

PUBLIC ATTITUDES TO AND KNOWLEDGE OF SLUDGE MANAGEMENT AND DISPOSAL: "WINNING THE POOH"

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ABSTRACT:

A review of available literature on public attitudes to sludge disposal was undertaken. This formed the basis for a national telephone pilot study in Perth, Adelaide, Ballarat and Sydney which investigated the knowledge and attitudes of 202 respondents to sewage sludge, alternative sludge disposal methods and public involvement in sludge management decision making. Knowledge of sludge and disposal methods was generally low and environmental impact appeared to influence preferences for disposal methods. Sludge was seen as a natural resource having value as a fertilizer and soil conditioner. More information and some involvement in sludge disposal decision making processes were seen as desirable. Selective telephone interviews with fifty experts and stakeholders also showed overall agreement with public involvement at some level of the decision making cycle. Sludge was seen by the majority of these as having value, but also inherent problems, such as toxic contaminants. Results and recommendations are presented in the context of a policy practice model.

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1.0 INTRODUCTION

Waste and its management is becoming an increasingly debated subject. While, traditionally the community in Australia has been prepared to leave the subject to the "experts" in the last decade, there has been an increasing insistence that the public should have a say in what constitutes an acceptable level of risk. Proponents of new heavy industry or major resource developments have been grappling to come to grips with two new players in the planning scene:- NIMBY (Not In My Back Yard) and LULU (Local Unacceptable Land Use), both of whom have been strident in their desire to ensure that technical decisions reflect community values.

The water industry, along with others, have become increasingly acquainted with NIMBY and LULU through controversies relating to sewage disposal in Sydney; locations for industrial waste in Western Australia and concerns about long term waste disposal policies in Adelaide. At the local government level, ongoing debates are held in many localities on the siting of waste disposal facilities and the effects of sewage policies on town planning in general.

In this study we examine public perceptions and concerns in relation to domestic sludge management with a view to deriving preliminary recommendations for public education and involvement in sludge management and the requirements for future community data to successfully implement these recommendations.

The preliminary recommendations will be formulated on the basis of:

- (i) a review of the limited, available literature on sludge management and relevant selected material from the general literature on public involvement in risky decision making;
- (ii) a pilot survey of residents in each of four Australian locations and
- (ii) information and opinions obtained from experts and stakeholders in the four locations.

As far as was feasible, the information sought from all three groups was the same to encourage a comparison between their perspectives.

It was felt that sludge management did require separate community study in that, despite it having a number of common characteristics with other areas of "risky" decision making such as large components of interpretation of technical biological and chemical data, it also can be regarded as unique in that the local community itself derives the wastes which it may not wish have disposed in its own backyard. Thus it is the community itself which is causing the problem. It may be then, that they want to be involved in the solution in different ways from that of developments imposed on them from outside.

2.0. COMMUNITIES AND SLUDGE MANAGEMENT: A SELECTIVE REVIEW OF THE LITERATURE

The literature on public involvement and domestic sludge management is comparatively small. Most attention has focused on hazardous waste associated with industrial wastes.

Despite the limited volume of literature specifically devoted to domestic sludge, there are a number of generalisations which can be made from the wider literature on potentially hazardous waste and risky decisions in environmental management.

This seems an appropriate response. As Feliciano (1982) points out, there is a large amount of uncertainty associated with sludge disposal:

"On the one hand you can incinerate the sludge but the fuel costs would make it very expensive. On the other hand you could bury the sludge in land fills, but land is expensive and you might contaminate the groundwater. On the other hand, you could dispose of the sludge in the ocean, but that would be wasting a resource and you may have to spend a lot of time and money in court. On the other hand, numerous scientists report that sludge can be stabilised and successfully applied to land for agricultural purposes, but other scientists report that sludge is laden with toxic and pathogenic materials that preempt any usage for agriculture".

From the above quotation it would seem that those involved with public education and involvement will need to combine the wisdom of Solomon with the dexterity of a juggler! In this selective review we examine three major issues separately before nominating a model of public involvement which we believe to be suitable for public involvement in sludge management

The three issues we address are:

- (i) that effective public involvement should attempt to develop planning criteria rather than attempt to deal with specific technological issues;
- (ii) that in areas of risk or uncertainty in sludge management, subjective perceptions of risk need to be incorporated in the design of the public involvement program;
- (iii) attention needs to be paid to perceptions of the fairness of the process of public involvement and decision making as well as the decision outcome.

2.1 The Misery Cycle

The literature is replete with descriptions of failed or flawed policy formulation and implementation in this area (eg. Kraft and Kraut, 1988). As a result, there are those who consider that the notion of public involvement may not be beneficial. Rosenbaum (1983) for example, has suggested that public involvement programs "may become a gamble against public prejudices or an act of faith in the possibilities of public education, often with considerable risks to the agencies promoting them."

In summary, on many occasions in the past, the first stage of the development of a new policy or site has been accompanied by silence from the policy makers who, in considering their options, have either been too preoccupied in their own deliberations to think of the public or have considered that the issues are too complex for the public to comprehend. Managers of existing facilities often do not think to keep the public informed of routine operations or changes. For whatever reason, the public is not informed until a precise policy or land fill site is presented to them or sometimes until an accident or some newsworthy change occurs (eg. Glover, 1976).

Consequently, those in the public who do have a say are forced to begin their interaction from the position of opposition or protest. Presumably, those who are happy or unaware of the policy have no need to communicate and thus any communications to planners are always negative.

If the protest is strong enough the instrumentality or company is then placed in a position of having to respond swiftly in order to reassure doubters. Institutional change may occur rapidly or rigid regulations may be devised if the political heat is sufficient. Often these solutions or their implementation are not optimal.

Such decision making is seen as the "solution" to the problem and once the public wrath is abated, the planner or manager breaths a sigh of relief. Because the public were such a "pain" during the last controversy, they are not informed or consulted until the next development or accident which leads to similarly heated debate and more misery for the planner or manager and the community. Further the "new" controversy is often at the same level of sophistication as the last and sometimes even on the same topic.

We have labelled (with apologies to Downs (1972)) such a process as miserable because the interaction between all parties is unproductive. It is cyclical because there is a lack of progress in the standard of debate and the process goes back to where it started. In the past, Rosenbaum's (1983) predictions about public involvement have become a self-fulfilling prophecy on many occasions!

Syme and Eaton (1989) and Syme (1990) have emphasised the importance of treating public involvement within environmental planning generally as an ongoing negotiative process which needs to be punctuated by satisfactory decisions for all parties and a mutual sense of progress. Such a view has also been endorsed by the USA Environmental Protection Authority within the specific context of their rules for sludge management (Easton, 1979) and interest has been shown in such processes for future planning for the United Kingdom (Doyle, 1988).

But how can we do better? The literature does provide us with a number of issues which have been shown to be important over a variety of risk related environmental issues. We briefly summarise these and conclude with a model of public involvement which is framed in such a way as to incorporate both planning and implementation and is amenable to the formulation of specific performance criteria for evaluative purposes.

2.2 Coping with Technical Information and Knowledge

The problem of the degree of sophistication of knowledge required for people to contribute to planning for issues in which there is technological sophistication and uncertainty is one which has consistently challenged planners of public involvement. On the one hand, authors (eg. Hunt, 1990) have stated that it is important that there is continuous information flow so that the misery cycle is avoided and more informed and rational debate can occur. On the other hand, it is evident that too much or the wrong kind of information can result in risk (or uncertainty) amplification in the community, which may lead to over-concern about issues. Obtaining the appropriate balance is a matter of ethical concern to many planners (Fiorino, 1989).

In a practical sense, two observations need to be made. Firstly, there is no need for the public to fully understand all technical issues. Public involvement should be about input into the criteria for planning (eg. a health preserving sludge policy or one which involves the maximum recycling) rather than the technicalities of the solution. People need either to know enough about the technicalities to understand what is impossible or to trust the relevant authorities sufficiently to believe that there is an honest attempt to incorporate their views (see Section 2.4 below). Technical information flow should be designed with this point in mind.

The professional roles literature (Argyris and Schon, 1974) indicates that, while the effective professional needs to act in partnership with the client or public, he or she has a duty to take prime leadership in issues of a specialised nature because of the specialised knowledge acquired by that professional.

Specific steps for planning for information campaigns are described in the model below. One simple point which must be made, however, is that for the planning of any successful information and/or public involvement program, it is imperative for the planner to know the level of knowledge and the beliefs about sludge management in the community. Too often, public discussions on issues such as this are confused because the concerns of the public and the professionals are different and neither end up helping each other (eg. Aird, 1973).

2.3 Acceptable Risk

Domestic sludge management and certainly industrial sludge management as stated above has a number of elements of uncertainty. Some of the components of uncertainty will be related to issues of chemistry or biology (How long does it take for a helminth to die?). Other components of uncertainty will relate to people's psychological perceptions of risk which may have nothing to do with anything physical, but are equally important to planning and decision making. Defining what is "acceptable risk" has become one of the most vexed problems facing public involvement planners (Covello, Flamm, Rodricks and Tardiff, 1983). It is an issue which is clearly related to that of presenting information.

Researchers have shown that people are likely to take a number of "heuristics" or "rules of thumb" into their assessment of particular risks (Kahneman, Slovic and Tversky, 1982).

For example, studies have shown that risks tend to be overestimated if:

- (i) they are more "available" in that information in relation to a topic is often seen in the press (eg. cases of botulism are well publicised in the USA and therefore the probability of it occurring to oneself is overestimated);
- (ii) people are presented with too much detail in terms of how processes work. (Evidently they are more impressed with what may go wrong than the sophistication of the process);
- (iii) if the risk is a "vivid" one or easy to imagine (sludge is likely to be included in this category).

Finally, both experts and the public tend to be over-confident in probabilities derived from a small amount of information.

The reason for noting these consistent findings is that often squabbles may break out between the public and planners about what is the "real" level of risk associated with a new treatment plant or the desirability of using sludge in particular ways. From the public involvement viewpoint, such an argument may be an unfortunate distraction in that scientific probabilities are no more real than subjective perceptions if one is trying to develop policies. The function of the public involvement program is to put the scientific data and local knowledge into the discussion about what is acceptable, given the diversity of knowledge and values among the stakeholders.

The first three heuristics may tend to work against innovation in the sludge management area, the final one may tend to interfere with "reasonable discussion".

In regard to uncertainty and arriving at acceptable risk, Fischhoff, Slovic and Lichtenstein (1983) state:

"There are many reasons for laypersons and experts to disagree. These include misunderstanding, miscommunication and misinformation. Discerning the cause underlying a particular disagreement requires a combination of (a) careful thought, to clarify what is being talked about and whether agreement is possible given the disputants' differing frame of reference and (b) careful research to clarify just what it is that the various parties know and believe. Once the situation has been clarified, the underlying problem can be diagnosed as calling for a scientific, educational, semantic or political solution."

2.4 Equity, Trust and Procedural Justice

As stated above, the process of public involvement will need to be an ongoing one if the misery cycle is to be avoided. If this is the case, interest groups and the community generally will tend to accept decisions on the basis of the perceived fairness of the ongoing process of decision making and the siting of facilities.

Before wanting to positively contribute to decision making, people will tend to examine the fairness or equity of which groups bear the costs of disposal over time

(Keller and Sarin, 1988), the openness of the public service or business (Pierce and Doerkson, 1976) and decide upon the trust that they have in the decision makers. This trust is paramount in governing attitudes towards policies and levels of service. For example, in a study to determine the attitudinal bases for the perception of drinking water quality in a variety of locations in Western Australia with differing water qualities, trust in the Water Authority of Western Australian was the major predictor of water quality satisfaction (Williams and Syme, 1989).

Put simply, there is a strong ethic in Australia and other democracies that people should have "voice" or a fair hearing (Lind and Tyler, 1988), and many people will accept decisions if the decision making process is seen to be procedurally just. Often problems in debate about public involvement programs revolve around sophisticated arguments about what is or what is not fair. In these areas the superior expertise does not necessarily lie with the planner.

Issues which will arise can relate to the scoping of the questions allowed within the public involvement programs (What are the range of issues which should be looked at?), the eligibility of differing groups to participate (should only NIMBY's be invited), the role of special interest groups (Nancarrow and Syme, 1989), and the power which should be accorded to participants (Arnstein, 1975). Finally, different public involvement techniques are seen as being more or less fair for different occasions (Creighton, Priscoli and Dunning, 1983).

Sometimes people prefer advisory groups selected from the wider communities, (Tourbier, 1978), sometimes planners prefer NIMBY and LULU not to be invited (McGarry, 1982), while some interest groups insist on being positively involved (McNulty, 1978).

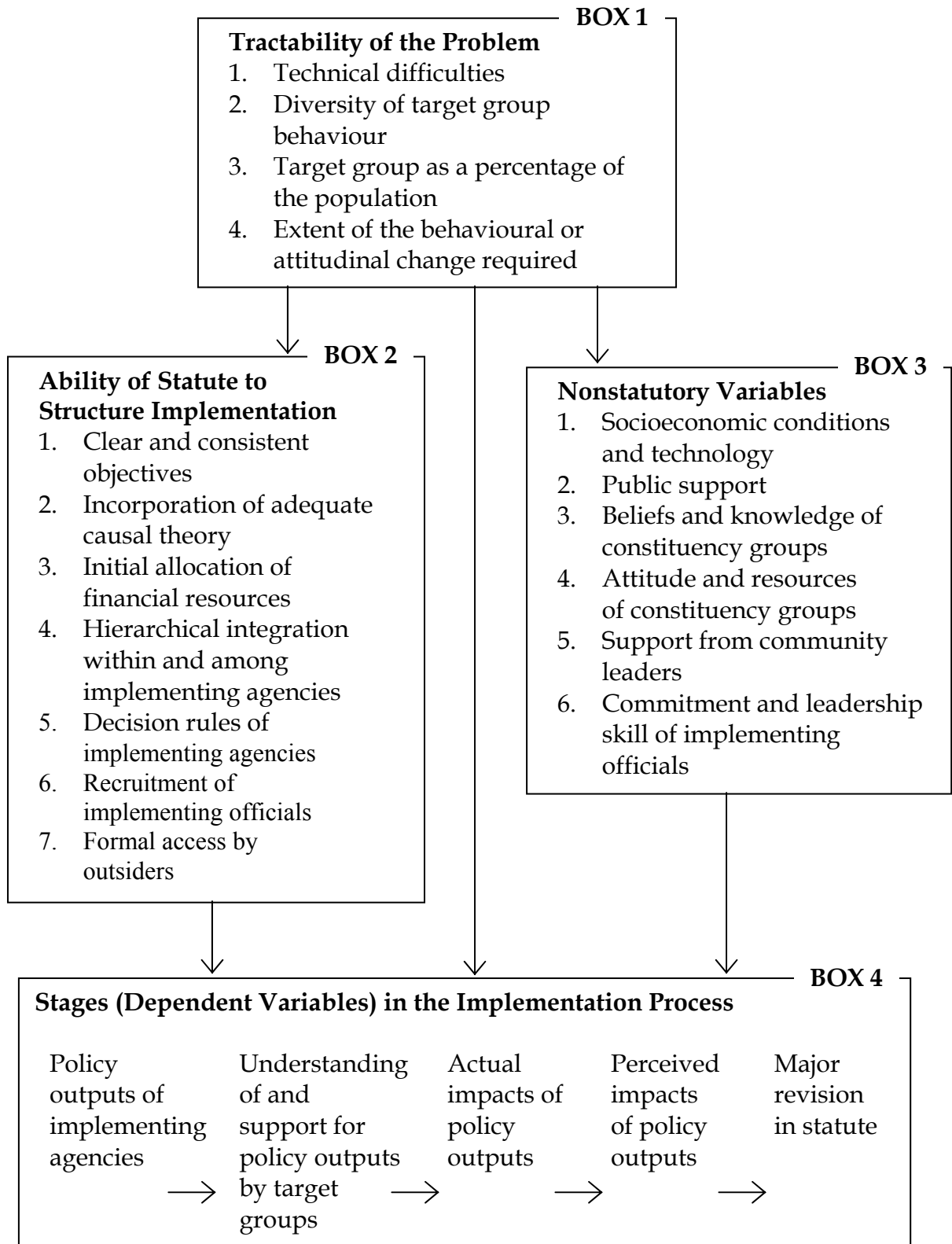
The precise formulation for any particular program will depend on the circumstances and the problem at hand. The important thing for the planner however, is to ensure that the process undertaken is perceived as being fair by most sections of the community. This will require the preliminary social investigation suggested by the following model.

2.5 A Framework for Implementing Public Involvement

After perusal of a wide variety of models of public involvement (see Sewell and Phillips, 1979) we have selected that of Mazmanian and Sabatier (1983) as one which would provide clear direction for the sludge management issue. The major advantage of the model is that it concentrates on practice and the requirements for implementation at each stage. Figure 1 shows a slightly modified version of that originally proposed by Mazmanian and Sabatier. The modifications reflect the fact that we believe there is currently only modest knowledge about sludge management in the community.

The benefit of this modified model is that it acknowledges that the problem has both technical and social components and these components need to be melded to define the level of policy change which may be required (Box 1). It also demonstrates that the composition of the public needs to be thought about as carefully as the contents of the sludge.

Figure 1
Factors Affecting Policy Practice



ADAPTED FROM: *Implementation and Public Policy* by Daniel A. Mazmanian and Paul A. Sabatier. Copyright 1983 by Scott, Foresman and Company.

Boxes 2 and 3 show there is a need for a separate, but parallel, understanding of how both the bureaucracy and the community should be monitored. Box 2 emphasises the need for a clear model of the policy process among government agencies. Box 3 shows the requirement for the need for systematic analysis of the knowledge, needs and beliefs of the general public and special interest groups.

Finally, Box 4 shows the phases of implementation of policy and acknowledges the need for ongoing evaluation of the effects of particular policy and the timely identification for revision of policy. In short, it acknowledges that no one policy will last forever so there needs to be an inbuilt mechanism incorporating the public which acknowledges the dynamic nature of decision making and hopefully avoids the misery cycle.

In the report on the survey that follows, we have attempted to gain some preliminary information from all three players represented in Boxes 2 and 3: decision makers, special interest groups and the public as a whole.

3.0 SURVEY METHODOLOGY

3.1 Selection of Cities

It was the aim of this pilot study to select cities varying in the degree of community awareness of sludge management and disposal issues. Sydney was chosen as a large city where sludge disposal practices have achieved a high profile; Adelaide has had extensive recent discussion in relation to ocean disposal of sludge and uses 70% of its sludge as soil additive; Ballarat, a smaller provincial city where sludge disposal is an issue amongst the experts responsible for its disposal; and Perth, a relatively large city where sludge disposal was thought to be of little interest. Time constraints restricted the number of cities able to be included in this study and the sample size. Nevertheless some tentative conclusions can be made.

3.2 Selection of Subjects

Three groups of people, having various levels of knowledge and involvement in sludge management and disposal were selected:

- (a) members of the general public;
 - (b) various 'stakeholders' or people who have an interest in aspects of sludge management and disposal, or who may be influenced by decisions made for its disposal;
- and (c) professionals involved in some aspect of sludge treatment, management, research or disposal (the 'expert' sample).

Interviews with the public were obtained by random selection through the white pages of relevant telephone books for each of the cities. Experts and stakeholders were selected firstly, by recommendation of the Sludge Workshop Organising Committee members, secondly by reputation, and then by availability. In instances where the recommended person was unavailable, for example on leave, the next most appropriate person was consulted.

It was difficult to draw a cut off point for expert and stakeholders, and while the aim was to achieve a balance of representation for these groups, there will, undoubtedly, be some views that have not been canvassed.

3.3 Procedure

Telephone interviews of community members were conducted over the period of one week, from the Perth base at CSIRO, between the hours of 10.00am and 7.30 pm for each of the cities. This was done to ensure a representative sample of the population (ie. across age levels, education, and gender). Stakeholder and expert interviews were also conducted by telephone from the Perth base. The refusal rate for expert and stakeholders interviews was zero, and for community interviews an average of 35% of people contacted refused an interview for reasons that included "not interested", "going to work", "going to airport", "cooking", "deaf", and "can't understand English very well". This would appear to be an expected response given the subject of the interview and people's reported interest in and knowledge of sludge. It also compares favourably with other pilot studies. For example, a pilot study interviewing people in a shopping mall reported an overall refusal rate of 47% (Nancarrow & Syme, 1990).

A total of 202 community members were interviewed, 50 from Ballarat, Adelaide and Sydney, and 52 from Perth; and a total of 50 experts and stakeholders were interviewed - 12 to 13 in each city.

3.4 Questionnaires

A fourteen-item questionnaire consisting of Likert scales and free and fixed-response questions was developed for community interviews. Expert and stakeholders were administered a semi-structured open-ended questionnaire.

To achieve the aims of this conference paper, the questionnaire was designed to assess firstly, how much knowledge the general public has about sludge and sludge disposal. The community questionnaire was aimed at assessing knowledge of sewage waste components (eg. the difference between sludge and effluent) before investigating preferences for and beliefs about various disposal practices. The questionnaire finally inquired about preferences for public and action group involvement in sludge disposal decision making.

The expert and stakeholder questionnaire was devised to assess differences in beliefs about sludge disposal practices, both between experts and stakeholders, and within both of these groups. Beliefs about alternative disposal mechanisms, and the extent of public and action group involvement in sludge disposal decision making were also gathered.

4.0 RESULTS

4.1 What is Sludge? - Who Knows...?

Given the lack of information about community knowledge of sewage, the most obvious starting point was to ask respondents if they knew the difference between sewage, sludge and effluent. Respondents who gave an inaccurate description, or said they did not know, were read a simplistic definition to enable them to participate in the rest of the survey. As was expected, many respondents (59% or 118) did not know the difference between sewage, sludge and effluent, while 32% (or 65) had some idea. The level of knowledge did not differ between respondents from the different cities.

Even fewer respondents knew how sludge is disposed of in their city (18% or 37), leaving the majority of respondents (73% or 147) unaware of sludge disposal practices. The selection of Sydney, as a city where sludge has a relatively high profile, and Perth, where it has had a fairly low profile, probably accounts for more Sydney respondents reportedly knowing how sludge was disposed of in their city (34% or 17) than did Perth respondents (10% or 5). Not surprisingly, the method named by most Sydney respondents was ocean discharge. Other disposal methods mentioned by other respondents were: composting, being sold as fertilizer, and landfill.

The stakeholders and experts interviewed were all asked how sludge was disposed of in their city and most were able to answer, with varying degrees of completeness depending on their involvement with sludge disposal. For example, where a number of disposal methods were used, a soil contractor may only name 'landscaping uses', or for the private sewage contractor 'disposal' was at the waste treatment plant.

4.2 'Value' of Sludge

Responses to the question 'is sludge valuable?' could indicate general approaches for dealing with sludge disposal. Perceptions of the 'value' of sludge may have implications for the acceptability of some of these methods, for example, recycling. It then provides a basis for further public involvement by giving information about the costs and benefits of such methods to allow community decisions that involve tradeoffs between environmental protection and economic costs.

Most community respondents (68% or 137) believed sludge had some value, as a fertilizer, soil conditioner, and paving brick additive, with only 10% (or 20) saying it had none. The experts and stakeholders were divided in their views. Some believed sludge was valuable for its nutrients and as a soil conditioner because of its water holding capacity. Others believed it needed nutrients added to be of value as a fertilizer or some other treatment before it could be considered valuable. Others again said it had no value because of heavy metal and other contaminants.

4.3 Preferences and Alternatives for Sludge Disposal

In keeping with the current general awareness in the population of environmental and pollution issues, both incineration and ocean discharge were disliked by community respondents because of their effects on the environment. When asked for their *preferred* methods of disposal, the use of sludge as a fertilizer received the greatest approval, followed by its reuse as a soil conditioner/mix. Detailed responses are shown below, and there were no observed statistical differences between the cities.

Community Preferences for Sludge Disposal

| Disposal Method | Agree | Disagree | Undecided / Don't Know |
|-------------------|--------------|--------------|---------------------------|
| Incineration | N=34 17% | N=71 71% | N=24 12% |
| Ocean Discharge | N=16 8% | N=173 87% | N=10 5% |
| Use as Fertilizer | N=182 90% | N=10 5% | N=20 10% |
| Use as Landfill | N=107 54% | N=51 26% | N=42 21% |
| Landscaping/Soil | N=144 72% | N=21 11% | N=35 18% |

Although there was greater consensus for use of sludge as fertilizers, landfill, and for soil or landscaping purposes, there was also an element of belief that there may be potential health or environmental risks associated with these methods, with many people adding comments such as:

- "if all the chemicals are removed",
 - "it has to be handled carefully",
 - "if it is treated",
 - "as long as it doesn't affect the soil or atmosphere",
- and "as long as it is safe".

So even given their high approval for these methods, there is a possibility that public approval could be withdrawn should there be insufficient or conflicting information about hazards or risks associated with these methods. However, many community respondents mentioned that sludge, as a natural resource, should not be 'wasted'.

The experts named a wide variety of alternative sludge disposal methods, such as spray irrigation, pelletised fertilizers, composting, minesite rehabilitation, silviculture, incineration, use in road building, oil from sludge, Vertch - a chemical processing method, and vapour solvent extraction to remove the heavy metals. However, many of

these options were not feasible because of associated costs of transportation and processing to facilitate handling, and problems with toxic contamination.

A suggestion from one stakeholder involving no transportation costs was the use of Bio-Loo's, a domestic composting apparatus. The use of worms on filter beds was also suggested as a method of processing.

4.4 Current Issues in Sludge Disposal

It was noticeable throughout this survey that stakeholders and experts have a good deal of common ground and this was reflected in their responses, which were differentiated by formal levels of training rather than by particular attitudes. For example, some policy makers were as concerned as environmentalists about ocean pollution, and some planners were as concerned as chemists about heavy metal contamination of sludge. Thus, when stakeholders and experts were asked what they considered to be current issues in sludge disposal and management, responses were not differentiated by source, but according to category of concern. Responses have been categorised into the following broad areas.

Policy: Issues were primarily the lack of national guidelines, and the lack of a booklet with information about the practice of sludge disposal, such as regulatory constraints.

Research: The need for more information, particularly related to Australian conditions, was called for:

- re-use of sludge including agricultural uses, soil conditioning, silviculture, composting with other waste, pelletised fertilizers;
- land reclamation;
- downstream manufacturing; treatment research such as Vertch, microwave, Memtech reverse osmosis; cheaper dewatering techniques; point source disposal.

Severe lack of Australian specific data on the effects of sludge disposal on our "fragile soils" was seen as critical.

Community: Public acceptance and perceptions of sludge and community awareness generally were considered main issues. Education was needed to combat ignorance of issues. Sludge products needed to be marketed and local communities needed information on the development of housing within buffer zones of treatment plants.

Environmental: The main issues were seen to be the pollution of the ocean (destruction of sea grass and toxic contamination) and air; problems with toxic sludge such as the disposal and contamination of soil and groundwater; heavy metal extraction from sludge and lack of long term management and planning proposals for toxic and industrial sludge.

Operational: The accountability of small sewage plants; the lack of facilities generally and the lack of toxic waste dumping facilities specifically were considered to be the current operational issues.

4.5 Knowledge of Sludge Disposal Regulators

Reflecting the actual differences in regulatory and controlling organisation between the states, there was a difference between the communities' beliefs about which organisations were responsible for sludge disposal. In Sydney and Ballarat most respondents (48% and 56% respectively) thought the local Water Board, the local Council, and the Health Department all had some responsibility for this process.

Perth respondents were divided between a combination of the local Water Authority, local Council and Health Department (27% or 14), the local Water Authority alone (27% or 14), and the Council alone (19% or 10). Most Adelaide respondents (40% or 20) thought sludge disposal was the Engineering and Water Supply Department's responsibility.

Expert and stakeholders' knowledge of regulators and controllers of sludge disposal tended to be related to the organisations with which they had personal dealings, and some mentioned organisations having particular jurisdictions in specific situations. Others were able to name all authorities they believed regulated sludge disposal. For example, the Engineering and Water Supply Department (EWS) respondent in Adelaide specified the Department of Environment and Planning, Fisheries Department and Health Commission having regulations covering the St Vincent's Gulf, and on land the Department of Environment and Planning, Health Commission, Department of Agriculture and the EWS. A private sludge disposal contractor, on the other hand, only mentioned the Waste Management Commission.

Overall, there was little clear consensus either between experts or between experts and stakeholders. Some explanations for this could be:

- the question was not specific enough to warrant a specific answer;
 - respondents were not aware of all the regulating bodies;
 - respondents were aware of all the regulating bodies but only mentioned those specifically relating to their operations;
- or
- respondents *thought* they were aware of all regulating bodies but because the system is so complex there are, in fact, organisations having some jurisdiction of which they were not aware.

4.6 Preferences for Regulation

Addressing preferences for sludge regulation at a national, state or local level, community preference was for sludge regulation at a national level (43% overall or 87), with 25% (or 51) preferring state regulation, and 20% (or 41) opting for local regulation. Only 2% had no opinion with the remainder offering various combinations of the three levels.

The majority of experts and stakeholders agreed on the need for national guidelines to provide consistent regulations across the states. Some believed states had a role in setting standards appropriate to particular climate, environment and industries operating in the state, and local authorities enforcing regulations. The most frequently mentioned desirable combination was national guidelines with local "fine-tuning" and

enforcement. Two respondents suggested that local government was in a position to control sludge at its source - "at a household level".

Experts and stakeholders were then asked which organisations or bodies they think should be responsible for setting regulations at the different levels. In discussing this issue, many respondents reiterated the necessity to have some 'separation of powers' where the operators were not also the regulators.

The most frequently mentioned organisations to undertake national sludge disposal regulation were various combinations of existing bodies such as the EPA and the Health Department or an inter-departmental committee or consortium under the umbrella of the EPA. Other suggestions included AWRC, or a national body similar to the National Sanitation Association in the USA.

4.7 Attitudes Towards Sludge Disposal Regulators and Providers of Information

Overall, community respondents were divided in the extent to which they trusted their local authorities to plan for sludge disposal responsibly, with 50% or 101 reporting trust in their local authority. However, this depended upon where they lived. For example, Ballarat and Adelaide respondents tended to express more trust in authorities (66% and 56% respectively) than did Perth and Sydney respondents (42% and 37% respectively, Chi-square=14.95, p<.02).

This difference in expressed trust between Ballarat / Adelaide, and Sydney / Perth respondents persisted when they were asked how much trust they would have in information if it was given to them by their local council. However, it was not evident when the same question was asked about the water board, Health Department, an environmental action group, a ratepayer action group, or a university research team.

Trust in information (if it was provided) about sludge disposal from various sources is shown below:

**Proportion of Respondents having
"Quite a bit" / "Complete" Trust in Information about Sludge**

| Source of Information on Disposal Practices | Percent | N |
|--|----------------|----------|
| University research team | 79% | 158 |
| Health Department | 70% | 139 |
| Water Board | 57% | 114 |
| Environmental Group | 54% | 108 |
| Local Council | 46% | 91 |
| Ratepayer Group | 40% | 81 |

A possible explanation for lack of trust in information about sludge disposal if it was provided by the local council may be that councillors may be seen in the same light as politicians and as having vested interests. The lack of trust in ratepayer groups was based on the perception that they did not have expertise on which to base this information.

Sydney and Perth respondents were again distinct in that a significantly higher proportion wanted information about sludge disposal (86% and 79% respectively), than did Adelaide and Ballarat residents (66% and 56%, Chi-square=13.24, $p < .004$).

4.8 Attitudes to Public Involvement in Sludge Disposal Decision Making

The idea of 'involving the public' in the decision making processes that eventually have some impact on their lives or lifestyles has ideological appeal. However, the practicalities of this approach requires consideration of the meaning of 'involvement', and defining 'the public'.

In the three options given to the community, expert and stakeholder respondents, both the level and the degree of involvement were implicit. They were asked if they thought the public should:

- (a) be able to *assist* in making *decisions* about sludge disposal;
- (b) be *kept informed and educated* about sludge disposal by the authorities;

or

- (c) that there is *no need* for the public to be involved at all.

Most community respondents felt that the general public should be kept informed and educated about sludge disposal practices (62% or 124), while an additional 25% (or 49) believed they should be able to assist in decision making as well as being kept informed and educated.

There was greater support for the involvement of community action groups and environmental groups in the processes of decision making regarding sludge disposal, where 80% (160) thought these groups should and 18% (or 35) thought they should not be involved. This greater support could be attributed to individual community members' lack of confidence in their abilities to effectively contribute to a public involvement program. There was a general misconception by the community respondents that such a program would require technical expertise.

There were no statistically significant differences between respondents living in different cities and their support for public involvement in some form.

The majority of the experts agreed that the public needed to be involved to some extent, however there was disagreement about to what extent and at what level they should be involved. Most were of the view that the public should be able to assist in decision making but were concerned about involvement at a technical or scientific level where the public did not have expertise. Some believed that the authorities, while encouraging the public to assist in decision making, "should manage the public" and not "pass over control".

Others felt very strongly that full consultation was necessary, particularly where decisions involved high expenditure. They thought that the public's ability was sometimes underestimated. Of the respondents advocating assistance in decision making by the public, most added that they would have to be informed and educated in order to participate in this process. Specific areas in which the public should be educated included acceptable risk generally and the acceptance of end products of sludge, such as soil conditioners and other garden products.

When asked whether community action groups or environmentalists should be involved, the majority of expert and stakeholders again were in favour of their assistance in decision making. Some of the experts commented: "they should actively be encouraged towards early involvement to bring in new ideas" and "they have to be involved so they have 'ownership' of the solution and recognise financial and technical constraints on any decision". One stakeholder suggested that "public participation is needed at the earliest stage to allow community groups to engage their own consultants".

There were concerns expressed, however, about the level of expertise in these groups, and that the final decisions should rest with the authorities. Some were concerned that some groups can "go overboard". One expert thought that involvement of these groups was not appropriate - "it would create a storm in a tea cup, it's best to keep them informed in a low key way". A minority saw no need for public involvement at all, "the more say the public gets the more complicated the issue gets".

5.0 CONCLUSIONS AND RECOMMENDATIONS

This pilot study has presented preliminary information indicating general lack of community knowledge about sludge - from what it actually *is* to how it is disposed and the treatment processes in between. In this situation there is clearly potential for extensive community concern which may lead to desirable conflict, given increasing environmental awareness and a lack of credible and authentic information from reputable sources. There is also a potential to avoid future conflict as the policy implementation model presented in this paper shows (see Figure 1).

Outlined below are the three components of the model. Relevant variables within these components, which are applicable to the results of the pilot study, are specifically dealt with. These are followed by directions for further research or action as, obviously, all aspects of the model could not be dealt with in this study.

BOX 1:

The model begins by defining the tractability of the problem by examining factors influencing its scope and definition. Our study identified some stakeholders and interest groups. However, there is a need for systematic identification of these groups. An investigation, in more detail, of the diversity of attitudes, beliefs and expertise held by these groups would provide valuable information for planning its education and involvement programmes.

BOX 2:

Aspects of statutory authorities' ability to implement policy are described in this box. Results of expert interviews conducted as part of this pilot study pointed to a number of deficiencies which may affect the ability of authorities to implement sludge policy.

These included:

- the lack of knowledge of *who* are these regulators and operators within each state and from state to state;
- the lack of cohesive national guidelines;
- and - the lack of a 'co-operative' body of regulators and operators to produce national guidelines.

It would seem imperative to address these deficiencies through the formation of an expert committee or co-operative, ideally at a national level. The tasks of this co-operative could therefore begin with:

- collecting and integrating information about its own member regulators and operators;
- producing regulations and guidelines;
- producing principles to facilitate public involvement in decision making;
- to provide information and educational materials for members to distribute to the community;
- and - investigating the desirability and feasibility of allocating funds to community groups to allow them to commission their own consultants or conduct their own research.

The formation of a national 'co-operative' body would encourage widespread ownership of the sludge problem and a realisation by the community that state decision makers were acting in a positive manner to overcome what is both a national and international problem.

BOX 3:

Factors outside the control of the implementing authorities, but affecting the process of policy practice, are shown in this box of the model. Results of the community pilot study corresponding to these factors indicate:

- a lack of knowledge about sludge disposal practices and what sludge is generally;
- community concern with environmental protection and support for 'environmentally friendly' disposal practices or schemes for recycling sludge;
- some lack of trust in authorities responsible for sludge disposal;
- perceptions of some risks associated with sludge;
- some desire to be informed and educated about sludge disposal and to be involved in assisting with decision making;
- and - a lack of knowledge about the meaning and process of public involvement.

Possible future research should include an extensive community study to confirm these preliminary findings. This research could focus on:

- defining community perceptions of risk associated with sludge and sludge disposal methods including sludge by-products;
- investigating bases for perceptions of risks associated with sludge to enable regulators and operators to address these in an education programme;

- defining community perceptions of 'acceptable' risk and factors that moderate these perceptions such as attitudes to environmental protection, socioeconomic costs/benefits and trust in authorities;
 - investigation of the concept of NIMBY and the psychological process that results in the community 'divorcing' its own sludge;
- and
- presentation of information on and alternative methods for community involvement to enhance their knowledge of this process and determine the relative acceptability of these methods.

Non-statutory factors influencing the success of policy implementation also arise from personal beliefs and knowledge held by experts. The expert interviews indicated a good deal of acceptance of community involvement in sludge management decision making. However, experts' lack of knowledge of the process of involvement resulted in concerns about community involvement in technical and scientific debate. Often experts believed that there would be unnecessary amplification of risks through exposure to technical information. If this occurred, there would be an emotionally driven controversy which may lead into the misery cycle.

The education of experts in public involvement should focus on engendering commitment to the process by encouraging the views that public involvement will lessen the probability of conflict by promoting trust in the authorities and ownership of the decisions made about sludge management and disposal. Experts will therefore benefit from viewing public involvement as an essential part of the ongoing planning process.

In summary, there is little knowledge of sludge management and disposal in the community and this creates the potential for misinformation to occur, leading to risk amplification, conflict, and a full-blown misery cycle. Community respondents, as well as experts and stakeholders, showed little knowledge of what community involvement should be and what it should achieve. Sludge disposal and management policy and practice is a dynamic process of which public involvement should be an integral part. All parties should understand that public involvement programs do not require technical expertise from 'amateurs' but a contribution to setting planning criteria. It needs to be continually incorporated, at the local level, with provisions made in annual budgets and acknowledgement by their organisations for officials effectively conducting this activity.

However, the role of a national co-operative should not be overlooked. Essentially sludge management and disposal practices need to reflect a co-ordinated national policy that is communicated, applied and regulated at a local level consistent with local conditions.

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