where a broad range of representation was established by the middle of the process. A "1" would be assigned if most, but not all critical interests were represented toward the end of the process. A zero would be chosen if certain groups were excluded and were only able to make their views known after the permit was submitted for approval from appropriate authorities.

The "communication" category refers to how open or closed the communication channels were, and how much specific attention was paid to communication issues throughout the development of the project. A "3" rating indicates frequent meetings of a variety of forms, rapid sharing of new information to participants, and specific attention given to communication strategies and the generation of press releases, newsletter publications, and the like. A "2" would represent a case in which information is shared among many participants, but tightly controlled with respect to other partes. A "1" indicates minor attention to overall communication strategy. A "0" indicates relatively few meetings, selective sharing of information, and reluctant and unsystematic release of information to the news media.

"Responsiveness" is measured by changes in project design based on input from various interests. The broader the representation of interests who are the source of pressure for modification, and the greater the number of adaptations, the higher the rating. For example, a rating of "3" would indicate a case in which project designs were modified substantially to conform to concerns from a broad range of interests, whereas a "0" would designate staunch adherence to an original plan. A "2" would indicate adapting plans to accommodate some, but not all requests from selected interests. A "1" represents a situation where modifications were made, but with substantial reluctance.

"Credibility" is represented by the environmental and legal track record of each group involved, and the degree to which one participant's statements are believed by others. It is also measured by the length of time participants have known each other and are known by the community in which the project is located. Credibility is also affected by the positions or status participants achieve in their own area of expertise. A situation in which a "3" would be awarded is where participants readily believed and trusted each other, were viewed as environmentally responsible by members of the planning group and by the public-at-large, and who had known each other over a long period of time. An example of a "2" rating would be where a high level of trust existed within the primary planning group, but some questions remained concerning intent and former practices associated with institutions affiliated with project sponsors. A "1" represents a case where there is question of credibility among participants and in interactions with the general public. A "0" rating would indicate distrust among representatives of interests who have had no experience with each other, where at least some have acted in bad faith, or are known to have violated environmental regulations.

"Environmental Impact" encompasses measures that were taken during project design that minimize negative environmental impacts. Practices such as using bottom MWC residues only, rather than combined residues, and scaling the project so that it is no larger than what experimental rigor dictates are examples of actions that can be taken to reduce environmental impact. Other measures that minimize environmental impact are selecting a site removed from high public access and potential exposure that does not potentially jeopardize surface or ground water bodies, and planning an experimental design that includes background testing and life cycle considerations. In addition, taking precautionary steps to ensure worker safety, and providing enclosures for performing dust generating operations would be noted in this category. Special factors, such as mitigating other environmental problems with the proposed application are also included in this category. The greater the number of these environmentally cautious actions taken, the higher the rating.

"Resources" refers to the relative scarcity of landfill space and natural aggregate. A "3" is awarded if new landfill sites have been successfully resisted in the immediate area, if municipal waste and MWC residues must be transported out-of-state for disposal, if the population density is high, and the water table and drainage characteristics of the location make landfill siting unlikely. In addition, natural aggregate is expensive and difficult to obtain. A rating of "0" indicates some successful landfill siting in the immediate area, and an abundance of naturally occurring aggregate for construction use. A "1" indicates successful siting and scarce aggregate. A "2" might indicate a situation where aggregate is readily available and siting efforts have failed.

Two projects, C and E, are noteworthy. Both are characterized by early involvement of a wide range of interest groups. In project C that emphasis is most marked. The project manager and contact persons state their approach: "We try to think of who would be opposed and invite them in to discuss the idea." This is a contrast to the more characteristic pattern of trying to avoid opposition, usually environmental advocacy groups. In both projects specific attention is given to ensuring open and broad communication, and responsiveness to suggestions for modification. "Nobody has all the angles or answers. Everyone has different questions they want asked ...different concerns". "We try to keep everybody informed and up-to- date. It takes alot of time, but it pays off."

The factors of participation , communication, and responsiveness are engaged differently in projects A, B, and D. The manager and one of the sponsors of a project characterize their situation as a polarized fight: "This is a battle. We have to convince them ...". And in another, one of the most active members of a successful opposition group indicated that he would probably not have fought the project with such vengeance "if they (the project supporters in the locality) hadn't suggested that I be quiet and go home." Although in all projects, original plans were modified to some extent, the changes were accomplished in a more consensual manner in projects C, D, and E. Requests for altering project design in projects A and B were met with strong resistance. Debates became polarized and emotional among proponents and opponents alike.

A high degree of credibility and trust by the residents of the localities for the program sponsors and among the sponsors themselves was unique to Projects C and E. Admiration and appreciation of the high caliber of skills brought to the project's development by each participant was evident. This was the case across technical /non-technical lines as well as within the professions. "You see alot of snake oil salesmen in my work..." , but the remainder of the sentence assured the listener that this project group contained none. People knew each other and were familiar with their previous work and reputations. Responses from community residents indicated a high degree of trust in project participants: "If _____ says it's okay, then it's fine with me", or "If there's a problem, I know _____ would be right on it."

Although in the other projects there might be a high degree of respect among sponsors, trust is not as evident, not in relations to outsiders, and sometimes not between sponsors. In some instances there is a reluctance to discuss project details with anyone but those intimately connected to the project's development. In others, where sponsors and representatives of interest groups are willing to talk about the process, lack of trust and questions of credibility among interest groups is directly expressed. "Those were lies". "I was clearly set up for that blow." "They misrepresent information for their own purposes." "They're not interested in the truth." "All they want to do is make money right now, they aren't interested in the long term safety (of the ash)".

Motivations and intentions of different parties may be linked to the success of the project. Project sponsors and proponents may be so pressured by cost concerns or so convinced that there is minimal risk in using MWC residue in the project, that they do not recognize the validity of questions from other sources. Experimental design and testing protocol are more likely to be compromised in this case. The approach to the effort is "We're going to show that this (MWC residue) is safe.", rather than "What is safe, and how can we best determine if it is?" Projects A, B, D, and E are presented more like demonstrations than experiments. In contrast, the attitude of the principal sponsors of Project C was "Let's see what happens. It sounds like a good idea, but if it isn't safe, we shouldn't be using it. We think it'll be fine, but in case it isn't...if the tests show it isn't safe, we'll pull it right up." Plans include storing replacement material on site for immediate action. In most other projects, liability and removal/replacement issues are dealt with grudgingly by project sponsors. In addition, the construction application of project C was performed to resolve an environmental problem.

The "Resource" ratings reflect a universal difficulty in siting new landfills. In areas that appear to have appropriate land mass available, the high colloquial value placed on farm land makes siting virtually impossible. In addition, in all but one project, traditionally used natural aggregate is in short supply.

To illustrate the difference among these publicly accessible projects in another manner, the sum of the hypothesis ratings for each project was plotted against time spent in planning (Figure 3). There appears to be an inverse relationship between the level of effort directed toward the public acceptance parameters and the length of time consumed in planning stages. Project C, represented by the point at the upper left corner of the chart, is likely to be implemented within 1 1/2 years from planning initiation. Project E is now targeted for start-up after three years of planning. Project D may be terminated for reasons other than local environmentally concerned opposition, and if it proceeds, a new site must be chosen. Projects A and B may be implemented, but in one case a new site must be identified and other parameters may change. In project A, the issue of utilization itself is being debated. Site selection is not even being discussed at this point.

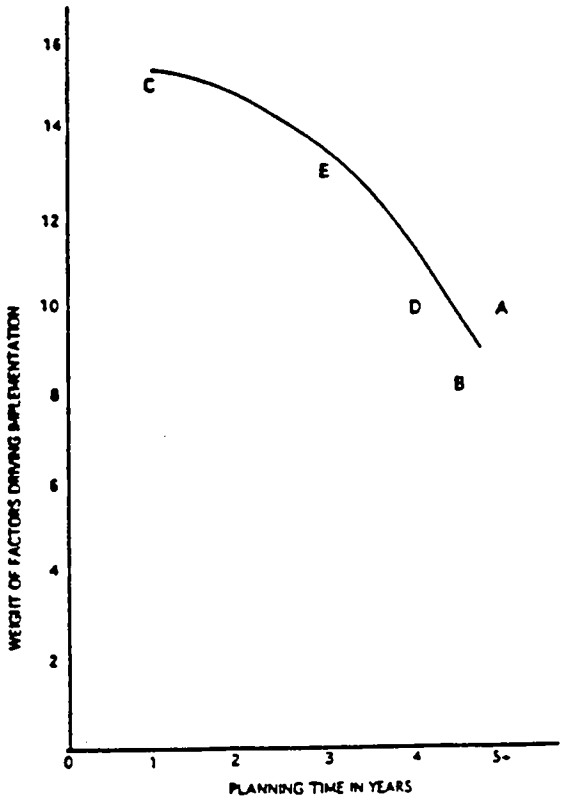

Figure 3. Years in Planning Compared to Overall Performance on Factors Influencing Public Acceptance, by Project.

CONCLUSIONS.

If these preliminary results accurately represent some aspects of the dynamics of MWC residue utilization projects, the following conclusions can be drawn:

- ° MWC residue utilization projects are more likely to be implemented in areas of low public accessibility and on property owned and controlled by project sponsors, such as landfill sites, incinerator facility locations, city-owned parking lots, and non-residential areas;
- ° Implementation or consensus is more likely when all major interest groups are included in very early stages of project planning and throughout the remainder of the process;
- ° Implementation or consensus is more likely when open, two-way, responsive communication is consciously planned and built into the development process; and,
- ° Implementation or consensus is more likely when credibility and trust are high among all participants.

The following recommendations might be considered by those wishing to conduct field experiments in instances where MWC residues are being used. If it is necessary to site the projects in areas of high public accessibility, involve all interest groups in the planning from the beginning. In any case, develop a communications plan for the project, and be accepting, honest, respectful and responsive in interacting with opponents, neutral observers, and proponents alike. Shrouding and withholding information will only increase distrust. If possible, select people who are well known, highly regarded, and solidly trusted by a wide spectrum of the local community.

There is no guarantee that by involving representatives from all major interest groups from the initial phases on, and keeping communication open and actively two-way, projects will be sited in publicly accessible areas and MWC residues will receive approval for widespread use. It might be determined that resources ought to be channeled in other directions. A project may contain elements that are too high risk to be considered. Finally, unforeseen political factors beyond the influence of project proponents may override support.

Acknowledgement

This work is being funded by USEPA, Risk Reduction Engineering Laboratory under Cooperative Agreement. CR818178-01-0, Carlton Wiles, Project Officer. The views expressed in this paper are those of the author(s) and do not necessarily express views or policies of USEPA.

Key Words

combustion residues, ash utilization, public acceptability, risk perception, risk communication, decision making

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TECHNICAL REPORT DATA
(Please read Instructions on the reverse before complet

1. REPORT NO.	2.	3.
EPA/600/A-94/218		

4. TITLE AND SUBTITLE	5. REPORT DATE
Impact of Decision-Making Strategies and Communication Processes on the Public Acceptability of Municipal Waste Combustion Residue Utilization in the United States	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Frances E. Hoffman[1], David S. Kosson[2]	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
[1]Rutgers, The State Univ. of New Jersey, Dept. of Urban Planning and Policy Anslysis, Piscataway, NJ 08855 [2]Rutgers, The State Univ. of New Jersey, Dept. of Chemical and Biochemical Engrg., Piscataway, NJ	11. CONTRACT/GRANT NO.

12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Risk Reduction Engineering Laboratory--Cinti, OH Office of Research and Development U.S. Environmental Protection Agency Cincinnati, OH 45268	Published Paper
	14. SPONSORING AGENCY CODE EPA/600/14

15. SUPPLEMENTARY NOTES Project Officer = Carlton Wiles (513)569-7795
1993 MWC International Conference, Research Triangle Parks, NC, May 1993
p:1-9

16. ABSTRACT

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17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Municipal Waste Combustion Residues, Ash Utilization		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
RELEASE TO PUBLIC	UNCLASSIFIED	10
	20. SECURITY CLASS *(This page)*	22. PRICE
	UNCLASSIFIED	