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Community Participation in Pollution Control

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Regulation of pollution requires direct contact between the regulator and polluting firms, but direct involvement of affected citizens is uncommon. This may lead to inefficiencies where local pollution impacts are (or are perceived to be) severe, local circumstances differ, and government regulation does not adequately account for local circumstances, knowledge and preferences. In such cases, efficient pollution control may require direct communication between the firm, the community and the regulator.

In recent years the Victorian Environmental Protection Agency (EPA) has introduced Environment Improvement Plans (EIPs). EIPs are comprehensive strategies to improve an industrial company's environmental performance, drawn up in consultation with the EPA and the local community. Companies publicly commit to continuous improvement, to the community's right to know, and to community involvement in ongoing monitoring and review of industry plans and operations. EIPs involve the formation of community liaison committees (CLCs), including industry site managers, community members and EPA staff, to undertake the reporting, monitoring and review processes. EIPs operate alongside, and are intended to reduce the need for, the EPA's statutory enforcement powers (EPA, 1993).

Victorian EPA staff believe that communication of different industry, community and EPA perceptions of the risks attached to proximity to industrial sites is one important justification for the creation of CLCs (EPA, 1998). There is an extensive literature on lay perceptions of the risks associated with the use of modern technologies for human purposes, and their implications for communication and management of risks in modern democratic societies (see, for example, National Research Council (NRC), 1996; Presidential-Congressional Commission on Risk Assessment and Risk Management, 1997; The Royal Society Study Group, 1992).

This paper explores possible justifications for community participation in pollution control decisions and the circumstances where it is most likely to be socially advantageous. Inadequate communication of knowledge and perceptions between resource users, affected communities and regulators may also occur in the regulation of other forms of environmental degradation (for example, salinisation due to vegetation removal). Thus many of the arguments about community participation presented in the paper are expected to apply to environmental protection measures other than pollution control, although no such generalisations are made in this paper.

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The paper proceeds as follows. Ways in which information can be distorted in regulation involving bilateral dealings between the regulator and firms are considered. Risk analysts' findings about lay perceptions of risks are reviewed, and their implications for information exchange in pollution control considered. Evidence concerning the gains from community participation at industrial sites in Victoria is examined. After a brief review of different approaches to community participation, information from the preceding sections is combined in a summary of the possible advantages and problems of community participation in pollution control, and the situations where it is likely to work best. There is no intention to pass judgement on community participation — the concluding section assesses its possible value as a means of communication and coordination between polluting firms, communities and regulators.

Information Problems with Government Regulation

Government regulation of pollution in a modern democracy involves extensive transfers of information between parties. At a minimum, information must pass between emitters, the regulator (EPA), scientific experts, elected legislators and those community members who perceive harm from pollution. The longer the chain of information transfers, the greater the chances of information gaps and of distortions of information and parties' incentives along the way. There are several ways in which information and incentives can be missing and/or distorted when polluting firms and the regulator have no direct contact with pollution sufferers:

- Cognitive distortions regarding firms' and sufferers' and the regulator's aims and circumstances may prevent satisfactory resolution of differences between polluters and sufferers. For example, local communities may fail to appreciate technical and labour relations constraints impeding rapid emissions reductions, and firms and the regulator may be poorly informed about risk perceptions in the local community. Such distortions of information specific to pollution problems may be exacerbated by parties' ignorance of other groups' culture and learning processes. For example, most community members and many EPA staff may know little about firms' internal organisation, staff routines and culture. Yet to reduce emissions firms often have to adjust organisation, routines, monitoring and reward/penalty systems; the extent of such intra-firm adjustments will affect the rate and costs of emissions reductions.
- Some types of information about pollution and its impacts, such as fatality and injury rates and dollar values of material damages, are more readily and accurately quantified and communicated than others, such as scientific uncertainty about hazards, citizens' fears and insecurities and the contexts in which possible harms arise. Non-quantifiable characteristics of environmental harms are more likely to get filtered out when pollution regulation is in the hands of technical and economic experts (NRC, 1996).

However, as discussed below, such characteristics of pollution may be important components of citizens' welfare.

- Intermediaries in the regulatory process, including legislators and bureaucrats, being generally physically and contractually remote from polluters and pollution sufferers, often have the ability to pursue goals other than maximising net benefits to polluters and sufferers. Where this is the case, there may be further information filtering on the basis of the decision maker's self-interest.

Recognition that distortions of information occur along the chain of information transfers between polluters and pollution sufferers is likely to increase firm, community and regulator uncertainty about the possible outcomes of pollution control measures. Put another way, asymmetric information between the parties is likely to multiply the possible outcomes for any one party in the multiplayer pollution control game.

Lay Risk Perceptions

When questioned directly about their perceptions of technological hazards, laypersons typically report that their feelings are dependent on multiple characteristics of the risks associated with those hazards. People's judgments about natural and technological hazards are based on both their quantitative (such as fatality rates) and qualitative (such as the voluntariness of exposure) characteristics (NRC, 1996:61-66; Slovic, 1992; The Royal Society Study Group, 1992:101-08). Particular risk attributes may have different significance for different people. In particular, scientific or other experts are generally more concerned with quantitative characteristics than are laypersons.

Qualitative risk characteristics of major (adverse) concern to lay people include involuntary exposure, uncontrollability, non-observability, not being known or understood, delayed effects, threats to future generations, fatal consequences, catastrophic potential (in terms of number of victims per incident), and unequal distribution of benefits and costs (American Chemical Society, 1998:30-32; NRC, 1996:61-64). Slovic (1992) and his co-workers group these qualitative characteristics into two dimensions; the degree to which a risk is perceived or known or understood, and the degree to which it is uncontrolled and evokes perceptions of dread (fear) and catastrophe. Hazards creating risks which are unknown, uncontrolled and dreaded are of the greatest concern to laypersons. Slovic (1992:124) points to public attitudes to nuclear power following the reactor accident at Three Mile Island in the USA in 1979 as an example of factors other than injury, death and property damage imposing enormous costs on industry.

Many risk analysts believe that laypersons' concern with qualitative characteristics of the risks of modern industrial technologies is tied to perceptions of the allocation of the risks and benefits of technologies in modern industrial societies. Wynne (1992:282) sees lay concerns with hazard attributes such as involuntary exposure, uncontrollability and being unknown as surrogates for

public concern about the inaccessible and non-negotiated nature of collective decision-making processes. Leiss and Chociolko (1994:2) make a similar point when they describe risk controversies as:

> … rooted in the fear of falling victim unfairly to uncompensated loss … when their (the general public's) exposure is involuntary.

In other words, members of the public frequently see themselves as subject to negative externalities when government and private organisations initiate risky projects, and frequently do not trust government or private organisations to inform them about all the possible associated hazards, or to obtain their *ex ante* consent by offering some form of compensation.

The distinction between the more quantitative characterisation of hazards by experts and laypersons' greater concern with qualitative characteristics raises the question: Are the experts right and the laypersons wrong? Today, almost all risk analysts would answer no, on the grounds that judgments and value-based choices are involved in all concepts of risk — all characterisations of risk, expert and lay, are to some extent subjective (The Royal Society Study Group, 1992:94-98). The National Research Council (NRC, 1996:38) in the USA puts it this way:

> … the concept of risk helps people to interpret and cope with the dangers and uncertainties of life, including but not limited to the prospect of physical harm, and that concept is shaped by human minds and cultures. That is, there are many different kinds and qualities of dangers and many potentially useful ways of making sense of them, and even though many of these are measurable in principle, it is judgments and values that determine which ones are defined in terms of risk and actually subjected to measurement.

Not only do all understandings of risk have subjective content, but since the people who perceive risk are social beings living and working in communities governed by social and cultural norms and with particular histories, perceptions of risk are in part determined by culture and the social circumstances of the particular community (also see Jasanoff, 1999; Rayner, 1992; The Royal Society Study Group, 1992:111-14). Recent studies of risk perception suggest the relevant social context can be locality-specific. For example, Walker et al. (1998) report on cases where public awareness and concern about industrial site risks are substantially influenced by past industry-community relationships at the particular site.

The view of risk perception as being influenced by social context and group cultural norms leads many risk analysts to skepticism about expert judgments on risk. These writers point out that expert cultures, and the organisational routines and commercial and political pressures to which experts are often subject, can cause them to ignore or misjudge risks which turn out to be important to society *ex post*, as was the case for the O-ring failures which were the immediate cause of the Challenger space shuttle accident (Vaughan, 1996; Otway, 1992).

Risk Perceptions and Environmental Policy Making

Now consider some plausible implications of the above risk perception findings for information exchanges and organisational arrangements in environmental policy making, and for the role of economic analysis in policy decisions:

- Experts focus most attention on those consequences of hazards that they can measure, particularly where market or quasi-market valuations permit interpersonal comparisons of possible costs. Thus non-quantifiable and non-monetised attributes of pollution are likely to get less *ex ante* attention in the normal processes of collective choice over pollution control measures, despite their significance to the lay population.
- Experts focusing on the technical aspects of risk assessment emphasised in their professional culture may miss the social impacts of hazardous situations.
- The qualitative attributes of pollution hazards identified as very important to laypersons are not measurable in cardinal terms, let alone valued in markets. Thus they are not communicable between parties concerned about pollution control in ways that permit ready interpersonal comparisons of benefits and costs. In addition, because of the measurement problems, they provide opportunities for strategic distortions of preferences by interested parties.
- If qualitative attributes of pollution hazards are perceived differently by different individuals and groups in society, and difficult to compare across persons, resolution of differences about pollution control measures cannot be achieved by arms-length benefit-cost analysis. It is more likely to be achieved by consultation or negotiation between the parties, and most likely to be resolved by the political process, with or without explicit consideration of community perceptions.
- When dealing with the allocation of the risks and benefits of modern technologies, different interested parties have different access to, and clout in, regular political processes[1]. One issue in regulation of risky public and private projects is lay public rights — rights to information about technologies and the assumptions underlying collective decision processes, and rights of lay participation in choices about the selection and deployment of pollution control measures.

Involving members of the lay public in deliberation over pollution control decision making will add to the resource and time costs involved: lay participants have to be briefed on technical issues, and industry and regulatory participants on lay understandings and concerns; adding participants and issues to the decision

[1] In the view of Otway (1992:219), the policy establishment and expert peer groups, who generally have 'the power to define the limits of the system in public discourse also implicitly decide who is being rational. You can quite rationally oppose a technical system that engineers have certified as "safe" if it turns out that their definition of "the system" did not include the things you care about most'.

process increases opportunities for strategic delaying behaviour. On the other hand, attempts to decide an issue on more narrowly-defined technical and legal bases, involving only industry and the regulator, often backfire leading to legal challenges and/or political opposition which can ultimately cause greatly-increased delays and costs. This appears to have been the case in the issue of disposal of high-level nuclear waste in the USA (NRC, 1996:133-37) and in CSR's aborted 1998 attempt to establish a disposal facility for hazardous wastes from the Melbourne area in a former quarry near Werribee (*The Age*, 1998). Risk analysts point out that trust in public and private risk management institutions can be created by investing time and effort in frank communication with the lay public, and that, once achieved, public trust in institutions can substitute for large amounts of costly information exchange (NRC, 1996:115; The Royal Society Study Group, 1992:122-23; Wynne, 1992:277-81).

Community Participation under Victorian EIPs

The first CLC to operate at an industrial site in Victoria was established at the Altona Petrochemical Complex in 1989 (Hardy, 1998). Beginning in the 1960s, several adjacent chemical manufacturing plants were established in the western suburbs of Melbourne to use feedstock from the nearby Mobil Altona Refinery. Up until the 1980s, local residents, although fearful of exposures to the hazardous chemicals used and stored at the sites, and upset at periodic noise, odours and liquid discharges from the Complex, felt powerless to influence industry actions: the chemical industry was very important to the local economy; the command-and-control regulator, the EPA, was seen as remote and slow to respond to complaints, and there was no dialogue between industry managers and the community. In the 1980s, a distrustful local community began to oppose all development proposals at the Complex. The stalemate was broken in 1989 by the formation of the Altona Complex Neighbourhood Consultative Group (ACNCG), comprising industry site managers, residents, and EPA and local government representatives. As reported by Hardy (1998:3):

> The '*them and us*' attitude decreased as the industry representatives learned that it was possible to explain technical problems to untrained people (untrained, that is, in chemical engineering) and the residents have learned to focus on the problems at hand. … (T)here has been a substantial reduction in emissions and other adverse effects from industry and a more responsible attitude now prevails.

According to Unglik (1996:89):

> Between 1992 and 1995 $1.8 billion was invested (in the Altona area) — not a single dollar of which was opposed by the local community. Consequently, companies such as Mobil, Exxon and Toyota were able to feel secure in their investment knowing they had the support of the community … .

The success of the ACNCG no doubt contributed to the emphasis the EPA places on three-way consultation in the creation of EIPs[2]. There are now about 50 companies participating in EIPs at about 45 industrial sites across Victoria represented on local CLCs. CLCs include one or more representatives from site management(s), the local community and the EPA. CLCs are continuing bodies that typically meet every second or third month throughout the year.

A survey of industry, community and EPA participants in eleven CLCs operating in Victoria in 1999 reports on the information exchanged and participants' views of the gains and costs involved (Wills and Fritschy, 2000). Community consultation resulted in the exchange of much additional information about industrial operations, pollution impacts, pollution control and each other's perceptions and actions. Ninety per cent of respondents reported gains from the consultation process. The major gains were in the forms of better communication and relationships between the three parties and more operational feedback to the firm managers concerned. Few participants felt that consultation involved significant sacrifices, and its benefits were generally seen as far greater than its costs and risks. The major cost involved was the participants' time — time requirements were a major deterrent to greater community participation.

The Victorian survey results suggest that the consultation process commonly leads both community and industry participants to greater understanding of the other side's situation and concerns: in the case of industry, consultation helps industry to recognise the legitimacy of community perceptions and fears about industry and pollution; on the community side, a better understanding of plant operations and the technical and behavioural barriers that firms face in controlling emissions helps to legitimate the technical and economic concerns of industry in the eyes of the community. This interpretation of the survey results is consistent with the views of the NRC (1996:114-16) and Wynne (1992) that an improved understanding of the social context within which others view risks (in this case, the risks stemming from emissions from industrial plants) can help to integrate the different world views of polluters and pollution sufferers. As a result, each is more willing to accept information provided by, and recognise legitimate rights of, the other.

Richer and more credible information exchanges between industry, community and regulator are not the only possible explanation for the observed cases of community participation in pollution control. Other, not mutually exclusive, explanations for ongoing local community involvement include community satisfaction from being involved[3], regulatory budget constraints, leading to the enlistment of local communities in the monitoring process and, in the case of industry initiatives, industry and company aims to avert stricter

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[2] Details of regular information exchanges and the rights and responsibilities of participants at ACNCG meetings are given in Wills (1998).

[3] As suggested by a referee, laypersons are more likely to feel comfortable when participating in deliberations undertaken in a non-formal and non-hierarchical setting, as opposed to the due process and appeals mechanisms operated by councils and the courts.

regulation and/or reduce local opposition to industrial activities (Simmons and Wynne, 1992; Maxwell, Lyon and Hackett, 1999).

Disciplinary Perspectives on Community Participation

Political scientists, sociologists, lawyers and risk analysts have written on, and frequently advocated, more community participation in pollution control decisions in recent years (Lafferty and Meadowcroft, 1996; Renn, Webler and Wiedemann, 1995; Gunningham and Grabowsky, 1998). Two national multidisciplinary reviews of risk assessment and risk management in the US have strongly advocated deliberative approaches to health and environmental risks, by which they mean involving all interested and affected parties in all stages of the risk assessment and management processes, thereby integrating expert and lay understandings throughout (NRC, 1996; Presidential/Congressional Commission on Risk Assessment and Risk Management, 1997).

Economists generally do not visualise the direct participation of affected citizens in pollution control decisions, as opposed to their indirect involvement as voters. Economic studies of pollution control commonly focus on information exchanges between the regulator and emitter firms[4]. Economic analyses also commonly ignore the obstacles to rapid adjustment in firms and regulatory agencies posed by internal organization, routines and culture. Both firms and the regulator are usually assumed to be 'black boxes', in the sense that changes in legislative directives or market or tax/charge signals will quickly produce adjustment to maximise the agency budget or minimise organisational costs or maximise profits or whatever. For discussion and evidence on impediments to rapid adjustments, see Demsetz, 1995:30-39; Rees, 1994; Steinzor, 1998:122-30).

Only economists writing on facility siting, in particular, public decisions on the siting of facilities to store or dispose of hazardous wastes, appear to have given close attention to the *ex ante* involvement of local communities in pollution control decisions (for example, Kunreuther, Fitzgerald and Aarts, 1993; Frey and Oberholzer-Gee, 1996). Yet, if the risk analysts are right, economists' non-engagement with the issue of community participation may be contributing to a prolongation of the past preoccupation with scientific and technical expertise (including quantitative economics expertise) in the public determination of pollution control measures and associated risk management choices. This is at the expense of lay concerns and, many would add, democratic participation by those most seriously affected by localised industrial pollution.

Modern institutional economics, which allows for costly information and transactions, endogenises the choice of organisations and behavioural rules, both those operating within agencies and firms and those governing their interactions (Eggertsson, 1990). These organisations and rules are determined in the search for

[4] Open hearings held by the Productivity Commission provide an indirect means of communication between industries, communities and government regulators when regulatory policies are being formulated.

combinations of transactions and production costs and production outcomes (which may include pollution not valued in markets) that will yield the greatest net benefits to those with influence over the choice of organisations and rules (who may not include all affected groups in the community).

Applied to community consultation in pollution control, institutional economics logic would suggest that, in a democracy, the introduction of community participation measures would occur in response to failures of other forms of regulation, such as command and control and economic incentive measures, to achieve commercial and emissions outcomes deemed acceptable by both polluting firms and affected communities. This appears to have been the case in the creation of the ACNCG at Altona, described previously.

Advantages and Problems of Community Participation

The preceding discussion suggests a number of advantages of community participation in pollution control decisions. Community participation can:

- reduce the opportunities and incentives for cognitive and self-interested distortions of information by parties involved in transferring information between polluters and pollution sufferers.
- educate firms, communities and the regulator about the technical and administrative capabilities, organisational and community cultures, values and routines of the others. (The resulting reduction in the asymmetry in the technical and behavioural knowledge possessed by the parties reduces uncertainty for all.)
- reduce mutual misunderstanding and mistrust, born of different lay and expert views about the nature of modern technologies and the reliable functioning of the organisations responsible for operating and monitoring them.
- reduce local community apprehension about pollution risks, since local community participation can increase both knowledge of and feelings of control over hazards.

The discussion also suggests some problems:

- Because major benefits of community participation, reduced misunderstanding and apprehension and reduced uncertainty about others' values, circumstances and possible actions, are qualitative, it will be difficult to assess the benefits, as opposed to the costs, of community participation.
- Community participation in decision-making involves additional time and resource costs. In the Victorian survey, the time involved in CLC participation was said to be a significant disincentive to greater community involvement.
- Limited community and industry (where numbers of small-medium firms are involved) participation may lead to unrepresentative membership. If

participants are not representative, the goals of mutual education and reduction of mistrust among parties may not be achieved.
- If any of the participants, industry, community or regulator representatives, fail to accept the legitimacy of others' perceptions of modern technologies and resulting risks, misunderstanding and mistrust can be exacerbated.
- Informational asymmetries can encourage distortions of technical and commercial information by industry, and of preferences by the community.
- Local community participation at particular sites could impact adversely on non-local communities not represented in the consultation process.

Where might community participation work best, in two senses: first, both firms and communities being interested in consultation, and second, the benefits of consultation being most likely to exceed its costs?

- Firms and communities will be more interested in dialogue if each has some actual or potential control over assets that the other values — in Williamson's (1983) terms, each must have hostages in the hands of the other. In the case of the Altona Petrochemical Complex in Victoria, which lead to the prototype CLC in Victoria, firms' actions affected the value of local citizens' homes, and the local community had the political clout to veto, or at least seriously delay, firms' development plans. In these, as in other circumstances where the parties expect repeated interactions in the future, each party has more reason to rely on information supplied by the other.
- The greater the geographic spread of emissions, the greater the costs of regular consultation. The case for affected community participation is stronger the more local circumstances (including past industry-community relationships) differ, the more emissions are geographically concentrated and the more severe the emission impacts.
- Since information transmission under non-participatory regulation may filter out non-quantifiable characteristics of pollution impacts that are of major concern to citizens, such as the degree to which pollution impacts are borne involuntarily, are unknown and are unobservable, the case for community participation is stronger where pollution has such characteristics. It follows that, in general, communities will benefit more from consultation focussing on unknown and unpredictable industrial accidents than on known emissions resulting from normal plant operations.
- Unequal political access may filter out the concerns of those with less political influence. Thus there is a stronger social welfare case for sufferer participation where pollution impacts are disproportionately borne by such groups.

A Provisional Assessment

A recent paper in this Journal called for more critical assessment of public consultation processes in public policy development in Australia (Kerley and

Starr, 2000). Kerley and Starr point out that it is extremely difficult to identify all those affected by major government policy proposals, that often only organised interests (and more often the losers than the winners from policy changes) can be identified and respond, and that effective public consultation takes time and involves shared responsibility. One result is that public consultation requirements can lead to a loss of governments' will to initiate change. Another is a substantial public relations component in many consultation exercises, leading to cynicism on the part of many of those affected.

At least some of the frustration with modest results from public consultation stems from the need for a clear focus on additional information exchange between the parties (including information about the veracity of others), as opposed to creating fora for public relations exercises. This is the case for Victorian CLCs, where representation is confined to locals and organisations with environmental regulatory responsibilities at industrial sites, and outsiders and the media only have access to proceedings by common consent of the participants. In these circumstances, local consultation may be the most effective means of communicating information about what we might, paraphrasing Hayek, term 'the particular circumstances of time and place and society' in respect of pollution and other environmental problems. Kerley and Starr report (2000:190) that involving affected communities in change processes has been more successful in the case of small communities represented by locally-based groups.

The experience of the ACNCG (Hardy, 1998) and the results of the Victorian survey of CLCs suggest that the most valuable information from consultation is information that helps decision makers to identify others' possible actions and the possible consequences of actions. Costs of decision-making under uncertainty are reduced because information about the values and circumstances of others enables industry managers, local residents and the regulator to formulate simpler and more specific decision and event trees. Also, to the extent that managers, residents and regulatory decision makers are risk averse, they will benefit from the reduced uncertainty. However, while it is in principle conceivable that decision makers could estimate many of the resulting time and cost savings *ex post*, this seems almost impossible in practice.

There is also a conceptual barrier to benefit-cost analysis of community participation in pollution control. Effective community participation realistically implies some change in rights to information and to control the use of natural resources. Thus, strictly speaking, it is not possible to compare the economic efficiency of pollution regulation with and without community participation; when rights change, the identity of the people whose efficiency judgements count changes, and so what is judged efficient may also change.

Otway (1992), Wynne (1992) and Leiss (1994:chapter 2) emphasise the importance of rights and control in decision-making. Leiss argues (1996:52) that the initiators of risky activities 'have a direct interest in under-assessing and under-estimating risks so as to maximise net benefits to themselves.' Lay recognition of this possibility is one reason for the wide advocacy of public consultation in cases of LULUs (locally unacceptable land uses) such as hazardous waste facility siting.

Recall that the creation of mutual trust between regulators, industry and the public is likely to be a very important product of community participation (Walker et al., 1998:s.2.3). Since trust involves 'a willing acceptance of vulnerability' (p. 11), the creation of mutual trust implies a shift in control towards local communities, which renders industry and government vulnerable to the decisions of communities, as well as communities being vulnerable to the decisions of industry and government. Given the historic reliance of industry and government on expert and political judgements, their scepticism about lay rationality, and the time and resources required for effective public participation, relinquishing some control to communities is no small matter. On the other hand, if the lay public trusted industrial firms and the relevant government agencies to always act in the public interest, to observe the best possible technical and safety practices, and to communicate fully on these matters, the public's qualitative concerns about industrial risks, and consequent barriers to industrial development, would be reduced. This appears to have been the case at Altona, and could be the most important product of community consultation measures.

Economists, as a rule, ignore culture and the behavioural norms and organisational routines that flow from culture within organisations and communities. However, the modern literature on accidents emphasises the importance of routines and culture in understanding the causes of accidents (see, for example, Perrow, 1984 and Vaughan, 1996). Where pollution is the result of industrial accidents, as is commonly the case for localised hazardous pollution, behaviour which is *ex ante* economically-sensible in normal operational circumstances is sometimes pathological. In these circumstances, a possible advantage of community participation in local pollution control, one which is unlikely to figure in any conventional economic analysis, is that it requires the firm and the EPA to consider the views of outsiders, people with specific local knowledge who are much less likely to accept firm and EPA operational norms and routines.

Pollution control is a social coordination problem, requiring exchange of information between the parties concerned and incentives to provide true information and to respond to the concerns of others. If it is too difficult to measure the additional benefits and costs due to a switch to local community participation in pollution control, it will still be useful to study the information-generating and incentive effects of institutions involving community participation in local pollution control, both in principle and as they exist in the real world.

References

Demsetz, H. (1995), *The Economics of the Business Firm,* Cambridge University Press, Cambridge.

Eggertsson, T. (1990), *Economic Behaviour and Institutions,* Cambridge University Press, Cambridge.

Environmental Protection Agency (1998), *Strategic Approaches to Community Participation: Theoretical and Practical Perspectives*, unpublished, July (Working Paper).

Environmental Protection Agency (1993), *Enforcement Policy*, Publication 384, EPA, Melbourne.

Frey, B., and F. Oberholzer-Gee (1996), 'Fair Siting Procedures: An Empirical Analysis Of Their Importance And Characteristics', *Journal of Policy Analysis and Management* 15:353-76.

Gunningham, N. and P. Grabowsky (1998), *Smart Regulation,* Clarendon Press, Oxford.

Hardy, N. (1998), 'The Altona Complex Neighbourhood Consultative Group', unpublished, ACNCG.

Jasanoff, S. (1999), 'The Songlines of Risk', *Environmental Values* 8:135-52.

Kerley, B. and G. Starr (2000), 'Public Consultation: Adding Value or Impeding Policy?', *Agenda* 7:185-92.

Kunreuther, H., K. Fitzgerald and T. Aarts (1993), 'A Test of the Facility Siting Credo', *Risk Analysis* 13:301-15.

Lafferty, W., and J. Meadowcroft (eds) (1996), *Democracy and the Environment: Problems and Prospects,* Edward Elgar, Cheltenham, UK.

Leiss, W. and C. Chociolko (1994), *Risk and Responsibility,* McGill-Queen's University Press, Montreal and Kingston.

Maxwell, J., T. Lyon and S. Hackett (1998), 'Self-regulation and Social Welfare: the Political Economy of Corporate Environmentalism', available at http://papers.ssrn.com/paper.taf?ABSTRACT_ID=147888.

National Research Council (1996), *Understanding Risk: Informing Decisions in a Democratic Society,* National Academic Press, Washington, DC.

Otway, H. (1992), 'Public Wisdom, Expert Fallibility: Toward a Contextual Theory of Risk', pp. 215-28 in S. Krimsky and D. Golding (eds), *Social Theories of Risk,* Praeger, Westport, Conn.

Perrow, C. (1984), *Normal Accidents: Living with High-Risk Technologies*, Basic Books, New York.

Presidential-Congressional Commission on Risk Assessment and Risk Management (1997), *Final Report,* (2 vols), avaliable at http://www.riskworld.com/Nreports/1997/risk-rpt/html/epajana.htm.

Rayner, S. (1992), 'Cultural Theory and Risk Analysis', pp. 83-115 in S. Krimsky and D. Golding (eds), *Social Theories of Risk,* Praeger, Westport, Conn.

Rees, J. (1994), *Hostages of Each Other: The Transformation of Nuclear Safety Since Three Mile Island,* University of Chicago Press, Chicago.

Renn, O., T. Webler and P. Wiedemann (eds) (1995), *Fairness and Competence in Citizen Participation,* Kluwer Academic, Dortrecht, Netherlands.

Simmons, P. and B. Wynne (1991), 'Responsible Care: Trust, Credibility and Environmental Management', pp. 210-26 in K. Fischer and J. Schot (eds), *Environmental Strategies for Industry,* Island Press, Washington, DC.

Slovic, P. (1992), 'Perception of Risk: Reflections on the Psychometric Paradigm', pp. 117-52 in S. Krimsky and D. Golding (eds), *Social Theories of Risk,* Praeger, Westport, Conn.

Steinzor, R. (1998), 'Reinventing Environmental Regulation: the Dangerous Journey from Command to Self-control', *The Harvard Environmental Law Review* 22:103-202.

The Age (1998), 'Don't Dump on Werribee', Editorial, 6 May.

The Royal Society Study Group (1992), *Risk: Analysis, Perception and Management,* The Royal Society, London.

Unglik, A. (1996), *Betweeen a Rock and a Hard Place,* Publication 503, EPA, Melbourne.

Vaughan, D. (1996), *The Challenger Launch Decision: Risky Technology, Culture and Deviance at NASA*, University of Chicago Press, Chicago.

Walker, G., P. Simmons, A. Irwin and B. Wynne (1998), *Public Perceptions of Risks Associated with Major Accident Hazards,* HSE Books, Sudbury, Suffolk.

Williamson, O. (1983), 'Credible Commitments: Using Hostages to Support Exchange', *American Economic Review* 74:519-40.

Wills, I. (1998), 'Information Exchange in Pollution Regulation', Paper presented to the 27th Conference of Economists, University of Sydney, 28-30 September.

Wills, I. and S. Fritschy (2000), *Industry-Community-EPA Consultation in Polllution Control: The Victorian Experience,* Research Report, Department of Economics, Monash University, May.

Wynne, B. (1992), 'Risk to Social Learning: Reification to Engagement', pp. 275-97 in S. Krimsky and D. Golding (eds), *Social Theories of Risk,* Praeger, Westport, Conn.

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