LEPC Roles in Toxic Hazards Reduction: Implementing Title III's Unwritten Goals

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SUMMARY

Many unwritten expectations are attached to SARA Title III. The Local Emergency Planning Committees (LEPCs) are expected to undertake risk communication and outreach with the public, and to give attention to long-term hazard reduction as well as emergency response. Even industry is expected to play a positive role by providing assistance in understanding the right-to-know data on toxic substances, and even voluntarily engaging in hazard reduction through changes in production and management practices. Yet Title III ostensibly requires nothing more of the LEPC planning process than preparation of areawide emergency response plans. Why should we expect Title III's unwritten goals to be pursued at all?

Some policy theorists have argued that the limitations of regulatory approaches call for new strategies. One strategy is using "information as regulation," which is what product labeling and right-to-know laws do. Another strategy is to mandate a process that brings the local stakeholders together with equal information, and see what types of local commitments to change emerge. Title III has something in common with that strategy as well. The LEPC planning process involves a mandate for balanced participation between public agencies, industry, and community groups, and it levels the field at least somewhat by forcing toxic substances use data into that multi-interest process.

A 1989 survey gathered information on a limited number of LEPCs in 42 states soon after the first (1988) emergency plan completion deadline under Title III. A 1992 national survey updated the results of the first study. The focus of this multi-year study is on whether or not LEPCs evidenced any discretionary, voluntary support for action on toxic hazard and use reduction. An analysis is made of the relative importance of the LEPC planning process to explaining early support for hazard reduction, including industry, community and public agency participation and the communication of hazard information by the LEPCs to their publics. Also important is whether the economic and social conditions in the LEPC districts are major influences, because public participation and resources to address hazard reduction could be due to interlocal differences in wealth, population and economic base, as well as fears of economic reprisal or loss from aggressive environmental policies.

The results in 1989 showed that 43 percent of the LEPCs made at least one recommendation for a hazard reduction action that can be carried out by local government, such as restricting transportation routes to facilities and changing zoning ordinances to prevent future population vulnerability. Only 26 percent recommended at least one hazard reduction action that must be carried out by private facilities, such as substituting less toxic substances in production

or reducing volumes stored on-site.

The most important factor in explaining early LEPC support for hazard reduction goals was neighborhood group participation in the LEPC. In addition, the LEPCs which nade efforts to use volunteer experts to communicate the meaning of the right-to-know data to LEPC members were more likely to support hazard reduction. There were differences in factors associated with public versus private action, however. Labor union representation on the LEPC was negatively associated with support for transportation, zoning, site design and business fee actions. The presence of an active CAER program sponsored by a facility in the LEPC district was strongly associated with support for private industry hazard reduction.

Those effects generally held even after controlling for interlocal differences in wealth, size, growth, population make-up, and economic base and high-emission industry--all of which could plausibly be alternative explanations. However, it was found that some community characteristics were important after accounting for the effects of the LEPC planning process. Public hazard reduction recommendations were significantly less likely in the fast-growing sunbelt states of Texas and Arizona, because those states do not support local land use and site design controls. Private hazard reduction recommendations were significantly less likely in areas that had higher unemployment rates in recent years.

The second national survey in 1992 showed that LEPCs have continued to undertake public risk communication and outreach activities, and industry aid is positively rather than negatively related to that trend. That strong set of trends do not support the fears of industry capture of LEPCs or of LEPCs' reluctance to inform the public of hazards due to industry pressure. However, there are also a significant number of LEPCs (about one-quarter) that have failed to even make uninterpreted, raw right-to-know data readily accessible to their citizens. And none of the more effective and proactive methods of hazard communication or outreach were in use by much more than one-third of the LEPCs sampled in 1992. Thus it is probably prudent to say that many LEPCs, particularly in areas with supportive industry, are undertaking active hazard communication with the public, but that there are areas where inactive LEPCs and uninvolved and unsupportive industries are the case.

LEPCs have also demonstrated broad interest in the question of how the public and private sectors can pursue long-term accident prevention and risk reduction. Fewer have acted on specific strategies to do so. The most consistent factor associated with LEPC action on hazard reduction of any kind is an active LEPC effort to communicate hazard information to the public. In terms of action by LEPCs to promote hazard reduction efforts by industry, however, not only is risk communication a significant factor, but

so is active industry technical and resource assistance to the LEPC itself. That result in itself shows that the LEPCs have become at least modestly a focal point for voluntary collaboration with industry on managing toxic hazards. The role of LEPCs is further underscored by the fact that in 1992, LEPCs were more likely to promote specific actions for hazard reduction than would be predicted by citizen demands for such action alone (as reported by the LEPCs).

The question of public participation in the LEPCs remains somewhat problematic, however. Compliance with the intent of Title III to involve "community groups" remains highly variable and clearly interpreted quite differently from one local area to another. Nonetheless, some form of citizen participation is consistently associated with LEPCs taking action to make hazard reduction a "mainstream" concern in local government by becoming involved in trying to inform and influence local government planning, zoning and transportation management policy. However, LEPC action on public sector steps towards hazard reduction remains much less frequent than LEPC involvement in promoting modest forms of long-term hazard reduction to their area industries. In the latter case, citizen involvement within the LEPC is not a strong predictor of action, but vigorous local government agency involvement and proactive industry support and resource contributions are.

In sum, several of the major unwritten expectations about Title III as a voluntaristic and adaptive national policy have continued to unfold. LEPCs have engaged in more (but still limited) risk communication and industry has assumed a role as both target of and supporter of this approach to toxic hazards management. In turn, both those factors are the most strongly related to LEPC efforts to promote longer-term hazard reduction by both the private and public sectors, as measured in this study. Whether this unfolding of a voluntaristic approach to environmental health and safety will continue is another question. LEPCs continue to cite needs for more resource support, which has always been limited, but local governments are less able to fund additional activities due to fiscal distress. The consistent finding over four years' time that stagant or declining local economic conditions are associated with less willingness to promote long-term hazard reduction does not bode well for sustained efforts unless economic conditions change.

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INTRODUCTION

SARA Title III's statutory language specifically requires of local governments nothing more than preparation and maintenance of areawide emergency response plans through multi-jurisdictional Local Emergency Planning Committees (LEPCs), and providing to the general public, on demand, the same right-to-know information on toxic substances that the LEPCs and local fire services have receive from industry. Why are so many added expectations attached to Title III?

Among those unwritten expectations is the belief of some federal and state officials that Title III ought to spur efforts by LEPCs to improve "risk communication" to the public at large (see Conn, Rich and Owens, 1989; Hadden, 1989). Another expectation is that disclosure of toxic substances use by industry will lead individuals or even the LEPCs to exert pressure for the reduction of toxic substance hazards before accidents occur (see National Association of State Title III Program Officials 1989; Elkins

1988). A third expectation is that industrial hazard generators will play important roles in providing the expertise needed for effective risk interpretation and communication, and that they will cooperate in voluntary hazard reduction under public pressure (see Hadden 1989a).

Most policies that create expectations for action also provide penalties or incentives that are assumed will produce the desired changes in behavior. Such cause and effect assumptions or "policy theories" underly most environmental regulation and other public policies. But Title III provides few direct sanctions or incentives, other than penalities on firms that fail to provide right-to-know information on toxic substances and threshold releases to the environment. Nonetheless, the expectation has been that the provision of an indirect incentive--information on the presence of toxic chemicals--will spur voluntaristic action by both industry and communities, to reduce such hazards at industrial facilities.

What is the Value of a Non-Regulatory Policy?

This study examines Title III's local planning requirements from the standpoint of a broader debate about whether non-regulatory or voluntaristic policies can be effective. The study is based on two surveys of LEPCs throughout the United States, conducted in 1989 and 1992. The following sections discuss

the issues in policy design and implementation underlying the study, the study methods, results and implications.

ALTERNATIVES TO REGULATION: TITLE III AS INNOVATION

Is it reasonable to expect so much from a law that, statutorily speaking, demands so little? That question goes to the heart of an ongoing controversy about the design of public policies for environmental hazards, public health, product safety and many other concerns. This section discusses the theoretical debate and its practical issues. The 1970s brought a wave of top-down national regulation of air and water quality, solid and hazardous waste disposal, consumer products and toxic substances. Formerly, the states and their localities enjoyed almost complete discretion in such matters. That discretion ended. The new central, federal regulatory policies relied on setting standards, creating penalities and incentives to change behavior, and monitoring and enforcement efforts.

By the 1980s, however, growing questions were raised by serious policy scholars about the effectiveness of relying on national centralized regulation alone (see Bardach and Kagan, 1982a & b; Poole 1982). Certainly regulation is always slowed by efforts on the part of the targets of regulation (individuals, firms or localities) to block implementation or avoid strict compliance. But regulatory approaches also have weaknesses when the objective

is to spur positive behavior and creative problem-solving, new local government commitments to change, and innovative private industry practices. Local conditions vary so widely that it is difficult if not foolhardy to define single solutions across the nation. Specific solutions often need to be negotiated on a case by case basis with the cooperation of the policy's target groups.

The regulatory reform debate brought new ideas like using "information as regulation." Michael O'Hare of MIT, a former Massachusetts environmental official, describes how information can be a substitute for regulation if it is widely distributed as a public good and if it reveals and motivates action on opportunities for voluntary changes in behavior (O'Hare, 1982). A variation on that theme is using information to create "self-regulation" within industries--for example, where forcing the disclosure of safety or health data empowers professional personnel within the firm to advocate changes in practices (Poole, 1982). Another variation on self-regulation is the expectation that industrial leaders, once confronted with now-public data about their environmental liabilities, will unilaterally take action to reduce risks because of concerns about public outcry and poor business climates. That expectation has often been cited regarding the provisions of Section 313 of SARA Title III, which creates the national Toxic Release Inventory (TRI) to publicly report certain waste emissions to air, water and land (Lynn and Kartez, forthcoming).

More generally speaking, Paul Berman of the RAND Corporation calls the alternatives to direct regulation "adaptive policies" (Berman, 1980). Adaptive policies avoid demanding a specific result and rely instead on creating processes that bring the stakeholders together to evolve solutions that are tailored to local circumstances. Thus, pushing information on environmental threats into the public eye may motivate industry to take action, or motivate citizens to do so as well. The result may be unilateral industry improvements in managing risks of toxic chemicals used in production, or it may be citizen demands that industry negotiate such improvements. The specific outcomes are not strictly determined by such an approach.

Adaptive policies can suffer serious weaknesses, however. Some stakeholders, especially the general public, may lack power to influence what happens in specific locales or with respect to powerful industries. In that case, using information-as-indirect-regulation is an empty promise of improvement for structural reasons (e.g., a rigid imbalance of power). The results of an adaptive policy approach are also hard to evaluate because the solutions that emerge can vary widely from place to place--indeed results are expected to vary with local corcumstances to some extent. How do we know that those different solutions are effective and equitable from the standpoint of overall national or state goals for health and welfare? Opinions differ. For example, Robert Schwab, an economist with Resources

for the Future, Inc., has argued for an "environmental federalism" in which pollution standards should vary from state to state based on the differences in costs and benefits involved (Schwab, 1988).

The unwritten expectations attached to SARA Title III make more sense in the context of the debate over regulatory design. The Congressional history leading to Title III's enactment reflects the dilemma of choosing a course that is neither direct regulation nor complete abdication of public responsibility. On the one hand, industry argued for voluntary disclosure of right-to-know information. On the other hand, environmental and labor groups argued for regulation of the use of toxic substances in addition to mandatory right-to-know laws. The result was a law that is one of the few instances of a nationally decentralized adaptive policy, in that SARA Title III decentralizes responsibility for resolving some of those issues to the community level.

Previous right-to-know laws, like product labeling, have also been examples of information as a substitute for direct regulation. Public officials, citizen groups and even industry have all pointed out anecdotes of how disclosure of toxics use data led to voluntary industry action to reduce hazards at facilities under pressure from specific citizens groups. But Title III's local planning requirements potentially go beyond that indirect approach, because of the requirements for participation by multiple community interests including hazard generators and local governments, and

because of the expectations attached to that process. Title III convenes the stakeholders on a local level. It provides a basis for confronting industrial toxic hazards by forcing right-to-know information into the public domain. But it mandates a planning product for only one phase of hazard management--emergency response.

Nonetheless, the law sets the stage for education and even bargaining among local interests over what additional aspects of hazards management should be put on the public agenda for action, like hazard reduction. That expectation makes sense for several reasons. One purpose of planning, in general, is to provide an open process for seeking consensus on public objectives, and to thrust those new purposes into the light of day. Hazards specialists have also argued for more than fifteen years for a comprehensive management approach that gives equal attention to mitigation as well as response, including the National Governor's Association's commitment to comprehensive emergency management in 1979 (National Governors Association, 1979). Whether the Title III process can move in that direction and what steps could facilitate giving more attention to mitigation and prevention of toxic hazards and industrial accidents is a question that needs investigation.

TESTING TITLE III AS AN INNOVATIVE POLICY

At least one early evaluation of LEPC activities in ten

selected states, conducted by Conn, Rich and Owens of Virginia Tech, with EPA funding, found that LEPCs were reluctant to innovate by undertaking active risk communication efforts with the public. The LEPC members did not necessarily view their role as outreach and innovation and primarily focused on completion of the required emergency response plan (Conn, Rich and Owen, 1989). The research reported here takes a somewhat different approach by examining risk communication as one part of an overall planning responsibility of the LEPCs.

That responsibility encompasses a spectrum of activities that range from those that are specifically mandated by law to those that are implied or hoped for by some policy advocates, but which are voluntary in nature. Examples of the former, mandated activities include preparing an emergency response plan and making right-to-know information available to the public on demand. Voluntary activities include making a proactive rather than passive effort to communicate right-to-know information to the public (as investigated by Conn et al.) but also activities such as efforts to communicate <u>desired</u> <u>uses</u> for right-to-know information, like reduction of hazards at plants or regulation by local government of certain aspects that increase vulnerability (e.g., transportation routes around industrial facilities or types of land uses adjacent to facilities. All cuh voluntary activities can only emerge under the current law as a result of "adaptive implementation," that is to say as the result of the processes that LEPCs undertake and the

interactions of the various interests involved in LEPCs.

Two questions have to be answered to test the effectiveness of an adaptive policy. First, does the process actually produce any of the new commitments to problem-solving that we would reasonably expect, such as proactive public outreach or commitments to hazard reduction? Second, are those changes merely the result of differences in local circumstances, e.g., because some communities already have more political activism or wealth or less dependence on the status quo with job-generating industry (Kartez 1989)? The second question must be answered to determine if new local efforts are only due to some communities having better endowments of wealth or freedom to act, or possibly more limited hazards.

Have LEPCs supported the unwritten goal of toxics hazard reduction during Title III's implementation, and if so are the reasons because of the planning process required by the law or because of community economic/social characteristics that are outside the control of policy makers and managers? This study analyzed the relative importance of two sets of factors to explaining why some LEPCs have voiced early and continuing support for hazard reduction. One set of factors consists of how the LEPC carried out its planning process, in terms of analysis of hazards, risk communication about the hazards, and the participation of multiple interests on the LEPC, including the role of industry as both a participant (required by law) and as a provider of expertise and

aid (an unwritten expectation). The second set of factors includes community economic and social characteristics that are known to generally influence local government policy and program innovations of many types, but which are outside the control of policy makers and planning participants.

Figure 1 outlines the study framework. Hazard reduction is one of several expectations that have been attached to the Title III process, and is the focus of the analysis here. Voluntary efforts to address hazard reduction were measured in the 1989 phase of this study by identifying the extent to which LEPCs had supported any of eight specific recommendations for public and private sector hazard reduction efforts through encouraging: 1. changes in regulations (public action) or 2. changes in production and storage practices at facilities (private action). (Table 1). Those measures were slightly expanded in the 1992 phase of study, as discussed later.

LEPC Planning Process Could Influence Innovation

The role of community-level planning processes is often poorly understood in national approaches to American environmental policy. There are three specific aspects of the LEPC process that could lead to more attention being given to hazard reduction. First, the Materials Safety Data (MSDSs) the LEPCs receive from private facilities provide the basic information that can be used to

identify the need for hazard reduction. However, LEPCs vary in the efforts made to share that information among their members and to analyze the data to identify hazards. LEPCs that make more effort to use the information would be more knowledgeable about the hazards and opportunities for mitigation, and more likely to identify goals for hazard reduction.

Second, participation by a range of different interests (as Title III requires) is necessary to reach any consensus that hazard reduction is a legitimate public objective that deserves attention. If membership is limited to first-responder public safety agencies and industrial facility personnel, hazard reduction is unlikely to receive that attention. Title III's requirements for "community group" participation are broad and could potentially include many citizen stakeholders with an interest in hazard mitigation like neighborhood groups and labor organizations, not only the environmental groups identified by Conn et al.'s EPA-sponsored study (1989).

Another important way in which industry participates in LEPC activities is through the private facility-sponored Community Awareness and Emergency Response (CAER) programs encouraged by the Chemical Manufacturers Association. A CAER program influences LEPC planning because it involves proactive industry efforts to communicate about toxic substances and facility practices and in some cases to provide expertise in understanding right-to-know

data. Some LEPCs were preceded by voluntary emergency or safety committees organized by local industrial facilities in the CAER program. Finally, studies of local emergency management have also found that the more diverse the number and types of local public agencies involved, the more innovative and comprehensive are hazard management efforts (Kartez and Lindell 1987, 1990; Kartez/International City Management Association 1988).

Third, when an LEPC has completed the required emergency response plan its members are not only better informed about the consequences of the hazards, but as a practical matter are more likely to have time to address voluntary, discretionary tasks like hazard reduction. Of course, the LEPCs can fail to use the MSDS and Tier I/II data, fail to involve a wide range of different community interests in planning, and fail to have completed the required response plan. That is a matter of local choice. LEPCs can also be relatively richer or poorer in terms of the voluntary assistance they receive from industrial firms in their area.

Pre-Existing Conditions Also Influence Local Action

In addition to how LEPCs choose to conduct a planning process, there are additional community characteristics that affect the ability to make new commitments. Those characteristics are the

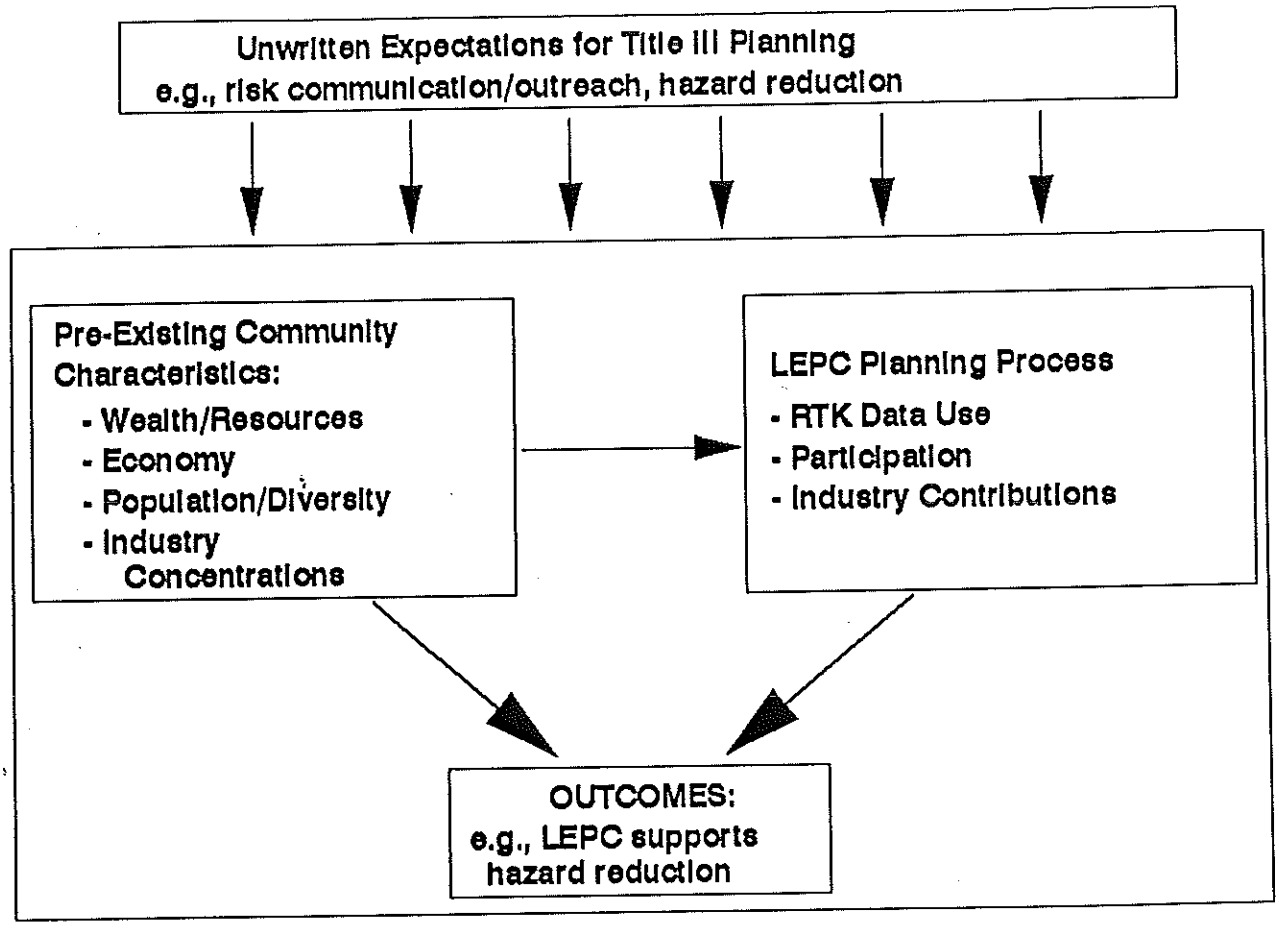


FIGURE 1: Conceptual Model of Context and Process Effects on LEPC Actions

Table 1

HAZARD REDUCTION RECOMMENDATIONS INCLUDED IN STUDY

For Local Government (public action):

Change zoning code to prevent future industrial/commercial development from locating too near a vulnerable population

Change zoning code to require design standards for new (or expanded existing) industrial/ commercial facilities, such as setbacks and impoundments of storage areas.

Change truck transportation routes to reduce populations at rick from truck accidents with toxics

Create a revenue source for funding hazmat emergency management (to be) collected from business/industry

For Private Facilities (private action)

Substitute alternate, less toxic chemical substances in the production process or use different processes.

"Just-in-time" inventories to reduce the volumes of toxic substances stored on plant site

Reduce routine discharges of toxic waste products into the air or water environment through use of better containment technology

Re-use or recycle toxic waste or by-products of production

second set of factors considered here. Studies of community policymaking since the 1960s have found that wealth, size, growth, basic economic conditions such as high or low unemployment, and high minority concentrations all can influence local action on federal and state mandates (Clark and Ferguson 1983; Clark and walter 1986, 1987; Dye, 1966, 1976; Dye and Gray, 1980; Lineberry and Fowler 1967; Sharkansky 1967; Tompkins 1975).

Less wealth, stagnant economic conditions, and a more diverse general public made up of different ethnic interests can result in less capacity to act early to initiate new policies. In the case of Title III, concentrations of industries subject to the law could have an effect too. Counties with high concentrations may have a greater need to take action to mitigate hazards (and plan for emergency response). But studies of other public policies suggest that concentrations of employment in those industries may also make communities less politically aggressive in making new demands on those firms for restrictions and changes in production practices. Even fear of industry retribution was voiced during early Congressional hearings on right-to-know (Subcommittee on Commerce, Transportation and Tourism 1986).

After discussing the sources of data and their limitations, this paper describes what was learned about the LEPC planning process and early support for hazard reduction. The hypothesis that those planning efforts, rather than pre-existing community

conditions, made a significant difference is tested. Additional selected results are also discussed later in this paper.

DATA COLLECTED, SAMPLE, AND BIAS

Data on the activities of a national sample of LEPCs was collected through a mail survey in early 1989, several months after the October, 1988 deadline for the completion of the first emergency plans required by Title III. The data include information on the membership of the LEPC, the effort to use right-to-know information, and whether the plan had been completed and submitted to the State Emergency Response Commission. In addition, city level data on the emergency planning and outreach activities of the individual cities, recent accidents, and local city constituent support for hazard reduction was collected but is not reported here.

Sample

The sample consisted of municipalities with populations of greater than 20,000 that participated in a 1986 National Science Foundation-sponsored study of good practices in emergency planning (Kartez/International City Management Association, 1988). As in 1986, city managers and mayors were contacted and asked to have the personnel most directly involved in the relevant LEPC respond to the survey. Data was collected through cities in order to continue

the long-term study of their emergency planning programs and to investigate how Title III planning affected individual municipalities' own emergency preparedness, hazard reduction, and public information efforts.

Four states were excluded from the group studied in 1986. Localities in Georgia, Delaware and Oregon were not sent surveys because their respective Governors designated their entire states as a single Local Emergency Planning District, making questions about community participation meaningless. California localities were also excluded because Chapter 6.95 of the State's Health and Safety Code establishes "local administering agencies" which are equivalent to LEPCs in other states because they are local in nature, but far different in other respects. No community group representation is required, as it is under Title III, and the local administering agencies have the power to require private facilities to prepare "risk management and prevention programs," which Title III does not require. Finally, the large regional LEPC districts California has created, which include up to sixteen counties each, are not comparable to most districts in other states.

A total of 228 cities from 42 states responded to the survey, representing a return rate of 77 percent. Of those, 13 percent reported no involvement in the LEPC in their district. The remaining cities represented 165 separate LEPCs. Twenty-two LEPCs were represented by more than one city's response to the survey,

almost always in large metropolitan counties. A procedure was developed to combine those multiple responses and to resolve conflicts in the information provided. A detailed analysis of those errors and the reliability of the data is available from the author. Generally speaking, an LEPC was not counted as having a particular characteristic (such as membership of a community group or public agency) or counted as making a recommendation for hazard reduction, unless there was agreement on that item among the two or three separate cities reporting on that specific LEPC's activities.

The data therefore may slightly undercount the extent to which LEPCs included some participants, made efforts to use right-to-know data, and supported hazard reduction goals. Another source of possible bias results from the fact that the localities included in the study are ones which were interested enough in hazards management and Title III to respond both in 1986 and 1989. The high response rates for both surveys, 82 and 77 percent respectively, limits the amount of that bias, but these data still tend to represent local governments that have evidenced more interest in emergency management over a period of years.

Data on Local Characteristics

Data on the characteristics of the counties comprising the LEPC districts were collected from published sources. Those data

include total population, recent population growth or decline, average per capita income, unemployment rates, and percent minority population. In addition, two imperfect measures of the extent to which the districts differed in their concentrations of industries with toxic hazards were developed. The first used data from the 1987 Toxic Release Inventory to identify counties with at least one industrial facility with toxic pollution emissions of more than 3,000,000 pounds per year.

A total of 450 facilities nationwide reported such emissions levels in 1987 while the remaining 18,000 facilities reporting to EPA had smaller total emissions. Twenty-five percent of the districts in this study included at least one high emission facility. The second measure of toxics-using industry concentrations was the percentage of total area employment in six industrial categories identified by previous studies as presenting the most significant toxics use and waste hazards (U.S.O.S.H.A. 1977; National Wildlife Federation 1980). Those industrial sectors include textiles, chemicals, petroleum refining, rubber and plastics, metals and electrical/electronic equipment. Those two measures provide only a very weak indicator of comparative hazard exposure among the LEPC districts, but more detailed information could not be collected with the limited resources available.

A PROFILE OF THE LEPC PLANNING PROCESS

Eighty-one percent of the 165 LEPCs surveyed had submitted their emergency response plan to the SERC at the time they were surveyed. The membership of most of the LEPCs was characterized by the involvement of industry and traditional emergency response-oriented local public agencies. Community groups are not consistently represented as the law requires, as was also found by Conn et. al's EPA-sponsored study (1989). The present study looks in somewhat more detail at public agency, industry and community forms of participation.

Participation in LEPCs

A total of 92 percent of the LEPCs report involvement by at least some private industry representatives (Table 2). In sixty-two percent of the cases, at least one facility sponsoring the chemical industry's CAER Program was reported as being active in the LEPC district. Twenty percent report that formation of the LEPC in their area had been preceded by a CAER voluntary emergency planning committee.

Among the seven types of public agencies that represent the diversity of disciplines that could participate in Title III planning, the municipal fire departments are not unexpectedly the most frequently represented on 98 percent of the LEPCs. Eighty-six

percent of the LEPCs report law enforcement agency involvement, and 67 percent report local emergency medical agency involvement. Equally well represented with those three traditional emergency operations disciplines are public health departments at 75 percent. Among the less traditional public service disciplines in emergency management, public works departments were involved in 53 percent of the LEPCs. Thirty-one percent of the LEPCs report local planning/community development agency participation and facilities/general services agencies were involved in 28 percent of the cases.

Community group representation on LEPCs has been much lower. Only 49 percent of the LEPCs have had at least one of four types of community groups represented. National environmental groups are represented among 14 percent of the LEPCs and local environmental groups among 25 percent. Although environmental groups have sometimes been assumed to be the major citizen participants in LEPCs, neighborhood groups have been members of 24 percent of the LEPCs and union locals among 12 percent.

Community group participation on LEPCs was generally limited to one particular group rather than a cross-section of interests. Of the 49 percent of the LEPCs with any members from community groups, about 70 percent of the total had only one group represented. In 55 percent of the cases, the one group represented on the LEPC is an environmental group. In another 26 percent of

the cases it is a neighborhood group that is represented. Union locals are represented in the remaining 19 percent of the cases where only one community group was an LEPC member. Only three LEPCs (four percent of the entire sample) had environmental, neighborhood and union interests all represented at the same time.

Hazard Information Use

Several months after the October 1988 planning deadline, only three-quarters of the LEPCs were reported to have reviewed "at least some" of the righ to know data disclosed by industry (Table 3). The two greater efforts by LEPCs to use hazard information, as defined in this study, were in use by almost half of the LEPCs, however. Those two efforts include use of face-to-face discussion of the data between LEPC members and volunteer experts from government and industry, and use of the data to develop a hazard vulnerability analysis.

Also shown in Table 3 is data on individual cities' efforts to provide public access to right to know data. One of the findings of Conn et al.'s (1989) study was that community leaders (called "local opinion mediators" in their study) expressed the strong opinion that their local governments, rather than the LEPCs, may be a more effective conduit for ongoing communication of hazard information to the public. Among the individual cities surveyed in the present study, 88 percent claimed to have provided public

TABLE 2

PARTICIPATION IN LOCAL EMERGENCY PLANNING COMMITTEES

	Percent
Industry Involvement:	
Industry involved as member	92
CAER Program is active	62
CAER voluntary committee preceded the LEPC	20
Local Public Agency Involvement:	
Fire service	98
Law enforcement	86
Public health	75
Emergency medical	67
Public works	53
Planning/community development	31
Facilities/general services	28
Community Group Involvement:	
Local environmental groups	25
Neighborhood groups	24
National environmental groups	14
Union locals	12

TABLE 3

HAZARD INFORMATION USE BY LEPCs and INDIVIDUAL CITIES

	Percent
LEPCS' USE OF RIGHT-TO-KNOW DATA:	
Reviewed at least some of the data	74
Used expert advisors, consultants or industry volunteers to explain nature of chemical hazards	45
Prepared or used a hazard vulnerability analysis translating chemical use and storage data into knowledge of areas at risk	49
CITY LEVEL EFFORTS TO PROVIDE PUBLIC DATA ACCESS:	
Public can view copies of original data sheets at a local public agency	88
Citizens can access on-line computer-based file on the data	10
City has prepared a general summary or listing of the information in a more readily understandable form	10
Knowledgeable city personnel or industry volunteers provided to explain meaning of data to organized community groups	38

access on demand to the raw right-to-know data at a local agency. Although 38 percent also reported efforts to provide presentations to community groups, only 10 percent had as yet provided more permanent public information summaries on right-to-know data such as a computer listing or written report on toxic substances in use (Table 3).

Support for Hazard Reduction Goals

As table 4 shows, the sampled LEPCs were more likely likely to support recommendations for hazard reduction actions that can be carried out by units of local government than to recommed the actions that require cooperation by private industry. And only a very few of the LEPCs (10 to 13 percent) recommended hazard reduction by private facilities. On the one hand, that can be viewed as evidence that Title III planning at the local level had little effect on hazard reduction by 1989. On the other hand, Title III requires no attention at all to hazard reduction. The fact that any LEPCs at all gave attention to long run hazard management at all needs to be investigated to determine why.

EXPLAINING SUPPORT FOR HAZARD REDUCTION

This section analyzes how the LEPC planning process and pre-existing community conditions are related to LEPC support for hazard reduction objectives. Selected characteristics of the LEPC

planning process--who participated, how right-to-know data was used, and whether the plan was completed--can be examined for their individual relationship to the LEPCs' support for hazard reduction.

One analysis of this type is made for the public hazard reduction recommendations that must be carried out by units of local government (Table 5). The same analysis is repeated for the four hazard reduction recommendations that require private industry action (Table 6). Following those two sets of results are mutlivariate analyses that test which aspects of the LEPC planning process made a statistically distinctive difference in support for hazard reduction when all are analyzed at the same time, and when the effects of pre-existing community conditions are also taken into account.

Table 5 lists nine of the planning process characteristics included in this study. Public agency participation is not shown because it must be analyzed in a different manner. Private facility membership on the LEPC is not shown because it made no difference in any analyses, owing to the almost complete (92%) rate of participation reported in the survey.

For each characteristic, the LEPCs are broken into one of two groups: those LEPCs to which the characteristic applied and those LEPCs to which it did not apply. For example, the first row of

Table 5 divides up the 165 LEPCs according to whether or not the CAER program was being sponsored by a private facility in the district. The two right-hand columns of Table 5 report the percentage of LEPCs, in each of the two groups, which recommended at least one public hazard reduction action (i.e., actions that can be taken by units of local government, such as zoning changes). Table 5 shows that when the CAER program was active, 45% of the LEPCs recommended public hazard reduction efforts. The percentage supporting public hazard reduction was lower (38%) among the remaining LEPCs in whose districts there was no private industry CAER program.

TABLE 4

LEPCs SUPPORTING SELECTED HAZARD REDUCTION RECOMMENDATIONS

Recommendation:	Percent of LEPCs Making:
Change zoning code to prevent future industrial/commercial development from locating too near a vulnerable population	21%
Change zoning code to require design standards for new (or expanded existing) industrial/ commercial facilities, such as setbacks and impoundments of storage areas.	18%
Change truck transportation routes to reduce populations at risk from truck accidents with toxics	14%
Create a revenue source for funding hazmat emergency management (to be) collected from business/industry	20%
Substitute alternate, less toxic chemical substances in the production process or use different processes.	10%
"Just-in-time" inventories to reduce the volumes of toxic substances stored on plant site	10%
Reduce routine discharges of toxic waste products into the air or water environment through use of better containment technology	13%
Re-use or recycle toxic waste or by-products of production	13%

In all but 2 cases the LEPCs with the planning characteristics listed in Table 5 were more likely to recommend public hazard reduction actions than those LEPCs without the characteristics. One exception is participation by national environmental group chapters on LEPCs, which had virtually no effect (42% vs. 43%). The second exception is participation by labor interests. Labor participation is associated with less support for public hazard reduction objectives. Only in four cases, however, are the differences in LEPC support for public hazard reduction statistically different than zero (i.e., statistically significant at an acceptable confidence level of .05).

The largest and most significant effect is when neighborhood groups participate in the LEPC. The next two statistically meaningful differences are related to how the LEPC used right-to-know information in the planning process. More effort to use the data is consistently related to more support for local government action on hazard reduction. The fourth statistically significant effect is completion of the required emergency response plan.

Table 6 repeats the same analysis for the private hazard reduction objectives. The percentages shown are for LEPCs which recommended at least one of the four actions that private facilities can take. The largest and statistically most confident

factor associated with support for private hazard reduction is the presence of a private industry CAER program within the LEPC district. In addition, neighborhood group participation in the LEPC and the LEPC's efforts to understand and use right-to-know information are again factors associated with support for private sector hazard reduction as a goal.

Summary: effects of individual planning characteristics

In sum, neighborhood group participation is consistently important to an LEPC giving support to hazard reduction issues. That makes sense because neighborhoods near facilities have the greatest stake in long term hazard mitigation. Neighborhood level activism was instrumental to passing Philadelphia's right-to-know law, which set a precedent for later state level action (Chess 1984, 1986), as did a Durham, North Carolina neighborhood's actions after a plant explosion (Lynn 1987). Making proactive efforts to communicate hazard information to all LEPC members and using the data to analyze risks are also consistently related to more support for hazard reduction by the LEPC.

Those results, although modest, tend to support the idea that Title III's mandate for a planning process can result in local innovation by providing opportunities for participation based on a free flow of information about toxic substances hazards. The effect of industry's CAER program, however, is positively related

TABLE 5

BIVARIATE EFFECTS OF PLANNING PROCESS CHARACTERISTICS ON LEPC SUPPORT FOR PUBLIC HAZARD REDUCTION

Characteristics:	Percent of LEPCs That Recommended One or More Public Hazard Reduction Actions	
	With Characteristic	Without Characteristic
1. The CAER program was active in the LEPC district	45%	38%
2. The LEPC was preceded by a CAER voluntary emergency committee	55%	39%
3. Local environmental groups were represented on the LEPC	44%	38%
4. National environmental groups were represented on the LEPC	42%	43%
5. Neighborhood groups were represented on the LEPC	62%	37% **
6. Union/labor interests represented on the LEPC	26%	45% #
7. Right-to-know data was explained to LEPC members by volunteer experts from public agencies or industry	55%	32% **
8. Right-to-know data was used in a hazard vulnerability analysis	49%	36% *
9. The emergency response plan had been submitted to the SERC	46%	*27% *

TABLE 5 (continued)

* - Difference in percentages is statistically significant at .05 level
** - Difference in percentages is statistically significant at .01 level
# - Difference is not significant but is of interest and has probability level in the range .10 to .15.

TABLE 6

BIVARIATE EFFECTS OF PLANNING PROCESS CHARACTERISTICS ON LEPC SUPPORT FOR PRIVATE HAZARD REDUCTION

Characteristics:	Percent of LEPCs That Recommended One or More Private Hazard Reduction Actions	
	With Characteristic	Without Characteristic
1. The CAER program was active in the LEPC district	32%	14% **
2. The LEPC was preceded by a CAER voluntary emergency committee	30%	24%
3. Local environmental groups were represented on the LEPC	31%	24%
4. National environmental groups were represented on the LEPC	25%	26%
5. Neighborhood groups were represented on the LEPC	38%	21% *
6. Union/labor interests represented on the LEPC	21%	26%
7. Right-to-know data was explained to LEPC members by volunteer experts from public agencies or industry	33%	19% *
8. Right-to-know data was used in a hazard vulnerability analysis	31%	20% #
9. The emergency response plan had been submitted to the SERC	27%	18%

TABLE 6 (continued)

---

* - Difference in percentages is statistically significant at .05 level
** - Difference in percentages is statistically significant at .01 level
# - Difference is not significant but is of interest and has probability level in the range .10 to .15.

only to LEPC support for private industry hazard reduction actions. The public education efforts of CAER sponsors ought to influence the attention LEPCs gave to public sector hazard reduction as well, but that was not the case here.

Multivariate Analyses

The true test of whether the factors discussed above make a valid, distinctive difference in LEPCs' support for hazard reduction is to analyze all factors at the same time, while also controlling for alternative explanations. To use a crude but legitimate example, what if the LEPCs that devoted more attention to using right to know data were only those in wealthy areas with ample staff resources? Then the real cause of greater support for hazard reduction is adequate funding, not the right to know process with its theme of "information is power." Or community participation may be highly correlated with community wealth--again making the idea that participation causes attention to hazard reduction misleading.

Logistic regression analysis was used to test the joint effects of all the planning process and community characteristics on the two dependent variables: LEPCs' support for public-oriented and private-oriented hazard reduction actions. Logistic regression is an appropriate technique when the dependent variable is a dichotomous (yes or no) measure, as in this case. The dependent variables for the two analyses measure whether or not each LEPC recommended at least one public

or one private hazard reduction action, respectively. Table 7 provides a summary of the results, based on the analyses presented in Tables 8 and 9.

Four factors were significant in explaining LEPC support for hazard reduction actions by units of local government (Tables 7, 8 and 9). First, neighborhood group participation is still positively related, even after controlling for all other factors. Second, labor interest participation is negatively related to support for public hazard reduction actions. Third, the LEPCs that used volunteer industry/agency experts to help explain the right-to-know data to members were more likely to recommend public sector hazard reduction efforts. Fourth, LEPCs in fast-growing districts were significantly less likely to support public hazard reduction.

The negative effect of growth appeared unusual at first because growth is usually associated with more resources and political latitude to undertake new public policy efforts. However, detailed examination of the data revealed that the negative "growth effect" was tied to two states: Texas and Arizona. Because those two states are among the least supportive of local government land use and site design restrictions, as well as taxes and fees on business, it made more sense that growth was negatively associated with support for local government actions involving those types of policies.

Only three factors were significant in explaining LEPC recommendations for private hazard reduction efforts. Again, an active

CAER program in the district is positively associated with those recommendations, even after accounting for other explanations including industry dominance of the local economy. Second, LEPCs in areas with higher unemployment rates are less likely to recommend hazard reduction actions by industry. Third, LEPCs that included participation by a larger variety of local public agencies were more likely to recommend hazard reduction by industry.

TABLE 7

LISTING OF STATISTICALLY SIGNIFICANT FACTORS
IN LOGISTIC REGRESSION ANALYSES OF SUPPORT FOR HAZARD REDUCTION

Dependent Variable: LEPC Recommended Hazard Reduction by Public Sector	Dependent Variable: LEPC Recommended Hazard Reduction by Private Sector
* SIGNIFICANT POSITIVE FACTORS: -Neighborhood Group Involvement -LEPC Used Volunteer Industry/ Agency Experts to Help Members Understand MSDS Data	* SIGNIFICANT POSITIVE FACTORS: -CAER Program in LEPC District -Larger & More Diverse Group of Public Agencies Involved
* SIGNIFICANT NEGATIVE FACTORS: -Labor Union Participation -Rapid Population Growth in LEPC District	* SIGNIFICANT NEGATIVE FACTORS: -Higher Unemployment in LEPC District

Table 8

LOGISTIC REGRESSION: EARLY LEPC SUPPORT FOR PUBLIC HAZARD REDUCTION RECOMMENDATIONS

Predictors:	Standardized Coefficients:
LEPC submitted a plan to the SERC	.08
CAER program sponsored by facilities in LEPC District	-.03
CAER voluntary committee preceded the LEPC	.11
Number and diversity of local public agencies involved in LEPC	.14
National environmental group chapters represented on LEPC	-.03
Local environmental groups on LEPC	-.13
Neighborhood groups represented on LEPC	.23 *
Labor union locals represented on LEPC	-.26 *
LEPC used volunteer agency or industry experts to explain RTK data to members	.24 *
LEPC prepared a hazard analysis with data	.02
High-emission facilities in LEPC district (based on Toxic Release Inventory, 1987)	-.02
Percentage of local employment in six toxics-using sectors, 1986	-.09
LEPC district population, 1986	-.05
LEPC district per capita income, 1986	-.02
LEPC district percent population change, 1980-86	-.31 *
LEPC district unemployment rate, 1986	-.01
1980 % population in minority groups,	-.11

Chi-square for regression, 31.5 with 17 DF, $p < .05$
* $p < .05$ for coefficient for individual predictor

Table 9

LOGISTIC REGRESSION: EARLY LEPC SUPPORT FOR PRIVATE HAZARD REDUCTION RECOMMENDATIONS

Predictors:	Standardized Coefficients:
LEPC submitted a plan to the SERC	-.11
CAER program sponsored by facilities in LEPC District	.27 *
CAER voluntary committee preceded the LEPC	.02
Number and diversity of local public agencies involved in LEPC	.33 *
National environmental group chapters represented on LEPC	-.15
Local environmental groups on LEPC	.06
Neighborhood groups represented on LEPC	.09
Labor union locals represented on LEPC	-.10
LEPC used volunteer agency or industry experts to explain RTK data to members	.15
LEPC prepared a hazard analysis with data	.10
High-emission facilities in LEPC district (based on Toxic Release Inventory, 1987)	-.18
Percentage of local employment in six toxics-using sectors, 1986	.12
LEPC district population, 1986	.08
LEPC district per capita income, 1986	-.02
LEPC district percent population change, 1980-86	.01
LEPC district unemployment rate, 1986	-.33 *
1980 percent population in minority groups	-.06

Chi-square for regression, 29.05 with 17 DF, $p < .05$
* $p < .05$ for coefficient for individual predictor

Generally speaking, many of the same characteristics of the LEPC planning process that were significantly related to hazard reduction in the single-variable analyses are also significant in the multivariate analyses. Some of the effects of how LEPCs used right-to-know information dropped out in the multivariate analyses, however, because the ability and need to use the information is correlated with other measures of local capacity, like size, wealth, concentrations of industry subject to Title III, and so on. Communicating the meaning of the RTK data to the LEPC membership was still significantly related to LEPC support for public hazard reduction actions, however.

Neighborhood groups were not found to be a significant factor in the multivariate analysis of LEPC recommendations for private hazard reduction, as they were in the analysis of single-variable effects (Table 6). Nonetheless, the evidence from all of the analyses suggests that neighborhood group involvement is an important factor in whether LEPCs give attention to hazard reduction. That merits a closer look at which LEPCs had neighborhood representation.

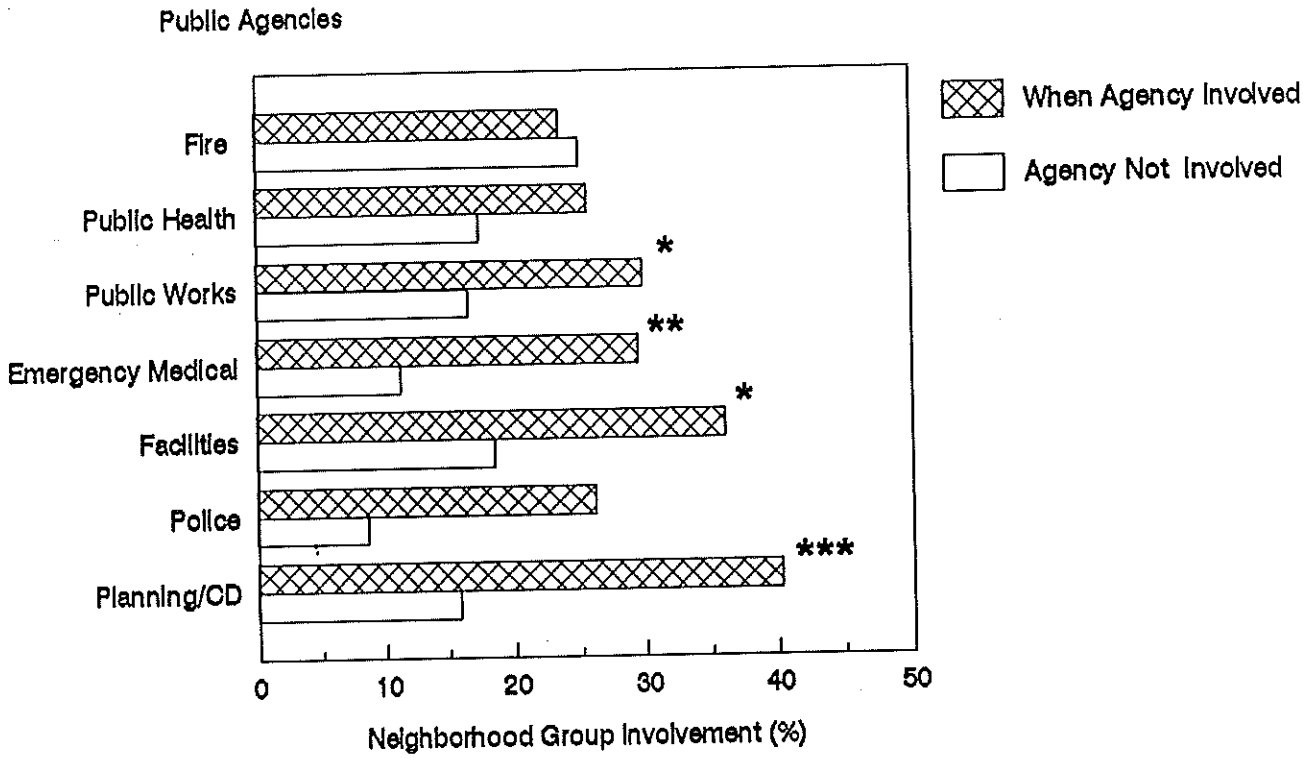
Only 24 percent of the LEPCs reported neighborhood groups as members. What leads neighborhood groups to participate in the LEPCs? Although many neighborhood groups are ad hoc organizations reacting to specific issues, many are also organized as part of ongoing public agency programs such as housing, planning and

community development, and for crime prevention and neighborhood safety. If those public agencies participate in the LEPCs, they may bring their neighborhood group constituencies with them into the planning process. Although the data collected in this study was not designed to explain neighborhood group involvement, it was possible to make a rough test of the hypothesis that broader agency participation spurs organized citizen involvement.

Figure 2 compares the percent of LEPCs with a neighborhood group involved according to whether or not each of seven types of public agencies were involved as well. For example, fire department involvement made no difference in neighborhood group participation because virtually all the LEPCs had fire departments involved. The largest difference is when local planning & community development departments are involved in the LEPC. Neighborhood group participation jumps from 16 percent to 40 percent when local planning agency staff are involved in the LEPC.

Although these data are only suggestive, they indicate that we need to know more about how integrating LEPC activities with other long-standing community programs can boost public involvement and innovation. Planning agencies, in particular, are responsible for functions that are directly relevant to long-term hazard mitigation and are also agencies that often have a direct charge to educate and involve the public.

Neighborhood Group Involvement in LEPCs vs. Involvement by Public Agencies



*** p < .05, ** p < .01, *** p < .001**

Traditional Agencies

- **Fire**
- **Police**
- **Public Health**
- **Emerg. Medical**

Non-Traditional

- **Planning & CD**
- **Public Works**
- **Facilities**

FIGURE 2: Neighborhood Group involvement in LEPCs versus involvement by local public agencies

Summary of 1989 Findings:

Early in Title III's legislative life, 43 percent of the LEPCs made at least one recommendation for a hazard reduction action by local government and 26 percent made at least one recommendation for an action by private industry. The most consistent factors that explain that early support are the involvement of neighborhood groups on LEPCs and industry activism through the CAER program. Efforts to effectively use right-to-know information and make sure all LEPC members understand its implications were also consistently associated with support for action by local governments, but not by industry.

The picture that emerges is one of great potential for an ongoing LEPC role in hazard reduction and broader hazard management, but also significant constraints. Participation of community interests in LEPCs was still limited in 1989, as were LEPC public risk communication and outreach efforts. In addition, there was mixed evidence that economic concerns, such as fear of job loss, do influence how far LEPCs venture into promoting hazard reduction. The potential for adaptive policy implementation through localized planning processes cannot be said to be tested as yet when implementation of the process itself was still so limited. A subsequent 1992 survey pursued these questions.

1992 Continuing Survey of LEPCs:

Implementation of Title III by the LEPCs was still at early stages in 1989. But successful implementation of an adaptive policy is not instantaneous (as we too often erroneously believe that conventional regulatory approaches will be) Time is required for decentralized commitments to action to evolve. Those commitments are in turn dependent on the development of relationships between stakeholders to the policy, as well as being dependent on a process of learning among those parties and, in a sense, within society as a whole.

To further investigate the unfolding outcomes of Title III planning by LEPCs, a follow-up study was conducted three years after the first survey, in mid-1992. One purpose was to examine the progress of policy evolution. An additional purpose was to increase the representativeness of the group of LEPCs being studied. The 1989 survey was based on a set of local governments that are somewhat more urban than the norm for the majority of LEPCs and local governments across the United States.

Methodology of 1992 Survey:

The second survey of LEPCs was designed to collect information from both those that responded in 1989 and an equivalent number of randomly selected LEPCs that represent conditions across the nation and outside of large metropolitan regions. By 1992, U.S.

Environmental Protection Agency records showed that there were 4,008 LEPCs that had been formed in the fifty states. A 5% stratified random sample of approximately 200 LEPCs was developed, excluding the 165 LEPCs already included as a result of the 1989 study.

Selection was proportionately stratified by states so that the number of LEPCs selected from each state is proportional to the percentage of all 4,008 LEPCs represented by that state. Thus for New Jersey, which has 588 LEPCs organized by municipality rather than county, 29 LEPCs were randomly selected to represent 14% of the total target number of 200. Twelve LEPCs were added to the initial 200 selected for cases where states would otherwise not be represented because their percentage of the national total of 4,008 is less than one-half of one percent. Two LEPCs were therefore selected for the states of Alaska, Delaware, Hawaii, Minnesota (which has regional LEPCs), Rhode Island and Vermont.

An additional eight LEPCs were added to improve representation of special cases such states with only one LEPC in the sample (Arizona, Florida, Maine, Maryland, Nevada and Wyoming), where the state had only one statewide LEPC (Georgia), and for the District of Columbia. The total random stratified sample consisted of 220 LEPCs. Given customary survey response rates of 75-80% using our mail survey methods, this sample allowed for a number of repsonses equivalent to the 165 LEPCs represented in the 1989 survey. Thus a total of 385 LEPCs were surveyed, with 165 representing those included in 1989 and 220 representing those selected to represent

the nation in 1992. The two subsets of the sample are referred to here as the longitudinal sample (1989 respondents) and the random sample (additional 1992 LEPCs).

Response rates among the two samples varied significantly. A total of 140 of the 165 LEPCs in the longitudinal sample responded again in 1992, representing an extremely high 85% response rate. However, only 123 of the LEPCs in the random sample responded to the survey, representing only about a 55% response rate. This difference in response rates undoubtedly reflects the fact that the random sample is dominated by smaller, often more rural counties or LEPC districts than does the original group of LEPCs contacted in 1989. In conducting the 1992 survey, it was quite apparent that the part-time, voluntary nature of LEPCs in smaller counties and places negatively affected the response rate. Although the random sample includes LEPCs whose districts vary in population from a few thousand to more than a million people, small populations are much more numerous. Those small places are also often not highly motivated to undertake planning activities mandated by Title III because of a lack of significant non-agricultural industrial activity in their areas and/or a severe lack of resources and personnel to devote to new activities. By contrast, the longitudinal sample is dominated by metropolitan areas where both industrial activities and overall government capacity are greater.

Comparison of Longitudinal and Random Samples:

A detailed comparison of characteristics among the two samples emphasizes those and other differences (Table 10). The longitudinal, metro-area based sample has been significantly more likely than has the random sample to experience both transportation-related and facility-related accidental toxic releases in recent years. It is very unlikely that this difference is due to random statistical variation. Yet both samples have somewhat similar proportions of their economies in manufacturing employment (21.6 versus 25.1 percent). The predominance of more rural and non-metro areas in the second sample, however, also means that a greater amount of manufacturing employment is in agricultural and food processing industries. The two samples also differ significantly in the average number of facilities reporting to the LEPC under Title III, five times as many on average for LEPCs in the longitudinal sample than in the second, random sample. The Much higher number of facilities on average per LEPC is of course correlated with the higher reported incidence of accidental releases.

Table 10

Comparison of Sample Characteristics, 1992 Survey, With Significant Differences Noted

Characteristics (Means):	Longitudinal Sample	Random Sample
Rail or truck accident with toxic release, 1987-91	53%	25% ***
Accidental release from fixed facility, 1987-91, with public evacuation or in-place shelter	49%	23% ***
Contamination of water or soil from accidential release, requiring health warning to public	40%	30%
Number of Title III industrial facilities reporting to LEPC	273	53 **
1990 Average County Population in LEPC District	407,870	75,960 ***
Percent Manufacturing Employment, 1989	21.6%	25.1% #
Percent Non-white Population, 1990	16.3%	11.1% *
Per Capita Income, 1988	$11,555	$11,129
Percent Unemployment, 1988	7.2%	7.25%

*** Difference is significant at .0001 level; ** difference is significant at .001 level; * difference is significant at .01 level; # difference is significant at the .05 level.

In terms of demographics, the longitudinal sample represents large metropolitan counties with an average of more than five times the population of the counties in the second, national random sample. Despite the more sophisticated local government facilities and services which that implies, the two samples do not differ at all in per capita income, a proxy measure of local wealth and resources. The only mentionable demographic difference is that the longitudinal sample is slightly more racially diverse, although the average difference is not large (16.3 vs. 11.1 percent non-white citizens). In sum, the two samples differ in urban vs. non-urban populations and most significantly in a much higher incidence of accidental releases in the longitudinal sample in the five years preceding the 1992 survey than in the random sample.

1992 Survey Content:

The survey instrument itself incorporates all questions from the 1989 survey but expands significantly a number of key measures, reflecting what has been learned about Title III implementation. (See Appendix B for copy of 1992 survey instrument). First, the question of whether industry plays a key role as a resource provider to LEPCs, and perhaps a constraint on local willingness to press for change, called for an expansion of questions regarding industry contributions. In 1989, only the existence of a CAER program in the LEPC's service area was used as a measure of industry resource support.

In 1992, specific types of industry aid are also included, such as funding for computer and emergency response equipment, training and in-kind technical advice. In 1992, equally detailed types of state government assistance to LEPCs have also been identified. That is important to measure because of the variability among states in the kinds and degrees of assistance provided to LEPCs. Types of assistance asked about reflect the growth of state implementation of SARA Title III programs by State Emergency Response Commissions (SERCs) and other agencies. Types of assistance include funding for LEPCs from state-mandated industry fees in some cases, and much greater state technical assistance to LEPCs in general. The 1992 survey asked respondents for information about both the types of assistance provided by state government, and the importance of each kind of assistance from the local viewpoint.

Importance has continued to be placed on risk communication and public outreach/education activities by LEPCs. The 1992 survey asks LEPCs about their current use of a more detailed set of types of outreach activities. The types of voluntary risk reduction activities undertaken by LEPCs has also been expanded, especially to include LEPCs' provision of Toxic Release Inventory (Section 313) data to the public, and additional strategies for promoting industry action on risk reduction, such as "good neighbor agreements." In addition, the 1992 survey asks about whether LEPCs have acted on each strategy for promoting risk reduction, or only discussed taking such action. Finally, the 1992 survey collects information about the extent to which LEPCs are receiving requests for information and

involvement from both the public and other local government public agencies. Following sections present descriptive information about the 1992 survey, and analysis of factors contributing to LEPC performance in supporting voluntary hazard reduction activities. Results from 1989 and 1992 are compared and overall findings and policy implications are discussed.

Participation in LEPCs:

Figure 3 illustrates that participation by industrial facilities and organized citizen (neighborhood and environmental) interest groups remained somewhat similar between 1989 and 1992, for the combined sample of 260 LEPCs. Memberships of organized neighborhood and labor groups actually dropped somewhat from already low 1989 levels of about 20 percent and 10 percent respectively. Local environmental group membership, however, jumped from 25 percent to over 40 percent. The static or declining rates of membership by neighborhood and labor groups is noteworthy because both groups' membership on LEPCs is, as noted earlier, a significant factor in explaining LEPC support for hazard reduction in the 1989 sample. Environmental group involvement, by comparison, was not a significant factor in 1989. The 1992 survey also shows that industrial facility membership on LEPCs is stable. No data was collected on news media membership on LEPCs in 1989, but in 1992 the data show that most LEPCs included a news media member as required by Title III. Finally, the 1992 survey asked about individual

FIGURE 3

Comparison of 1989 & 1992 Participation on LEPCs

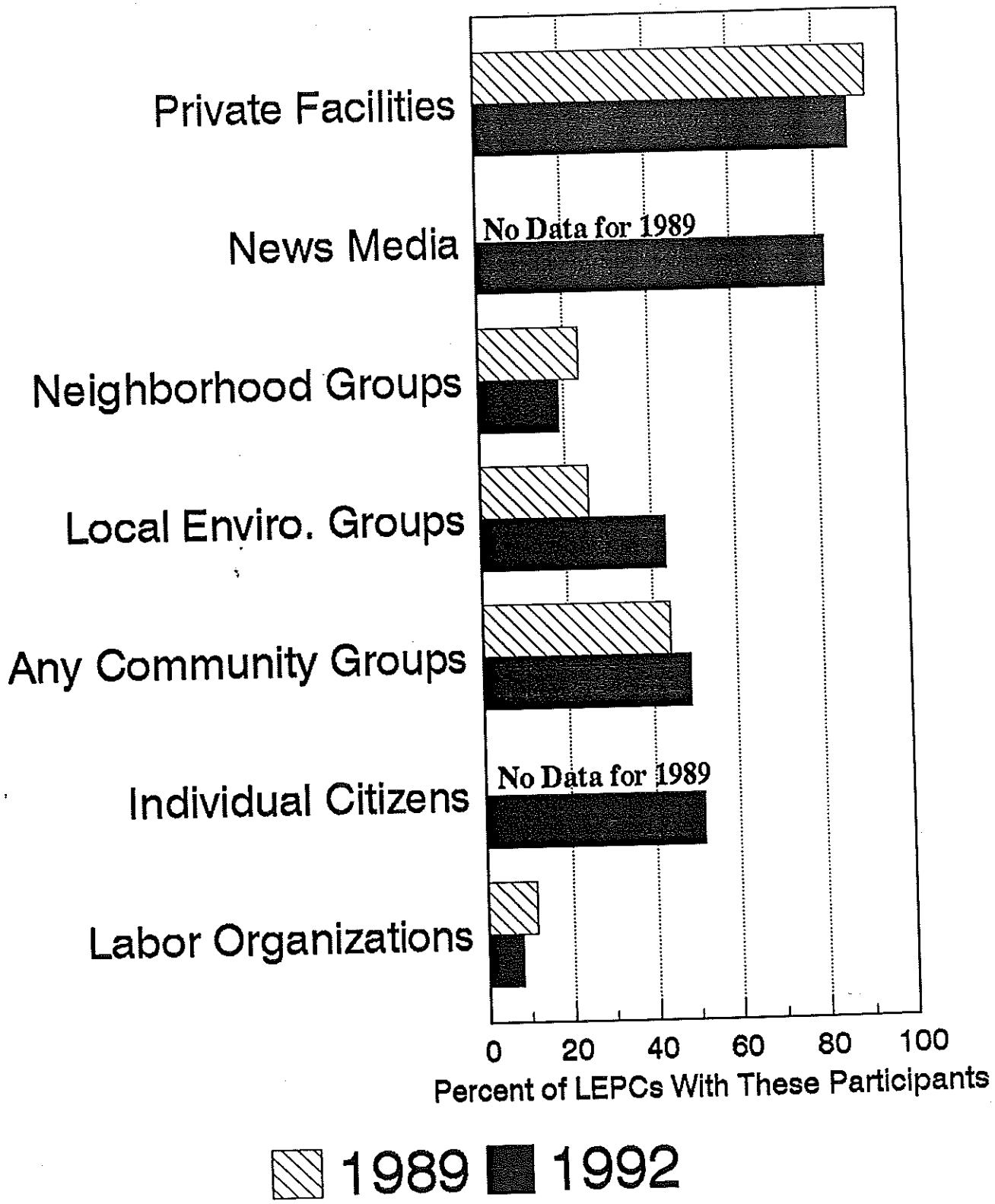
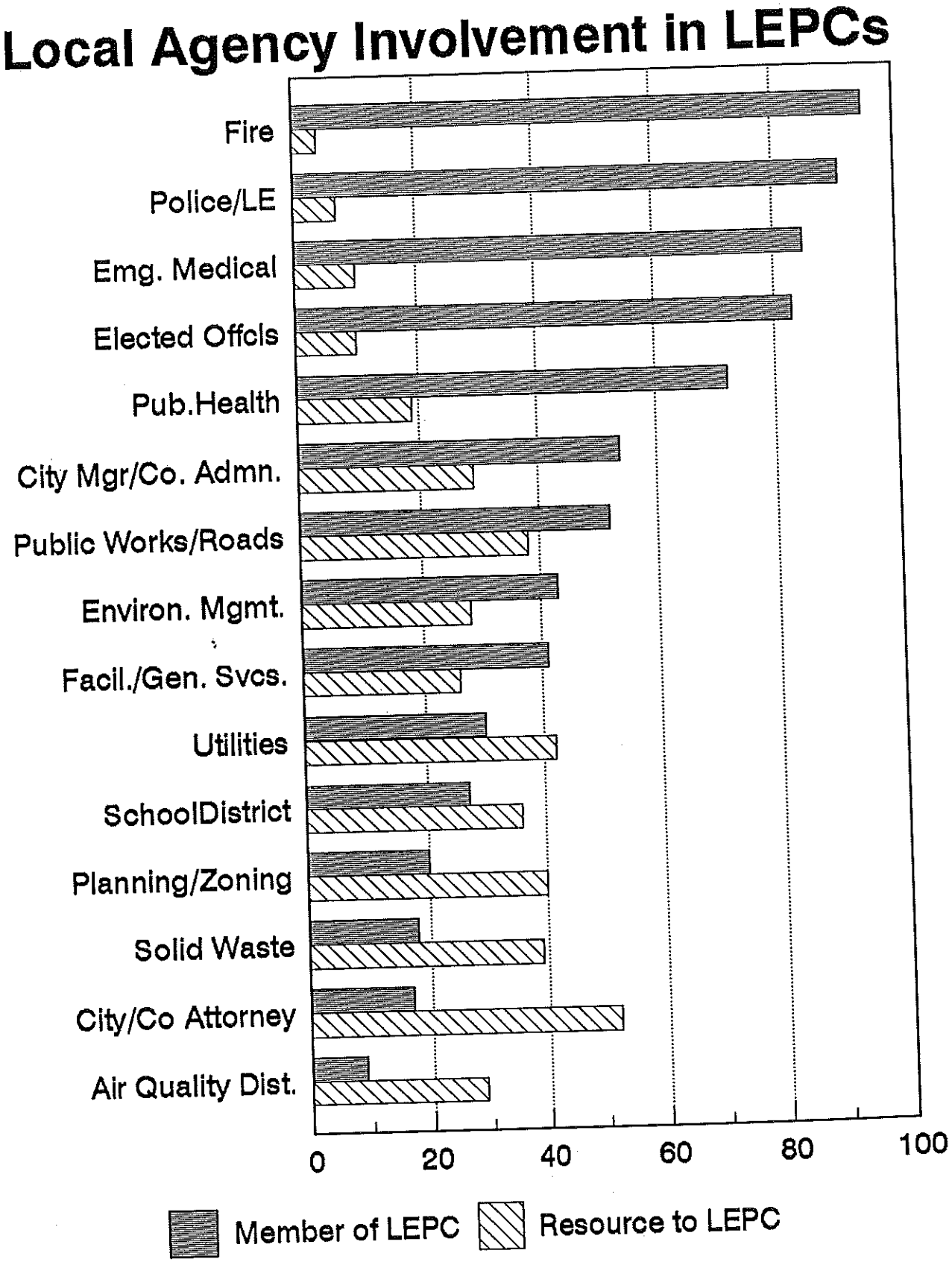


FIGURE 4


Local Agency Involvement in LEPCs
Fire
Police/LE
Emg. Medical
Elected Offcls
Pub.Health
City Mgr/Co. Admn.
Public Works/Roads
Environ. Mgmt.
Facil./Gen. Svcs.
Utilities
SchoolDistrict
Planning/Zoning
Solid Waste
City/Co Attorney
Air Quality Dist.
0
20
40
60
80
100
Member of LEPC
Resource to LEPC

citizen membership on LEPCs, and over 50 percent of LEPCs reported individual un-affiliated citizens as members.

Information on local public agency involvement in LEPCs was defined in either terms of direct membership or availability of the agency as a resource or provider of expertise or advice to the LEPC. (See Figure 4). Public safety (fire and police) and emergency medical agencies--the traditional first-responder agencies for emergency management continue to dominate as members. Elected officials, required as members by Title III, are members in over 80 percent of the cases. Similarly, public health agencies are members in over 70 percent of the cases. Among non-traditional emeregncy management agencies, the most frequently represented as members are public works and local environmental management agencies. Although "environmental" agencies are required to be members of LEPCs under Title III, only 40 percent of LEPCs reported them as members. Another 30%, however, reported environmental management agencies as resources to the LEPC.

Among key agencies not required as members of LEPCs, local land use planning and zoning agencies were members in only 20 percent of the cases LEPCs in 1992 (compared to 31 percent in 1989). However, another 40 percent of LEPCs reported planning agencies as a resource. Air quality districts, which will play an important role in risk management planning under the 1990 Clean Air Act Amendments, were reported as members by less than 10 percent, but are resources to the LEPC in another 30% of the cases. That rate of involvement

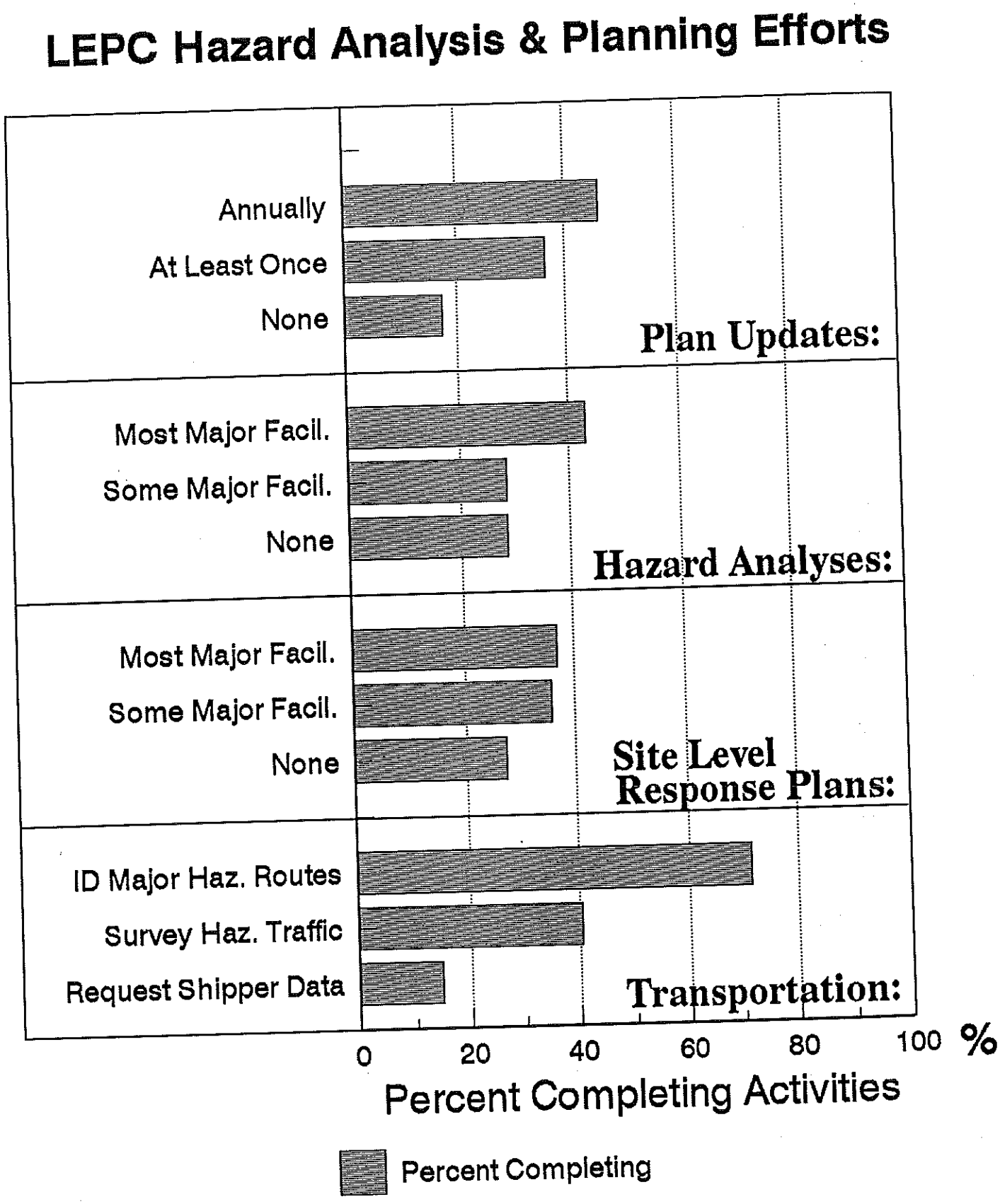
by AQDs is high given the fact that many of the LEPCs in this sample are from non-metro areas where such districts do not exist.

LEPC Progress on Hazard Analysis and Planning Tasks:

Since the first deadline for submission of chemical emergency response plans to SERCs in 1988, LEPCs have been mandated under Title III to update plans each year. In 1992, 46.2 percent reported that plans had been updated annually, although another 36.5 percent reported that plans had been updated at least once since the initial deadline. (See Figure 5). The remaining 17 percent have not updated plans. Implementation of effective emergency preparedness also requires that local response agencies have more detailed site-level response plans at individual industrial facilities that present significant risks of accidental toxic releases. About thirty-seven percent report that site level plans have been prepared for all or most major facilities, and another 36 percent report that site plans are completed for at least some major facilities. (Figure 5).

The quality of emergency preparedness for releases depends on making full use in hazard analyses of the data disclosed by facilities. In 1992, 43.1 percent had mapped the vulnerable zones for accidental releases around most or all major facilities. Another 28.5 percent had mapped vulnerable zones around at least some facilities. (Figure 5). The remaining 28.5 percent of the reporting LEPCs had not mapped any vulnerable zones based on

FIGURE 5


LEPC Hazard Analysis & Planning Efforts
Annually
At Least Once
None
Plan Updates:
Most Major Facil.
Some Major Facil.
None
Hazard Analyses:
Most Major Facil.
Some Major Facil.
None
Site Level Response Plans:
ID Major Haz. Routes
Survey Haz. Traffic
Request Shipper Data
Transportation:
0
20
40
60
80
100
%
Percent Completing Activities
Percent Completing

accidental release scenarios.

Since the time SARA Title III was passed, more attention has been placed on toxic releases resulting from transportation accidents (rail, truck, and water). Title III limited transportation planning to a vague requirement for identification of "major routes" along which tozic substances transport could produce accidental releases. Congress responded to increasing concerns in passing the Hazardous Materials Transportation Uniform Safety Act (HMTUSA) almost five years after passgage of SARA Title III. The HMTUSA provides for federal funding of more sophisticated hazard analyses of transportation risks. The LEPCs surveyed here were asked about steps they have already taken to assess transportation hazards, but before the state and local planning and training assistance grants authorized by HMTUSA actually began. Almost three-quarters (71.5 percent) of the LEPCs reported that they had identified "major routes" as required by Title III. (See Figure 5). Forty (40.4) percent reported that they had surveyed typical traffic and most likely toxic substances transported, a very common and simple methodology for local governments that wish to create a rudimentary transportation hazard analysis. However, only 14.6 percent of the LEPCs had requested voluntary information from shippers on the types of toxic substances that are being transported.

These data indicate that hazard analysis and planning activity varied widely among all LEPCs national in 1992, about four years

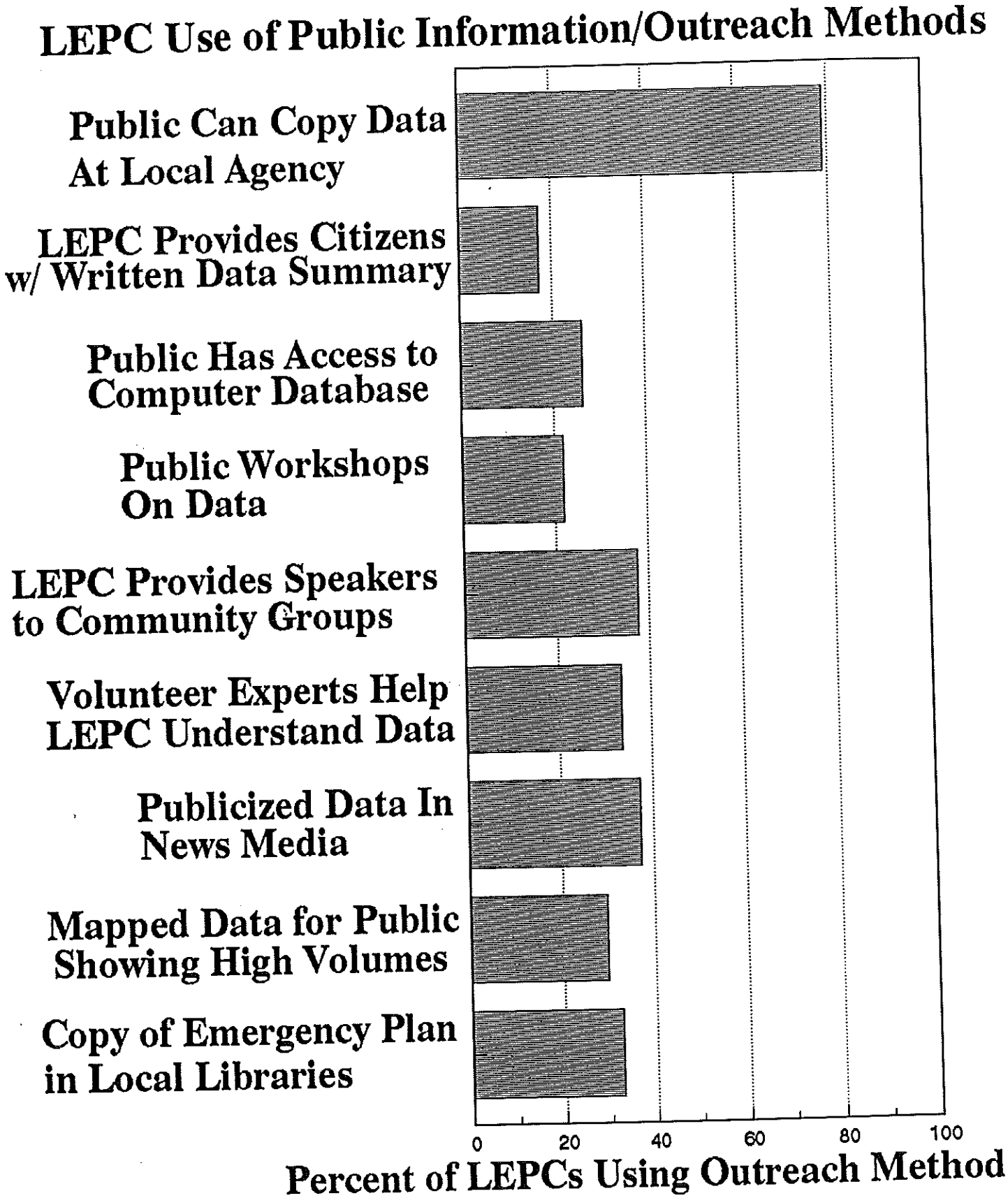
after the first October, 1988 planning deadline. In some case that is due to the fact many small LEPCs have limited sources of risk, but it also relfects the limited resources available to LEPCs, both with and without significant sources of risk.

LEPC Outreach & Risk Communication Efforts:

As discussed earlier, it has been an expectation across virtually all interests involved in Title III (i.e., industry, citizens and government) that the LEPCs would assume some role in "communicating hazard information" to the public. Yet the only explicit requirement in the law for risk communication is that LEPCs allow citizens access to the raw right-to-know data reported by industry. Nonetheless, EPA, state governments in some cases, and major industrial firms had devoted persistent efforts <u>until</u> 1993 to promote risk communication by LEPCs through technical assistance programs.

The 1992 survey examined LEPCs' public outreach efforts in more detail than in 1989. (See Figure 6). In 1992, almost four-fifths (79.2 percent) of the LEPCs had provisions for the public to copy data at a local public agency, as required by law. Only 17.3 percent provided a written summary of the data on industries in the District as one form of outreach to assist citizens. More LEPCs (26.2 percent) reported that they provided a computer database from which citizen could retrieve right-to-know data at a public place (e.g., a library or fire department headquarters). Only 21.9

FIGURE 6


LEPC Use of Public Information/Outreach Methods
Public Can Copy Data At Local Agency
LEPC Provides Citizens w/ Written Data Summary
Public Has Access to Computer Database
Public Workshops On Data
LEPC Provides Speakers to Community Groups
Volunteer Experts Help LEPC Understand Data
Publicized Data In News Media
Mapped Data for Public Showing High Volumes
Copy of Emergency Plan in Local Libraries
0
20
40
60
80
100
Percent of LEPCs Using Outreach Method

percent of the LEPCs (or member industrial faciltiies) held formal workshops with citizens to help them understand the data, but 37.7 percent provided volunteers to speak with community groups about the data when requested. One-third (33.5 percent) of the LEPCs also used volunteer experts to help the LEPC members themselves with interpreting the right-to-know data.

Perhaps most surprising is that only 37.3 percent of the LEPCs publicized right-to-know data through the news media. That result is consistent with concern that LEPCs are heitant to pro-actively make the public aware of right-to-know data on toxic hazards because of concern about citizen anxiety and/or industry pressures. Nonetheless, 29.6 of the LEPCs reported that they have provided mapped data showing where facilities with major reportable quantities are located in relation to neighborhoods, one of the most vulnerable populations in communities. Such mapped data is more effective in communicating basic awareness of hazards in the community than the original data on types and quantities of reportable substances. Finally, as a check on the overall tendency for LEPCs to undertake proactive public outreach for their preeminent responsibility under Title III--emergency response planning--we asked whether the LEPC has put a copy of the Title III emergency plan in local libraries. Only 32.7 percent reported that action.

The picture of public outreach efforts that emerges here is mixed. On the one hand, a significant proportion of LEPCs

nationally cannot report that they have taken even minimal steps to make right-to-know data more available to the public. On the other hand, significant proportions of LEPCs have taken innovative and completely voluntary steps to make the data more accessible, e.g., through providing data on personal computer databases or providing mapped data on major reporting facilities.

Sources of Aid for LEPCs:

One of the consistent local government complaints about the LEPC program under SARA Title III has been the lack of significant funding for the many planning and outreach activities that ought to be conducted at the local level. In the initial years after 1986, funding was almost exclusively limited to emergency-response training/operations and some general planning support through a budget allocation administered by the Federal Emergency Management Agency. In some states, that support was viewed as an merely an extension of customary emergency preparedness funding by federal and state emeregncy and civil defense agencies, rather than a stimulus to new activities oriented towards the distinctive community needs for toxic hazards management, including communication with the public. It is safe to say that one of the largest industrial states in the nation simply ignored Title III for all programmatic purposes, while incorporating funds into its normal emergency management budget. Yet other states such as New Jersey, Ohio and Kansas (to name a few) gave specific focus to community-level toxics management under Title III, creating specific right-to-know programs

that spanned outside the public safety function alone to health and environment.

By 1992, a program of grants to state governments by EPA was beginning to bear fruit in innovative efforts by State Emergency Response Commissions and other state environmental and emergency management agencies to provide technical support to LEPCs in data management, planning and in some cases public outreach. During the years since Title III's enactment, a few of the states that passed legislation requiring industry to pay reporting fees also made portions of those funds available to LEPCs as either operating grants or for technical assistance.

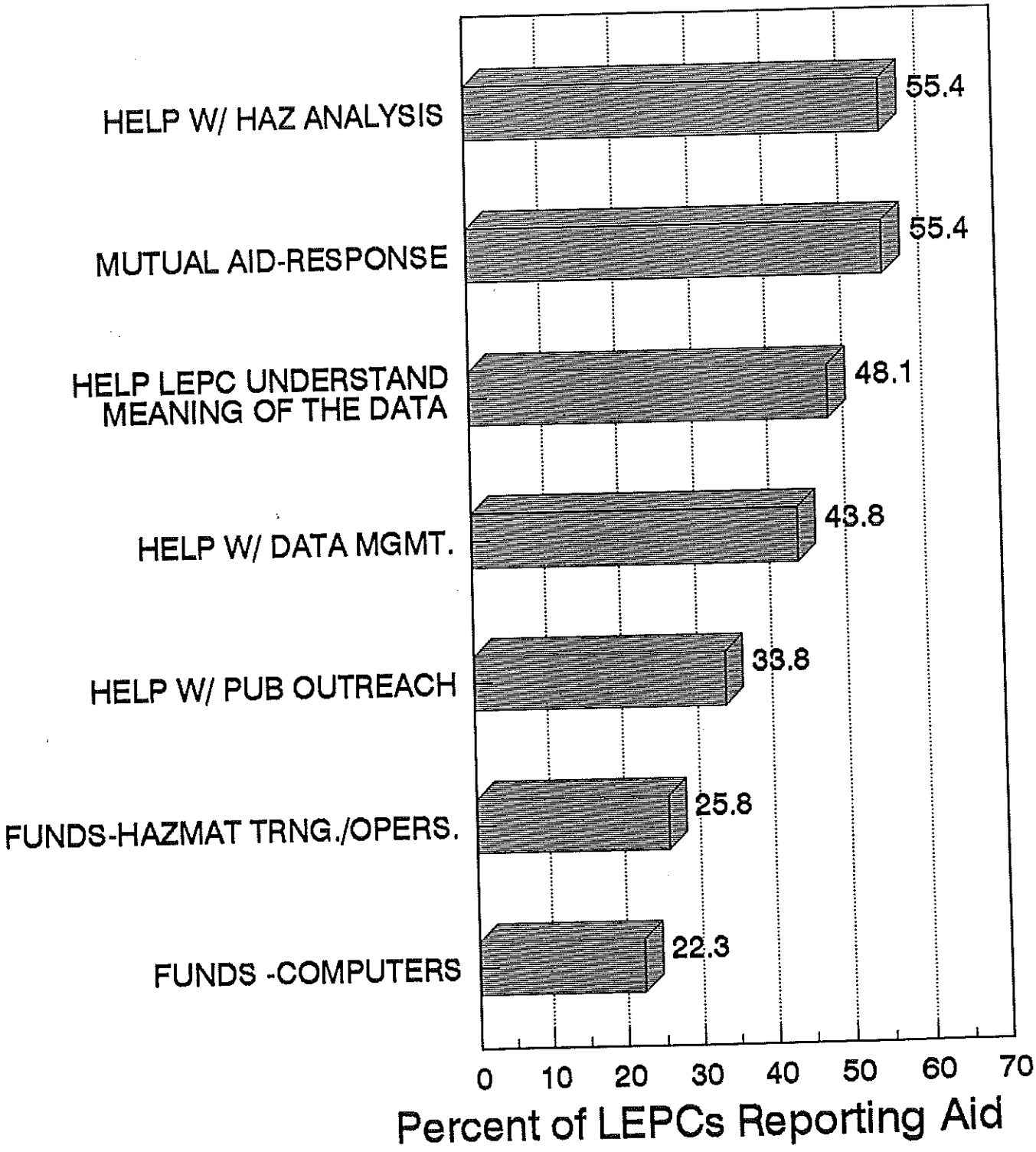
Finally, private industry continued to provide assistance directly to LEPCs through programs such as CAER, which had begun even prior to enactment of Title III as discussed earlier. Thus the scope and impact of assistance to LEPCs from all sources was significantly broader by 1992 than it had been even a few years before. Yet no comparative analysis has been done of how that aid has been distributed to LEPCs nor the relationship of aid to LEPCs' discretionary and voluntary role as proponents of risk reduction.

Industry Aid:

Data on seven types of industry aid was collected in the 1992 sample. (See Figure 7). Analysis also showed that the incidence of industry aid was significantly higher in the more metropolitan

FIGURE 7

INDUSTRY AID TO LEPCs
Frequency By Type of Aid



longitudinal sample than in the more nationally representative random sample for five out of the seven types of aid. Those differences are noted here.

The two most frequent types of industry aid to LEPCs were both related to the core emergency response functions of LEPCs and the focus of Title III requirements for industrial facility responsibilities. (Figure 7). Industry was reported to be providing LEPCs with help in conducting hazard analysis in 55.4 percent of the cases and help through mutual aid agreements to share euipment and personnel in emergency response in 55.4 percent of the cases. However, 62 percent of the LEPCs in the longitudinal (more metro) sample reported industry aid with hazard analysis, while only 48 percent did in the random sample ($p < .05$). Similarly, 62 percent of the longitudinal sample reported industry participation in mutual aid response agreements, while 48 percent did in the random sample ($p < .05$).

Almost as frequent as industry aid with core emergency management functions was industry assistance in helping LEPC members interpret the meaning of right-to-know data reported by facilities, in terms of toxicity, reaction characteristics, health effects or storage practices. That wholly voluntaristic type of assistance was reported by almost half (48.1 percent) of the overall sample. In this particuoar case, there was no significant difference between the sub-samples of LEPCs. Almost as many LEPCs (43.8 percent) reported industry aid with data management of right-to-know

information, again with no significant differnces between the longitudinal and random samples.

One-third of the LEPCs reported that industry personnel helped assist them with citizen outreachand education about right-to-know information. In this case there was a large difference beteen samples. While only 21 percent of the random sample reported such aid, 45 percent of the longitudinal sample received help with public outreach ($p < .001$). Finally, the two least frequent types of industry aid to LEPCs were those involving direct funding for hazmat response training (25.8 percent) and computer equipment for data mamagement (22.3 percent). However, funding or donations of compauter equipment were more frequent for the longitudinal sample (28 percent) than the random sample (16 percent; $p < .05$). The difference was even greater for funding of hazmat response training, with 38 percent of the longitudinal sample reporting such aid versus only 12 percent of the more non-metropolitan, small city random sample ($p < .001$).

What is noteworthy of this unique profile of voluntary industry assistance is that there is so much of it. That is especially true when we identify the significantly higher incidence of industry aid in larger LEPC districts of the longitudinal sample, which also have five times as many reporting facilities on average. Industry aid is also clearly not limited only to traditional assistance with emergency response tasks (in which industry self-interest is obvious given the culpability they face in catastrophic accidents). The

LEPCs report significant industry assistance that can contribute to LEPCs better meeting their right-to-know responsibilities to citizens.

But one significant question that has existed is whether or not such close industry aid to LEPCs involves capture of the program and constraint on LEPCs' willingness to meet their responsibilities to the public. One means to examine that issue is to look at the relationship between levels of industry aid and LEPCs' efforts to undertake active public outreach and hazard communication. Figure 8 shows the relationship between the average number of outreach activities reported by LEPCs (as listed in Figure 6 earlier) and the average number of different types of industry aid that the LEPCs are receiving (as just described). Unquestionably, industry aid is associated very strongly <u>on average</u> with more proactive LEPC efforts to undertake risk commmunication/outreach.

State Government Aid:

The LEPCs were asked to rate the priorities they place on receiving thirteen different types of assistance from SERCs and other state agencies. (Figure 9). Local government demands for funding of Title III responsibilities received the highest and most distinctive priority, with a mean priority of 4.67 on a five-point scale. The second-highest rated priority, however, had more to do with receiving guidance from states about requirements of federal and state laws than receiving hard resources. The priority for more

FIGURE 8

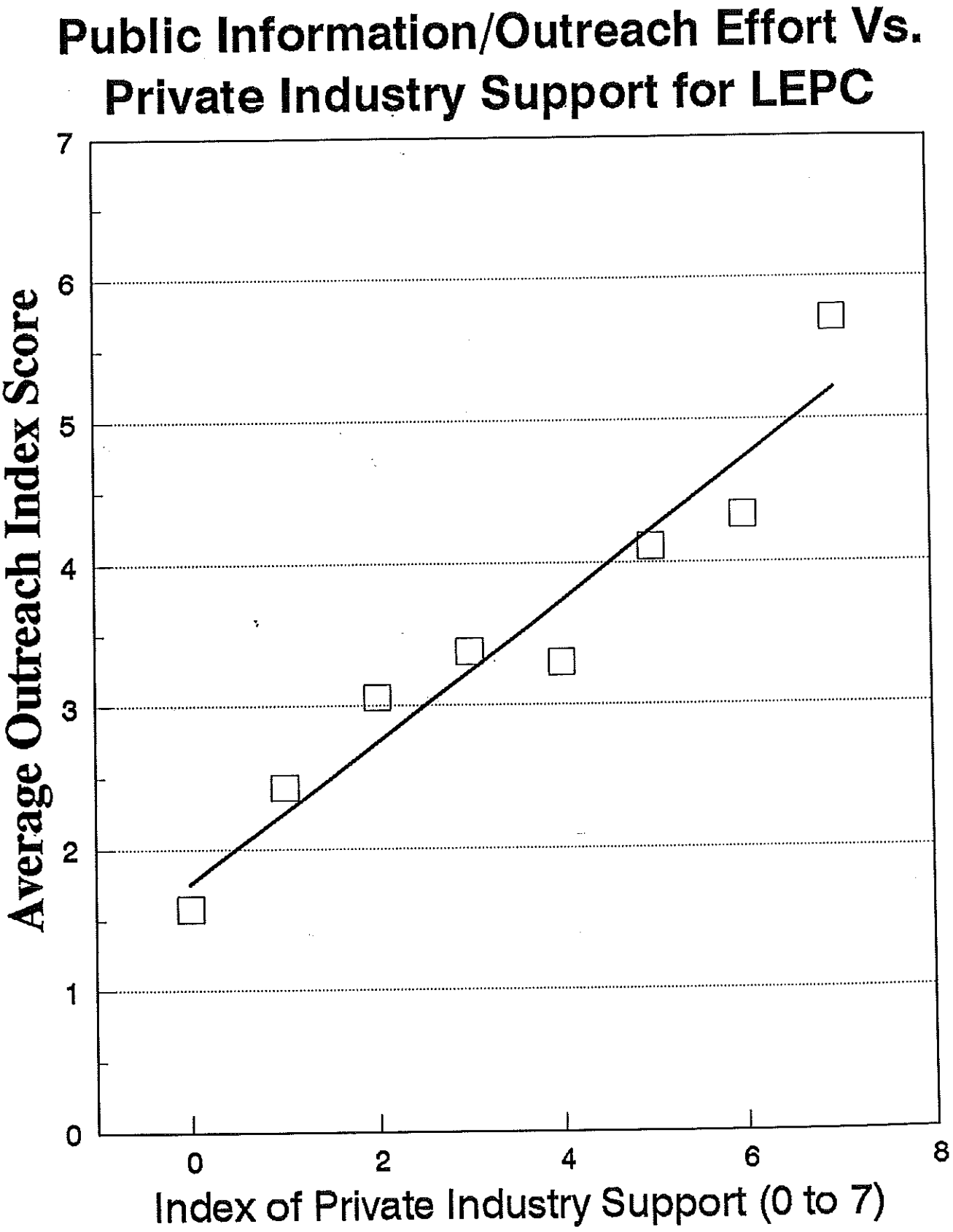

Public Information/Outreach Effort Vs.
Private Industry Support for LEPC
Average Outreach Index Score
0
1
2
3
4
5
6
7
0
2
4
6
8
Index of Private Industry Support (0 to 7)

FIGURE 9: LEPC ratings of priorities for state government assistance

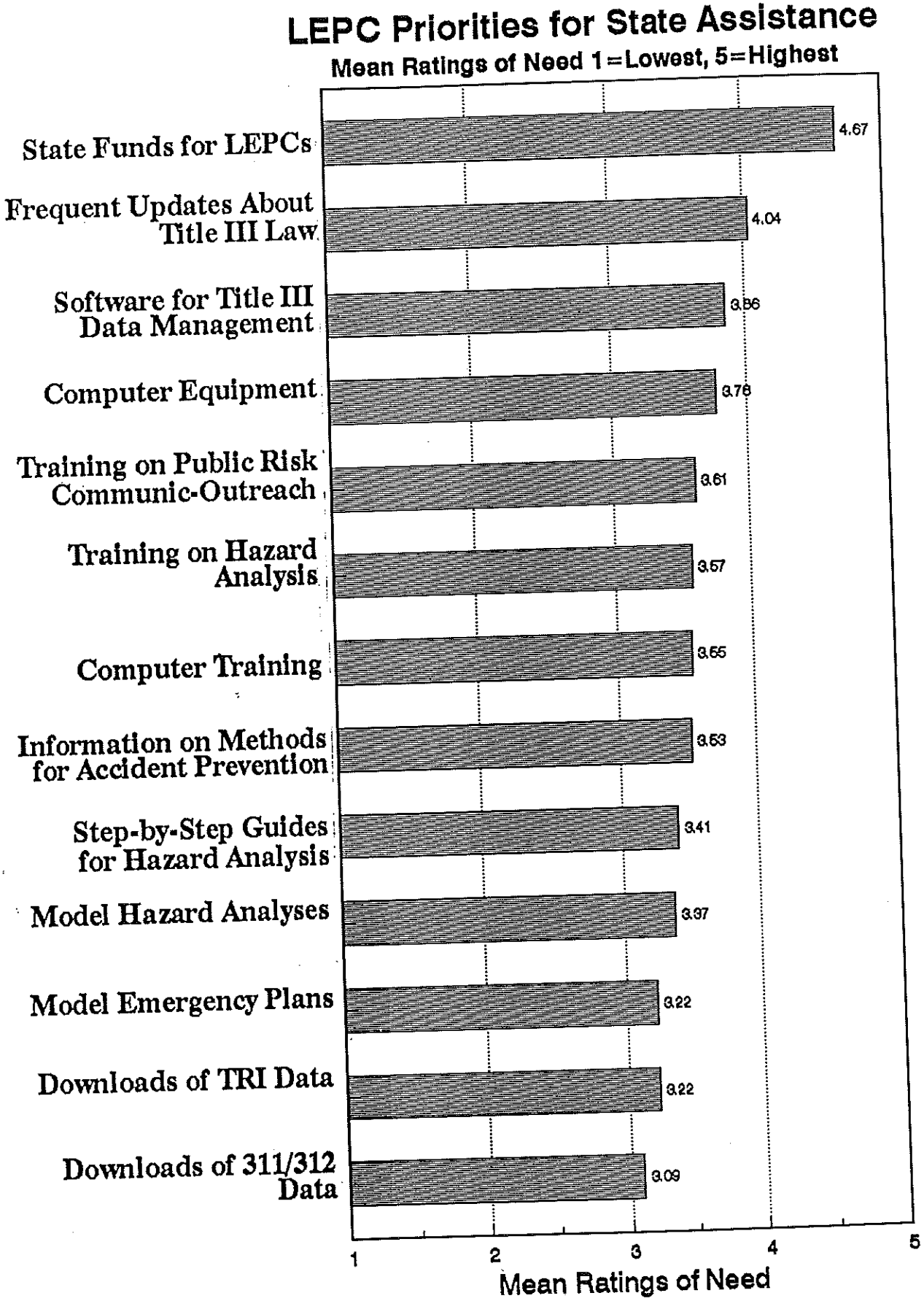
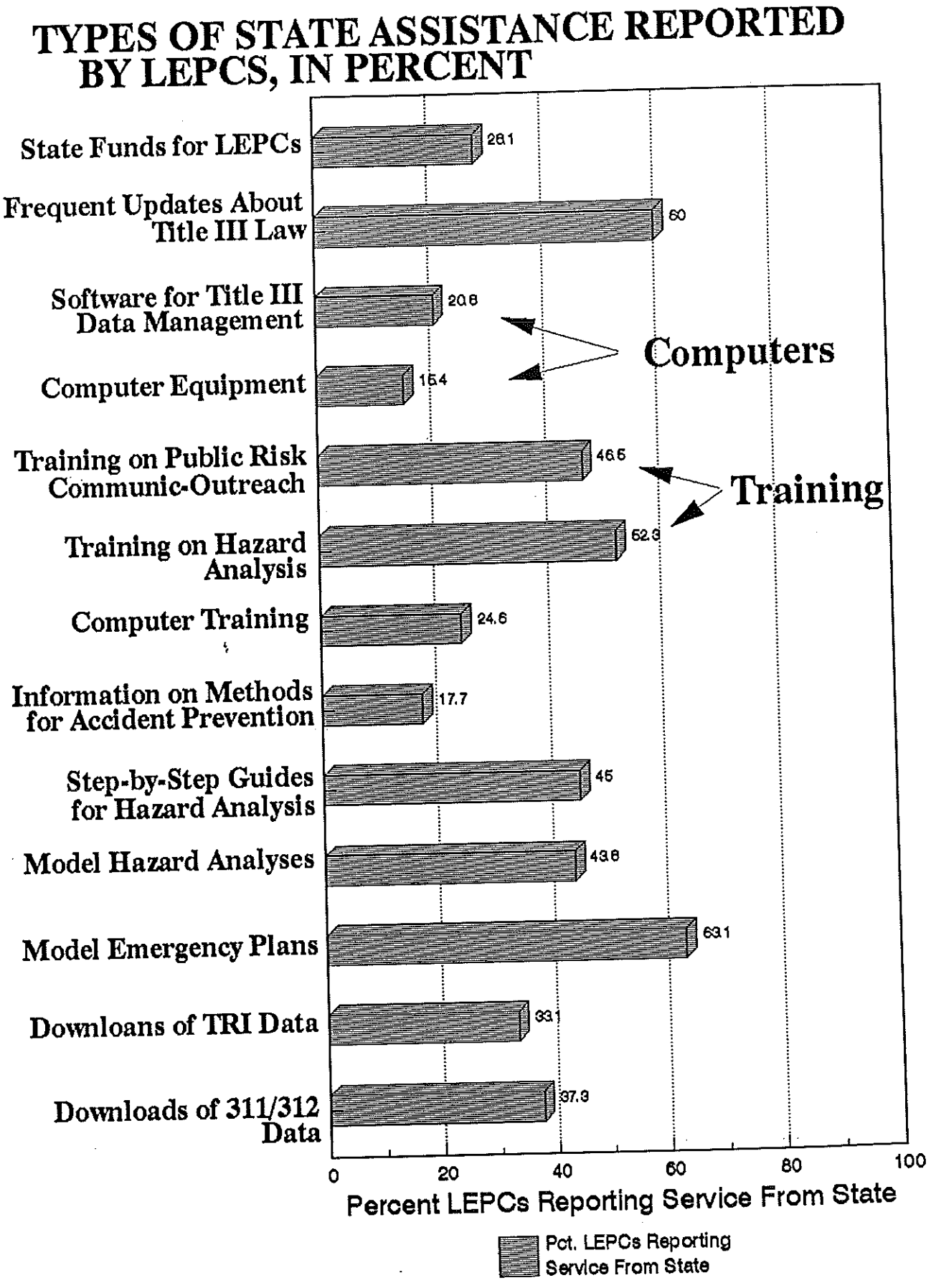


FIGURE 10: Actual state government assistance reported by LEPCs



frequent updates about Title III and other statutes was rated at 4.04 on average. (Figure 9). Most of the remaining 11 items were not rated much lower than that. The picture is one of LEPCs that see priority needs in most all areas.

Even given the relatively close numerical ratings of priority for state assistance, some patterns do emerge in the relative rankings of different types of assistance, however. Higher prioroty tends to be placed on more aid for LEPC data management responsibilities and for training (rather than handbooks or models) related to risk communication, hazard analysis, and computer-based data management of right-to-know information.

LEPCs were also asked which types of assistance they are already receiving from their respective state governments. (See Figure 10). Several patterns stand out. The most important is perhaps that LEPCs are not receiving as much state assistance with computer data management as they believe is needed. That is significant because a major federal effort was undertaken to develop the CAMEO software for local government use and foster its utilization. The need for that effort to continue is apparent. Another point is that relatively more LEPCs (but still only half or less) are already receiving training in two high priority areas: risk communication and hazard analysis. Current programs supporting both those training needs still need to penetrate more than half of the population of LEPCs, as estimated by this survey. Finally, although almost two-thirds of the LEPCs report receiving assistance

Table 11

LEPC PROMOTION OF HAZARD REDUCTION/ACCIDENT PREVENTION

	LEPCs That Discussed Action	LEPCs That Acted
PUBLIC SECTOR-ORIENTED ACTIONS:		
Provide public access to/analyze TRI (Section 313) data	83.8%	25.4%
Create a local zoning ordinance to regulate some industrial use of toxics near resiential areas	68.1%	4.6%
Comment of proposed local land use plans and zoning concerning chemical safety and protection issues	67.3%	9.6%
Ask local/state agencies to re-route hazardous traffic away from vulnerable populations	72.7%	10.0%
Comment to local plan commissions on proposed industrial zone changes or land use permits	62.7%	6.9%
PRIVATE SECTOR-ORIENTED ACTIONS:		
Use 303(d(3)) authority to get more detailed information from private facilities for planning and hazard analysis	90.4%	49.2%
Set up meetings with facilities to discuss safety	84.6%	40.4%
Ask facilities to use accident prevention methods, e.g., reduce volumes onsite, better housekeeping	70.8%	11.9%
Pursue "good neighbor" agreements or other negotiations on safety with facilities	67.7%	12.7%
Provide to facilities written materials that describe specific accident prevention methods	71.9%	24.6%
Ask facilities to reduce use of toxic substances	67.7%	6.9%

with model emergency plans, that is a relatively lower priority for future state technical and resource assistance.

In sum, the assistance being provided to LEPCs by both the private sector and their states has become diverse and detailed. But it has been mixed in terms of coverage of all LEPCs.

LEPC Roles in Hazard Reduction/Accident Prevention

LEPCs have continued, on a mixed basis, to undertake risk communication or public outreach that goes beyond the minimal requirements of Title III, and private industry has continued to provide, to some LEPCs , assistance with that voluntary but expected task. Have LEPCs expanded their involvement as proactive proponents of action on reducing the risks? In the 1992 survey, LEPCs were asked to report on eleven types of actions related to encouraging risk reduction. As in 1989, some of the actions are those that can be undertaken by the public sector, and other actions are those that request induistrial facilities to undertake actions in the private sector.

Table 11 shows the percentages of LEPCs that acted on or discussed each of those eleven prototypical actions. Some items are again categorized as public sector-oriented because they describe actions that the LEPC can take itself or ask local or state government to take. The other items are defined as private sector-oriented because they all involve the LEPC seeking industrial

facility cooperation with an aspect of risk reduction that requires private sector action.

What is apparent from Table 11 is that very high percentages of all LEPCs are concerned enough about long-term hazard reduction/accident prevention to have discussed all of the actions that were included here. Even in the case of more extreme and still rare local government regulatory actions like creating new zoning provisions that restrict location of new or expanded toxics-using industrial land uses, two-thirds (68.1 percent) of the LEPCs claim to have discussed supporting such an action. Only 4.6 percent of the LEPCs report actively pursuing such local government "toxics zoning," however.

The four most frequently acted-upon hazard reduction activities are informational in nature: using Title III's Section 303(d) authority to request more detailed information from facilities on toxic substances locations and handling (49.2%); simply meeting with facilities to discuss safety (40.4%); giving facilities specific written examples of accident prevention actions they cvan take (24.6%); and providing the public with better access to Toxic Release Inventory (TRI) data, which is often a stimulus to negotiations about voluntary risk reduction, but not required to be disseminated by LEPCs (25.4%).

Surprisingly, very few LEPCs had taken the step of becoming a source of information for planning commissions making decisions

about long-range land use regulation (9.6%) or specific land use changes under zoning permits (6.9%). Yet over two-thirds of the LEPCs report having discussed assuming such a role in promoting risk reduction through preventing location of hazards near vulnerable populations. The idea that Local Emergency Planning Commissions can play a role in the more day-to-day, mainstream functional planning of communities remains visible but rarely carried out. Indeed, in the one state (Pennsylvania) whose proposed Title III-implemnettaion legislation included a direct endorsement for LEPCs to work with local planning bodies, the provision was hotly debated by opponents. In Nevada the blue-ribbon commission that was convened after a major accident (the Henderson Commission) proposed new authority to adopt toxics zoning, but the legislation was tabled.

The problem appears to be as much that LEPCs remain disconnected from policy-making and decision-making processes at the local level as it is the controversial nature of becoming advocates for regulatory action. For example, although almost three-quarters of the LEPCs have discussed asking for re-routings of dangerous traffic to reduce risk due to vulnerable populations, only 10% report having acted. Yet that action is far less intrusive on private activity than new zoning and land use regulation.

LEPC action to promote private sector changes is much more frequent for information-based activities, including: using Title III's Section 303(d) authority to request additional information from facilities (49.2 percent); meeting with facilities to discuss

safety (40.4 percent); and providing facilities with examples of good practices for accident prevention (24.6 percent). The more intrusive type of LEPC action--to promote specific private sector changes--is, however, not any more frequent than action to promote public sector changes, as shown in Table 12.

Only 12.7 percent of the LEPCs have pursued "good neighbor" agreements with facilities; 11.9 percent have directly asked facilities to use accident prevention techniques (e.g., reduced volumes of toxics on-site through just-in-time inventories; improved maintenance). About 7 percent have asked faciltiies to reduce their use of toxics. Nevertheless, each of those actions to promote hazard reduction has been discussed by at least two-thirds of the LEPCs reporting in 1992. Interest in hazard reduction is consistent although action has been limited.

The LEPCs would not be expected to pursue every hazard reduction strategy listed in Table 12 because local conditions vary. Another way to look at these data is in terms of how many LEPCs have undertaken at least one hazard reduction action from among those covered here. Thirty-nine (39) percent of the LEPCs reported having taken action on at least one of the public hazard reduction items they were asked about. The much higher number of LEPCs, 67 percent, that reported at least one effort to pursue private hazard reduction with facilities reflects the higher percentages of LEPCs that undertook the information-related strategies (collecting additional data from facilities, distributing recommendations on accident

Table 12

CITIZEN INTEREST/PRESSURE FOR HAZARD REDUCTION EFFORTS

	Percent of LEPCs That Report Citizen Proposals for Action
PUBLIC SECTOR-ORIENTED ACTIONS:	
Provide public access to/analyze TRI (Section 313) data	16.2 %
Create a local zoning ordinance to regulate some industrial use of toxics near residential areas	11.5%
Comment on proposed local land use plans and zoning concerning chemical safety and protection issues	19.2%
Ask local/state agencies to re-route hazardous traffic away from vulnerable populations	20.8%
Comment to local plan commissions on proposed industrial zone changes or land use permits	19.2%
PRIVATE SECTOR-ORIENTED ACTIONS:	
Use 303(d(3)) authority to get more detailed information from private facilities for planning and hazard analysis	27.3%
Set up meetings with facilities to discuss safety	23.8%
Ask facilities to use accident prevention methods, e.g., reduce volumes onsite, better housekeeping	22.3%
Pursue "good neighbor" agreements or other negotiations on safety with facilities	15.4%
Provide to facilities written materials that describe specific accident prevention methods	17.7%
Ask facilities to reduce use of toxic substances	16.9%

prevention to facilities, and meeting with facilities to discuss safety).

Did LEPCs' efforts to promote long-term hazard reduction reflect pressure or interest from citizens within their areas? Is a lack of public interest a reason for limited action by LEPCs to push for specific risk-reducing measures? Table 12 lists the percentages of LEPCs that reported ever being asked by community, environmental, or neighborhood groups to discuss, endorse, or act on each of the strategies for hazard reduction discussed in Table 11.

On the one hand, it is immediately apparent that LEPCs have been far more proactive in pursuing informational strategies with private facilities than would be predicted by the amount of citizen interest alone. For example, while 27.3 percent of the LEPCs reported citizen interest in having the LEPC pursue additional information from private facilities under Section 303(d), almost half (49.2 percent) took that action.

On the other hand, LEPCs took action on specific hazard reduction measures, particuoarly those in the public sector, less often than citizen interest would predict. For example, while 20.8 percent of the LEPCs had citizen groups requesting that the LEPC advocate risk-reducing changes in truck transportation routes, only about 10 percent of the LEPCs took such action. Similarly, 19.2 percent of the LEPCs had citizen groups request that the LEPC make comments on the risk-related aspects of local land use permit

decisions, but only 6.9% of the LEPCs report having done so.

It must be cautioned that these data on citizen requests to LEPCs do not identify the intensity of such interest nor the relative merits of requests from one community to another. In some cases, for example, it may have been inappropriate for an LEPC to comment on a local land use permit.

Nonetheless, an interesting pattern exists. LEPCs have pursued creating dialogue with indistrial facilities about safety and improving information about facility use of toxics, beyond citizen interest. That of course makes sense in that LEPCs would need to be proactive about those strategies to adequately prepare for emergency response during accidental releases, and especially to protect public safety personnel. The LEPCs in general are less involved in becoming advocates for changes in local policy and changes in facility practices, such as toxics use reduction, than citizens might like them to be. In sum, LEPCs continue to discuss a wide variety of risk-reducing actions they might take, with or without citizen demands to do so. However, LEPCs are more cautious in taking action that would create local government policy precedents or intrude directly on industry production practices (as opposed to industry accident reduction and emergency response matters).

Explaining LEPC Action on Hazard Reduction:

In 1989, some aspects of public involvement in LEPCs (i.e.,

neighborhood groups) and industry involvement and resource assistance (i.e., through CAER programs) were important positive factors in explaining why some LEPCs recommended taking hazard reduction actions. LEPC outreach efforts to meet with and explain right-to-know data to citizens were also a significant positive factor, as was LEPCs' efforts to analyze right-to-know data themselves.

Tables 13 and 14 repeat the bivariate analyses of those relationships between influences and actions, this time using data from the broader 1992 survey. In Table 13, the percentages shown are the number of LEPCs that took at least one public hazard reduction action as discussed earlier, with and without the characteristic listyed in the left hand column. Thus in Table 13, 45.4 percent of the LEPCs that had an industry CAER program in their district also reported they took action on at least public hazard reduction item. But 36,6 percent of the LEPCs without a CAER program in their district also took at least one public hazard reduction action, and the proportions, although higher in the case with a CAER program, are not statistically different than what could be expected from random variation. Similarly, Table 14 repeats the same analyses of different characteristics of LEPCs' programs and the percentages of LEPCs taking at least one private sector-oriented hazard reduction action.

Some of the characteristics are slightly different from those presented earlier in the 1989 study. Neighborhood group members of

Table 13

BIVARIATE EFFECTS OF PLANNING PROCESS CHARACTERISTICS ON LEPC ACTION ON PUBLIC HAZARD REDUCTION

Characteristics:	Percent of LEPCs That Acted on One or More of the Public Hazard Reduction Actions	
	With Characteristic	Without Characteristic
CAER program in LEPC district	45.4%	36.6%
Local environmental groups are LEPC members	43.4%	36.0%
Neighborhood groups organized by other local government programs are LEPC members	54.8%	37.1% #
Unsponsored neighborhood groups are LEPC members	50.0%	37.7%
Individual citizens are LEPC members	47.7%	30.1% **
Union/labor groups are LEPC members	42.8%	38.9%
Right-to-know data was explained to LEPC members by industry volunteers	50.0%	33.7% *
Right-to-know data was explained to LEPC members by any volunteer experts	54.0%	31.8% ***
LEPC provides volunteers to speak to community groups about how to understand right-to-know data	48.9%	33.3% *
Emergency plan has been updated since initial plan	41.8%	26.6% #
Risk areas mapped around some or all facilities (site-specific hazard analysis)	42.3%	30.9% #

Differences are significant at .10 level; * at .05 level; ** at .01; *** at .001 level.

Table 14

BIVARIATE EFFECTS OF PLANNING PROCESS CHARACTERISTICS ON LEPC ACTION ON PRIVATE HAZARD REDUCTION

	Percent of LEPCs That Acted on One or More of the Private Hazard Reduction Actions	
Characteristics:	With Characteristic	Without Characteristic
CAER program in LEPC district	84.4%	59.5% ***
Local environmental groups are LEPC members	75.2%	60.5% *
Neighborhood groups organized by other local government programs are LEPC members	77.4%	65.5%
Unsponsored neighborhood groups are LEPC members	71.9%	66.2%
Individual citizens are LEPC members	71.6%	61.9% #
Union/labor groups are LEPC members	90.5%	64.9% **
Right-to-know data was explained to LEPC members by industry volunteers	84.1%	58.1% ***
Right-to-know data was explained to LEPC members by any volunteer experts	82.7%	58.9% ***
LEPC provides volunteers to speak to community groups about how to understand right-to-know data	85.7%	55.6% ***
Emergency plan has been updated since initial plan	71.6%	44.4% ***
Risk Areas Mapped Around Some or All Facilities (Site-Specific Hazard Analysis)	75.1%	45.1% ***

Differences are signififcant at .10 level; * at .05 level; ** at .01 level; *** at .001 level

LEPCs are classified as either those groups sponsored by other local government programs (e.g., Crime Watch or neighborhood planning groups) or as unsponsored groups. A new measure of individual citizen membership on LEPCs is added. National environmental group membership on LEPCs was not measured in 1992, only local environmental groups. Volunteer experts to speak with citizen groups about right-to-know data have been broken into those cases where volunteers come from industry versus those cases where any source of volunteer experts has been used. The item on whether an initial emergency plan had been submitted to the SERC in 1989 has been replaced with the question about whether the plan has been updated at least once. Finally, one additional public hazard communication method not included in 1989 is shown in Tables 13 and 14. That is mapping of vulnerable areas around at least some or all facilities.

Consistent with the 1989 survey, the results in Table 14 show that neither having a CAER program sponsored by local private facilities, nor having local environmental groups as LEPC members, made significant differences as far as support by LEPCs for public hazard reduction actions. Only somewhat consistent with 1989, local neighborhood group membership on LEPCs made a significant positive difference in the case of neighborhood groups tied to other local government programs, but membership by ad hoc neighborhood groups made no difference. The positive effect of sponsored neighborhood groups is less significant in statistical terms in 1992 than in 1989 however.

Surprisingly, membership by individual citizens not affiliated with government or industry made a much larger and significant difference (47.7 versus 30.1 percent). Once again, all hazard communication activities in the planning and outreach process were associated with signifcantly higher percentages of LEPCs acting ot promote public sector hazard reduction policies. LEPCs that have updated their emergency plans are also slightly more likely to have taken action to promote public sector hazard reduction (41.8 versus 26.6 percent) although the difference is statistically significant only at the .10 level.

Turning to Table 14, having a CAER program in the LEPC district made a large and significant difference in the likelihood that LEPCs have promoted private sector action on hazard reduction (84.4 versus 59.5 percent). When local environmental groups or individual citizens as members of LEPCs, the percentage of LEPCs taking action on private hazard reduction is somewhat higher in both cases, but not as dramatically or significantly as in the case of having a CAER program sponsored by industry. Consistently, LEPCs that undertook hazard communication and outreach efforts with citizens or with their own LEPC members are significantly more likely to be actively promoting private sector hazard reduction. The difference is between 25 and 30 percentage points in every case. Finally, the LEPCs that have updated their emergency plans at least once are significantly more active in pursuing one or more private sector hazard reduction strategies.

These results of item-by-item analysis must be qualified and put in the context of other factors, such as differences in local economic conditions and local government capacity, and characteristics of local risk such as recent accidents and numbers of facilities in the LEPC district. For example, public participation on LEPCs, which stimulates LEPC action on hazard reduction, may only be occuring in relatively wealthier and less racially diverse areas. In that case, what is important about the causes of LEPC action is that it results from pre-existing differences in wealth and political culture, not from participatory activities of the LEPC. Such a result would, again, raise questions about whether the Title III approach to voluntary hazard reduction truly gives both poorer and wealthier communities equal opportunities to effect change at the local level.

Logistic regression analyses were done for both LEPC action on public hazard reduction and private hazard reduction respectively. (See Tables 16 and 17). A dichotomous dependent variable is used in each case. For example, if the LEPC reported action on any of the public hazard reduction items, the dependent variable was set to one. Otherwise it was set to zero. The same coding was done for the private hazard reduction items. In each case, the first analysis only predicts LEPC action on public or private hazard reduction on the basis of context factors. Those context factors include recent (1987-92) accidental releases of toxics from rail/truck accidents or facility accidents; significant

Table 15

Definition and Coding of Context and Planning Process Variables

Variables:	Source and Coding:
Rail or Truck Toxic Release, 1987-92	1992 Survey, 0/1
Facility Toxic Release, 1987-92	1992 Survey, 0/1
Soil/Water Contamination From Release That Required Public Health Warning	1992 Survey, 0/1
Number of Reporting Facilities, 1992	1992 Survey, No. of facilities
1990 Population	1990 Decennial Census
1980-90 Population Rate of Change (%)	1990 Decennial Census
1989 Percent Employment in Manufacturing	1989 County Business Patterns
1987 Unemployment Rate in Percent	County and City Data Book, 1988, U.S. Bureau of Census
Per Capita Income, 1988	Local Population Estimates, 1987-8, Current Population Reports, U.S.Bureau of Census
Non-White Population, Percent	1990 Decennial Census
CAER Program in LEPC District	1992 Survey, 0/1; Includes both cases where CAER sponsor industries were LEPC members where they were not members
Neighborhood Group Members of LEPC	1992 Survey, 0/1; Includes both publicly-sponsored and ad hoc groups
Labor Union Members of LEPC	1992 Survey, 0/1
Local Environmental Group Members of LEPC	1992 Survey, 0/1
Individual Citizens Members of LEPC	1992 Survey, 0/1; Individual citizens not affiliated with environmental or neighborhood groups

Table 15 (Continued)

Definition and Coding of Context and Planning Process Variables

Index of Number of Public Agencies Supporting LEPC as Members/Resource	1992 Survey, index ranges from 0 to 45; each of 15 agencies coded as 2 if a member of LEPC, 1 if a resource, 0 if uninvolved
Public Hazard Communication Effort by LEPC, Index	1992 Survey, index ranges from 0 to 9; number of outreach methods used
Updates of Emergency Plan by LEPC	1992 Survey, scale 0 to 2; Coded 0 if never updated; 1 if updated once; 2 if updated annually
Mapping of Hazard Vulnerability by LEPC	1992 Survey, scale 0 to 2; Coded 0 if no area mapped; 1 if some major facilities mapped; 2 if most major facilities mapped
Extent of Site-Level Emergency Planing	1992 Survey, scale 0 to 2; Coded 0 if no site plans; 1 if plans for some major facilities; 2 if site plans for most major facilities
Index of Industry Assistance to LEPC	1992 Survey, index ranges from 0 to 7 based on total number of types of industry aid to LEPC
Index of State SERC Assistance to LEPC	1992 Survey, index ranges from 0 to 13 based on total number of types of state government aid to LEPC

contaminations of soil or water from accidental releases that required public health warnings; the number of reporting facilities in the LEPC district; and a series of demographic measures of the LEPC district's size and growth, average wealth in per capita income, dependence on manufacturing, unemployment, and racial minority population. (See Table 15 for variable definitions).

The second analysis, in Tables 16 and 17 respectively, include all the measures of the LEPC planning process discussed earlier. Those include participation by community, industry, and labor interests, the LEPC's performance in completing three types of planning tasks (plan updates, hazard mapping and site-level emergency plans), the LEPC's effort to communicate hazard information to the public, and three measures of resources available to the LEPC (i.e., from local public agency participation, voluntary industry contributions and state government agency technical and resource assistance programs).

In the analysis of how existing conditions may have influenced LEPC action on public hazard reduction (see model 1 in Table 16), only recent accidental releases of toxics from transportation accidents are significantly related. The relationship is also quite weak ($p < .10$). (Note that the signs of coefficients have been reversed in all logistic regressions to clarify interpretation of results). In the full analysis, including all measures of participation, resources, and adequacy in the planning process, two factors have significant and unique positive effects on support for

Table 16
Logistic Regression Analysis: Predictors of
LEPC Action on Public Hazard Reduction

Predictors:	Model 1 Context for Action Only	Model 2 Context and Planning Process
Rail or Truck Toxic Release, 1987-92	.140 #	.111
Facility Toxic Release, 1987-92	.119	.106
Soil/Water Contamination From Release	.079	.025
Number of Reporting Facilities, 1992	.152	.087
1990 Population	-.093	-.082
1980-90 Population Rate of Change (%)	.077	.141
1990 Percent Employment in Manufacturing	-.085	-.066
1990 Unemployment Rate in Percent	.032	.049
Per Capita Income, 1989	.007	.027
Non-White Population, Percent	.027	-.022
CAER Program in LEPC District		-.120
Neighborhood Group Members of LEPC		.023
Labor Union Members of LEPC		-.020
Local Environmental Group Members of LEPC		-.109
Individual Citizens Members of LEPC		.207 *
Index of Number of Public Agencies Supporting the LEPC as Members or Resource		.054
Public Hazard Communication Effort by LEPC		.270 *
Updates of Emergency Plan by LEPC		.055
Mapping of Hazard Vulnerability by LEPC		.086
Extent of Site-Level Emergency Planing		.084
Index of Industry Assistance to LEPC		.068
Index of State SERC Assistance to LEPC		-.027

(#: $p < .10$ *: $p < .05$); Full model Chi Square=47.27 with 22 DF ($p < .01$)

Table 17
Logistic Regression Analysis: Predictors of
LEPC Action on Private Hazard Reduction

Predictors:	Model 1 Context for Action Only	Model 2 Context and Planning Process
Rail or Truck Toxic Release, 1987-92	.142	.082
Facility Toxic Release, 1987-92	.062	.020
Soil/Water Contamination From Release	.275 **	.207 #
Number of Reporting Facilities, 1992	.150	.015
1990 Population	-.047	-.082
1980-90 Population Rate of Change (%)	-.152 #	.055
1990 Percent Employment in Manufacturing	.187 *	.245 *
1990 Unemployment Rate in Percent	-.143	-.279 *
Per Capita Income, 1989	.027	.047
Non-White Population, Percent	.287 **	-.248 *
CAER Program in LEPC District		-.006
Neighborhood Group Members of LEPC		-.015
Labor Union Members of LEPC		.189
Local Environmental Group Members of LEPC		-.027
Individual Citizens Members of LEPC		.051
Index of Number of Public Agencies Supporting the LEPC as Members or Resource		.122
Public Hazard Communication Effort by LEPC		.416 **
Updates of Emergency Plan by LEPC		.089
Mapping of Hazard Vulnerability by LEPC		-.020
Extent of Site-Level Emergency Planing		.137
Index of Industry Assistance to LEPC		.261 *
Index of State SERC Assistance to LEPC		.157

(# $p < .10$; * $p < .05$; ** $P < .01$; Chi square 86.74 with 22 DF ($p < .001$)

Table 18
Logistic Regression Analysis: Effects of Participation on LEPC Action on Private Hazard Reduction

Predictors:	Model 1 Participation Factors Only	Model 2 Participation and Context
Rail or Truck Toxic Release, 1987-92		.082
Facility Toxic Release, 1987-92		.020
Soil/Water Contamination From Release		.207 #
Number of Reporting Facilities, 1992		.015
1990 Population		-.082
1980-90 Population Rate of Change (%)		.055
1990 Percent Employment in Manufacturing		.245 *
1990 Unemployment Rate in Percent		-.279 *
Per Capita Income, 1989		.047
Non-White Population, Percent		-.248 *
CAER Program in LEPC District	.272 **	-.006
Neighborhood Group Members of LEPC	.000	-.015
Labor Union Members of LEPC	.205 #	.189
Local Environmental Group Members of LEPC	.089	-.027
Individual Citizens Members of LEPC	.092	.051
Index of Number of Public Agencies Supporting the LEPC as Members or Resource	.215 *	.122
Public Hazard Communication Effort by LEPC		.416 **
Updates of Emergency Plan by LEPC		.089
Mapping of Hazard Vulnerability by LEPC		-.020
Extent of Site-Level Emergency Planing		.137
Index of Industry Assistance to LEPC		.261 *
Index of State SERC Assistance to LEPC		.157

(# $p < .10$; * $p < .05$; ** $P < .01$; Chi square 86.74 with 22 DF ($p < .001$)

public hazard reduction. The strongest positive effect is the extent to which the LEPC is using multiple methods to communicate right-to-know information to the public (standardized coefficient of .27, $p < .05$). The second psoitive effect is the presence of individual citizen members representing the public on the LEPC (standardized coefficient of .207, $p < .05$).

The analysis of effects on LEPC support for private hazard reduction produced quite different results (Table 17). In the first model that only includes context factors (pre-existing conditions), three factors have significant positive effects. The three positive factors are higher percentages of non-white population (coefficient = .287; $p < .01$); soil/water contamination from accidental toxic releases that required a public health warning (coefficient=.275; $p < .01$), and percent of employment in manufacturing (coefficient= .187; $p < .01$).

That result is notable because it suggests that LEPCs are more rather than less proactive in the types of areas that have benn believed to be sites of environmental racism. This result can, however, also be interpreted as showing that areas of high minority populations and risks are those where the needs are so intense that LEPCs have been forced to acknowledge and act on risk reduction issues with private industry. Those high need characteristics are a significant predictor of LEPC action on private hazard reduction even after controlling for the fact that some areas have higher concentrations of manufacturing in the local economic base (i.e.,

measured here as percent of employment in manufacturing).

Higher rates of recent population growth are also a significant negative factor in predicting LEPC action on private hazard reduction. Again, as in the 1989 analysis, those high growth rates are strongly related to sunbelt industrial states of Arizona and Texas. The population growth effect is weak however ($p < .10$). It should also be noted that there are other positive effects in the context-only model of private hazard reduction which are close to being statistically different from zero. Toxic releases from rail and truck accidents have a positive coefficient of .142 ($p = .124$) and this is additional evidence that recent impacts of toxic hazards do have important influence on LEPC efforts to address how industry can reduce risks. Similarly, higher unemployment rates are negatively related to LEPC action on private hazard reduction ($p= -.143$) and that effect, while statistically not significant, is of interest ($p = .17$). The number of reporting industrial facilities also has a positive coefficient of interest (.150). That coefficient of effect is not significantly different from a random or zero effect ($p = .226$), but it is also intercorrelated with other measures of industrial activity (i.e., percent manufacturing employment as well the three measures of recent toxic accidents). The number of reporting facilities is by itself a significant correlate of action on private hazard reduction by LEPCs, in the bivariate analyses presented earlier. The pattern of coefficients shows rather consistently that areas with greater risk factors (accidental releases in last five years, concentrations of industry)

are more likely to act on promoting industrial hazrd reduction.

The full model of LEPC action on private hazard reduction (Table 17) shows that as in the case of public hazard reduction, the most significant positive predictor is the LEPC's effort to communicate hazard information to the public (coefficient= .416; $p < .01$). The second largest positive predictor of LEPC action is the level of industry assistance to the LEPC (coefficient= .261; $p < .05$). That is a notable effect given that industry support and LEPC hazard communication efforts are highly correlated wth each other.

Percent of employment in manufacturing and minority population both remain significant positive predictors of LEPC action (Table 17). Recent soil/water contaminations from accidental releases also remain a somewhat significant positive factor in predicting LEPC action (coefficient= .207; $p < .10$). If there were no differences on the planning processes being undertaken by LEPCs, then areas with relatively greater need would be more likely to pursue risk reduction by facilities. Similarly, areas with higher historical unemployment rates would be significantly less likely to act (coefficient= -.279; $p < .05$). But the LEPCs with active risk communication programs and high levels of industry involvement in supporting the LEPC are much more likely to promote risk reduction efforts with industry. It is worth noting that labor union involvement as an LEPC member, while not a statistically significant positive effect, is nonetheless relatively large (coefficient= .189; $p = .13$).

Community group, environmental group, and individual citizen membership on LEPCs, however, have no discernible effects at all; nor does public agency participation have any effect. Finally, presence of a CAER program has no effect in the full model, although it is reasonable that the effect of industry action through a CAER program is washed out by the more precisely measured index of industry assistance to LEPCs.

To examine that interrelationship, LEPC action on private hazard reduction was estimated only with participation factors and then with all other variables added, in Table 18. When participation variables alone are included, both having a CAER program in the area (coefficient= .272; $p < .01$) and the number of local government agencies assistaing the LEPC (coefficient= .215; $p < .05$) are significantly and positively related to hazard reduction (Table 18). Labor union participation in the LEPC is also significantly, if weakly, related to hazard reduction (coefficient= .205; $p < .10$). When all other factors are entered (model 2 in Table 18), both CAER programs and local public agency participation become insignificant. That indicates that the effects of those two participatory factors are subsumed under industry contributions, measures of superior planning efforts (e.g., for hazard communication) and pre-existing determinants such as simply having more industry. In fact, the effect of having a CAER program drops to zero because that effect is predicted by the other factors.

Neighborhood group, environmental group and individual citizen membership on LEPCs has no relationship to the private hazard reduction variable, however, either with or without other factors included in the analysis. Finally, although the relative positive effect of labor union membership on LEPCs is reduced and is not significant in the full model in table 18, it does not disappear as greatly as the effect of having a CAER program does. That is some evidence that labor community support is a unique participatory factor in analyzing why LEPCs support pressing industry to reduce risks.

The overall predictive power of the two full models of LEPC action on public and private hazard reduction, respectively, can be assessed by looking at whether each LEPC would be classified by the model as an actor or non-actor if the estimated probability was greater or less than .50 (even-odds) in each case. In the case of the public hazard reduction analysis, the correct rate of classification is only 63 percent. The LEPCs that did act on public hazard reduction were predicted correctly at a slightly better rate (67 percent) than the LEPCs that did not act (52 percent). In the latter case, the analysis was not much better than a coin toss in predicting correctly the LEPCs that did not undertake public hazard reduction activities as defined in this study.

The prediction rate is much higher for the private hazard reduction variable. In this case, 73 percent of the action or non-action cses are predicted correctly. The prediction rate is

quite a bit higher for non-acting LEPCs (78 percent) than for acting LEPCs (60 percent). In other words, referring to the most significant predictors in the full model in Table 17, an LEPC that had no risk communication program and no industry involvement in assistaing the LEPC, as well as low industrial risk factors, is very unlikely to have undertaken efforts to promote private hazard reduction.

Comparison of 1989 and 1992 Survey Results:

Comparing these results to the 1989 survey shows both consistency and inconsistency. The most consistent and strongest result is that LEPC efforts to actively help the public become aware of and understand right-to-know data are strongly related to efforts to reduce long-term risks in both the public and private sectors. A second consistent result is that areas of high unemployment, all other factors held constant, are less likely to undertake activities that press industry to reduce hazards. At the same time, the 1992 survey also shows that it is the areas that have the relatively greater concentrations of industry and recent accidents are more likely to act on hazard reduction, after taking differences due to unemployment rates into account.

Results are less consistent on the issue of public participation in LEPCs. The strong effects of neighborhood group participation, particularly on the attention LEPCs give to public sector hazard reduction actions, are not replicated in 1992. That

may partly be due to more precise measurement, as individual citizen participation as LEPC members is strongly related to support for public sector hazard reduction actions in 1992. However, participation by neighborhood, environmental and individual citizen interests has no uniquely discernible relationship to LEPC action on private hazard reduction. Another inconsistency in results from 1989 to 1992 is that where labor participation was a significant negative factor for public hazard reduction in 1989 but not for private hazard reduction, the reverse is true in 1992. In the 1992 survey, labor participation has no effect in the analysis of public hazard reduction actions, but a weak positive effect in the analysis of private hazard reduction actions.

Conclusions:

LEPCs have continued to undertake public risk communication and outreach activities, and industry aid is positively rather than negatively related to that trend. That strong set of trends do not support the fears of industry capture of LEPCs or of LEPCs' reluctance to inform the public of hazards due to industry pressure. However, there are also a significant number of LEPCs (about one-quarter) that have failed to even make uninterpreted, raw right-to-know data readily accessible to their citizens. And none of the more effective and proactive methods of hazard communication or outreach were in use by much more than one-third of the LEPCs sampled in 1992. Thus it is probably prudent to say that many LEPCs, particularly in areas with supportive industry, are

undertaking active hazard communication with the public, but that there are areas where inactive LEPCs and uninvolved and unsupportive industries are the case.

LEPCs have also demonstrated broad interest in the question of how the public and private sectors can pursue long-term accident prevention and risk reduction. Fewer have acted on specific strategies to do so. The most consistent factor associated with LEPC action on hazard reduction of any kind is an active LEPC effort to communicate hazard information to the public. In terms of action by LEPCs to promote hazard reduction efforts by industry, however, not only is risk communication a significant factor, but so is active industry technical and resource assistance to the LEPC itself. That result in itself shows that the LEPCs have become at least modestly a focal point for voluntary collaboration with industry on managing toxic hazards. The role of LEPCs is further underscored by the fact that in 1992, LEPCs were more likely to promote specific actions for hazard reduction than would be predicted by citizen demands for such action alone (as reported by the LEPCs).

The question of public participation in the LEPCs remains somewhat problematic, however. Compliance with the intent of Title III to involve "community groups" remains highly variable and clearly interpreted quite differently from one local area to another. Nonetheless, some form of citizen participation is consistently associated with LEPCs taking action to make hazard

reduction a "mainstream" concern in local government by becoming involved in trying to inform and influence local government planning, zoning and transportation management policy. However, LEPC action on public sector steps towards hazard reduction remains much less frequent than LEPC involvement in promoting modest forms of long-term hazard reduction to their area industries. In the latter case, citizen involvement within the LEPC is not a strong predictor of action, but vigorous local government agency involvement and proactive industry support and resource contributions are.

In sum, several of the major unwritten expectations about Title III as a voluntaristic and adaptive national policy have continued to unfold. LEPCs have engaged in more (but still limited) risk communication and industry has assumed a role as both target of and supporter of this approach to toxic hazards management. In turn, both those factors are the most strongly related to LEPC efforts to promote longer-term hazard reduction by both the private and public sectors, as measured in this study. Whether this unfolding of a voluntaristic approach to environmental health and safety will continue is another question. LEPCs continue to cite needs for more resource support, which has always been limited, but local governments are less able to fund additional activities due to fiscal distress. The consistent finding over four years' time that stagant or declining local economic conditions are associated with less willingness to promote long-term hazard reduction does not bode well for sustained efforts unless economic conditions change.

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APPENDIX ONE

RELIABILITY, VALIDITY, AND DATA AGGREGATION FOR 1989 SURVEY

A detailed assessment of the reliability and generalizability of the data to be analyzed is both necessary and possible because of the longitudinal study design. The set of 195 survey responses from municipalities reporting involvement in an LEPC (85% of all responses) also includes 52 cases where two to four different jurisdictions responded from within the borders of the same LEPC Emergency Planning District (EPD).

The data about each LEPC's activities that have been reported by two or more local governments must be aggregated for the analyses where the LEPC is the unit of interest. As mentioned in the text, it was not justifiable to limit the sample frame to one local government from each LEPC's EPD before the fact. Such an ad hoc decision to exclude some jurisdictions from the longitudinal data series would create bias of an unknown sort.

For example, simply choosing the one jurisdiction with the most exemplary hazard management efforts within each LEPC (based on the 1983-86 measures) would create selection bias that cannot be easily interpreted. It could not be known if those jurisdictions would also be those with strong efforts to implement SARA Title III in 1989, or perhaps ones that ignore Title III because of prior independence in hazard management efforts. The multiple responses from within the same LEPC borders are not always identical.

Sources of possible error must be assessed and decisions made about appropriate procedures for aggregation. These 52 cases involve twenty-two separate LEPCs. Following the analysis and aggregation of multiple response cases, a second analysis here examines how the current study's respondents compare to the others in the longitudinal sample frame on several measures of prior hazard management effort, to assess the representativeness of the current sample.

Summary: A simple measure of consistency among multiple responses was developed as an ad hoc reliability measure. All disagreements are counted as errors, even if a majority exists. The reliabilities range from 0.37 to 0.90 with a mean of 0.55. However, most of the lower reliabilities were attributable to three of the items reporting on public agency involvement in LEPCs and three of the items for emergency plan content and hazard reduction that involve high technical and administrative

complexity. When those six items are excluded, the mean reliability for the remaining twenty-six items is 0.70.

Multi-jurisdictional LEPCs in very large counties dominate the 52 multiple-response cases. Inspection of the data indicated that smaller cities within those LEPC Districts tended to under-report public agency involvement compared to what would be expected from such large counties. That is associated with the lowest reliabilities.

Two different data aggregation and recoding schemes were developed. The first is for the fourteen items that measure public agency, industry and community involvement. The pattern of under-reporting by small cities for many of these items indicated that pooling observations was an appropriate data aggregation procedure. If the small city respondents were less knowledgable about all of the large jurisdiction agencies and interest groups participating in the LEPC, then the pooling of observations (i.e. counting an item if any respondent reports it) will take that into account.

A different recoding and aggregation method was used for the remaining eighteen items. Those items pertain to hazard information use, the completeness of Title III-mandated emergency plans, and LEPC recommendations for hazard reduction. All are actions that could be expected to be more likely to be reported by an LEPC that has completed its plan than by those lagging behind in that central task. In early 1989, completion of plans was quite variable (from virtually none to 100% on a state-by-state basis) despite the October 17, 1988 deadline. Respondents varied in the date on which they reported and whether or not the plan was completed. Therefore, a reasonable coding scheme for these planning- rather than involvement-related items was to count the latest response for which a complete plan was reported.

The resulting item means for the aggregated cases were compared to a comparable group of large counties from the other cases, and to all remaining smaller-county cases. A reasonable recoding scheme should result in the two groups of large counties being more like each other than the group of 119 smaller counties. Statistically speaking, however, there was no systematic difference between the three groups.

As a further check on the data aggregation method, results of an alternate data recoding method are also reported. That simple majority rule counts an item if the majority of respondents report it. This alternate coding scheme produces that are statistically

indistinguishable for about half of the data items but highly uncharacteristic of both large counties and the first coded group for the remaining items. Therefore, the two coding schemes that were developed appear reasonable in terms of both statistical similarity to comparable cases and superiority to the most obvious alternative (majority coding).

External validity was assessed based on prior year measures of hazard mitigation and emergency planning efforts. The present sample is representative of all cities and does not exhibit the high-achiever selection bias that is thought to be prevalent in hazards policy studies. In following sections, the analyses of reliability, data aggregation, and external validity are examined in detail.

Reliability Measures Developed

The survey responses reporting on LEPC activities are the source of four sets of variables defined in this study. The first is data on involvement of different organizations in the LEPC, including local government agencies, industry, and "community groups." The second is data on LEPC efforts to internally use hazard information. The third is data on completion by the LEPC of the required Title III emergency plan. Fourth is the data on LEPC recommendations for hazard reduction efforts. Other data from the survey responses pertain specifically to individual municipalities' activities and functions, and are therefore not considered here.

An initial comparison of mean values for the data was made between the 52 cases of multiple response versus the 143 other cases of one response (but is not shown here). The 52 "multiple" responses are treated as if they were single reports from separate LEPC Districts like other responses. This comparison proved helpful in considering how best to aggregate the multiple responses.

There was a tendency for possible under-reporting of public agency involvement and industry involvement among the 52 multiple response cases. The evidence of under-reporting is more mixed for the community group variables--there were two instances of possible under-reporting (for national environmental groups and union locals) but also two virtually identical means reported for local environmental and neighborhood groups. For the remaining data concerning hazard information use, plan development, and hazard reduction, no such consistent differences were observed.

Inspection of the data revealed that the larger cities consistently report much higher rates of

involvement by the public agencies than do the smaller cities in the same large metropolitan areas. Of those 52 cases, sixty percent were received from among the fifty largest metropolitan counties in the United States. By comparison, only three (3) percent of the remaining 143 responses came from such large metro counties. Mean county population is 995,000 versus only 228,000 for the other 143 single-response cases ($p < .001$). However, the mean population size of cities in both groups is rather similar (111,000 and 85,000 respectively) and the difference is not significant. Thus the cities reporting on LEPCs in the smaller counties from which single responses were obtained were those representing major staff resources for the LEPC.

Therefore, one source of inconsistency among the multiple responses can be due a greater number of small jurisdictions in a single EPD that have varying involvement in the LEPC. The smallest jurisdictions are least likely to be involved in LEPC planning. If smaller cities in the large metropolitan areas tended to under-report the involvement of all public agencies, that was not true for the sample as a whole. Were that uniformly the case, it would be expected that such under-reporting would affect the entire sample of responses and that the observed means for agency involvement would also be lower for the other 143 cases. That was not the case.

The data on industry involvement evidenced a similar pattern. The overall sample percentage reporting some industry involvement in the LEPC was a surprisingly low 86%, given that such involvement is a major requirement of Title III. However, among the multiple-response cases, only 71% reported industry involvement, versus 92% among the single response cases ($P < .01$). A lower percentage also reported local industry sponsorship of the CAER program (50% versus 59%) but the difference was not significant at the .05 level.

Multiple responses therefore were dominated by larger metropolitan counties with multiple jurisdictions involved in the LEPC. To some extent, having multiple observations from within those EPDs could correct for an apparent under-reporting of involvement data. Single-respondent data on complex organizational processes can be subject to errors of the observer-reporters that would be reduced by pooling observations from multiple respondents.

One way to test how reasonable the results of that procedure may be is to compare the recoded data (resulting from combining multiple observations) to the most similar (large county) LEPCs from the other 143

responses. The same comparisons can be made for the aggregated data on information use, plan completion and hazard reduction goals. The data on information use, planning, and hazard reduction did not, however, evidence the same possible pattern of under-reporting. One would expect there to be more consistency for observations about official actions of the LEPC (plans, goals). Measures of consistency are examined in detail in the next section. Methods of aggregation are then developed and the results assessed.

Customary reliability assessment involves examining the mean inter-item correlations (Cronbach's alpha) between different measures that are all meant to tap the same concept. For example, if a twenty-question scale is used to measure an attitude, the scale is said to be reliable to the extent that the correlation between responses made by each subject is high (Nunnally 1978). The same logic cannot be applied to the present data, of course. However, an ad hoc assessment of reliability among the variables can be made based on the 52 cases of multiple-responses.

A simple reliability measure was developed. It is a simple count of all cases of city responses about each of the variables for which there was not complete agreement. The measure is inclusive because all city responses about an LEPC are counted as "errors" if there is any disagreement at all. Thus in the case where three cities report an item but the fourth does not, for example, all four cases are added to the total errors (E) for that variable even though one might justifiably argue that the fourth case is the one in error. The ad hoc reliability measure (R) is therefore the percentage of consistent responses: $R = (N-E)/N$, where $N = 52$ cases. For example, fifteen inconsistent cases results in an ad hoc reliability of $(52-15)/52 = 0.71$.

The measures in the first column of table A-1 state the total consistency between responses, without consideration of any possible corrections. Consistency and data aggregation are discussed for the public agency, industry and community involvement variables in the following section. The second column of table A-1 reports an adjusted reliability measure for the remaining

TABLE A-1. AD HOC RELIABILITY AMONG MULTIPLE RESPONSES

VARIABLES	AD HOC RELIABILITY (N = 52)	ADJUSTED RELIABILITY (N = 143)
Public Agency Involvement		
Fire	0.85	N.A.[a]
Public Works	0.46	N.A.
Police	0.40	N.A.
Planning	0.58	N.A.
Emergency Medical	0.40	N.A.
Facilities/Services	0.71	N.A.
Public Health	0.52	N.A.
Industry Involvement		
Industry Member LEPC	0.58	N.A.
CAER Program Sponsors	0.67	N.A.
CAER Committee Preceded LEPC	0.83	N.A.
Community Group Involvement		
National Environmental Groups	0.83	N.A.
Local Environmental Groups	0.52	N.A.
Neighborhood Groups	0.88	N.A.
Union Locals	0.63	N.A.
Internal Information Use		
Reviewed Some Title III Data	0.70	0.77[a]
Used Hazard Analysis	0.40	0.40
Used Industry/Staff Advisors	0.71	0.81
Required Plan Elements		
Private Facility Role Defined	0.65	0.77
Identify Hazardous Areas	0.83	0.87
Emergency Notification	0.58	0.71
Identify Industry Equipment	0.50	0.65
Toxic Release Detection	0.37	0.46
Evacuation Plan	0.58	0.90
Training Program	0.65	0.79
Exercise Schedule	0.46	0.56

Table A-1. (continued)

VARIABLES	AD HOC RELIABILITY (N = 52)	ADJUSTED RELIABILITY (N = 143)
Hazard Reduction Recommendations		
Change Truck Routes	0.90	0.90
Change Zoning Regulations	0.65	0.69
Change Site Design Stds.	0.69	0.77
Revenue Source From Industry	0.52	0.65
Substitute Toxic Chemicals	0.79	0.83
Reduce Inventories	0.81	0.90
Reduce Wastes	0.85	0.90
Reuse Toxics in Production	0.83	0.87

[a] Adjusted reliabilities were computed for the hazard information, plan element, and hazard reduction items based on using reports by the latest respondent in time that reported a completed plan. Cases of disagreement are not counted when the respondent that reports on a completed plan also provides an affirmative response about an activity or action for which the respondent(s) reporting about an uncompleted plan provided a negative response (not done, not used) for the item in question. This adjustment does not apply to the involvement items.

variables. The adjustment takes into account additional information about the respondents, as will be discussed below.

Involvement Variables: Reliability and Aggregation

The most consistently low of the "reliabilities" in the multiple response cases were reported for the items pertaining to public agency involvement (table A-1). The mean reliability for the seven items is 0.46. First, as discussed earlier, these data indicate that under-reporting of all public agency involvement occurred among small cities in very large metropolitan LEPC districts. That was manifestly obvious because the large cities reported much greater agency involvement.

Second, the reliability for the report of industry involvement is lower than would be expected (0.58), and the reliability for reports of Chemical Manufacturers CAER Program activity is moderate (0.67). Finally, reliability for the four categories of community group involvement is mixed, but particularly low for local environmental groups (.52).

It is useful to make a crude comparison of these ad hoc reliabilities to the conventional reliabilities (Cronbach's alpha) typically obtained from multi-item scales. In the most similar study for which alphas were reported (which is often not the case), Bryson and Boal (1983) utilized nine multi-item scales in their research on municipal compliance with regional planning mandates in the Twin Cities under the Metropolitan Land Planning Act. A single local official answered questions about their jurisdiction's planning activities and the response to state-legislated requirements. The median reliability was 0.65 and the mean was 0.64 (alpha). The reliabilities ranged from 0.52 to 0.83 (alpha), with almost half in the range 0.52 to 0.57 (alpha).

The procedure selected for aggregating the involvement data for the 22 LEPCs was to combine the responses for each LEPC. Thus if one jurisdiction reported involvement of an agency, industry, or a community group, it is included in the aggregate for the LEPC in question. That parsimonious procedure was judged most valid for the following reasons.

There was consistent evidence that the LEPC involvement data were under-reported by smaller jurisdictions in the very large metropolitan counties that dominate the multiple response cases. Under-reporting was, moreover, always associated with the lowest within-metro-area reliabilities. For example, the mean proportion of jursidictions among the single-response cases that reported police agency involvement was eighty-five percent, versus only sixty-five percent among the fifty-two multiple response cases (treated as single responses for the sake of comparison). The reliability for the police involvement data among those fifty-two cases was only 0.40.

table A-2 makes several comparisons of the recalculated means of the involvement variables for the 22 LEPCs (aggregated from 52 reports) versus other cases. Also included is a comparison of what the recalculated means would be if an alternate recoding scheme was used. That alternate recoding records the observation only if there is a simple majority of responses indicating "yes" from within the LEPC in question. Ties are counted as majorities.

In most cases the recalculated means in column one (1) are higher than the means for the single-response cases. That is not unexpected, given the preponderance of very large, multi-jurisdictional LEPC districts among the duplicate response cases. Those areas are likely to have greater staff resources, heavier concentrations of industry, and diverse publics that may participate in the LEPCs. However, to further test the results of the recoding, the single-response cases have been broken into two different groups.

The first group (in column two of table A-2) consists of 24 cases selected so that the mean county population matches that of the 22 multiple-response case counties. Ideally, one would expect that the recoded data for the 22 LEPCs dominated by large metropolitan areas will be more like the other large counties in the sample than the remaining 119 cases which have a mean county population of only 144,000, or eighty-five percent smaller (column three).

Examining columns two versus three of table A-2 shows that the 24 large counties are not necessarily always different from the 119 remaining cases on all measures. Examining columns one and two shows that the recoded data for the 22 LEPCs only differed significantly ($p < .10$) from the 24 large counties selected from the single response cases on one variable mean: planning agency involvement. The recoded data differed from the small county group (column three) for three variable means, however. Those are the means for public works and planning department involvement, and for local environmental group involvement.

Although it was not statistically different from the large county group (column two), the mean value of 45% for local environmental group involvement is distinctively higher for the recoded data than for the other two groups of cases which have means of 29% and 21% respectively. It was possible to examine this anomaly further. In one survey question, the municipal informants were asked to what extent community environmental and neighborhood groups in their cities have requested participation in the LEPC.

The percentage reporting one or more groups interested in the LEPC was only 32% for the multiple-response cases while it was 46% for all others Although that difference in responses is not significant ($p > .20$), the level of interest reported should be higher for the multiple-response cases in order to be

table A-2
RECALCULATED MEANS FOR THE INVOLVEMENT VARIABLES

VARIABLES	(1) 22 LEPCs		(2) 24 LARGE COUNTIES		(3) 119 REMAINING CASES		(4) MAJORITY CODING: 22 LEPCs
Public Agencies							
Fire	100%		96%		97%		100%
Public Works	68%	*	71%		46%	*	59%
Law Enforcement	91%		88%		85%		82%
Planning	50%	*	25%	*	29%	*	36%
Emergency Medical	77%		67%		66%		59%
Facilities/Services	36%		17%		29%		36%
Public Health	86%		83%		72%		77%
Industry							
Member of LEPC	95%		88%		92%		86%
CAER Program Active	77%		63%		59%		73%
CAER Preceded LEPC	32%		17%		18%		27%
Community Groups							
Nat'l Environmental	6%		25%		13%		9%
Local Environmental	45%	*	29%		21%	*	32%
Neighborhood	36%		17%		23%		32%
Union Locals	14%		8%		12%		14%
Mean County Population	995,600		923,600		143,960		995,600

(1): Coding used for multiple-response counties.
(2): Means from other cases with similar mean population.
(3): Means from remaining cases (much smaller populations)
(4): Means from alternate (majority) coding of the multiple-response counties in column (1).

*The indicated mean is different from the mean in column (1) at the .10 significance level.

consistent with the aggregated mean value of 45%. Therefore, the inconsistency in means for local environmental groups appears due to low reliability among the large metropolitan area respondents. That is consistent as well with the reliability of 0.52 for this variable (in table A-1), which was the lowest among all four of the community group variables.

To further assess how reasonable the recoding procedure is, data on the involvement variables was also aggregated using a simple majority rule. An item is counted if the majority (or half in ties) report it. Column four shows the results. For ten variables (out of a total of fourteen), the alternate recoding method makes no substantive statistical difference, as the results are similar to the means reported in column one. However, a majority count consistently lowers the mean values for public agency participation, which was noted as an obvious, substantive problem earlier, and the chief reason for pooling observations for the involvement variables.

Planning Variables: Reliability and Aggregation

Additional considerations were necessary in assessing the reliability of and calculating aggregated data for the planning variables (LEPC internal information use, required planning element completion, and hazard reduction recommendations). As discussed earlier, responses were received to mail survey follow-ups over an extended period of time. As a result, some jurisdictions reported later than others. Also, in response to specific survey questions, some localities reported that the Title III-required plan had been submitted to the State Emergency Response Commission for review, while other localities reported the plan was incomplete.

Those differences affect about half of all the multiple-response cases and are pertinent to assessing reliability and aggregating the data. When a jurisdiction reports on an LEPC that has not completed the Title III plan, it is obvious that fewer required plan elements are likely to have been completed. Also likely is that the LEPC's efforts to use hazard information may not yet be fully implemented. Furthermore, LEPCs that have not completed the required plan may not have addressed the discretionary matter of hazard reduction as yet. In one quarter of the cases, one jurisdiction reported the plan incomplete while the other jurisdiction(s) reported completion even though there was less than three months difference in date of survey response.

Referring back to table A-1, the second column shows how the ad hoc reliabilities for the planning variables would change if the information on plan completion is taken into account. Specifically, an inconsistency between two reports on completion of a planning element is not counted as an error if the jurisdiction reporting completion also reports submission of the entire LEPC plan to state government, while the jurisdiction not reporting the element completed also reports that the plan has not been submitted to state government. These are the cases where the difference in the planning variables is completely consistent with the difference in reports of plan completion and submission. Small increases in reliability result for most items (mean = + 0.09) when those cases for which inconsistencies can be explained by completion of the plan are not counted as errors.

However, for the two very low reliabilities for "Used a Hazard Analysis" (0.40) and the "Toxic Release Detection" plan element (0.37) taking the completion of the plan into consideration does not cause much improvement (0.40 and 0.46 respectively). In other cases of lower reliability (less than 0.60), taking plan completion into account results in a mean adjustment of + 0.18. The two items in question here appear to have been subject to distinctively high disagreement among respondents. Both are technically complex planning activities and both tend to be reported as used least frequently. That suggests the source of disagreement is uncertainty about what using a true hazard analysis and adopting plans for toxic release detection mean in practice. It is likely that those two items are unreliable for the entire sample.

To aggregate these data for the planning variables, the following procedure was used and the results are shown in column one of table A-3. If one or more jurisdictions reported the plan as completed and submitted and the other(s) did not, the former's response

table A-3

RECALCULATED MEANS FOR THE PLANNING VARIABLES

VARIABLES	(1) 22 LEPCs	(2) 24 LARGE COUNTIES	(3) 119 REMAINING CASES	(4) MAJORITY CODING: 22 LEPCs
Hazard Information Use				
Reviewed Some Data	77%	88%	71%	95%
Used Hazard Analysis	41%	38%	49%	64%
Used Advisors/Experts	41%	54%	50%	59%
Required Plan Elements				
Industry Role Defined	77%	79%	81%	77%
Identify Hazard Areas	91%	* 71%	* 84%	91%
Emergency Notification	77%	88%	87%	77%
Industry Equipment	59%	67%	61%	59%
Toxic Release Detection	59%	54%	66%	41%
Evacuation Plan	82%	* 54%	* 76%	82%
Training Program	73%	71%	66%	73%
Exercise Schedule	55%	33%	55%	55%
Hazard Reduction Goals				
Change Truck Routes	14%	8%	15%	18%
Change Zoning	18%	29%	20%	36%
Site Design Standards	14%	17%	19%	18%
Industry Fees Charged	18%	17%	21%	27%
Substitute Chemicals	5%	4%	13%	23%
Reduce On-Site Inventory	5%	4%	13%	9%
Reduce Toxic Wastes	14%	8%	14%	18%
Reuse Toxics	5%	8%	15%	14%
Mean County Population	995,600	923,600	143,960	995,600

(1): Coding used for multiple-response counties.
(2): Means from other cases with similar mean population.
(3): Means from remaining cases (much smaller populations)
(4): Means from alternate (majority) coding of the multiple-response counties in column (1).

*The indicated mean is different from the mean in column (1) at the .10 significance level.

was used for all items. If all jurisdictions reported the plan completed and submitted but one response was three or more months later than the others, the latest response was used. Finally, in cases where inconsistencies in items reported could not be explained in this manner, the items in question were not counted at all for that LEPC.

table A-3 shows the recalculated means for the 22 LEPCs (column one). It was expected that the superior resources of the large metropolitan areas among those 22 LEPCs (and likewise for the 24 large counties) would result in higher means for information use and plan completion items than for the other small county cases. The results are quite variable, however. High information use (i.e., using a hazard analysis and advisors/experts) is lowest on average for the recoded LEPCs (column one).

Completion of the required plan elements is highest among the 22 LEPCs for only two elements, but lower than either the large counties or small counties for three plan elements. In the two cases where the recoded means for the plan elements among the 22 LEPCs are highest, those means are significantly different from the means for the other large counties (column two), but not different from the 119 smaller counties (column three). However, the means for plan elements among those 24 large counties are in fact least characteristic of the sample as a whole.

For the hazard reduction recommendation items, however, both sets of larger counties (columns one and two) tend to be much less likely to report three of the four private reduction items than are the 119 smaller counties (column three). That could be due to the greater numbers and diversity of industry in the larger metro areas causing less consensus within multi-jurisdictional LEPCs with respect to both public and private hazard reduction goals. But the means for the public action recommendations (truck routes, zoning, site standards and industry fees) are quite similar across all three groups. None of the differences for hazard reduction variables are statistically different, however ($p < .10$).

Again, as in table A-2, an alternate recoding of the data for the 22 multiple-response LEPCs is shown in column four of table A-3, using a simple majority rule. The alternate coding produces much higher means for both the hazard information use and hazard reduction items among the 22 LEPCs, compared to column one, the first coding scheme. In fact, the item means for information use and hazard reduction, using the alternate (majority)

coding, are uncharacteristically high of the sample as a whole in most instances. The proposed coding scheme (column one) appears to again be a better choice for aggregating the multiple-response cases than a simple majority coding. The coding method makes little difference for the planning items, but the majority coding scheme tends to produce uncharacteristic means for a number of the other items (for hazard information and hazard reduction).

Analysis of External Validity

The 1986 sample response was quite representative of medium and large cities among the United States, as was the 1983 International City Management Association sample. The 1989 survey respondents are now compared to nonresponders on six prior-year measures of emergency planning and hazard mitigation efforts (table A-4). That allows us to test the representativeness of the smaller response set of the current (1989) study. This is an infrequent opportunity to assess the external validity of data collected by using the prior-year measures. Often the only analysis of self-selection bias that can be made in cross-sectional studies is to compare respondents with the non-responders (or the entire population) on some irrelevant criterion such as demographic characteristics (Rossi, Freeman and Wright 1979). Here it is possible to make such comparisons on measures that are directly relevant to the research objectives: the 1983-86 measures of emergency planning and hazard mitigation efforts. Excluded from these comparisons (table A-4) are the California, Oregon and Georgia jurisdictions that were not part of the present study.

For the two measures available in 1983, the current sample is more like the population of all cities for the code enactment measure but more like the non-responders for the public education variable. As would be expected, the lowest means for the code enactment and public education measures occur for the 1983 sample, which includes small cities of less than 20,000.

Uncharacteristically, however, the larger cities in the current sample response consistently score lower on average on all measures except one ("designate usable vehicles") than do the somewhat smaller cities that responded in 1986 but not in 1989. The difference in means between 1989 study cities and the remaining 1986 cases is only significant at the .10 level for neighborhood group training, however.

Bias from voluntary responses to studies of hazards management is thought to most often occur for a specific

table A-4. COMPARISON OF CURRENT SAMPLE TO BASE SAMPLE

PRIOR YEAR MEASURES	RESPONDENTS TO PRESENT STUDY (N = 187)	1986 CASES NOT IN SAMPLE (N = 93)	ALL 198 CASES I ICMA ST (N = 96
Enactment of Codes to Control Development in Hazard Areas (Source: ICMA Survey)	64% *	74% *	66%
Public Education for Emergency Management (Source: ICMA Survey)	40%	46%	31%
Install rotary phone connections and establish procedures for a citizen emergency information phone bank (Source: 1986 Survey)	37%	41%	N.A.
Train neighborhood groups for emergency self-help (Source: 1986 Survey)	33% *	44% *	N.A.
Develop specific methods & staff trained to make public evacuation warnings other than outdoor sirens (Source: 1986 Survey)	72%	74%	N.A.
Designate usable vehicles & drivers to carry transit-dependent & mobility-paired persons in an evac-uation of a neighborhood (Source: 1986 Survey)	71%	61%	N.A.
1980 City Population	86,800	68,900	54,000

* The difference in the indicated means is significant at $p < .10$.

reason. The jurisdictions with higher activity and achievement in that function tend to be the ones reporting, especially because hazard management is generally a low salience activity for local government. In the present case, taking into account expected differences due to the greater resources of cities with large populations, it appears that this form of selection bias does not at all dominate the present response from the longitudinal study group. Cities reporting on Title III planning in 1989 were perhaps even slightly more representative of the entire population in terms of performance (though not population) than were those that did not respond in 1989 (but did in 1986). Both groups are above average on historical measures of support for hazards planning and mitigation compared to all cities and towns in the nation, but that is more true for nonresponders.

As best as can be determined therefore, the current set of respodents is reasonably representative of local governments. Of course, support for hazards management is notoriously sensitive to erosion the longer the elapsed time since a major community emergency. An interesting methodological question is whether the non-responding cities (which tended to evidence exemplary efforts in 1983-6) are ones where public agency support for hazard management specifically declined, and if that is a reason for their non-response. That must remain unknown since those data are unavailable.