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WINDMILLS, INCINERATORS, AND SITING

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Summary

The public reaction to proposals for the siting of hazardous waste disposal facilities results largely from fear and from distrust of technologists. Several case histories are presented with inferences drawn as to possible future actions to reduce the problem.

Introduction

In recent years, many incidents have come to light that sharply reveal the inadequacy of earlier methods of disposal of industrial wastes and the damage to the environment and to the population that can result from such inadequate disposal methods. The glare of publicity has served to generate a spate of technical and legislative activity to discover adequate and safe disposal methods, and to institute governmental control over such activities. The result of this activity has been the development of new understanding and new regulatory tools that promise far better control in the future. The industrial pace is continually increasing as is the generation of new industrial wastes. It is urgent that these new and advanced disposal technologies are implemented.

Unfortunately, the same publicity that has brought about technical and regulatory progress has also resulted in an ill-informed but very sensitive public. In particular, when a new facility is proposed for construction at a specific site, negative public reaction is often so vigorous that the project has to be abandoned.

It is the purpose of this paper to explore several features of this situation and to attempt to point out ways in which the tension may be relieved, some of the misunderstanding removed, and progress made.

The public hearing

In the common understanding of the democratic process, it is essential that there is a suitable forum for the expression of shades of opinion on any matter that affects, or that is perceived to affect, the common welfare of the community. It is in this spirit that most political jurisdictions have instituted the

public hearing process when faced with making a decision that could have wide influence on the community. This mechanism is particularly widely used in matters that concern local zoning laws. For example, when considering the siting of a new shopping area or an extension to an interstate highway system, the public is invited to express its opinions as to the probable impact of the new facility. This is a natural result of an evolutionary process brought about by the complexity of the decisions that public officials are required to make. In order to dilute the ultimate responsibility, the public is invited to share in the decision making process.

The quasi-judicial public hearing process has developed as a mechanism by which parties with opposing views come together in an orderly fashion to present their individual views, discuss their differences, and reach a consensus. The petitioner is expected to present his case for the proposal, including the costs and the benefits to the community. The public participants, who are not infrequently opposed to the proposal, are expected to listen and understand the case presented by the petitioner, and then present their position on the matter. In the dialogue that should follow, the points of differences should be accurately defined and subsequently resolved by compromise. There is a necessity for mutual respect and understanding, based on a common language, if agreement is to be reached through public hearings.

The difficulties that are inherent in this process are well illustrated by the problem that arises when the petitioner is presenting the case for a new or modified chemical waste disposal facility. He is expected to present his case in terms of the technical details of the operation of the proposed facility, and the provisions that will be taken to reduce the hazard associated with transport to, and accidents within, the facility. In addition, he is expected to discuss the nature of the procedures to be instituted for dealing with an accident. The public reaction to such a proposal is generally negative since the possible benefits are completely overshadowed by the possible harmful effects of an accident, however improbable that eventuality might be. In view of the general lack of accurate information on the part of the general public and the general distrust of technologists, there is no real possibility of dialogue and thus no possibility of compromise.

Technical language and technology

A major deterrent to essential communication arises from the very specialized vocabulatory characteristic of most of modern technology. This language, which is specific to each of the disciplines involved, serves an important functi in that it allows precise communication among practitioners. Even when used in the manner for which it was created, the very nature of this language serves to confuse, and therefore frighten, the general public. Many examples of this problem may be cited; the fine distinction between hazardous and toxic will serve to illustrate the point. These precise distinctions are often lost on the lay public, with the result that there is no common language so that consensus, based on mutual understanding, is not possible.

A second problem that has arisen in the use of language by technicians can be illustrated by a quotation from Orwell [1] taken from his essay, "Politics and the English Language". A quote from Ecclesiastes as follows: "I returned and saw under the sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to them all", may be translated into more modern English as "Objective consideration of contemporary phenomena compels the conclusion that success or failure in competitive activities exhibit no tendency to be commensurate with innate capacity, but that a considerable element of the unpredictable must invariably be taken into account".
Although the "modern English" version is something of a parody, we are all very familiar with many examples of this kind of verbose writing by which the author succeeds in completely obscuring his meaning and intent. The general tendency of technical writers to use complicated syntax, coupled with highly specialized terminology tends to render technical literature inaccessible to even the interested lay reader.

Further examples of deliberately poor communication are those given in the recent award of the "1979 Doublespeak Award" [2] to the Nuclear Regulatory Commission for its explanations during the Three Mile Island incident, (Fig. 1). Clearly, these examples represent a deliberate attempt to confuse the public by the use of obscure technical euphemisms to describe real physical events. Such a use of the language serves to further erode the credibility of technology and technologists.

Explosion	=	energetic disassembly
Fire	=	Rapid oxidation
Accident	=	Normal aberration or plant transient
The reactor vessel is contaminated with plutonium = plutonium has taken up residence in the reactor vessel		

Fig. 1. Doublespeak — An example of technological language [2]

When the case for the safety of a proposed waste disposal facility is discussed in a public hearing, the emphasis is always on the nature of both the monitoring and the on-line safety equipment that will be used. Tacit in the discussion is the assumption that the operators will be responsible, and that they actually know of what they speak. The public perception of this is not always what we technologists would have it be. The point can again be illustrated by the Three Mile Island incident. All too often in the past, nuclear technologists have blandly assured the public that there are no dangers in their technology, and since all is under their control and in their very capable hands, there is no cause for alarm. The recent events at Three Mile Island clearly showed that all was not well, that things were not in control, and that there were, indeed, unforeseen dangers. The net result of these lapses has been a general erosion of public confidence, not so much in technology, but rather in technologists.

Public information

A second aspect of the complexities of technical language is the fact that, because of the many disciplines that are involved in problems concerning the environmental effects of chemical wastes, the technical literature is simply not available to the concerned lay public. Therefore, the only viable source of information is the media. Unfortunately, most of the media presentations in the past have been of poor practices. Many, if not most, of their presentations tend towards the spectacular, with gross over-simplifications. Few of the commentators are sufficiently knowledgeable in chemical or toxicological technology to adequately appraise the situation. This fact, coupled with the short attention span of both writers and readers, leads to the use of "buzz words" rather than the more unfamiliar technical terms. Examples of this effect are shown in Fig. 2.

Term	"Buzz word"
Toxic	Poisonous
Hazardous	Explosive
Waste	Poisonous
Remote	Arizona
Isolated	Arizona (Utah)
Experimental facility	Permanent installation
Limited operation	Continuous operation
Fail-safe	Dangerous
Emissions	Billowing clouds
Emission standards	Contaminated neighborhood
Non-hazardous	Gasoline, propane, etc.

Fig. 2. "Buzz word" vocabulary.

It would appear that at least some of the more vocal members of the general public have reacted to such resources of information, perceiving a chemica waste disposal facility, somewhat as Cervantes' Don Quixote perceived the windmill; [3]: "Engaged in this discourse, they came in sight of thirty or forty windmills which are in that plain; and, as soon as Don Quixote espied them, he said to his squire, 'Fortune disposes our affairs better than we ourselves could have desired; look yonder, friend Sancho Panza, where thou mayest discover somewhat more than thirty monstrous giants, whom I intend to encounter and slay and with their spoils we will begin to enrich ourselves; for it is lawful war, and doing God's good service to remove so wicked a generation from off the face of the earth."

The mere mention of the possibility that a chemical waste disposal facility is contemplated in their vicinity seems to evoke images of the turn of the century industrial city. Great belching stacks filling the skies with rolling billows of greasy black smoke, obscuring the bright blue skies, killing the

vegetation for miles around, causing happy children to choke and to be convulsed with pain, causing the good citizens to die like flies from the noxious fumes — these are the visions conjured up by the mention of an incinerator. T mention of a secure landfill site evokes the vision of a vast desert covered with rusting drums and abandoned industrial equipment; here and there are foul pools of oily water and over all hangs a miasma of poisonous fumes. In view of such visions of the nature of the chemical waste disposal facilities, it is indeed "a lawful war, and doing God's good service to remove so wicked a generation from off the face of the earth."

A successful siting proposal

Not all recent attempts to site waste disposal facilities, or to carry out test burns, have failed because of public reaction. It will be instructive to examine one such successful attempt in order to determine the factors that led to success. In the aftermath of the Kepone disaster in Virginia, it was decided that co-incineration offered the best approach to the disposal of the contaminated sludge that was stored in the Hopewell lagoon. A facility available in Toledo, Ohio appeared to be that most convenient for a series of test burns to establisl the necessary conditions for a large scale disposal operation.

After a number of private meetings with concerned local, state, and regiona officials in Ohio, a comprehensive publicity and public information program was prepared. Specifically, a very detailed Kepone Fact Sheet [4] was prepared for the purpose of briefing the interested press (and other media) in as detailed and factual a manner as possible. All terms that might lead to substitutions of "buzz words" were carefully defined. In addition, the precise details of the proposed experiments were spelled out, as were the safety precautions to be taken. This information was made widely available some six months before the proposed starting date of the test burns. The principals of the technical staff were on call to answer any questions that arose during the pre-burn period.

The availability of accurate, detailed information enabled all media to present a knowledgeable explanation of the proposed experiments. There was no concerted public outcry, and the experiments were carried out in an atmosphere of candour and public acceptance. (It should perhaps be pointed out that the experiments were carried out in the dead of winter, a factor that perhaps dampened the ardour of persons who otherwise might have been tempted to protest more vigorously.)

Future course

Every attempt to site a facility that is rejected by public reaction serves to harden anti-siting reactions in the future. This chain reaction effect makes it imperative that there is a national effort to determine the nature of the fears of the general public and the means by which these fears can adequately be

allayed. The problem derives from the means by which technical matters are discussed in public forum. In those areas of technology for which there exists a hard and defensible 'right' position, technicians agree and the public perceives the unanimity; all that is required is the straightforward presentation of the facts. Unfortunately, the factual basis of much that concerns the effects of hazardous materials and their ultimate disposal is, at best, meagre. The lack of unanimity leads to the injection of elements of subjectivity justifying the safety of a proposed hazardous waste facility. In a situation in which purely scientific arguments are insufficient, scientists often present their case without allowing, or even mentioning, the elements of subjectivity.

Several elements are needed to correct the present situations. First, the public must become better educated in environmental matters so as to allow them to make informed judgements as to the relative risks associated with a proposed facility, and then to be able to weigh these risks against the perceive benefits. Secondly, scientists and technologists working with hazardous materials and their disposal must become better equipped to deal with questions for which there does not exist a firm technical position backed by quantitative data.

Public education, especially in an area as complex as that of the environmental effects of long-lived chemicals, is a difficult matter, since most of their general information is derived from mass media. As was demonstrated by the Kepone experiments, when the media are presented with accurate information they will generally present a factual case to the public. It would seem, then, that the public perception of the problems associated with hazardous materials and their disposal could best be improved by means of an educated media

An interesting example of what can be accomplished in terms of public education is the Public Broadcasting Network presentation "Connections" [5] which undertook to trace the history of many modern technical devices such as the electronic clock, the telescope, radar and many others. This programme, prepared by James Burke, was extremely interesting as well as technically accurate in every respect. Perhaps something of this sort could be prepared to deal with such matters as the origin of industrial hazardous wastes, the connection between such wastes and the general standard of living of an industrial nation, the effects of inadequate disposal, the reasons for the new regulations and the justification of our belief that a properly operated facility is the safest means of disposal for these materials.

With respect to the general problem of scientific responsibility in those public matters for which there does not exist a strong and well established scientific data base, the solution is not so obvious. A recent article by Edsall [6] addresses this question, and a quote from that paper appropriately sums up the situation: "Since nearly all controversial issues of this sort involve technology, as well as basic science, the disputes cannot be resolved in terms of 'pre-established impersonal criteria'. Scientific facts and value judgements are so closely interwoven that it is exceedingly difficult to disentangle them, and the inferences to be drawn are inconclusive. Scientists can honestly dis-

agree as to what inferences can legitimately be drawn from the facts." This same question has been addressed by the Federation of American Scientists [7], which takes the position that scientists and technologists who are involved in public debate should avoid dogmatic claims, be prepared to admit and correct errors in fact or interpretation, and be willing to reason with those with whom they disagree. These requirements may seem an unattainable goal in the context of todays' climate, but we must remember that we too "are doing God's good work."

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