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# **The Role of Focus Groups in Designing a Contingent Valuation Survey to Measure the Benefits of Hazardous Waste Management Regulations**

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## PREFACE

This report describes the development of a contingent valuation questionnaire for measuring the benefits of reducing hazardous waste risks. Along the way, it provides some insights about the three key activities that were undertaken to aid the questionnaire development process: focus groups, field pretests, and videotaped interviews. In general, we have tried to describe each of these activities in some detail and to evaluate their relative effectiveness. In effect, this report tells our experiences--both good and bad--in charting the course of a contingent valuation questionnaire for valuing risk changes through some unfamiliar waters. We hope our experiences will aid other researchers who attempt to find a way through these same waters.

While this report and the research it summarizes is a standalone document, it also is part of a much larger research effort that eventually evolved from it. The research started as a relatively modest effort for Ann Fisher of the Benefits Staff at the U.S. Environmental Protection Agency (EPA). Its goal was to use (and evaluate) focus groups to develop a contingent valuation survey questionnaire for valuing reductions in hazardous waste risks. Along the way, this activity became part of a much larger and more comprehensive EPA Cooperative Agreement research effort, in which we proposed to use contingent valuation methods for measuring the benefits of reducing hazardous waste risks. Consequently, we added the Boston area focus groups, the field pretest, and the videotaped interviews to supplement our original activities. We also added George Provenzano as project officer for the Cooperative Agreement. George and Ann have contributed constructive criticism not only on this report, but throughout the entire research process. We are grateful to them for their much needed support.

Two other reports ultimately will complement the material presented in this report. One, Detailed Summary: The Role of Focus Groups in Designing a Contingent Valuation Survey to Measure the Benefits of Hazardous Waste Management Regulations, is a detailed summary of each of the focus group

sessions. Known affectionately to authors, reviewers, and our word processing staff as "the whopper," this document is presently in draft form and will be available in January 1985. The second report, an as yet untitled manuscript, provides preliminary insights gleaned from the data collected with the questionnaire and will be available in late January.

This summary report has benefited from both George and Ann's comments. We also received a helpful review on an earlier draft from Jon Harford of Cleveland State University. As members of the research team, we would be negligent if we did not acknowledge the role of Ann Dunson, a former team member whose charm and dulcet tones belied the skills of an organization wizard. Without Ann's help, the focus groups would have been considerably less productive (not to mention less fun). We also acknowledge our heartfelt thanks to our Publications Manager, Hall Ashmore, who contributed his much needed and valued editorial skills and judgments about style, language, and general pizzaz. Finally, because we always save the best for last, we wish to thank Jan Shirley and her staff of Word Processing specialists who never let us down despite the many obstacles we place in their way.

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## CHAPTER 1: INTRODUCTION

As a prelude to an effort that will eventually measure the benefits of hazardous waste management regulations, this report presents the insights gathered during a series of informal discussions--focus group sessions--conducted with small groups of citizens in North Carolina and Massachusetts during April, May, June, and September 1983. The purpose of these sessions was to gather information--primarily on what individuals feel, think, and say about the risks associated with hazardous wastes--that would be helpful in developing an effective contingent valuation survey questionnaire to measure the benefits of hazardous waste management regulations. Because the contingent valuation survey approach requires a questionnaire that creates a hypothetical--or simulated--market for nonmarketed goods (in this case, reductions in the levels of risk associated with hazardous wastes), the focus groups proved invaluable in collecting attitudinal, perceptual, and linguistic information that could help frame the questionnaire's hypothetical market in terms that were both credible and understandable to survey respondents.

Before summarizing the findings of this focus group research effort and outlining the contents of this report, the following sections give important background information and outline the purpose and methodologies of contingent valuation and focus group research. Specifically, Section 1.1 summarizes the essential background for this research, Section 1.2 cites the important study objectives, and Sections 1.3 and 1.4 briefly explain the aims and means of contingent valuation and focus group research, respectively. Section 1.5 summarizes research findings, and Section 1.6 is a guide to the report.

### 1.1 BACKGROUND

This section briefly summarizes the essential background for this research, including the policymaking challenge posed by hazardous waste management regulations; the primary economics tool--benefit-cost assessment--available to the public policymakers charged with executing hazardous waste regulatory

actions; and the multifaceted role played by risk in the decisions faced by these policymakers.

#### 1.1.1 A Policymaking Challenge: The Congressional Mandates

Hazardous waste management regulations undoubtedly constitute one of the most pressing environmental policymaking challenges facing the U.S. Environmental Protection Agency (EPA). Congress has mandated EPA to meet this challenge by passing the Safe Drinking Water Act (SDWA) in 1974, the Resource Conservation and Recovery Act (RCRA) in 1976, and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in 1980, also known as the "Superfund" Act. SDWA provides for general protection against a variety of organic and inorganic contaminants in the nation's drinking water and protects specific aquifers; RCRA contains a wide range of regulatory mandates involving all facets of the hazardous waste problem; and the Superfund Act requires a well-managed, comprehensive "cleanup" of unregulated, abandoned hazardous waste dumps. In addition, the Congress has passed modifications to extend the scope of RCRA authority and to shorten the time allowed to develop and implement mandated regulatory policies and procedures.

#### 1.1.2 Benefit-Cost Assessment: A Guide to Decisionmaking

In executing regulatory actions stemming from the Congressional mandates, EPA will be subject to the provisions of Executive Order 12291, which requires that agencies conduct regulatory impact analyses of major (annual economic impact or cost to society of \$100 million) and precedent-establishing regulations. In particular, for each of these regulations, the Executive Order calls for a consideration of the benefits and costs of the proposed regulatory action and its alternatives.

To conduct these analyses, the policymaker can call on the principles of economics--and on the principles of benefit-cost assessment, in particular--to ensure an efficient allocation of scarce public resources. Not only can the benefit-cost assessment framework organize information for the policymaker by identifying all the favorable and unfavorable outcomes of a proposed action, it can, where necessary, convert these outcomes into a common set of units, usually dollars, so that they can be compared in the aggregate, thus reducing the complexity of the decision process.

Of course, the principles of benefit-cost assessment provide only a guide for decisionmaking, not a rule; they do not provide the final answer for the policymaker, who must consider other issues, such as the distribution of benefits, that are outside the framework of a benefit-cost assessment. However, by identifying, classifying, clarifying, and monetizing the likely outcomes of proposed regulatory actions, these principles can significantly enhance the ability of the policymaker to respond to the regulatory challenges issued by the Congressional mandate to protect the nation's health and environment.

Finally, the principles of benefit-cost assessment can help free the policymaker from the value judgments that are either implicit or explicit in all decisions by providing the means--the framework--for identifying and organizing the objective information required for the public policy decisionmaking process. In particular, these principles provide objective measures of the gains and losses--the benefits and costs, respectively--to society resulting from regulatory actions. On one side of the ledger, benefits are measured objectively under the assumption that each individual is the best judge of his own welfare.\* On the other side of the ledger, costs are measured objectively under the assumption that resources are best valued according to their opportunity costs--the value of their next best alternative use. Of course, as shown by numerous discussions in the economics literature, no measure is ever completely objective. However, because of the organizational structure of their framework, the principles of benefit-cost assessment can help decisionmakers separate objective information from the value judgments they inevitably encounter, thus allowing them to make better decisions based on that information.

### 1.1.3 A Central Theme: The Role of Risk

If there is a central theme to the legislative mandates for regulating hazardous wastes management, it is one of risk. Indeed, EPA Administrator William Ruckelshaus has stated that problems involving risk confront EPA with one of its most difficult challenges--a challenge that will require improvements in EPA's decisionmaking process for risk issues, in the scientific measurement of risk, and in the communication of risk-related issues to the public. In turn, the scope of these challenges will require integrated research efforts

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\*For an overview of benefits, see Desvousges and Smith [1983].

encompassing a variety of disciplines, ranging, for example, from engineering and toxicology, which make technical measures and assessments of risk, to psychology and economics, which predict and evaluate perceptions of and behavioral responses to risk.

In the context of risk, the main objective of a benefit-cost assessment is to organize the assumptions and predictions necessary to develop "measures" of benefits and costs specifically in terms of risks. The idea of these measures is very fluid: they can be either very qualitative measures or quantitative (and monetized) measures of benefits and costs. The key is to provide the decisionmaker with the information to make the best possible decisions about the levels of risk implied by the proposed policy. In the very simplistic case shown in Figure 1-1, for example, the decisionmaker would be presented with information showing the extra benefits compared to the extra costs of achieving an additional percentage reduction in risk. In this simple example, the optimal level of risk reduction is not 100 percent but less--the level at which the marginal benefit curve and the marginal cost curve intersect.

As a concept, risk has multiple meanings. In some disciplines, it is synonymous with the probability of some injury or health effect (e.g. cancer or heart attack). In economics, it can imply the variability of investment outcomes in formal models of economic decisionmaking under uncertainty. (See Smith [1984] for a discussion of these points.) This report uses the term risk to imply the chance of something happening; it also uses the term probability, or the mathematical measure of risk, interchangeably.\*

## 1.2 OBJECTIVES

As noted earlier, the focus group research summarized in this report is part of a larger effort whose overall goal is to measure the benefits of hazardous waste management regulations--i.e., to estimate the benefits of public policies designed to reduce not only the risk of exposure to hazardous wastes, but also the risk of experiencing a resulting detrimental health effect, including death. As explained below, this larger effort entails the use of the contingent valuation survey approach, which simulates a market for a nonmarket

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\*It should be noted that it is common--though technically incorrect--to use risk to designate the type of risk (e.g., cancer risk) rather than its probability.

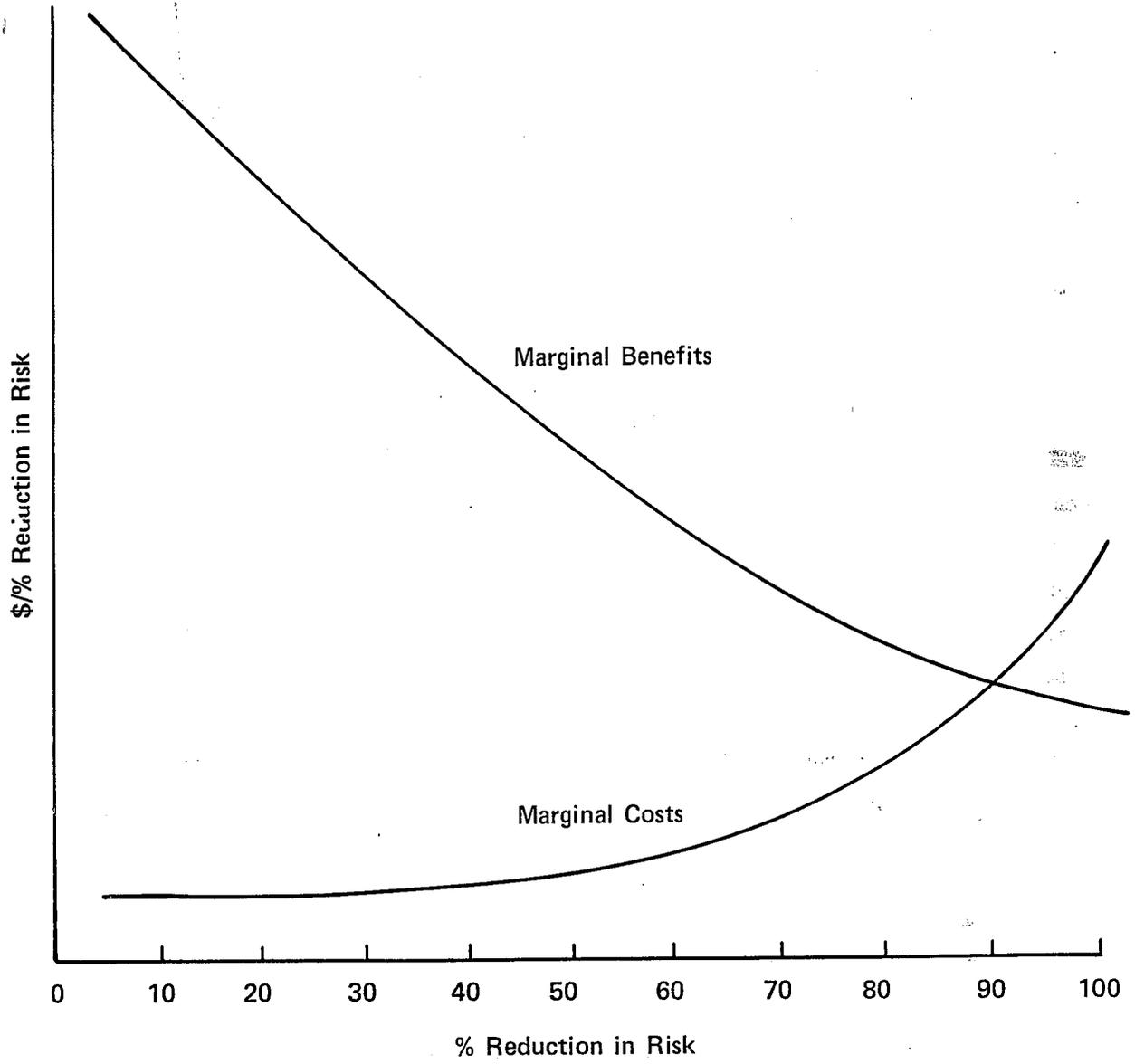


Figure 1-1. Marginal costs and marginal benefits of risk reduction.

commodity--risk reductions, in this case--and then asks respondents to express their willingness to pay for it.

Though more modest, the objectives of the present research are an important part of this overall effort. In general, as part of the survey questionnaire development activity, they are to gather information on how people feel, think, and talk about risks, especially those associated with hazardous wastes. In particular, the objectives of this report are to address three fundamental questions:

- How can focus groups be used in economics research on the risk of hazardous wastes?
- What are individuals' perceptions and attitudes toward the risks of hazardous wastes?
- How can information on the risks of hazardous wastes be effectively presented in a survey questionnaire designed to elicit individuals' willingness to pay to reduce those risks?

Because research on hazardous wastes is in its early stages, these questions cannot now be answered completely. However, the insights gathered during the course of the focus group effort go a long way toward indicating the general direction in which the answers lie. The remainder of this chapter summarizes what methodologies can be used to estimate the benefits of risk reductions and why and how focus groups fit into the methodology chosen. Subsequent chapters address these and other issues in more detail.

### 1.3 WHY USE THE CONTINGENT VALUATION SURVEY APPROACH?

One of the major difficulties of measuring the benefits of public policies concerned with risk reductions is that, frequently, there are no markets in which they can be traded and, thus, valued. Fortunately, economists have several approaches for measuring the benefits of goods that are not traded in markets, including the damage function approach and any one of several direct and indirect approaches. Of course, even under the best circumstances, these approaches deliver estimates indicative only of the ranges into which the actual benefits are likely to fall. However, this level of precision is consistent with the accuracy of the technical measures used in assessing the risks that public policies are designed to mitigate.

The following summary outlines the main approaches economists use to measure the benefits of nonmarketed goods:

- The damage function approach measures statistical relationships linking the environmental hazard with some well-defined physical effect.\* For example, exposure to a particular hazardous substance might lead to an increased risk of a specific type of cancer (as measured by the relevant disease-specific mortality rate). This approach by itself measures only changes in risk. It requires independent estimates--from either an indirect or direct approach--to value these effects.
- The indirect approaches use behavioral models to describe how the adjustments of economic agents to the environmental hazard are reflected in specific market transactions. For example, when houses in a given location have a recognized increased exposure to a specific pollutant, economic agents (households) will either offer lower bids for these houses (in exchange for accepting the risks associated with the increased pollutant exposure levels) or purchase houses at different sites having both lower exposure levels and, all else being equal, higher prices.
- The direct survey or contingent valuation methods ask individuals to reveal their willingness to pay for reductions in exposure to a specific environmental pollutant. In this case, the analyst creates a hypothetical market by describing some mechanism through which individuals would pay for improvements in environmental quality. For example, a household survey might be used to ask individuals' willingness to pay for specific reductions in the risk of being exposed to hazardous wastes, where the risk is described in terms they can understand.

For several reasons, the contingent valuation survey approach offers more than the damage function or indirect approaches do for the economist who must assess benefits in situations involving risk. These reasons include the following:

- It affords flexibility in defining the environmental commodity to be valued.
- It has the ability to test for the sensitivity of important design factors.

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\*The present state of knowledge often means that the physical effects have been observed only in laboratory animals tested at high doses. There are substantial uncertainties in extrapolating to the lower doses expected in the ambient environment and in converting animal doses into equivalent doses for humans.

- It is consistent with the willingness-to-pay criterion for benefits measurement.
- It has the ability to develop a specific context for risk and test for differences in risk attributes.

This is not to suggest that only the contingent valuation approach should be employed. Indeed, Smith and Gilbert [1983] and Violette and Chestnut [1983] suggest some useful roles for the hedonic wage approach. Simply, survey approaches offer promise.

#### 1.4 WHY USE FOCUS GROUPS?

In essence, focus group discussions were used in this effort because they offered a cost-effective way of discovering how best to ask economic questions--especially those concerned with risk--of noneconomists or laymen. In particular, because the contingent valuation survey approach requires that willingness to pay be elicited directly from survey respondents in a hypothetical market experiment, the use of focus groups provided an excellent way of ensuring that the respondents could clearly understand both the commodity to be traded--in this case, reductions in risks from hazardous wastes--and the market in which it was to be traded.

Using contingent valuation to estimate the benefits of hazardous waste management regulations requires detailed information on how and the extent to which respondents understand risk (or probability) and how government regulatory actions might change it. In particular, it is absolutely crucial to determine what respondents are likely to know about these concepts before they are given information necessary to help them form notions of willingness to pay. Using focus groups helped make this determination, particularly in discovering whether it was easier for respondents to think of risk in two separate stages--risk of exposure to hazardous wastes and risk of some resulting detrimental effect--or only the combined risk. In addition, focus groups helped to identify language that would effectively communicate hazardous waste concepts.

Contingent valuation also requires the resolution of issues related to framing--i.e., the definition of the commodity in its hypothetical market and how the transaction would occur. Resolving these issues requires assessing whether responses are affected, for example, by the information given, by the way in

which the valuation question is asked, or by the actual sequence of the questions on the questionnaire. Because they demonstrated very dramatically how respondents may react to varying types of information, varying types of questions, and different question sequences, the focus groups helped assess these framing issues as the questionnaire was developed.

Finally, the focus groups also proved an excellent way to test alternative methods of eliciting individuals' willingness to pay; to compare the workability of direct questions to elicit willingness to pay values with that for contingent ranking, which requires respondents to rank outcomes stated in terms of probabilities and willingness-to-pay amounts; and to ensure the development of a clearly worded, comprehensible survey instrument. The focus groups were particularly helpful in the latter effort since the participants were able to point out fuzzy language and muddy or incompletely formed concepts before the instrument was administered to the general target population.

The resolution of the issues discussed above and the development of the survey instrument itself evolved in a series of activities that spanned six rounds of focus groups, involved conducting 19 sessions in a variety of geographic areas, and required the participation of 198 men and women from a variety of economic, social, and educational backgrounds. Table 1-1 summarizes focus group session attendance. Round 1 consisted of general discussions centered around five major topics: risks in general, environmental attitudes, hazardous waste knowledge, hazardous waste risks, and attitudes toward paying for hazardous waste management. Figure 1-2 shows sample questions used as guidelines for these discussions. How and the extent to which the focus group participants responded to these questions enabled the project team to understand what kinds and amounts of information they should provide in the survey questionnaire so the respondent could form his notion of willingness to pay for risk reductions resulting from hazardous waste management regulations. As the project progressed through the focus group sessions conducted during Rounds 2, 3, 4, and 5, the project team was able to refine the information given to the respondent (i.e., both the questions on the survey questionnaire and the supplemental materials used in the interviewer's presentation to the respondent) until, in Round 6, they finally were able to administer a first draft of the survey.

TABLE 1-1. FOCUS GROUP SUMMARY

Round	Session	Participating organization	Location	Date	Number of participants	
					Per session	Per round
1	1	Duke Institute for Learning in Retirement	Durham, NC	April 6, 1983	14	
	2	White Rock Baptist Church	Durham, NC	April 11, 1983	7	50
	3	Vance County Heart Association	Henderson, NC	April 12, 1983	9	
	4	Triangle Presbyterian Church	Durham, NC	April 13, 1983	20	
2	1	INCO Sheltered Workshop	Henderson, NC	April 27, 1983	8	
	2	YWCA/Hobby Time Group	Durham, NC	April 28, 1983	11	27
	3	Methodist Retirement Home	Durham, NC	April 29, 1983	8	
3	1	Salem United Methodist Church, I	Haw River, NC	May 5, 1983	12	
	2	Salem United Methodist Church, II	Haw River, NC	May 24, 1983	7	35
	3	Ridgeroad Home Extension Club	Durham, NC	May 25, 1983	16	
4	1	Union Presbyterian Church	Carthage, NC	June 1, 1983	13	19
	2	Saint Catherine Catholic Church	Wake Forest, NC	June 2, 1983	6	
5	1	Presidents Crime Watch Council	Wadesboro, NC	June 21, 1983	22	
	2	Morven Presbyterian Church	Morven, NC	June 22, 1983	5	41
	3	Women of the Church				
6		Morven Presbyterian Church, Evening Group	Morven, NC	June 22, 1983	14	
	1	Acton Congregational Church	Acton, MA	Sept. 13, 1983	7	
	2	Concord Council on Aging	Concord, MA	Sept. 14, 1983	7	26
	3	Acton League of Women Voters	Acton, MA	Sept. 14, 1983	6	
	4	Needham American Red Cross	Needham, MA	Sept. 15, 1983	6	
Total 19					Total 198	

HAZARDOUS WASTES FOCUS GROUP QUESTIONS/TOPICS

1. In what ways do you think that you individually pay (monetarily) as a result of the "hazardous waste problem."
2. To whom do you pay? Where does the money go?
3. How is that money spent by the recipient(s) on hazardous waste management?
4. Have you personally or members of your immediate family actually experienced bodily harm or loss or injury to property due to hazardous wastes?
5. Do you believe in the possibility of personal loss or injury to yourselves as a result of hazardous wastes?
6. What do you think about the chances (probability) that you will actually experience personal loss or injury due to hazardous wastes?
7. What do you think about the chances that the environment will actually be damaged by hazardous wastes.
8. If you think that the chances are good that you will personally experience loss or injury from hazardous wastes, would you be willing to pay more than you now do to change the probabilities of loss or injury?
9. If you think that the chances are good that the environment will suffer damage, would you be willing to pay more than you now do to change the probabilities of loss or injury?
10. If you think that there is no chance that you or your immediate family will suffer loss or injury as a result of hazardous wastes, would you be willing to pay more than you now do to change the probabilities that others will suffer loss or injury?
11. If you think that there is no chance that you or your immediate family will suffer loss or injury as a result of hazardous wastes, would you be willing to pay more than you now do to change the probabilities that the environment will be damaged?
12. Whom do you hold responsible for proper hazardous waste management?
13. Whom do you hold responsible for the "hazardous waste problem?"
14. To what degree do you hold each of the following responsible for proper hazardous waste management:

(1) yourselves	(5) Federal Government
(2) society	(6) hazardous waste producers
(3) local government	(7) companies that dispose of hazardous wastes
(4) State government	
15. To what degree do you hold each of the following responsible for hazardous waste cleanup:

(1) yourselves	(5) Federal Government
(2) society	(6) hazardous waste producers
(3) local government	(7) companies that dispose of hazardous wastes
(4) State government	

Figure 1-2. Sample questions used in focus group discussions.

Although the advantage of hindsight now suggests, perhaps, that some of the 19 sessions conducted during this research could have been eliminated by additional planning, the experimental nature of using focus groups in a major contingent valuation survey questionnaire development effort and the desire to learn as much as possible about how people feel, think, and talk about risks from hazardous wastes were compelling reasons to conduct a large-- rather than an optimal (i.e., smaller)--number of sessions.

## 1.5 SUMMARY

The focus groups proved to be a valuable tool in constructing the survey questionnaire both in terms of learning how people think about different issues and in terms of the mechanical aspects of developing the survey. Specifically, they enabled the research team to perform the following:

- Determine how much of a lead-in to the topic was necessary. The presentations in the first rounds of focus groups were very long. They spent considerable time explaining general notions of risk using common examples, then led in to environmental risks and finally attempted to have participants make the link from everyday risks to risk of exposure from hazardous wastes. The focus groups enabled the research team to shorten the lead-in and narrow the focus of the presentation. In fact, they eventually led to the exclusion of common risk examples as a way of explaining risk of exposure from hazardous wastes.
- Target the most troublesome areas. The focus groups pointed out the concepts participants had the most difficulty understanding. For example, the research team was able to see that exposure pathways and ways one pays for regulations were areas more readily understood by participants. In contrast, thinking of risk in terms of a risk of exposure and a risk of effect given that exposure was much more difficult for all participants. A second trouble area was in determining realistic probabilities and a third in determining realistic dollar amounts. The focus groups enabled the research team to concentrate on these potential trouble areas. Use of the groups helped determine the clearest way of presenting this information.
- Try different techniques to determine the best way to impart pertinent information. The focus groups were helpful in several areas. First, the research team saw circles were not the best vehicle for determining people's risk perceptions. Instead, a risk ladder was found to be more appropriate. Further, it became apparent that the groups were quite sensitive to the benchmark examples used on the ladder. Their input in the

focus groups sessions helped determine examples that all kinds of people could relate to. Second, they enabled the research team to experiment with different techniques in presenting probability. After trying various numbers and placement of circles on a card, focus group participants indicated that showing three circles all on one card was the best way of explaining risk of exposure and effect from hazardous wastes. Third, the focus groups were valuable in determining how to represent probability. The research team learned that percentages work better than ratios. Fourth, in conveying numbers and types of products that produce hazardous waste byproducts, the focus groups enabled the research team to see that people tend to focus on effect rather than products. This led the research team at first to isolate the effects on a separate card from the substances and hazardous byproducts and finally to allow the participants themselves to indicate the type of effect they were thinking of.

- Develop an understandable hypothetical example. Focus groups were very helpful in discerning which aspects of the hypothetical situation were important in valuation decisions. Additionally, they were invaluable in helping to determine how the information had to be presented so participants would keep the hypothetical situation in mind while determining payment amounts. As the groups progressed, it became apparent that presenting vague facts in the hypothetical situation would not be sufficient. In contrast, being too specific about too many facts caused participants to overreact to the hypothetical situation. The focus groups showed the research team that the best hypothetical situation was one that used incidents similar to situations that had occurred in the area and provided very specific information about the most important aspects of that situation--type of landfill, how it would be monitored, and type of waste in the landfill.
- Determine the proper order of the interviewer presentation. The order in which information was presented affected focus group participants' perceptions and understanding of the problem. Therefore, the focus groups served as a good tool for assessing the best order for presenting the information. At first, general notions of probability were discussed followed by a discussion of the types and kinds of products that produce hazardous wastes, how you get exposed to them and how you pay to regulate them. By the end of the 6 rounds it became apparent that the best way to present the information was to talk first about hazardous wastes, then probability and then how you pay for managing these wastes.
- Determine the best language to use in wording the questions. Participants were able to help the research team reword questions throughout the rounds to make them clearer. Participants

also pointed out to the research team that it is important to take into account how terminologies vary in different regions of the country. This was particularly true when discussing distance and town characteristics in the Boston area rather than in North Carolina.

Although some of the information gathered during the focus group sessions could have been obtained as easily in a one-on-one pretest situation, not all of it could. For example, in many cases the group environment stimulated participants to think of and verbalize ideas they probably would not have expressed in a one-on-one interview. In addition, the focus groups enabled the research team to directly reach the population to be surveyed and, thus, provided access to specific local details that might have affected survey results. Finally, the focus groups enabled the research team to target a population composed of people from a variety of educational backgrounds and income levels that had experienced a hazardous waste incident. This was particularly crucial with such a complex topic.

The focus groups did prove less successful in one area. The transition from the oral to a written instrument was not smooth. This was apparent in the difficulty participants had answering the valuation question when the first draft of the survey was administered in the last round of focus groups. This difficulty occurred even though participants had little difficulty with the same question in the previous round of focus groups, where a less formal presentation was used. In effect, focus groups are extremely valuable in the testing of ideas and techniques and in constructing a first draft of a survey questionnaire, but they are not a substitute for a pretest or other one-on-one techniques that can be used to develop a questionnaire.

## 1.6 GUIDE TO THE REPORT

The following chapters of this report describe what the project team learned from using the focus group technique to develop a contingent valuation survey for estimating the benefits of hazardous waste management regulations. Specifically, in addition to reviewing and summarizing what the existing literature has to say on the advantages and disadvantages of using focus groups, Chapter 2 describes the project team's experience, highlighting such points as moderator skills, participant recruiting procedures, physical setting, and group homogeneity. Chapter 3 describes in some detail the iterative pro-

cess the project team used during the six rounds of focus group sessions to develop the survey instrument, underscoring the difficulty of effectively presenting information on risk to the general population. Chapter 4 summarizes the perceptual and attitudinal comments from focus group participants on six major areas of interest to the project team: risk perceptions and attributes, perceived risks from hazardous waste exposure, environmental attitudes, understanding of hazardous wastes, understanding of the payment vehicle, and perception of compensation. Chapter 4 also summarizes participant perceptions of governmental effectiveness and other key analytical variables. Chapter 5 describes the significant research activities conducted during the post-focus-group effort to further develop--refine--the survey questionnaire.



## CHAPTER 2: FOCUS GROUPS--AN OVERVIEW

### 2.1 INTRODUCTION

Focus groups are informal discussion sessions in which a skilled moderator leads a group of individuals through an in-depth discussion of specific topics to discover their attitudes and opinions. Neither the participants nor the moderator is necessarily an expert on the topics. A concept that grew out of the psychiatric techniques of group therapy, the focus group assumes that individuals are more apt to talk about a problem in the security of a group environment than they are in a one-on-one interview. In the 1950s some researchers extended focus groups beyond their initial therapeutic purpose and used them to obtain qualitative information from consumers about product advertising and promotional efforts [Bellenger, Bernhardt, and Goldstucker, 1979].

Traditionally, focus groups have served as a tool in marketing research to acquire qualitative data on markets, prices, and advantages of new products. In addition, focus groups have been used to

- Generate new hypotheses
- Provide background information on new product concepts, packaging, and advertising effectiveness
- Understand the consumer language associated with specific product categories or brands
- Stimulate new ideas about older products
- Structure and test questionnaires
- Interpret previously obtained quantitative results.

This project has used focus groups in yet another way--to obtain and evaluate the information necessary to develop a contingent valuation survey. In effect, the focus groups provided an opportunity to listen as individuals discussed various aspects of hazardous wastes; to observe their responses to several tasks that will be used in the contingent valuation survey; and to try alterna-

tive methods for presenting information about the risks of hazardous waste and other low-probability events.

This chapter reviews the current literature on the advantages, disadvantages, and design of focus groups and summarizes the project team's experience. Specifically, Section 2.2 describes the advantages of focus groups, Section 2.3 highlights the disadvantages of focus groups, and Section 2.4 summarizes major issues in designing effective focus group sessions. Section 2.5 provides insights that were gained during the hazardous wastes focus group sessions. To conclude this chapter, Section 2.6 lists suggestions, based on project team's experience, for ensuring effective focus group sessions.

## 2.2 THE ADVANTAGES OF FOCUS GROUPS

The literature\* cites many advantages of focus groups. First, focus groups can be completed more quickly and cheaply than a quantitative research project. A three- or four-group interview study can be conducted, analyzed, and reported in less than a week in an emergency and at a cost much lower than that of other ways of learning about attitude and behavior. In addition, although focus groups may add costs to projects that use them as complements to a survey or survey pretest effort, they can also reduce total costs if the information they deliver allows a smaller survey or survey pretest than would otherwise be required. Costs also can be affected by location of the sessions. Ultimately, the question of cost advantages will depend on the objectives of the research and the available alternative approaches. For this project, the focus groups were cost effective but in no way inexpensive. Even though they added costs, they improved the questionnaire and lowered the chances of conducting a survey where the data collected could not be used.

Second, focus groups can reduce the distance between client (or researcher) and participant. In a typical survey the accumulation of information is very mechanical: the interviewer asks a prescribed set of questions, and the answers are coded into a computer and analyzed by a statistician.

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\*See Fern [1982]; Cox, Higgenbotham, and Burton [1976]; Dupont [1976]; Szybillo and Berger [1979]; Wells [1979]; and Bellenger, Bernhardt, and Goldstucker [1979].

There is little opportunity for a participant to react to the questions or for those reactions to be heard by the client. Focus groups allow the client (or researcher) to take an active part in the interviewing process and to meet the respondent face to face.

Third, focus groups can add flexibility to an interview. Focus group moderators generally work from a topical outline and not a prescribed list of questions. Therefore, the moderator has the opportunity to ask a fairly wide range of questions and evaluate how receptive the group is to different topics. He can experiment with question order and wording and tailor the questions to the participants of a particular session. Additionally, each interview can be paced differently. If a topic has been well covered in a previous session with a similarly composed group, the moderator can switch to a topic that has not been covered after he is confident that he is getting similar responses.

Fourth, focus groups can help identify unknown relationships. Specifically, it is difficult to design questions that pick up the contingencies that link seemingly unrelated events in the mind of the respondent. Because they encourage the free exchange of ideas, feelings, and opinions, focus groups enable researchers to pick up relationships that otherwise might have been missed. During the focus group sessions on hazardous wastes, a participant often would begin to view an idea or topic from an entirely new perspective and share the insight with the whole group. For example, in discussions of the payment vehicle--a specified method of "paying" for a commodity in the survey--one participant completely altered his response after hearing other participants explain their understanding of the question. It was like seeing a light switched on behind his eyes.

Fifth, focus groups often stimulate participants' responses. Psychological as well as marketing literature suggests that combined group efforts are exciting and stimulating. These circumstances may lead to chain reactions of responses that in turn can produce new ideas and wider ranges of information. Additionally, a bold participant may encourage a less outgoing one to voice feelings and opinions that he otherwise would not have revealed.

Finally, the literature on focus groups frequently cites the following advantages:

- They create a secure environment--i.e., the participant may find comfort in the group and more readily express his ideas.
- They identify the language that participants ordinarily use--i.e., participants use their own language to describe their experiences and ideas, thus revealing the terminology analysts can use to develop a successful survey.
- They allow spontaneous responses from participants--i.e., since individuals aren't required to answer each question, they can give longer--more insightful and meaningful--responses.
- They generate hypotheses--i.e., the participants' responses generate background information the analyst can use as a starting point for his research.
- They yield findings that are easy to understand--i.e., whereas a typical survey gives volumes of percents and statistics, the narrative reporting of focus group results can be more accessible.\*

### 2.3 THE DISADVANTAGES OF FOCUS GROUPS

The major disadvantages of focus groups are that their results are easily misused and difficult to interpret.<sup>†</sup> More specifically, conclusions based on quantitative data cannot be drawn from focus groups. Although it is very tempting to project or generalize focus group results to the population as a whole, it is important to realize that the participants form a nonrepresentative sample that cannot be extended to the general population.

In addition, the session results can be biased by the moderator. The flexibility and freedom of action provided by the focus group format carries with it the risk of subjectivity and biased results. For example, the moderator may unconsciously want to reinforce views that are in accord with his or the client's. Further, if initial sessions have been highly consistent in their implications, the moderator may not want to recognize something at variance with his expectations. In particular, he may be patient, permissive, and en-

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\*While the information can be easily accessed, it is voluminous and requires considerable document preparation time and resources to maintain a consistent format across groups.

<sup>†</sup>See Bellenger, Bernhardt, and Goldstucker [1979]; Cox, Higgenbotham, and Burton [1976]; Szybillo and Berger [1979]; and Kennedy [1979].

couraging with participants expressing a favored point of view, and/or he may frown or ignore those presenting opinions that are at odds. This tendency can be controlled by an experienced and trained moderator who can recognize that these forces exist and can try to minimize them. Kennedy [1979] suggests using moderators with training in psychology and suggests also that moderators from time to time should videotape themselves to analyze their performance and hold post mortems with participants (and other project team members) to make sure they felt they had full opportunity to express their opinions. Session results can also be biased by the tendency of one participant to dominate the discussion. In this instance, such a participant either takes up too much of the session's time expounding on his own ideas or imposes his views on the other session participants.

Finally, as mentioned previously, focus groups, when used to complement a survey or pretest, can actually add costs to a project. Therefore, it is important for researchers to carefully review their objectives and alternative ways of obtaining desired information before deciding to conduct focus groups.

## 2.4 THE DESIGN OF FOCUS GROUPS

There are no hard and fast rules governing focus group design. To date, the atmosphere has been an experimental one in which many new approaches have been tried. The following discussion reports the major design issues.

### 2.4.1 Planning With the Client

The first step in focus group design is to ensure that the entire project team completely understands the client's objectives. After these objectives are clearly defined, the team should prepare a list of questions, not to be asked in the focus group sessions but to be asked of the session results. Discussing this list with the client enables everyone to agree on specific goals before the study begins. In addition, a topical outline of major issues should be provided for the moderator so he can cover all the important points [Wells, 1979].

It is important that the moderator have a good understanding of the topic to be presented and the results needed from the session.\* Only in this way

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\*The moderator was a member of the project team for the sessions conducted for this project.

will he be able to structure his questions to focus on the session objectives and to recognize interesting (and relevant) threads of the conversation when they arise. Finally, prior to the session, the interviewer should take time to review what he plans to present [Payne, 1976].

#### 2.4.2 The Focus Group Moderator

The literature suggests that the moderator have several specific skills.\* Most important, perhaps, the moderator should have the ability to listen, relate to, and respect the participants. These qualities will enable him to establish the necessary rapport with the participants so that they feel comfortable and will readily express their opinions. Similarly, the moderator should also have the ability to blend with the respondents--i.e., to relate to the participants as part of the group. If he cannot immerse himself completely, the group may sense his detachment, and the session will be less successful.

The moderator also should have the ability to convey his complete understanding of the task--i.e., not just the focus group procedure or its topic, but why it is being conducted and how its results will be used. This broad sense of purpose will encourage the participants to trust and respect the moderator and will foster more productive discussions.

Further, the moderator should have a kind but firm personality, which will allow him to maintain his leadership without destroying group interactions, and he should be flexible enough to recognize and permit shifts in direction during the discussion without allowing it to wander aimlessly. Specifically, the moderator must be able to maintain the delicate line between oncoming chaos and occasions in which a participant begins to express something that at first may appear tangential to the analysis but may in fact open up new areas of exploration.

In addition to the traits discussed above, the moderator must also be capable of handling a variety of activities in the session. For example, he should be able to encourage unresponsive or inhibited group members to participate in the discussion. The moderator can accomplish this by assigning each member of a group a task to perform, by being especially sensitive to unrespon-

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\*See Axelrod [1979]; Bellenger, Bernhardt, and Goldstucker [1979]; Wells [1979]; and Calder [1977].

sive participants, and by providing an opening for their remarks whenever possible. However, shy or easily intimidated participants must be handled very gently, or the moderator's overtures toward inclusion could only further embarrass them and reinforce their reluctance to participate.

In addition, the moderator should be able to control dominant or troublesome respondents--"pests." There are two general types of troublesome participants that sometimes surface in a group--the genuine expert and the all-purpose expert. The first may inhibit others from expressing their own opinions by displaying superior knowledge of the focus group topic. (Good recruiting may help exclude these people.\*) The second type believes he is an expert at everything and continually tries to dominate the conversation, thereby preventing others from making a contribution. A moderator should try to control these types of respondents by pointedly letting them know he is also interested in others' opinions. If this is not sufficient to discourage them, he should try more drastic measures, such as looking bored and inattentive when they speak or actually cutting them off midstream by stating he would like to hear another opinion. In the sessions on hazardous wastes, the problem of pests was more prominent in larger groups because it was easier for the others to sit back and remain quiet. However, even in these instances the moderator was able to limit the problem by addressing questions to other members of the group.

The moderator should also be able to regulate interactions among the respondents to yield the best results. Specifically, a skilled moderator should be able to direct the discussion so that positive interactions are recognized, encouraged, and expanded and so that negative interactions are quickly headed off before they upset whatever group dynamic and willingness to participate may have been established.

Finally, the focus group moderator should also be capable of adopting and exploiting either of two styles, as appropriate: spontaneous and directive. In the spontaneous style, he merely guides the discussion and keeps it within areas of interest; he rarely participates. This method is designed

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\*Although experts can provide useful information, one-on-one sessions proved more productive for collecting this information from experts than focus group sessions did.

to allow more spontaneous interchange among the participants. In the directive style, the moderator maintains complete control of the discussion. This method requires him to follow a predetermined sequence of topics and to encourage the group to explore each topic, one at a time [Wells, 1979 and Axelrod, 1979].

During the course of this project, the team found that the spontaneous style was most effective with small, well-informed groups whose members knew each other prior to the session. The directive style was the last resort--used mainly to prod reluctant groups or to control those that were unable to maintain a sensible course in the discussion.

In addition to the design issues that are specific to the project team, the client, and the moderator, two other issues deserve attention. First, because the moderator learns from each focus group session and thus becomes more effective with each group, the same moderator should be used for all the sessions. This not only makes the most thorough use of the moderator's accumulative experience, but may also help eliminate inconsistencies in the results that could otherwise be caused by using several moderators with different skill levels.

Second, the project team should carefully consider the sex of their moderator(s)--a point made by both schools of thought in the literature (see Caruso [1979]). According to one school, using moderators whose sex is the same as that of the respondents in the session insures the rapport necessary for a successful focus group (e.g., see Axelrod [1979]). The second school believes that using moderators whose sex is the opposite of that of the respondents is necessary to insure that responses are sufficiently specific--the idea being that the respondents will not assume too easily that the moderator understands them and will, therefore, explain themselves more thoroughly.

Because the literature is fairly evenly divided between these two perspectives, choosing the sex of the moderator is difficult. However, the choice could be influenced by such factors as how the focus group topic, the socioeconomic background of the respondents, and the physical environment(s) selected for the sessions could affect the likely level and intensity of discussion. For example, when free and easy discussion is not anticipated, a "same-sex" moderator may help encourage shy participants to talk; when the focus

group topic requires detailed explanations from participants, an "opposite-sex" moderator might deepen the specificity of the discussion. Sometimes, of course, the question of the sex of the moderator is made irrelevant by the presence of participants of both sexes at the same session.

## 2.5 INSIGHTS FROM HAZARDOUS WASTE FOCUS GROUP EXPERIENCE

In conducting their focus groups, the project team followed the principles discussed above and found them to work quite well. Occasionally drawing on the literature, the following sections describe the project team's experience with respect to several important aspects of focus groups: the moderator, recruiting, session organization, equipment, physical setting, interview length, group size, and group characteristics, including the number of participants, their degree of acquaintance, their homogeneity, and the number of groups.

### 2.5.1 The Moderator

It was essential that the moderator be very well informed about the research team's objectives. This not only assured his picking up appropriate threads of the conversation but kept the research team members themselves (who were there as observers) from interrupting the session when they felt an important point was not being emphasized. Having anyone from the research team other than the moderator ask questions in a session was very disruptive and hurt the moderator's rapport with the participants. Although the ideal moderator would possess all the skills discussed above and be able to perform all the activities described, it is unrealistic to expect any one person to possess all of these attributes. At the very least the research team found the best moderator to be knowledgeable, likable, and empathetic.

The six rounds of focus groups conducted for this project used both styles of interviewing. The first round comprised very general discussions around a few major topics. In this case the spontaneous style of interviewing by an impartial moderator worked very well. Participants interacted primarily with each other, thus generating new ideas and additional discussion. The remaining five rounds used the more directive style of interviewing. In part, this style was used because of the controversial nature of the topic, which required control to keep the participants on track.

In addition, in the last five rounds, the research team moderated its own sessions--a major deviation from the procedures suggested in the literature but required by this project's atypical use of the focus group. Because the participants' responses to very specific topics would later be transferred to a contingent valuation survey questionnaire, the project team decided it needed to use moderators extremely knowledgeable of the issues in survey development--people who would be directly involved in writing the survey questionnaire and who possessed the personality traits listed above. Thus, the focus group sessions were "self moderated" at the risk of introducing bias into their results. However, it was felt that this did not present an insurmountable problem.

Due to scheduling constraints and the sizable number of sessions it was necessary for the research team to use different moderators in a few of the sessions in Round 1. This procedure is not recommended. Moderators do in fact gather quite a bit of experience as the sessions proceed, and the best results come from using the same moderator throughout a round. Additionally, using the same moderator gives the sessions more or less the same framework and makes it easier to organize the session results.

Finally, the research team reached no definitive conclusion on the importance of a moderator's sex. In a few sessions composed primarily of women the team thought that had the moderator been female there would have been greater empathy between the moderator and the participants, resulting in less reluctance to speak. However, the research team did not have the opportunity to test this hypothesis.

### 2.5.2 Recruiting

Careful recruiting of participants coupled with a skilled moderator are the keys to successful focus groups. The literature suggests adhering to the following two principles in recruiting focus group participants [Axelrod, 1976]:

- Concentrate on the portion of the population that will give you the most meaningful information. This is particularly important because of the small sample size.
- Be careful to avoid participants that have participated in a lot of focus groups. These people might be showoffs and know-it-alls who may disrupt the session. They also could bias the results.

The research teams' objective in using focus groups was to reach portions of the population that in past studies have had difficulty in responding to complex surveys (see Mitchell and Carson [1981] and Desvousges, Smith, and McGivney [1983]). In addition, they wanted to examine the differences between people who had some experience with hazardous waste issues (e.g., lived in a community that had a water contamination incident) and those who did not. Therefore, it was particularly important that participants be carefully recruited.

The research team found it best to work with established groups or associations in geographic areas having the desired types of participants. The best method was to find a contact person in a community who could suggest groups that might be willing to participate in exchange for a \$100 contribution to their organization. Suggestions usually included senior citizen associations, garden clubs, church groups, and volunteer associations or organizations such as the local Heart or Diabetes Association or the League of Women Voters. The research team then could assess this list and decide which groups would provide the most appropriate participants. Working with groups made the tasks of recruiting and ensuring attendance much easier than they would have been with individual participants.

The next step was to find a contact person within each of the potential groups. This was often the club president or the group's paid coordinator. This person was the key to recruiting a successful focus group, and the research team worked very hard to establish good rapport with him. This person had to be someone with whom the team members could talk frankly about the kinds of people they were looking for and the objectives of the sessions. The contact person could then assess whether or not his group was appropriate at all and, if so, which members within the group should be asked to participate in the session. It was extremely important that this person be thoroughly briefed about the meeting and the Research Triangle Institute. Often they were sent supplementary materials about the project.

The research team asked only that the group contact person supply a mailing list, emphasizing that they wanted him not to go to any more trouble. The project team members would then work from the mailing list, inviting by letter approximately double the number of participants they wanted for a

group. The letters briefly stated the focus group concept, the purpose of the discussion, how long the session would last, where it would be held, that refreshments would be served, and that their organization would be compensated for their members' participating in the discussion. This letter was followed with a telephone call several days later (and just before the session) to remind the potential participants about the meeting, to assess the number that would attend, and to answer any questions. After the session, each participant was sent a note thanking him for his attendance.

Although the recruiting process could continue as just described without any further help from the group contact person, his help was often invaluable. For example, because the delicate and controversial topic of the focus groups often made potential participants very suspicious, particularly where the Research Triangle Institute was unknown, the group coordinator was often instrumental in allaying participants' fears. On their own, group contact persons frequently called prospective participants to spark their interest and suggest their attendance. In other instances, they merely made themselves available to answer the questions of wary potential participants, conveying to them their assurances and more complete knowledge about the meeting and the Institute.

The procedures outlined above evolved as the project progressed, and the team made many mistakes in the early rounds. In addition to cautions described above, the following also should be noted:

- Always make sure you are dealing with the person of authority when recruiting a group. This will avoid unnecessarily stepping on any toes.
- Always describe who you are and what the purpose of the group is in the invitational letter. This makes potential participants take the invitation more seriously, allays some preliminary suspicions, and reduces the number of calls and questions you will receive.
- Never get overzealous in your desire to recruit inexperienced participants. The focus group participants must still possess several characteristics--opinions on the subject you want to talk about and a willingness to express those ideas. Without that, the results of the session are not fruitful, even if you are working with one of the populations of primary interest.

### 2.5.3 Organizing the Session

The moderator opened with remarks that discussed the scope of the session and introduced the research team and the topics to be covered. Included in these remarks was an explanation of the tape recorder that invariably was on the table to record the discussion. Next, the moderator asked each person to introduce himself and briefly tell something about his life. This ensured that each participant would speak at least once about something he knew well. It also puts on tape relevant information about the composition of the group and sets up a good rapport between the participant and moderator [Axelrod, 1979].

During the focus group sessions, the project team found that where participants sit can make a difference. In particular, those seated across from the moderator have the most eye contact and tend to participate more than others; those directly to the moderator's right or left tend to participate less [Wells, 1979]. However, the project team found the suggestions in the literature concerning participant placement both unnecessary and difficult to follow since troubleshooting participant personalities at the outset of the meeting was difficult, if not impossible.

The project team members found the introductory parts of the sessions to be critical. The moderator could break the ice, begin to establish some rapport, and reduce the apprehensions of wary participants. Also, the use of name tags, which allowed the moderator to address all participants by name, was helpful. This added an informal and familiar air to the session and made the participants feel more comfortable.

### 2.5.4 Recording Equipment: Suggestions

Payne [1976] and Axelrod [1976] suggest that participants will rarely object to a session's being tape recorded. They feel that when the machine is treated routinely, its obvious presence has no notable effect on the conversation and respondents will forget it is there. In almost every session, the research team found this to be true. As long as its presence was adequately explained at the beginning of the session, participants were not disturbed by the recorder. However, it is important to remember the following:

- If there is any loud background noise such as an air conditioning unit or even a nearby highway, the conversation will be extremely difficult to hear on the tape. Therefore, at least one member of the research team should take notes during the session. This also helps in recalling particular points of importance if several days elapse before a session is transcribed.
- If participants explain their points by using gestures or other nonverbal communication (such as by holding up handouts that had been distributed to them during the session), these efforts must somehow be made audible (i.e., verbally restated) for recording on tape.
- Always set up the equipment prior to a session to ensure you know how to use it. This is especially important if the equipment is rented.
- Use good quality tapes, and keep extras on hand. The session tapes often undergo rigorous use. Good tapes break less easily.
- Carry a backup cassette recorder just in case the main recorder fails. It is impossible to recall all the specifics of a session without its having been tape recorded. Therefore, it is a good idea to anticipate all potential contingencies--i.e., battery or electrical failure. Also, in several cases the research team had uninvited participants come to a session. It was then necessary to split them into a separate discussion group. Having a backup recorder enabled the team also to record the auxiliary session.

#### 2.5.5 Setting

There is no consensus on the best setting for a focus group. Axelrod [1979] asserts that the most informal setting, i.e. the interviewer's home, is the best place to hold the meeting. She advocates not sitting around a conference table but, rather, using comfortable arm chairs and couches. However, Wells [1979] cautions about the inconveniences of such a setup (i.e., unexpected interruptions such as the telephone's ringing or participants' fumbling with clipboards, pencils, coffee cups, and other paraphenalia). He suggests using a more formal setting with a conference table because it gives the participants something to hold onto. Payne [1976] suggests that setting is less important than the tone of the meeting.

The research team experimented with several different settings and found the more formal one to be the best. This setting involved locating a session

in a meeting room participants were familiar with and providing them with pencils, paper, water, and name tags. Perhaps because of the nature of the topic, participants preferred this more serious approach. They also liked the fact that the team had gone to some trouble to set up the session and to provide them with materials. It appeared that the more formal atmosphere made participants feel both that they were going to learn something and that their opinions were valued by the research team. Sitting around a conference table did in fact provide participants with something to hold onto in the early parts of the session when they felt less secure.

The one group conducted in a participant's home did not work well. Unlike the sessions held in designated meeting rooms that the research team could visit and troubleshoot before a session, there was little that could be done to anticipate the difficulties that arose in the participant's home. For example, the room was not large enough for the screen and projector necessary for the research team's presentation. Additionally, in the more informal atmosphere, some of the participants felt it was acceptable to bring their children, and some even brought friends that had not been invited to the session. Thus, there were many disruptions, and the room was overcrowded. These problems arose because the group contact person did not clearly identify the nature of her group and the informality of their sessions. However, even under these adverse circumstances, several participants raised key unanticipated points about hazardous wastes.

Finally, participants appreciated the refreshments provided at the sessions and the fact that the research team had formally arranged them--i.e., used tablecloths, punch bowls, and flower arrangements. This expression of appreciation made the participants feel their comments were valued. Although catered refreshments may have seemed less friendly than home-made pastry or hand-carried bakery items, they made arrangements for the project team much easier, especially in out-of-town sessions.

Wells [1979] also suggests that it is not a good idea to have session observers who are visible to the participants. Many sources advocate using rooms equipped with two way mirrors. However, the research team had little trouble with having observers in the room as long as they were quiet. Nevertheless, it was important for the observers to mix with with participants at the break.

### 2.5.6 Length of Session

The literature suggests 2 hours as the outside time for a session [Payne, 1976]. It also cautions against underestimating the interview time to the participants when setting up sessions. The research team found this to be good advice and experimented with several ways of organizing the session within this time frame. Having a break midway through the 2-hour session seemed to work best. On several occasions, especially in the final sessions when participants were particularly wound up about the topic and did not feel that they had sufficiently responded to the presentation or the issues at hand, they were willing to remain for longer than 2 hours. Indicating that the session's designated time was up and giving participants the opportunity to leave if they wished seemed to work well in this situation. However, it was rare for a participant to leave in such cases.

### 2.5.7 Number of People

Most researchers advocate group sizes between 6 and 10 participants (e.g., Wells [1979], Payne [1976], and Fern [1982]). Groups much smaller than this tend to provide less stimulation among group members. On the other hand, when groups are too large they tend to be difficult to manage, and some valuable participants may be less inclined to speak [Fern, 1982; Payne, 1976; Wells, 1979].

The research team found these assertions to be correct, with an optimum group size of 8 people. However, if a very vocal group was expected, 6 participants was an even better size. This allowed everyone the chance to express their opinions fully and react to the important questions. On a few occasions more participants than were expected decided to attend. Although good comments were still provided in these groups, the issues could not be explored in as much depth as the research team would have liked. Additionally, many participants were reluctant to speak in a group of this size and the sessions were more apt to be dominated by a few of the more vocal participants. In retrospect, when overrecruiting yields greater attendance than desired (which was not uncommon in this project due to the interest in the topic being discussed), the research team advocates either apologizing to potential participants and indicating that the maximum group size had already been

reached or holding an additional session to accommodate the overflow. Groups larger than 10 are unwieldy.

#### 2.5.8 Degree of Group Acquaintance

There is no definitive conclusion among researchers on whether or not it is advantageous for participants in a focus group to know each other. Payne [1976] cautions against participants knowing each other because she feels discussions among friends may produce homogeneous opinions. She also suggests that friends who converse with each other daily may be less candid in their comments. Wells [1979] suggests that the assets and liabilities associated with group acquaintance balance out.

The research team found it very advantageous for participants to know each other. It lent a friendly and informal atmosphere to the discussions and appeared to make people less self-conscious about expressing their opinions. In fact, in the recruiting stages, participants often wanted assurance that they would know several people in the group before they agreed to attend. They were most relieved when they discovered that they would know everyone in the group and much more inclined to participate.

#### 2.5.9 Group Homogeneity

There is no conclusive opinion among focus group experts as to whether or not groups should be homogeneous. The research team experimented with both kinds of groups. They found that when differences in age, place in the family cycle, and income were mixed in a group, interesting discussion occurred that might not otherwise have taken place. However, it was also effective to have homogeneity within groups and several groups of different compositions. In this way one does not risk having the more vocal participants overwhelm older, younger, or less educated people who might be intimidated or have had less exposure to the subject. Similarly, groups composed entirely of one sex (male or female) can sometimes have more productive group discussions than groups of both sexes, though this is certainly not always the case. The research team advocates having a mixture of both kinds of groups. The research team also found it advantageous to have two groups of homogeneous respondents to gauge the similarity of their responses.

### 2.5.10 Number of Groups

The literature suggests that a great deal is learned from the first interview when an unfamiliar topic is being presented. The second interview yields even more, but not all of it will be new information. Usually by the third and certainly by the fourth most of what is said has been said before [Calder, 1977 and Wells, 1979]. The research team found these assertions to be true. More than four groups per round was unnecessary. In addition, they found it extremely important to leave sufficient time between rounds to make adequate changes in the materials and presentation. This was not done between the third and fourth rounds, and as a result the presentations were not sufficiently different to yield the maximum amount of information.

## 2.6 SUMMARY SUGGESTIONS

Based on their experiences, the research team can offer several summary suggestions:

- An initial evaluation should be held immediately after a session. In this way the sessions' major advantages, disadvantages, and analytical points are still fresh in everyone's mind. This assists in changes to be made in subsequent sessions as well as in the preparation of the final report.
- There should be some continuity from one session to the next in the questions that are asked. This allows consistency across groups and rounds in the final analysis.
- Although costly, the sessions should always be taped and transcribed. The team found that the clearest way to report group findings was by using direct quotes. Citing the important quotes and adding descriptive text around them is the most efficient way to report group results.
- Groups should be kept small--8 people should be the maximum.
- Refreshments and structured settings improved the discussions.
- Session observers and tape recorders have little impact on quality of group discussion.
- The moderator should be flexible, yet firm, and knowledgeable, yet unbiased, to ensure the highest quality discussion.
- Planning and agendas for discussion are useful.

- Civic, religious, and volunteer associations are good sources of participants.
- It is necessary to offer an organization or association some compensation for their participation in a focus group session. An amount of \$100 is sufficient to both stimulate the organization's interest in participating and induce the group contact to assist in setting up the group.



## CHAPTER 3: THE USE OF FOCUS GROUPS TO DEVELOP A QUESTIONNAIRE TO MEASURE THE BENEFITS OF HAZARDOUS WASTE MANAGEMENT REGULATIONS

As noted earlier, this report describes the results of 19 focus group discussion sessions held in North Carolina and Massachusetts during the Spring and Summer of 1983. Though it contributes in several ways to the focus group literature and to a general understanding of the risks associated with hazardous wastes, this research also is part of a much larger effort to assess the benefits of hazardous waste management regulations using the contingent valuation survey approach. In particular, the focus group discussion technique provided a controlled but candid environment for informal group conversations during which the project team could gather specific types of attitudinal, perceptual, and linguistic information--much of which could not be obtained any other way--that would help them develop an effective contingent valuation survey questionnaire--one that would not only ask the right questions, but ask them in a manner that respondents could readily understand. Given the complex and controversial nature of the survey's subject--individuals' willingness to pay to reduce the risks associated with hazardous wastes--the information sought during the focus group sessions was indeed critical both to the effectiveness of the questionnaire and to the success of the overall goal of estimating the benefits of reducing hazardous waste risk.

### 3.1 GUIDE TO THE CHAPTER

Concentrating primarily on the mechanics of developing the contingent valuation survey questionnaire, this chapter summarizes what was learned--and how it was learned--during each of the six rounds of focus group discussion sessions.\* Specifically, Section 3.2 briefly summarizes the essential findings,

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\*Where necessary to ease the exposition, we have lightly edited the participant quotations that appear in the following sections. To consult the unedited quotations, see Desvousges, Smith, Brown, and Pate [1985], which contains more detailed descriptions of each of the focus group sessions.

underscores the difficulty--and the importance--of effectively presenting information on risk, and outlines the issues of contingent valuation survey questionnaire development. Section 3.3 describes the chronological development of the vehicle used to communicate probabilities in the questionnaire; Section 3.4 highlights the information about hazardous wastes provided to all respondents to help frame the commodity; and Section 3.5 supplements the description of the framing issues by describing exposure pathways and the payment vehicle. Section 3.6 describes the role of perceived risks, its relationship to distance, and how they are included in the survey; Section 3.7 outlines the development of the hypothetical situation (or "vignette" in survey research jargon) that was used to complete the framing of the commodity; and Section 3.8 summarizes general findings from the focus group research effort.

### 3.2 OVERVIEW: FINDINGS AND ISSUES IN QUESTIONNAIRE DEVELOPMENT

In almost every instance, the focus group participants provided crucial information for the survey questionnaire development process, including both substantive and editorial comments that resulted in substantial revisions to the survey instrument. Many of the suggestions surprised the project team. For example, participants found simple examples of everyday risks useless for thinking about hazardous waste risks. In addition, while they found circles (or probability wheels) the easiest vehicle for communicating hazardous waste risks, the project team found that a risk ladder was more successful in eliciting responses about their perceived risks. Also somewhat of a surprise was that participants found the visual aid used to link the risk ladder and the probability wheels more confusing than helpful. Less surprising was the willingness of participants to provide explicit, detailed criticisms of the visual aids and other survey materials.

All of these findings relate to the key element in this chapter--the difficulty of presenting information about risks to the general population. This task was at the heart of the focus group research effort because the highest priority was finding an adequate way to "frame" (i.e., discuss and put in context) the hypothetical commodity that ultimately would be valued in the contingent valuation survey. The commodity to be framed in the survey is a change in the risk of exposure to hazardous wastes and a corresponding change in

the risk of a resultant effect, or death.\* In effect, therefore, the project team had to convey information about a commodity or event that might or might not happen.†

Communicating the commodity itself is only one element in framing the hypothetical commodity for a contingent valuation survey. It is also necessary to provide a specific context for the commodity--in this case, a context to explain how the exposure risk would arise, how it would be affected by government regulations, and how people would "pay" for reducing the risk of exposure (the "payment vehicle" in technical jargon). Once the respondent is given this information (i.e., the hypothetical commodity, the hypothetical context, and the hypothetical market), he is asked to complete the valuation task, during which he is asked to reveal his willingness to pay for the hypothetical commodity.

Researchers have used many different formats to elicit willingness to pay in the valuation task. They have tried asking the respondent directly (Desvousges, Smith, and McGivney [1983]) and have used iterative bidding games (Randall, Ives, and Eastman [1974]; Rowe, d'Arge, and Brookshire [1980]; Schulze, d'Arge, and Brookshire [1981]; and Desvousges, Smith, and McGivney [1983]). They have used cards with payment amounts and anchors based on average expenditures for other kinds of public goods (Mitchell and Carson [1981])--e.g. fire protection--and have tried rankings of specified payment levels matched with levels of the hypothetical commodity (Rae [1981a], [1981b]; Desvousges, Smith, and McGivney [1983]). Based on past experience, the project team chose to evaluate the direct question and the ranking formats in the focus groups because they represented two extremes in terms of the amount of information provided for the respondent: no information in the direct question format and a great deal of information (including specified payments) in the ranking format. Finally, these two formats also avoid the prob-

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\*Other nonlethal health effects are possible from hazardous waste exposure. For simplicity the single effect of death was chosen because it is easier to define than a particular severity of a specific illness.

†Brookshire, Cummings, et al. [1982] found that their willingness-to-pay bids were very sensitive to the changes in the framing of the hypothetical commodity.

lems caused by choosing the various starting points necessary in the iterative bidding game format (see Mitchell and Carson [1981] and Desvousges, Smith, and McGivney [1983]).

### 3.3 PROBABILITY

#### 3.3.1 Introduction

The need to explain the probabilistic nature of hazardous waste risks was evident from the outset of the project. Previous research has identified many pitfalls. Hershey, Kunreuther, and Schoemaker [1982] have found considerable variation in individual preferences for uncertain outcomes depending on how probability is presented. These findings are echoed by Tversky and Kahneman [1981] and Fischhoff, Slovic, and Lichtenstein [1982]. Unfortunately, the literature is devoid of information on how best to present probabilities. Acton [1973] uses bar charts to show alternative risk levels but did not evaluate the effectiveness of this vehicle. Jones-Lee [1976] and Frankel [1979] use complicated representations of probability distributions, and Loomes [1982] expresses probabilities as so many deaths per 100,000 members of the population. He finds significant differences in preferences with this measure depending on the equity implications implied in the presentation. Slovic, Fischhoff, and Lichtenstein [1978] use the probability numbers (percent measure of risk in some time period) in their research on accident probabilities and seat belt usage.

Selvidge [1975] provides both cautions and insights. She cautions that "asking someone who has not worked a great deal with very small probabilities to make such distinctions is analogous to asking a member of a stone-age tribe to make judgments about lengths of time" [p. 200]. Her insights are that individuals can be acclimated to the task by working them through specific hypothetical situations, then asking for probability information or an evaluation in relative terms. She also suggests the use of some kind of visual aid to highlight probabilities. Specifically, she recommends an urn filled with balls of one color and one ball of a different color. (This is analogous to the visual aid used by Schoemaker [1982] in his research.) However, two important factors limit the applicability of Selvidge's research to the project team's task: she was working with experts to encode probabilities, and she was not con-

ducting her experiments in a person's home (as is the case in the contingent valuation survey).<sup>\*</sup> Therefore, the project team adapted the idea of using circles, or probability wheels, from risk assessment research, during which experts were asked to encode the probabilities for different risky situations. Wallsten [1983] was instrumental in explaining the workings of the vehicle and how it has been used in the past.

### 3.3.2 Overview

It was apparent from the focus groups in Round 1 that participants would have difficulty thinking of hazardous wastes as numerical risks or probabilities even though they frequently showed a good intuitive understanding of risks and hazardous wastes. It was also apparent there would be a wide range of understanding of the probability concept among participants. Some people appear to naturally think of risk in terms of probability while others do not. For example, in answer to the question "How do you think about risk?" one participant responded as follows:

There are certain degrees of risk. If the chance of your being harmed and taking the risk is very small, then of course, you really don't consider it a risk. For instance, 1/1,000th, that's a good probability. In other words, your chances of making it are 999 out of 1,000. Most of the time, you would take that risk. Whereas in Russian roulette, there are only six cylinders, you've got a 1/6th chance. That's pretty high and anybody's kind of stupid to try anything like that. And taking my drinking water, when you consider the fact that the body is capable of having certain wastes and the fact that, if the water has been purified to some extent, then the chances of your taking water and living, of course, is very great. . . In fact, you don't even want to look at it if it's much more than 50 percent. You want to look at least 75 percent or 80 percent.

These different levels of understanding caused difficulty both in presenting probability to the focus groups and in explaining it within the questionnaire.

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<sup>\*</sup>The project team's experience with risk is an interesting contrast with their experiences with water quality (see Desvousges, Smith, and McGivney [1983]). When the water quality questionnaire was developed, Mitchell and Carson [1981] already had conducted a large-scale survey using a ladder to represent different water quality levels tied to recreational uses of water. Thus, the framing of the hypothetical commodity was a much easier task. Brookshire, Cummings, et al. [1982] in their contingent valuation study specified the commodity as a regulation and not as a risk.

To increase the understanding of probability among the focus group participants, the research team decided to cite examples of risky events that participants might face in their everyday lives and began to use circles with shaded slices along with these examples to indicate the chance outcome for these risky events. Later, when participants were asked to perform the contingent ranking, circles were again used to convey the chances of exposure to and effects from hazardous wastes. It was hoped that participants would link what they learned in the general probability presentation to the contingent ranking task, where they were asked to make payment decisions based on the probabilities of reducing exposure risks.

### 3.3.3 Round 2

In the first round of focus groups that included a presentation, Round 2, probability was explained using two circles.\* The first circle represented the risk of exposure, and the second, the combined risk of exposure and effect. Simple examples of risky events such as "rain," "IRS audit," "fishing," and "car accident" were listed beside the exposure circle, and the effects--"get wet," "pay more money," "catch a fish," and "get hurt," respectively--were listed beside the combined risk circles. Each circle had a different portion shaded to indicate the probability of the events' occurring. A copy of the transparency used in the presentation is included as Figure 3-1.†

In the ranking exercise, four cards (Cards A, B, C, and D) were used at first. The possible probabilities of exposure were 8/360, 6/360, 4/360, and 2/360. In the last two sessions of the first round, two additional cards (Cards E and F) with exposure probabilities of 1/360 and 25/360 were added. The risk of effect was always 4/360. In this round, a circle showing combined probability--the risk of exposure times the risk of effect--was not included. The cards used in Round 2 have been included as Figure 3-2.

There were many problems with the presentation described above. First, participant comments indicated that the shaded circles did not do a good job

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\*Focus groups conducted in Round 1 comprised only a general, spontaneous discussion of general topics related to risk and hazardous waste and, therefore, did not include a presentation using visual aids.

†All figures in this chapter have been significantly reduced from their original size.

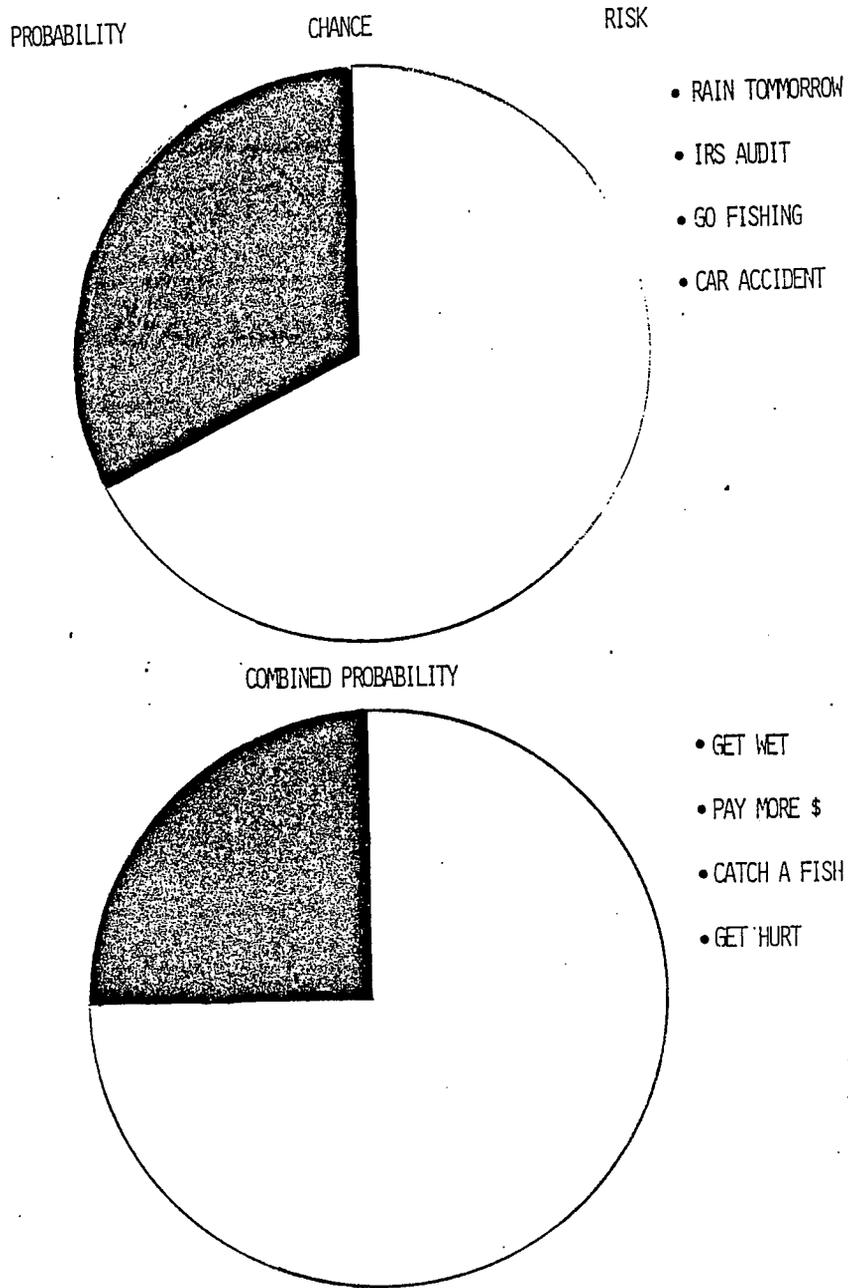
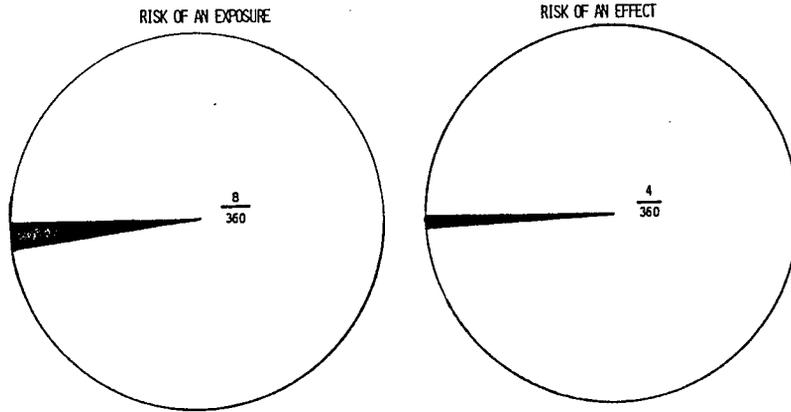


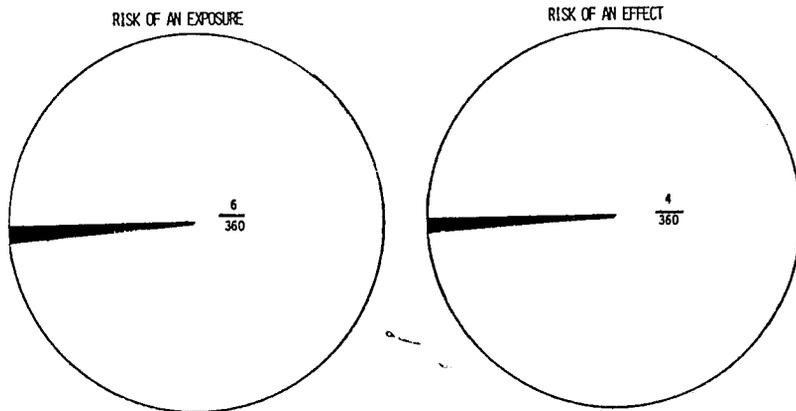
Figure 3-1. Probability circles indicating exposure risk and combined risk of exposure and effect.

CARD A  
HAZARDOUS WASTE RISKS



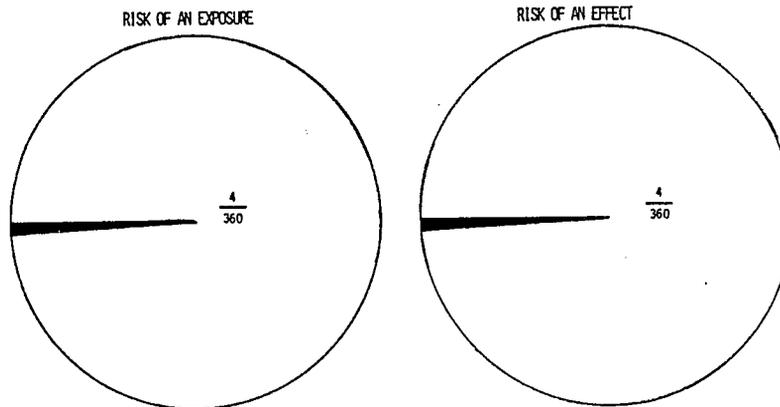
PAYMENT REQUIRED: \$25 PER YEAR IN HIGHER PRICES AND TAXES

CARD B  
HAZARDOUS WASTE RISKS



PAYMENT REQUIRED: \$50 PER YEAR IN HIGHER PRICES AND TAXES

CARD C  
HAZARDOUS WASTE RISKS

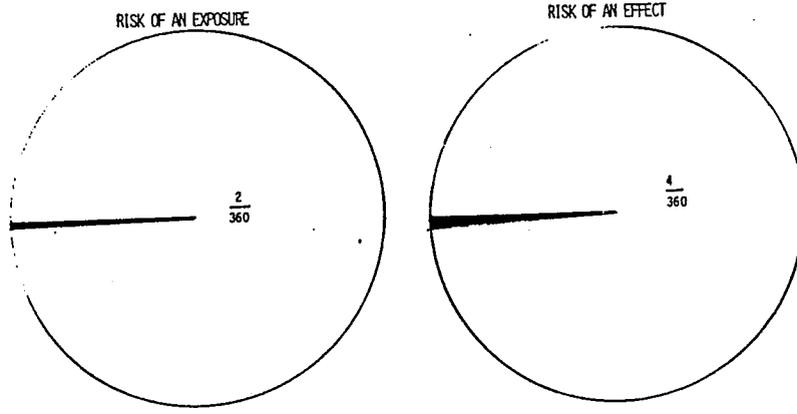


PAYMENT REQUIRED: \$100 PER YEAR IN HIGHER PRICES AND TAXES

Figure 3-2. Probability circles with various combinations for risk of exposure and effect.

CARD D

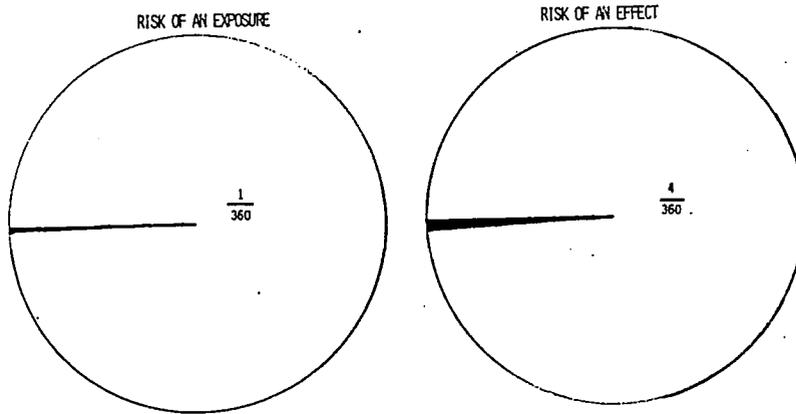
HAZARDOUS WASTE RISKS



PAYMENT REQUIRED: \$175 PER YEAR IN HIGHER PRICES AND TAXES

CARD E

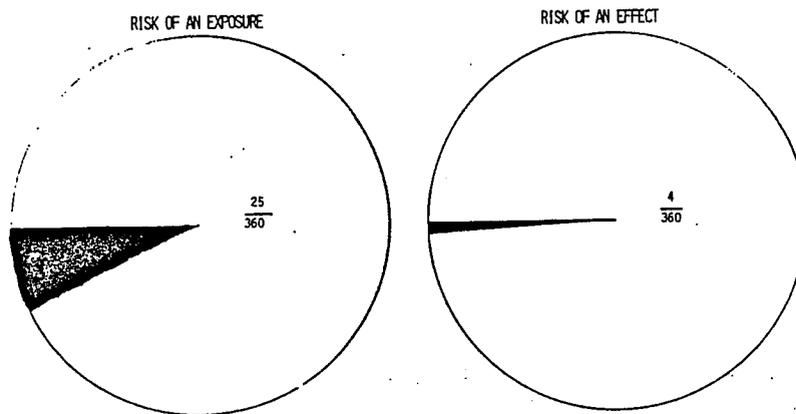
HAZARDOUS WASTE RISKS



PAYMENT REQUIRED: \$400 PER YEAR IN HIGHER PRICES AND TAXES

CARD F

HAZARDOUS WASTE RISKS



PAYMENT REQUIRED: \$0.00 PER YEAR IN HIGHER PRICES AND TAXES

Figure 3-2 (con.).

of relating the idea of chance. Adding spinners to the circles was suggested by many participants as a way to improve them as vehicles for relating chance.

Second, participants indicated they did not understand how the combined probability was formed. They were not perceiving either that the chance of exposure and the chance of effect were separate, independent events or that the combined probability was the result of multiplying the exposure by the effect probability. This was true in both the simple probability explanation and in the contingent ranking task, with different levels of understanding frequently appearing within all groups:

Question: How did you react to the discussion of the idea of chance of exposure and then chance of risk?

The risk of exposure is greater than the risk of effect?

You could be exposed to a certain type of food and it affects some but not others.

We can be exposed to many, many things but according to your own conditions, what would affect you individually you might not get. For example, you might be in a room with chicken pox and only one person get it.

Question: What did you think of the process of having to rank cards?

You thought about if you got exposed you were going to be affected at some point. That's for sure. Regardless of the amount of exposure, you're still going to get some effect.

After this round, the project team hypothesized that participants would have the easiest time determining willingness to pay for hazardous waste management regulations if they were given very explicit information about probability. Participant comments in this round support this hypothesis.

Third, with the exception of fishing, the simple examples were easy for the participants to understand:

The fishing didn't fit. Everything was a negative effect except for fishing. That was positive. The other examples all seemed like things you had control over.

However, participants did not find the simple examples of risk helpful in understanding the chances of exposure and effects from hazardous wastes. They

indicated that the attributes of everyday chances were so different from those of hazardous wastes that one did not help explain the other:

There were too many examples preceding the hazardous waste example.

I understand the examples of the chance of rain, etc., but I don't understand the great relationship between your chance here and our deciding which is the best order to rank the cards in.

In ranking the cards you go through a process of reasoning which is different from that of the simpler examples, like the chance of rain.

Finally, participants had trouble believing that the hazardous waste exposure probabilities were real. In general they felt they were too small:

I wondered if what you were presenting was unbiased because of the extremely small chance of being exposed to hazardous wastes. I wondered if you were trying to program the results.

#### 3.3.4 Round 3

For Round 3, the research team expanded the probability presentation to include three circles: an exposure circle, an effect circle, and a combined risk of exposure and effect circle. This change was made to address the participant's need in the previous round for a better explanation of how the combined probability was formed. In addition, it was hoped this more explicit probability presentation would help participants understand both that the risk of exposure and the risk of effect are independent events and that the probability of an effect is conditional on a given level of exposure.

In this round, the research team added more descriptive titles to each of the three risk circle cards. Instead of just displaying the words chance, probability, and risk, the exposure card now included the title "What Will Happen?" and the effect card included the title "What it Means to You." Also, the example of fishing was excluded, but the examples of "rain," "IRS audit," and "car accident" were still used to illustrate effects. The card entitled "What it means to you" included the results "be outside," "make a mistake on return," and "glass breaks," respectively. The third circle included the combined risks--"that it will rain and you get wet," "IRS audit and pay more money," and "car accident and get hurt." It was hoped these changes would

make it easier for each participant to relate to each circle. In addition, due to the suggestions of the first groups, spinners were added to the circles. Copies of these circles are included as Figure 3-3.

Finally, there were five cards (Cards A through E) in the contingent ranking exercise with exposure risks of 4/360, 6/360, 2/360, 1/360, and 25/360. The risk of effect was still 4/360 and the risks were not combined explicitly. These cards are included as Figure 3-4.

Participants still had difficulty understanding probability even after these changes. The spinners seemed to do little in helping them to understand chance:

He was telling you that there's a certain amount of the stuff you're going to get irregardless.

Without a dumpsite you are still going to get your share.

In addition, adding the third circle in the explanation section did not seem to help participants understand how the combined risk circle was derived; instead, they focused on the fact that the effect probability did not change in the ranking cards:

No matter how much money you spend, the effect's the same.

The effect is the same on all of them, so why should I pay \$400 a year for something my risk of getting an effect from it is the same as if I pay nothing?

Moreover, participants' comments also indicated they still did not understand exposure and effect as independent events or effect as being contingent upon first being exposed:

Question: Why do you think the risk of effect stays the same and the risk of exposure changes?

I didn't notice.

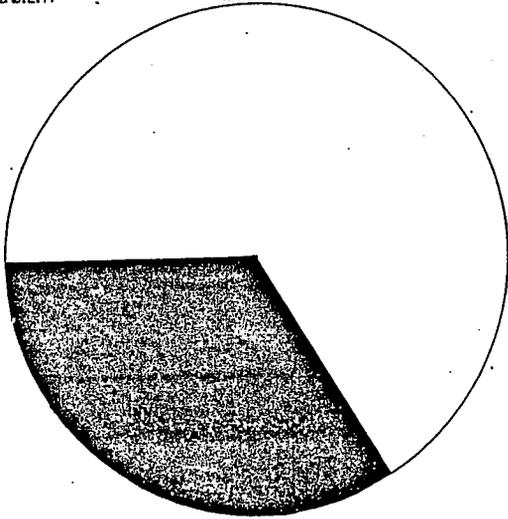
Obviously everyone exposed won't be harmed, some will, some won't, but here's one, one out of 360 exposures and 4 out of 360 the risk of effect, can't understand that, three of them got it that wasn't even exposed.

Finally, participants in Round 3 infrequently felt that the probabilities were too small. Rather, they indicated that they didn't perceive enough of a difference between them to affect their payment decisions:

PROBABILITY

RISK

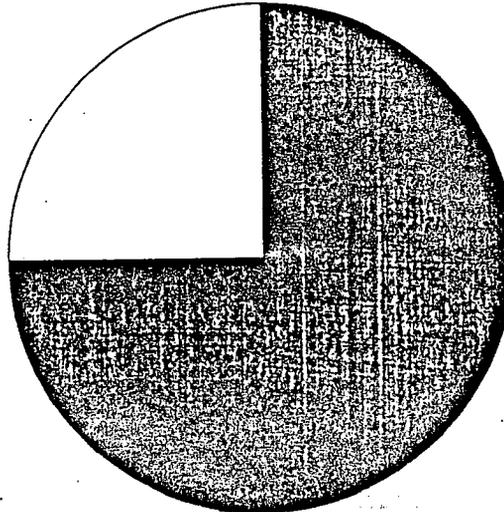
WHAT WILL HAPPEN:



- RAIN TOMORROW
- IRS AUDIT
- CAR ACCIDENT

RISK

WHAT IT MEANS TO YOU?

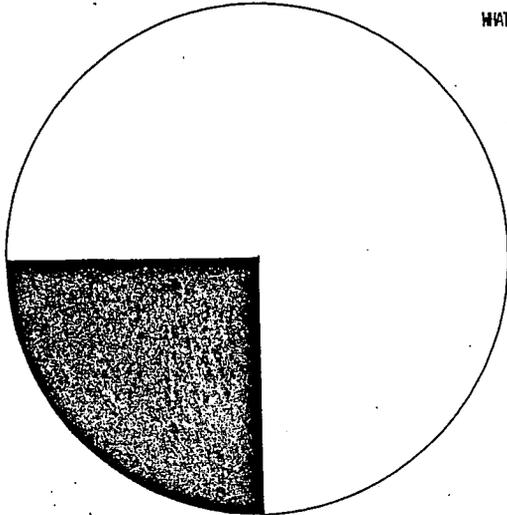


- BE OUTSIDE
- MAKE A MISTAKE ON RETURN
- GLASS BREAKS

(COMBINED RISK)

WHAT WILL HAPPEN

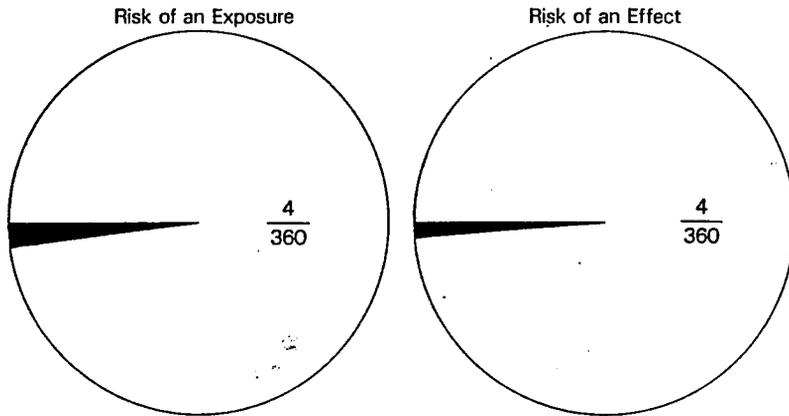
WHAT IT MEANS TO YOU



- RAIN & GET WET
- AUDIT & PAY MORE \$
- CAR ACCIDENT & GET HURT

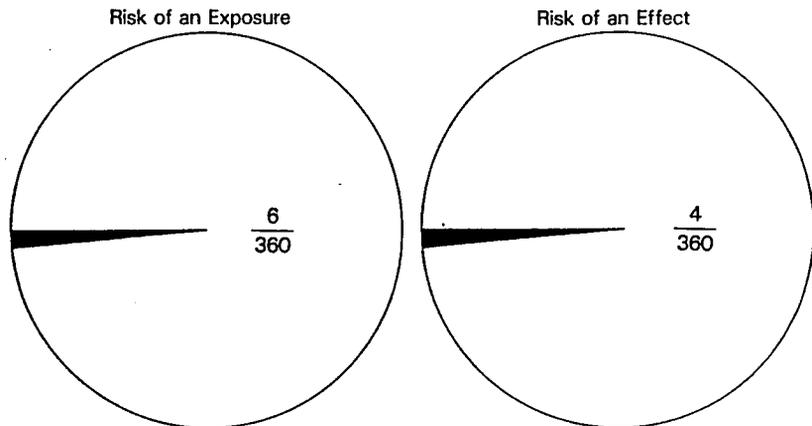
Figure 3-3. Probability circles separating exposure, effect, and combined risk of exposure and effect.

**Card A**  
**Hazardous Waste Risks**



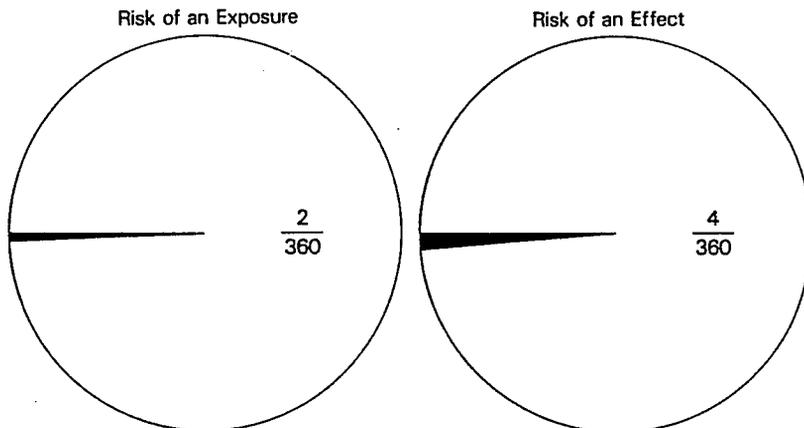
Payment required: \$50 per year in higher prices and taxes

**Card B**  
**Hazardous Waste Risks**



Payment required: \$100 per year in higher prices and taxes

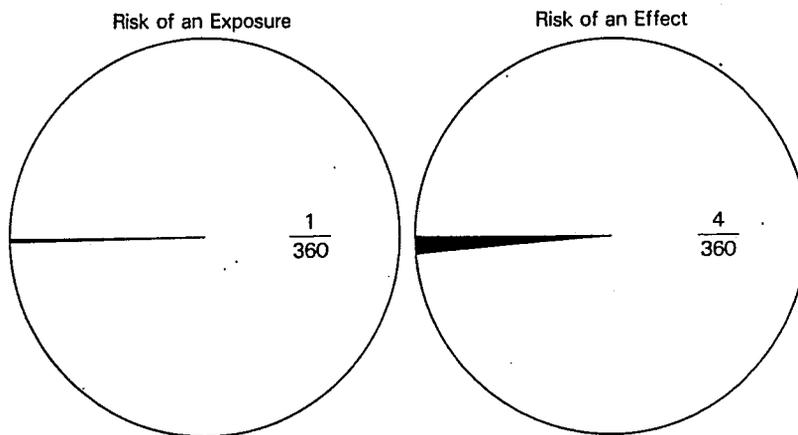
**Card C**  
**Hazardous Waste Risks**



Payment required: \$175 per year in higher prices and taxes

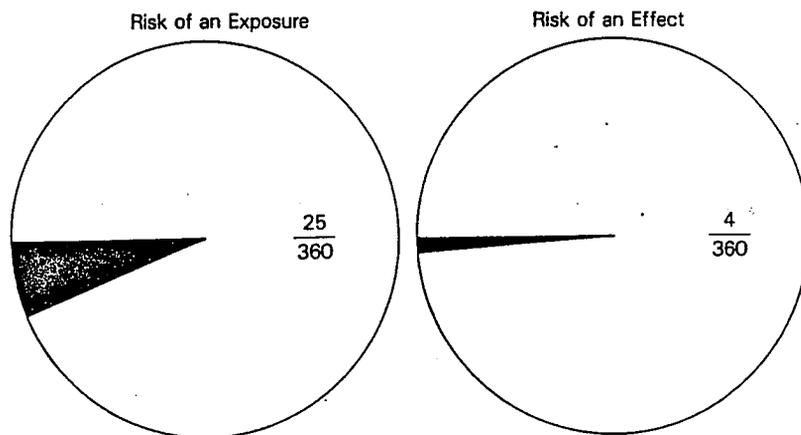
Figure 3-4. Circles used for Round 3 probability presentation.

**Card D**  
**Hazardous Waste Risks**



Payment required: \$400 per year in higher prices and taxes

**Card E**  
**Hazardous Waste Risks**



Payment required: \$0.00 per year in higher prices and taxes

Figure 3-4 (con.).

Obviously we're going to look at how much it costs since there's not so much difference between the chances of exposure.

### 3.3.5 Rounds 4 and 5

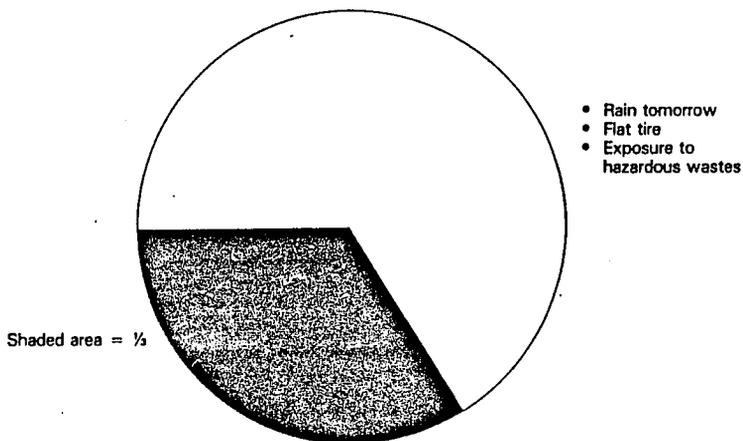
In the fourth and fifth rounds the circle cards and accompanying explanations were made even more explicit. The spinners were removed; the title on the exposure card was expanded to read "What Will Happen: Events Outside Your Control"; the effect card was changed to read "What It Means to You: Your Circumstance When It Happens"; and the combined risk card was changed to read "What It Means to You." The examples corresponding to these cards were changed to read, respectively, "rain tomorrow," "flat tire," "exposure to hazardous wastes"; "walking from the car," "on the interstate," "your hereditary background"; and "get wet," "flat tire," and "get cancer."

For the exposure to hazardous wastes example, the text on the cards described exactly the association participants were supposed to make--"exposure to hazardous wastes," "your heredity background," and "get cancer." Additionally, each circle card included the ratio of the part of the circle that was shaded and some explanation to help participants understand what was being conveyed on each card. The exposure card included the statement "probability = chance spinner will fall in the shaded part," and the combined probability card included the statement that "both of the earlier outcomes must occur." Copies of these circles are included as Figure 3-5.

Besides the circles and examples, an additional card was added to help participants make the association between the simple risk examples and the hazardous waste risks. This card, entitled "Hazardous Wastes as a Risk," included the same information displayed on the circle but in tabular form. Added to each example was a column entitled "How it Might Have Been Anticipated." For "rain" this included "bring an umbrella"; for "flat tire" this included "have a spare"; and for "hazardous wastes" this included a question mark. This card is included as Figure 3-6. It was hoped that using the hazardous waste example along with the simple risk examples would help participants link the two.

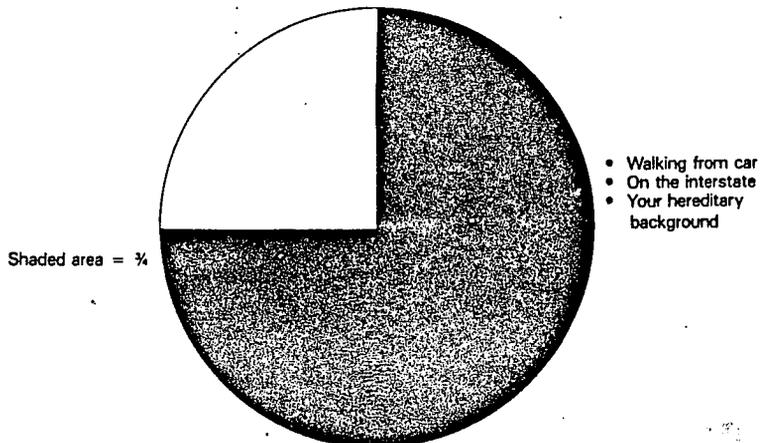
In addition, within the fourth round the organization of the presentation was changed. Instead of beginning with the general notion of probability, the definition and examples of hazardous wastes were covered first. This was

**What Will Happen:  
Events Outside Your Control**

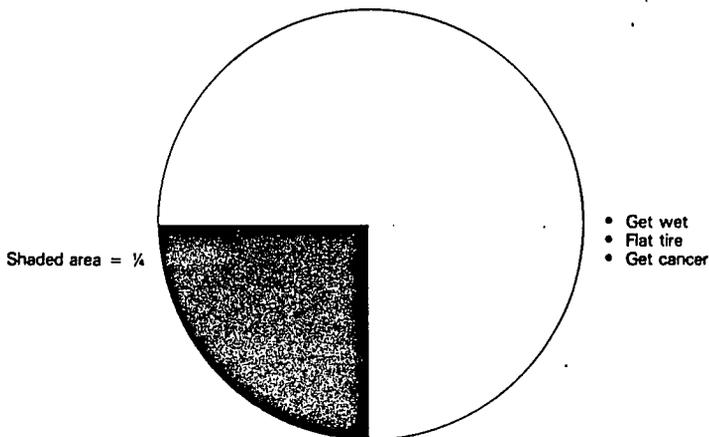


Probability = chance spinner will fall in shaded part.

**What It Means to You:  
Your Circumstances When It Happens**



**What It Means to You**



Both of earlier outcomes must occur.

Figure 3-5. Circles with expanded explanations used in Rounds 4 and 5.

## Hazardous Wastes as a Risk

Event Outside Your Control	Your Circumstances When Event Happens	What It Means To You	How It Might Have Been Anticipated
Rain	Walking from car to work (store, school, etc.)	Get wet	Bring an umbrella
Flat tire	On the interstate (versus in driveway)	Stranded on road (late)	Have a spare
Exposed to hazardous waste	Physical makeup (hereditary background resistance)	Get cancer	?

Figure 3-6. Tabular format linking hazardous waste risks with simple risks.

then followed by the general probability explanation and then the explanation linking everyday examples of probability to chance of exposure from hazardous wastes. Participants in general were much more interested in learning something about hazardous wastes than in trying to comprehend probability. Beginning with this more interesting and relevant part of the presentation tended to capture the interest of the participants early in the presentation and to keep them more attentive throughout the remainder of the presentation. Unfortunately, the reversal of the information did little to help participants make the jump from simple risk examples to risks associated with hazardous waste exposure.

The ranking cards (Cards A through E) were also expanded in this round. Now, instead of each having two circles (risk of effect and the risk of exposure), they also included a third circle, combined risk. The risk of effect circle was also changed to read the "risk of effect if exposed." The risks of exposure were 1/90, 2/90, 5/90, 10/90, and 20/90. The risk of effect if exposed was 90/540. Combined risks were 1/540, 2/540, 5/540, 10/540, and 20/540. These cards are included as Figure 3-7. Round 5 cards were slightly different. Instead of being asked to rank cards, participants were asked to determine a willingness-to-pay amount. Therefore, only three cards were used, with risks of exposure of 1/90, 5/90, and 10/90.

Participant comments in these rounds indicated much greater understanding of probability. First, they appeared finally to have understood that the risk of effect is merely a multiplier:

Question: What about that middle circle? Anybody have some feelings on the meaning or the use of that middle circle?

At that point there's nothing you can do about it.

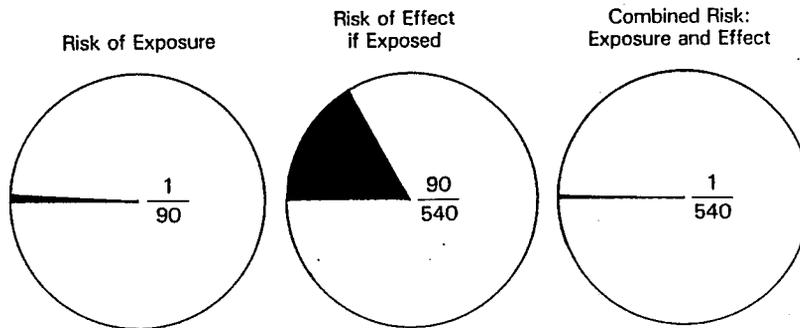
It's just a multiplier.

It's an arbitrary fact at that point.

They also seemed to be looking at exposure and effects from hazardous wastes as only being a chance occurrence:

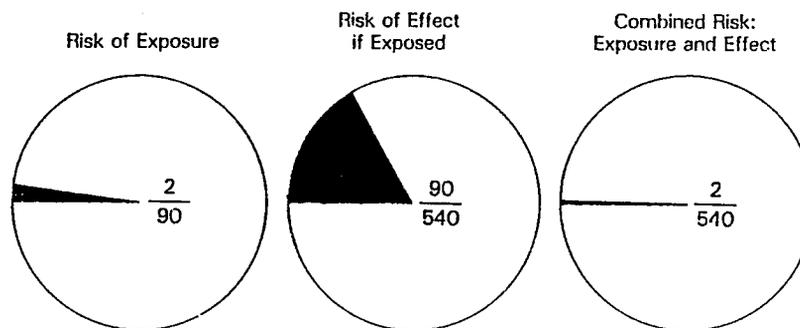
The thing that came across to me was that you were using the circles to point out that it could be controlled by just chance in the control of hazardous wastes and the effects on the people would just be a chance.

**Card A**  
**Hazardous Waste Risks**



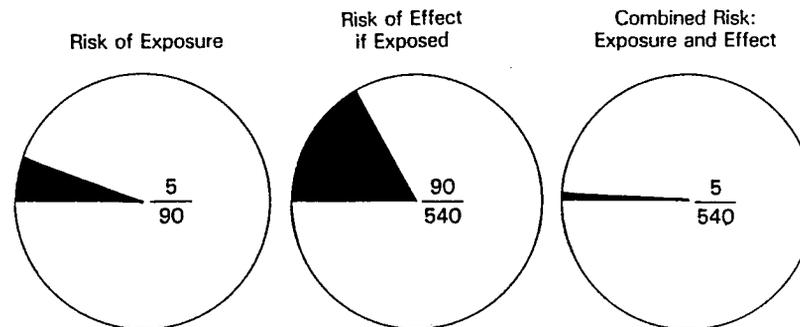
Payment required: \$400 per year in higher prices and taxes

**Card B**  
**Hazardous Waste Risks**



Payment required: \$225 per year in higher prices and taxes

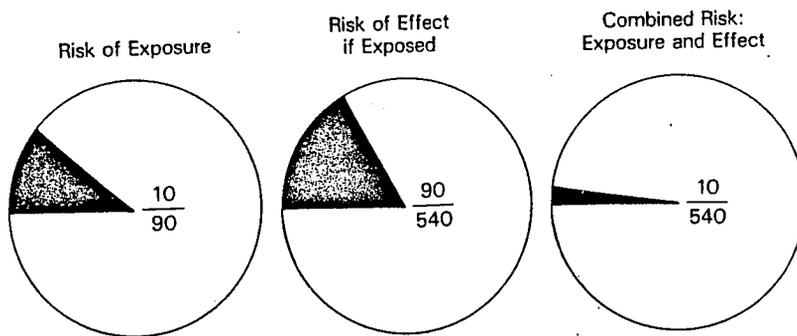
**Card C**  
**Hazardous Waste Risks**



Payment required: \$125 per year in higher prices and taxes

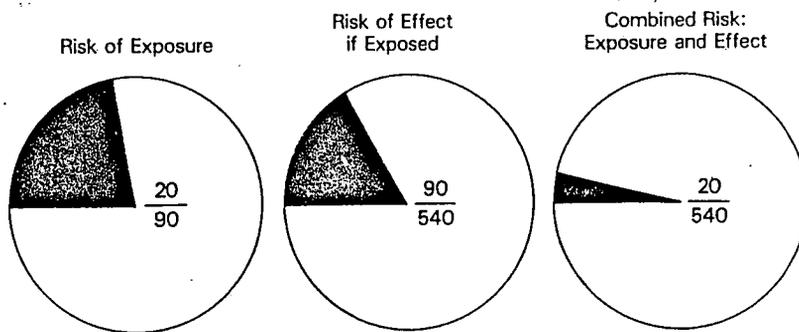
Figure 3-7. Five cards (A through E) used for Round 4 probability presentation.

**Card D**  
**Hazardous Waste Risks**



Payment required: \$50 per year in higher prices and taxes

**Card E**  
**Hazardous Waste Risks**



Payment required: \$0 per year in higher prices and taxes

Figure 3-7 (con.).

It is important to note, however, that the groups in Rounds 4 and 5 were well educated and/or very knowledgeable about hazardous wastes.

### 3.3.6 Round 6

In the final round, where the first draft of the survey was administered, circles were no longer used in the probability explanation to explain simple risk. Instead, the card explaining risks in tabular form was made more explicit. It still included three examples, but each one was explained more clearly. "Events Outside Your Control" were "it might rain," "you might have a flat tire," and "you might be exposed to hazardous wastes." "Your Circumstances When Event Happens" were "walking from car to work (store, school, etc.)," "on the interstate (versus in driveway)," and "physical makeup (hereditary background, resistance, diet, smoking)." "What It Means To You" was "get wet," "stranded on road (late)," and "reduced life expectancy." Finally, "How It Might Have Been Anticipated" was "bring an umbrella or raincoat," "have a spare, change tires more frequently," and "manage wastes properly, recycle wastes." This card (Card 4) is included as Figure 3-8. Circles were still used on the ranking cards and were exactly the same as in Rounds 4 and 5.

Participants in the first group in this round indicated that they found the simple examples of risk unnecessary and confusing:

Question: Card 4--examples of risk. What did you think of that?

You are confusing the problem of hazardous waste by introducing irrelevant examples of risk--like if it rains, are you going to have a flat tire. That is so remote from what hazardous waste involves, it seems like you're trying to put some of these risks in the same classification [as hazardous wastes].

Thus, the research team finally decided to eliminate the everyday risk examples from the probability explanation. This was counterintuitive to what they thought would be the clearest way to present probability. However, participants in each session indicated that the context in which they think about hazardous waste risks is too different from that in which they think about simple risks. In addition, the attributes they associate with each type of risk differ. Simple risks were viewed as voluntary or controllable events such as wearing seatbelts to reduce risk of death in a car accident. Hazardous wastes

## Card 4 Examples of Risk

Event Outside Your Control	Your Circumstances When Event Happens	What It Means To You	How It Might Have Been Anticipated
It might rain	Walking from car to work (store, school, etc.)	Get wet	Bring an umbrella or raincoat
You might have a flat tire	On the interstate (versus in driveway)	Stranded on road (late)	Have a spare, change tires more frequently
You might be exposed to hazardous wastes	Physical makeup (hereditary background, resistance, diet, smoking)	Reduced life expectancy	Manage wastes properly, recycle wastes

Figure 3-8. Card in tabular form to present probability and explain simple risks in Round 6.

risks, on the other hand, were seen as involuntary and uncontrollable. (Participants' attitudes about risk are explored in more detail in Chapter 4.) Instead of everyday examples, very explicit explanations using local or well-known hazardous waste incidents were used to illustrate probabilities of exposure and effect.

The main criticism surrounding the probability explanation was its length. Some participants indicated that their minds were wandering by the time the probability of effect was explained. In fact, those who did not understand the concept seemed to stop listening right after the first circle was described. However, those who had some knowledge of probability seemed to listen more intently. This is evident in the following example, in which one participant is able to explain what is being said to another:

I still can't in my mind figure out how this is the combined risk.

Two percentages. You have half of a quarter times a half is what is an eighth and this is a six times a 9 percent times 16 percent is the combination that comes out so you take 10 percent of 16 percent is 1.6 percent or something like that, so that you are getting it down . . .

But don't most people react to this because none of us know our heredity and how we personally are going to be impacted. But this is an external thing that we can sort of take in.

You have been told that the middle is the average of all the population in that you are generally going to fit into that category.

Participants still had difficulty believing that the probabilities used on the cards were realistic:

Again I wondered where you came up with these. It looked as if it could be almost arbitrary.

Many helpful suggestions were made by the participants in clarifying the cards. Most of these surrounded the mathematical representation of probability. Using percentages was advocated by participants in all groups:

One of the things is the math that gets you down. Use a percentage figure or one out of thousand or hundred thousand, 10 over 90 and 10 over 540.

I would have used ratios. If you went from 1 in 54 to 1 in 10, I wouldn't use any circles.

They could be converted into percentage relationship. That I could read.

I kept wondering why you didn't put percentages here. 10/90 doesn't mean anything to me but 11 percent does.

Scientific notation, that we are going to lose most people. Put in terms of a one-over kind of number (i.e., 1/100,000) as opposed to ten-to-the-minus number.

Two out of 100,000 or something like that. . . .

One participant also suggested putting more description on the hazardous waste exposure risk cards:

Why not describe what it is [on the card], i.e., heredity, background, pathways.

These suggestions were all taken into account when the circle cards were designed for subsequent survey drafts. The final version of the circle cards includes three circles entitled "Risk of Exposure," "Risk of Death if Exposed," and "Combined Risk: Exposure and Death." Each circle's significance is further explained by a caption underneath. The exposure circle is captioned "Possible Pathways"; the effect circle, "Heredity and Health"; and the combined risk circle, "Personal Risk." Each circle has a portion that is shaded to signify chance or probability of risk. Both the percent and ratio of the shaded portion of the circle are on the circle card. The actual probabilities vary since there are several survey versions that will be administered to respondents. One version of these circle cards is included as Figure 3-9.

In addition, instead of giving payment amounts, some respondents will be asked to rank payment cards. These cards are identical except that each will have a title giving the payment amount. This title is also more explicit than in previous rounds. It includes both a monthly and yearly amount and states directly that this is in higher prices and taxes. One version of these ranking cards is included as Figure 3-10.

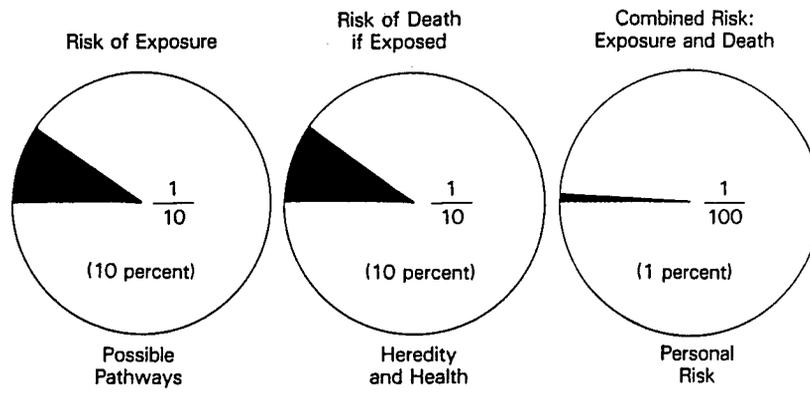
### 3.4 PERCEPTION OF EXPOSURE RISK

#### 3.4.1 Circles

Shading portions of empty circles was the first means used by the research team in trying to determine participants' perceived risks of exposure

R-1

Card A-1



R-1

Card C-1

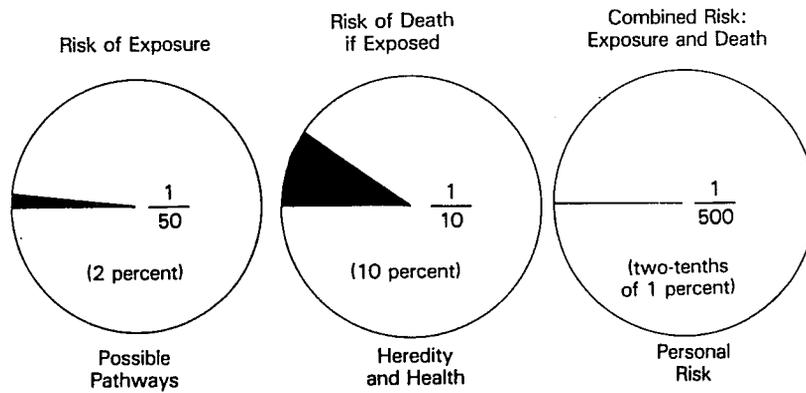
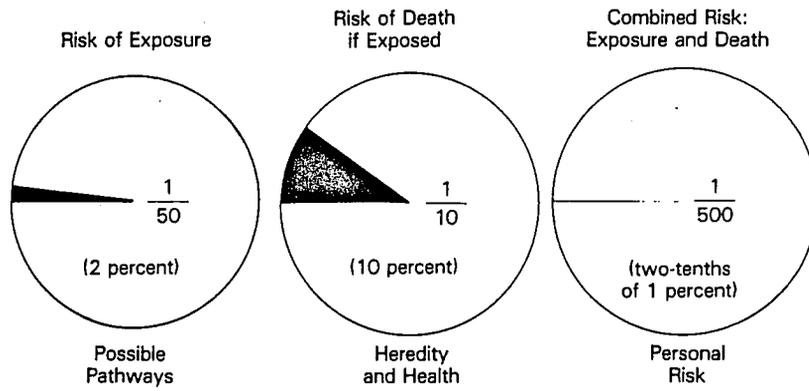


Figure 3-9. Four cards (A-1, C-1, X-1, and Y-1) with final contingent-ranking format (without payment amounts).

R-1

Card X-1



R-1

Card Y-1

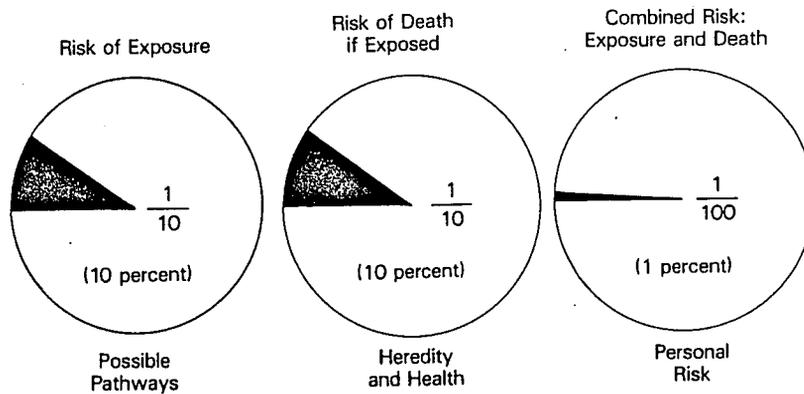
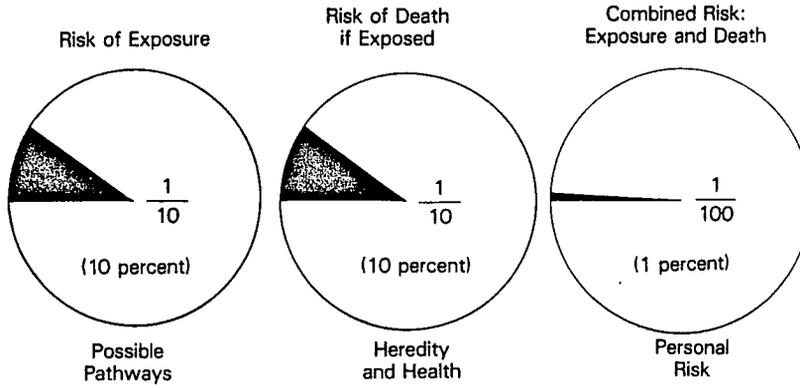


Figure 3-9 (con.).

R-1

Card A-1

Payment required: \$0 per month  
in higher prices and taxes



R-1

Card B-1

Payment required: \$20 per month (\$240 per year)  
in higher prices and taxes

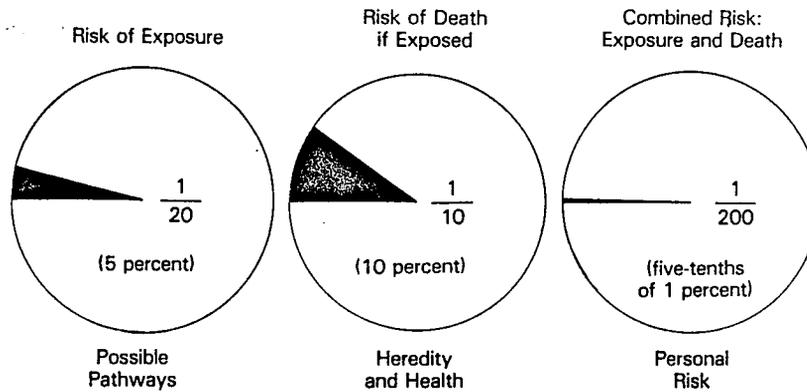
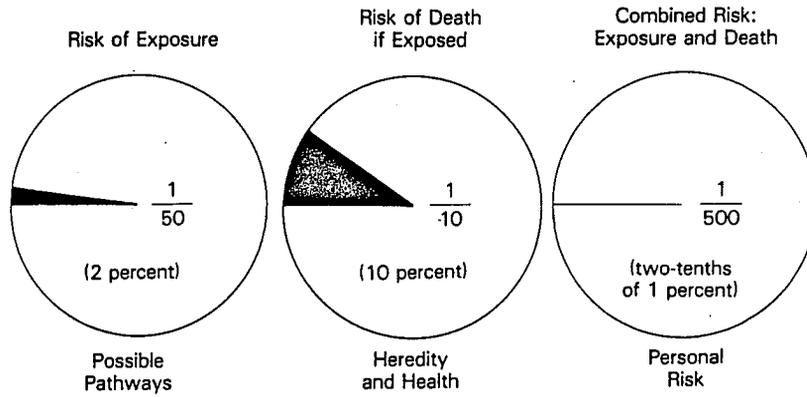


Figure 3-10. Four cards (A-1 through D-1) with final contingent-ranking format (with payment amounts).

R-1

Card C-1

Payment required: \$55 per month (\$660 per year)  
in higher prices and taxes



R-1

Card D-1

Payment required: \$105 per month  
(\$1,260 per year) in higher prices and taxes

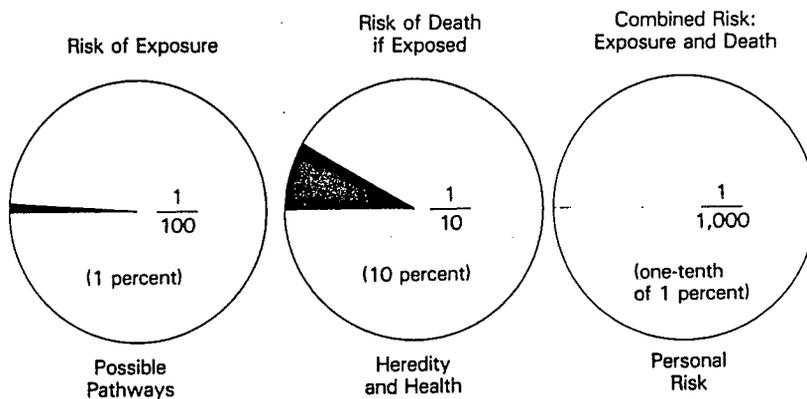


Figure 3-10 (con.).

to hazardous wastes. However, participants indicated that the circle was not really the best way of doing this and that they often very arbitrarily selected the portion of the circle to shade. It became apparent that some kind of benchmark or anchor was needed to guide their responses.

### 3.4.2 Risk Ladder

The research team then attempted to determine participants' perceived risks of dying from hazardous waste exposure by using a risk ladder as a visual aid. In the early rounds, the risk of dying from exposure to three different kinds of hazardous wastes was placed on a ladder among the risks of death from other kinds of events. A copy of this risk ladder is included as Figure 3-11. In this first draft version of the ladder, we decided to use three estimates of hazardous wastes risks from a risk assessment study to see how respondents would react to this (and other) information. The ladder was based roughly on the number of people who die annually from various causes or activities. Participants in general seemed comfortable with the ladder as a graphical representation:

I think we're all used to seeing things represented in graphs like these and that it's easier than to start comparing circles.

They were, however, very sensitive to the other events on the ladder. For example, "eating peanut butter," one of these other events, was brought up for discussion in each group. Participants were also disturbed by the probabilities used in association with each event and in most cases were reluctant to believe they were accurate numbers. They indicated that if the team were going to try to use these numbers as true probability occurrences they ought to include at the least a source and some explanation of what they were based on:

I never took it as an accurate measure of what the probabilities were. If I were to take it as an accurate number, I'd have to know what you meant by hazardous wastes # 2, where #1 set that exposure and what does that mean. I just took it as a general idea that we are exposed to a hazardous waste generates these possibilities rather than to graphically represent possibilities of it occurring.

Additionally, some participants felt the ladder was misleading because it wasn't drawn to scale:

For true representation, don't you need to put a broken scale on it?

### Risk Ladder: Comparing Risks of Death

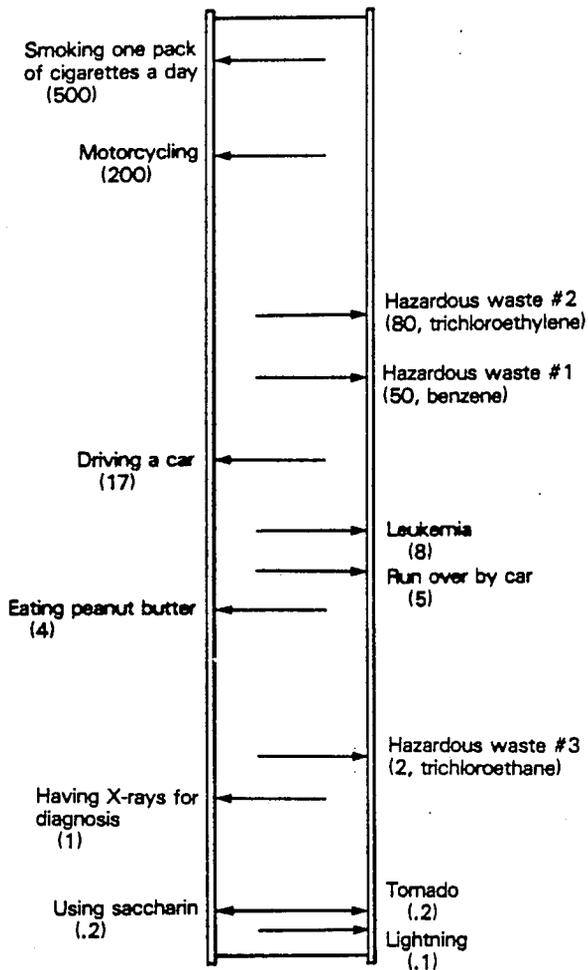


Figure 3-11. Initial risk ladder including exposure to three kinds of hazardous waste among risks from other events.

In the next round the same ladder was used, but this time the exposure risks to hazardous wastes were removed. Participants were asked to place their perceived risk of dying from hazardous waste exposure on the ladder. By and large, participants were able to perform this task, but their comments indicted they had the same misgivings with the ladder as in the previous rounds:

This is a really misleading risk ladder. Your rates are not accurate. They're not age specific. The data is just not accurate. You're asking an individual for a certain age and this is just not accurate for an individual of that age. . . . The way you're trying to ask your questions, you can't extrapolate from death data for the whole population very accurately and then ask individuals where you put yourself on here.

In the final round, when a draft of the questionnaire was administered, the ladder was changed substantially. This ladder included occupational risks on one side and risks of dying from various events on the other. The probabilities were removed from each event, and each portion of the ladder was shaded differently. There was a break between each of these shaded portions on the ladder to give it the appearance of being more to scale. A copy of this ladder is included as Figure 3-12. In addition, a second card was included that attempted to tie the ladder to the risk circles that had been previously used to explain probability. This card had both a ladder and circles on it. The ladder had just three events on it of high, low, and medium death risks. Next to each event was a circle partially shaded to indicate probability of death from that event. This card (Card 6) is included as Figure 3-13. Participants in the first session in this round indicated this card was not helpful in making a transition between circles and the ladder. In fact, the card confused them:

Question: Did card No. 6 help make a transition between the ladder and the circles?

Pointless.

If you can't keep it maintained to a 100 times for all three, it's meaningless.

This card was eliminated from subsequent sessions in this round.

## Card 5

### Risk Ladder: Comparing Risks of Death

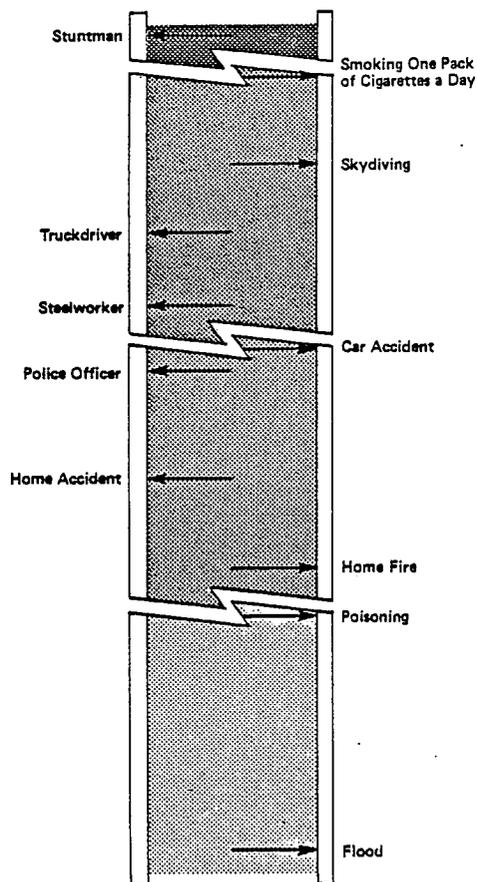


Figure 3-12. Revised risk ladder separating occupational risks from other events and introducing breaks in ladder.

# Card 6

Risk Ladder: Comparing Risks of Death

Combined Risk Circle:  
Comparing Risks of Death

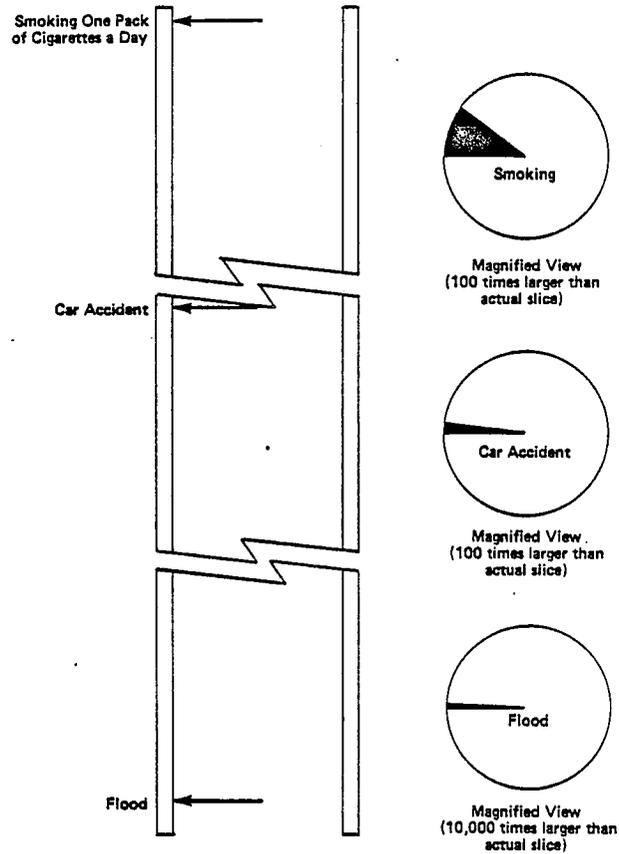


Figure 3-13. Card attempting to tie risk ladder to probability circles.

Participants in this round had both graphical and conceptual suggestions for making the ladder and task clearer. The graphical comments revolved around shading and putting the events more to scale:

Question: What did you think of the risk ladder? Was it helpful? Not helpful? What kind of impression did you get out of it?

If you did the graph in a different format it might become a little clearer to more people. The gradation and shading are a little troublesome at first. There is not a great distinction between the gradation that one notices the distinction until you go back and study it. The arrows going in two directions rather than one.

The breaks are not clear. If you're working with hard numbers, it's easier to see and to integrate it . . . to try to figure out how much space there is between steelworker and car accident, you're just left to your imagination. It could be a little or a lot; the person just has no idea.

I had a question when you explained the ladder. The breaks in the ladder appear to indicate that this is a long ladder. Is there a big gap between smoking one pack a day and a stuntman or are they right on top of each other? That is something that isn't clear. I think it would help if you could somehow or other indicate that--maybe on a numerical scale--because then you wouldn't be constrained by the size of the page or whatever else.

One of the difficulties is the way the break comes across. Cigarette smoking is at the top of the break and if there had been a wider break you would see it's not in the same class as stuntman.

In addition, participant comments indicated that the examples made it difficult for them to assess where on the ladder they should place their perceived risks of death. For one participant, all the risks were accidental except smoking. Because participants did not see death from hazardous wastes as accidental, they tended to put their perceived death risks closer to smoking and thus higher on the ladder than they really felt was accurate:

Do you mean the risk of premature death? Because all of these are by accident except for smoking. The rest are premature death due to some kind of accident.

It's hard to relate the risk [of death] from hazardous waste [with the other examples of risks of death] because it's more like the cigarettes than all of these other things.

Comparing [hazardous wastes] to all these accidental deaths made me keep pulling it up the ladder.

You could compare it to smoking a pack of cigarettes a day. The problem is there is nothing else like that on here.

Other participants didn't feel there were enough examples on the bottom of the ladder:

These seem to be all very high risk . . . at least from home fire up. I would have liked to have had something at the other end of the scale. In between flood and poisoning because everything else seemed too high up.

Many participants had difficulty in relating to the types of occupations used as examples:

But the skydiving and stuntman are so remote from the average person's experiences, maybe you ought to have death of a heart attack at age 60, something that people relate to.

The women in particular thought there were too many male dominated occupations:

The occupations are not ones I related to very easily. They tend to be more male occupations.

Most participants wanted to see some indication of the probability of dying from the events listed on the ladder:

When I saw cigarettes way up there, I didn't think it very believable. I didn't believe it--it looked like someone just did it. Shouldn't it say based on insurance statistics or something?

Everything else in the thing is done with numbers. You might very well, since all these are different levels, just put numbers along side of them. It might be easier.

In the group where the participants were asked to place their perceived occupational risks on the ladder, it became apparent that more examples that professionals could relate to were needed:

I can't relate to your probabilities. I work in an office and the worst thing that is going to happen to me is hypertension and I have a heart attack.

If they doubled the exposure from those CRT terminals. If it radiated more stuff, that's in an office.

I couldn't even get on the first rung of the ladder. It's zero.

I might have a problem getting to and from work; that's a problem.

I did have a little difficulty identifying, say, with the sky diving, for example, or with drunk driving.

The older group of participants had the most difficulty understanding the exercise. They indicated more text around the ladder would clarify the task:

Question: Does anyone have any reaction to the risk-ladder card? Did you find it helpful, confusing?

Confusing.

I just didn't understand it. A graph like that says nothing to me. You have to put it in words in a paragraph.

Finally, some participants suggested ways to reword the question to make it clearer. The comments indicated our question had to provide more specific details on the situation they were evaluating:

It might have helped us if you said "premature" before "death."

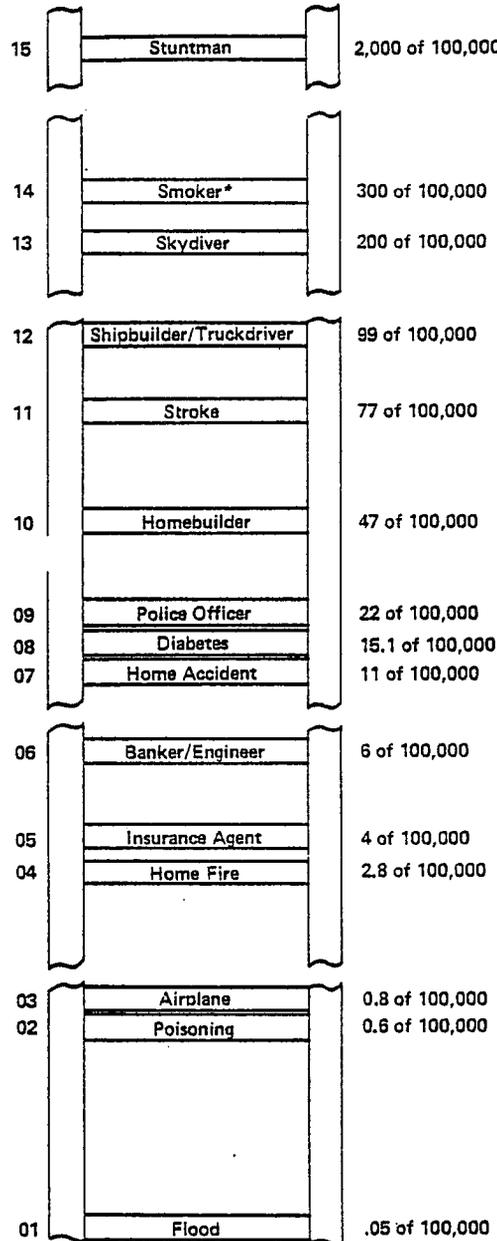
What about age. Some people might not care if it means they are going to live to 70-75.

Whether it's an actual exposure to hazardous waste or what is your potential of being exposed to hazardous waste. If you have an actual chemical spill in your town, that's different than what you think your chances are of being exposed.

Participants' suggestions were taken into account to construct a ladder for the final version of the survey that is quite different from that used in the focus groups. Each segment of the ladder is a different color to show more clearly the breaks that signify changes from one probability level to another. The events are no longer listed on two sides of the ladder but down the middle. Risks of death from more common professional occupations are included, such as insurance agent, engineer, or banker. Probabilities of each event have been included, not in fraction form but as the number of persons out of 100,000 who will die every year. An uncolored copy (reduced in size) of the ladder is included as Figure 3-14.

In addition, the survey script explaining the ladder is much more explicit. It points out the breaks in the ladder and what they signify, documents

### Risk Ladder: Comparing Annual Risks of Death



\*At least one pack per day.

Figure 3-14. Final version of risk ladder incorporating suggestions from participants.

the probabilities, and explains them--e.g., 11 out of every 100,000 people will die from home accidents each year. The development of the risk ladder clearly demonstrates the effectiveness of using focus groups to develop a contingent valuation questionnaire. Specific, immediate feedback enabled the research team to alter the ladder to resolve confusions.

### 3.4.3 Distance

In Rounds 5 and 6 the research team assessed distance as a variable in determining a participant's perceived risks of exposure to hazardous wastes. The distance relationship is important to the property value approach, which uses distance from a hazardous waste site as a proxy for risk. In Round 5 participants were asked to keep in mind a hypothetical situation in which a landfill was known to have leaked wastes into the groundwater. Participants were asked how far the city's wells would have to be from the landfill for them to feel safe. They had five choices--1 to 2 miles, 3 to 4 miles, 5 to 6 miles, 7 to 10 miles, and more than 10 miles. The research team found out several interesting things from this exercise. First, in North Carolina, 10 miles is perceived as a short distance. Therefore, almost everyone indicated he would need to be more than 10 miles away. Second, because the participants in these groups were all well informed about hazardous wastes, they wanted more specific information about the situation on which to make their decision:

Isn't there a false assumption in this question? Doesn't it matter what side of the stream you live on?

It depends which direction, if you're above it you worry less.

In the survey draft administered in Round 6, the distance question was handled differently. To account for the differing concepts of distance, participants were able to actually fill in a distance amount. Two different types of distance questions were asked. In the first question, participants were told to keep both a hypothetical situation and risk level in mind. Then they were asked, "Suppose you were given the opportunity to move from your home instead of paying. Do you think there is some distance that you could move to reduce your risks?" If they answered "Yes" to that question, they were asked, "If you could get a very similar home without additional financial costs to you, how far would you want to move to feel you have reached the reduced

exposure level shown on Card D?" From the very start it was apparent that the wording of this question was troublesome. The responses of the first group in this round caused the research team immediately to change the question to read "how far would you have to move" for the subsequent rounds. The wording of the question still caused trouble:

Question: Did you think there was some distance that you could go to get away from hazardous waste; and would you move? What did you think of that?

You could have said it clearer. You explained properly, I just finally understood it now. That the level of risk may have scared me into moving or might have made me say yes. I was looking more in terms of this combination which is really the exposure to me because of the combination of the two.

I felt more comfortable with "could you move" not "would you move." Not that I would be willing to.

It was worded with the assumption we would move.

Could you move to get away from this?

"Would you?" is the way I interpret it.

I think you worded this with Love Canal in mind. In Acton no one considered moving. We considered fixing it. Where are you going to go--Woburn--then you've got worse problems.

You should eliminate all the people who wouldn't move no matter what and that might give you more useful answers.

The question was a reasonable one but just wasn't phrased correctly. The question assumed that given those problems you would move. To us it's not just the house that's keeping us here.

I thought the questions was worded, how far would you have to go to get away from that environmental situation. You'd have to move out of the East Coast.

Finally, even though more specific information had been added to the hypothetical situation, participants indicated they still wanted to know more about the situation before making a decision:

No, in terms of miles. I put down here "Yes, you can travel a distance to get away." But it would depend on the type of exposure on how far you would have to go.

No, I wasn't able to answer that question. I couldn't answer that until I know what the risk was.

The landfill. Is it one with a liner? Is it regulated? Is it encased properly, or is it dumped near a stream?

This question was completely rephrased and simplified in the final survey. First, participants were asked to estimate the average cost of a house in their neighborhood. They were then told that they would have a choice between two identical homes--same number of rooms, types of rooms--and that their children would attend the same schools. They were then asked how far they would want to be from the leaking waste disposal site if they had to pay \$250 for each mile away from the site for that same house.

The second distance question involved participants' determining how close a variety of public facilities, commercial or industrial buildings, could locate before the participants felt they would want to move. Participants could fill in mileage in response to this question or circle one of four responses--"in your neighborhood," "less than one mile," "does not matter," and "don't know." Participants also had quite a bit of difficulty answering this question. They again indicated they wanted more information about the specifics of the situation before answering the question:

I was able to answer with no feeling that it bore on reality. I felt the specifics of the situation are so important. For example, if the home for delinquent boys were carefully supervised I wouldn't mind if it were next door. So I really don't know. I put a number down but I feel if I was really faced with the situation I might have to revise it.

In addition, the research team learned that terminology differs from one part of the country to the other. Terms used in North Carolina had different meanings in suburban Boston. For example, whereas 10 miles was considered a short distance by North Carolinians, 10 miles was considered quite far by Bostonians:

Question: Is 10 miles considered close or far here?

That's far.

Question: What if we said a mile?

That would change my answer.

Additionally, street, town, neighborhood, and community connotated very different images or these participants:

You could say "on your street, out of sight," for example, Route 2 is two blocks from me. I can't see it so I like having it there.

I think what you mean "in your neighborhood" is "on your street."

A 10-story building. What are you getting at? Do you want a business? Why not a 3-story building?

Question: In your own mind when we use the word town, how far does that extend geographically?

I think of precise boundaries.

Question: Would community have been as descriptive or is town a better word?

Town is better.

The final survey simplifies this task by merely asking participants to fill in how close to them each facility would have to locate before they would move.

### 3.5 NUMBERS AND TYPES OF PRODUCTS WITH HAZARDOUS BYPRODUCTS

In the first round, one card was used to relay the number and vast array of products that produce hazardous waste byproducts. This card listed a variety of consumer products, either the substance used in production or the waste substance, and the potential harmful effects from this substance. A copy of this card is included as Figure 3-15. When the card was arranged in this way, participants focused more on the effect than on the numbers and types of products. Therefore, in the following rounds two cards were used. On the first, only consumer products and substances were listed (Figure 3-16). The effects were listed separately on the card shown in Figure 3-17. As participants in each of the rounds talked about the kinds of products they were aware of (Figure 3-18), chemical and petroleum products and medicines were added to the product list. The effect card was altered in the survey draft to list just the effects participants had indicated they most often thought of in connection with hazardous wastes. Each effect was also described more specifically. They included heart and circulatory problems such as heart attack, high blood pressure, or stroke; blood problems such as anemia, kidney prob-

<u>CONSUMER PRODUCTS</u>	<u>SUBSTANCE USED IN PRODUCTION/WASTE SUBSTANCE</u>	<u>POTENTIAL HARMFUL EFFECTS</u>
AUTOMOBILE BATTERIES	LEAD	BRAIN DAMAGE BONE DAMAGE
DRY CLEANING FLUID	CARBON TETRACHLORIDE	LIVER DAMAGE KIDNEY DAMAGE
PAINT/TEXTILES	CHROMIUM	CANCER OF THE RESPIRATORY TRACT
GLASS/ELECTRONICS	SELENIUM	EYE DAMAGE LUNG DAMAGE HEART DAMAGE
STEEL	MANGANESE	EMOTIONAL DISTURBANCES NERVOUS SYSTEM DAMAGE
PESTICIDES/DIELDRIN, DIELENDRIN, DDT, CHLORDANE	VINYL CHLORIDE	CANCER

Figure 3-15. Round 1 card listing consumer products and potential harmful effects.

<u>SUBSTANCE USED IN PRODUCTION/WASTE</u>	
<u>CONSUMER PRODUCTS</u>	<u>SUBSTANCE</u>
AUTOMOBILE BATTERIES	LEAD
DRY CLEANING FLUID	CARBON TETRACHLORIDE
PAINT/TEXTILES	CHROMIUM
GLASS/ELECTRONICS	SELENIUM
STEEL	MANGANESE
PESTICIDES/DIELDRIN, DIELENDRIN, DDT, CHLORDANE	VINYL CHLORIDE

Figure 3-16. Card used in later rounds to list consumer products and hazardous substances.

<u>POTENTIAL HARMFUL EFFECTS</u>
BRAIN DAMAGE BONE DAMAGE
LIVER DAMAGE KIDNEY DAMAGE
CANCER OF THE RESPIRATORY TRACT
EYE DAMAGE LUNG DAMAGE HEART DAMAGE
EMOTIONAL DISTURBANCES NERVOUS SYSTEM DAMAGE
CANCER

Figure 3-17. Card used in later rounds to list potential harmful effects.

<u>Substances Used in Production/Waste</u>	
<u>Consumer Products</u>	<u>Substance</u>
Automobile batteries	Lead
Dry cleaning fluid	Carbon tetrachloride
Paint/textiles	Chromium, organic chlorine compounds
Glass/electronics	Selenium
Steel	Manganese, phenols, benzene
Pesticides/dieldrin, dieleldrin, DDT, chlordane	Vinyl chloride, organic chlorine compounds
Chemical and petroleum products	Phenols, benzene, organic compounds
Medicines	Organic solvents

Figure 3-18. Revised list of consumer products and substances associated with hazardous waste production.

lems, cancer or leukemia; birth defects, genetic problems, or other problems children may have when they are born; and reproductive problems, such as difficulty in having children (Figure 3-19). The final survey card illustrating products and their hazardous wastes was very similar to that of the previous rounds (Figure 3-20). The effect card, however, was eliminated. Instead, participants were asked to give the effect they most often associated with hazardous waste exposure.

### 3.6 EXPOSURE PATHWAYS AND HOW CONSUMERS PAY

The exposure pathways card and the card indicating how consumers pay for hazardous waste management worked quite well from the start of the focus groups and required very little change throughout the sessions. The exposure pathways card simply listed common ways participants might come into contact with hazardous wastes (Figure 3-21). In the first round this included four such pathways: groundwater, water in rivers and lakes, air, and the food chain. The food chain was eliminated in several of the middle rounds, but since participants in subsequent rounds indicated they wanted more specific information, food and soil were added back in as exposure pathways. Aside from that alteration and some graphical pleasantries, the card and explanation remained very similar throughout all the rounds (Figure 3-22). The pathways card was made more explicit in the final survey draft. It is included as Figure 3-23.

On the card indicating payment for hazardous wastes it sufficed to simply say "consumers: higher prices," and "taxpayers: higher taxes" throughout all the sessions (Figure 3-24). In the survey draft administered in Round 6, however, this card was made more explicit. It included both pictures and words (Figure 3-25). This change seemed to confuse participants rather than assist them:

Confusing. I couldn't figure what you were driving at and then you didn't discuss it, and then you went on to something else. While I am studying this, you are on another thing. I wasn't sure what you wanted us to get out of it.

This same format was used for this card in the final survey; however; it was made clearer and the text surrounding it more explicit (Figure 3-26).

Card 1 List of Health Problems
Heart and circulatory problems— such as heart attack, high blood pressure, or stroke
Blood problems— such as anemia
Kidney problems
Cancer or leukemia
Birth defects or genetic problems or other problems children may have when they are born
Reproductive problems— such as difficulty in having children

Figure 3-19. Revised list of health effects reflecting concerns most often expressed by participants.

Card 2 Products and Their Hazardous Wastes	
<u>Consumer Products</u>	<u>Discarded Hazardous Substances</u>
Automobile batteries	Lead
Dry cleaning fluid	Carbon tetrachloride
Paint/textiles	Chromium, organic chlorine compounds
Shoes and other leather goods	Chromium
Glass/electronics	Selenium
Steel	Manganese, phenols, benzene
Plastics	Vinyl chloride
Pesticides—aldrin, dieldrin DDT, chlordane	Chlorinated organic chlorine compounds
Chemical and petroleum products	Phenols, benzene, organic compounds, brines
Pharmacy products	Organic solvents

Figure 3-20. Final card for presenting consumer products associated with hazardous waste production.

POTENTIAL EXPOSURE PATHWAYS:
HOW MIGHT WE COME INTO CONTACT WITH HAZARDOUS WASTE?
<ul style="list-style-type: none"> <li>• GROUNDWATER</li> <li>• WATER IN RIVERS AND LAKES</li> <li>• AIR</li> </ul>

Figure 3-21. Initial version of exposure pathways card.

Potential Exposure Pathways:
How Might We Come Into Contact With Hazardous Waste?
<ul style="list-style-type: none"> <li>• Groundwater</li> <li>• Water in rivers and lakes</li> <li>• Air</li> </ul>

Figure 3-22. Interim version of exposure pathways card.

**Possible Exposure Pathways**

- Water you drink
- Air you breathe
- Touching wastes in contaminated soil
- Eating food grown in contaminated soil or eating meat from contaminated animals
- Eating fish or shellfish from contaminated waters

**Figure 3-23. Final version of exposure pathways card.**

## How Do We Pay to Control Hazardous Waste Pollution?

- Consumers: higher prices
- Taxpayers: higher taxes

Figure 3-24. Card used in Rounds 1 through 5 to indicate payment for hazardous waste management.

### Card 7 How We Pay for Reducing the Hazardous Wastes

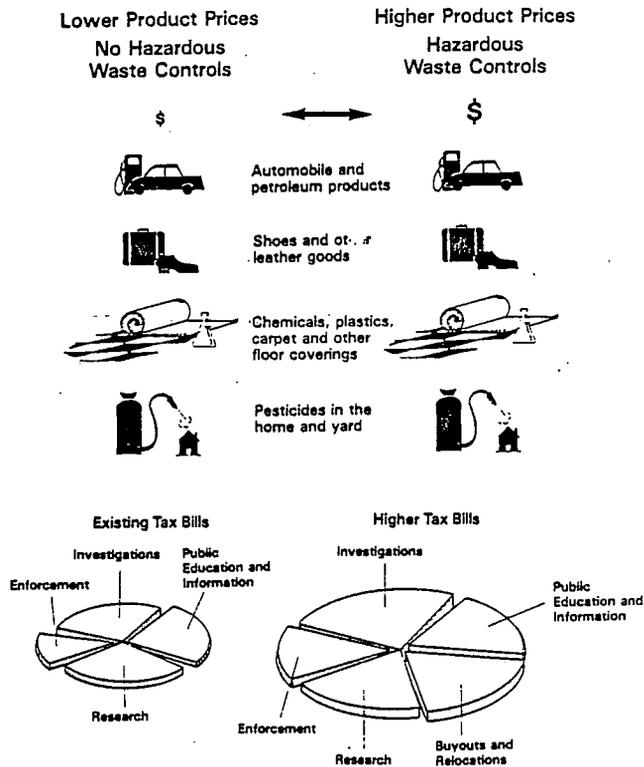


Figure 3-25. Card used in Round 6 to indicate payment for hazardous waste management.

## Card 6

### How We Pay for More Control of Hazardous Waste

Products We Buy	Existing Controls Existing Exposure Risk and Product Prices	More Controls Lower Exposure Risk with Higher Product Prices
 Automobile and petroleum products	\$	\$
 Shoes and other leather goods	\$	\$
 Chemicals, plastics, carpet and other floor coverings	\$	\$
 Pesticides in the home and yard	\$	\$

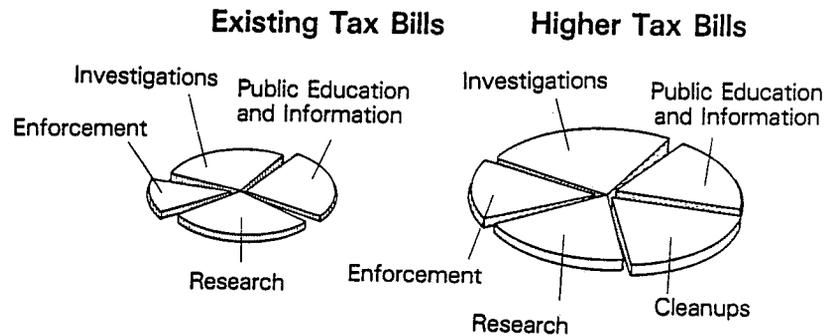


Figure 3-26. Final version of card to indicate payment for hazardous waste management.

### 3.7 INFORMATION NECESSARY TO UNDERSTAND THE VALUATION QUESTION

#### 3.7.1 Hypothetical Situation

The hypothetical situation participants were asked to keep in mind when performing the contingent ranking was very general at first (see Figure 3-27). It states that a landfill was located in the participants' community 5 miles from the residential district; that the source of wastes was electronics or agricultural industries; that the effects were heart damage, lung damage, and cancer; that the latency period was 30 years; and that industries producing the wastes were required by regulations to use the best possible control practices, to monitor the site, and to have insurance bonds. Participants found this vague example very difficult to relate to. This difficulty in turn made it hard for them to keep the situation in mind when ranking their cards:

Question: Does the scenario seem like a realistic situation?

The hypothetical is hard to deal with. If you had specific data that people could actually believe. You just get an uneducated answer.

When the moderator phrased the situation more specifically and in such a way that the participants could relate to it, they were more able to answer the ranking question:

Question: Suppose the shoe company could dispose of the chromium so that there was no chance of someone being harmed by the chromium but that price for the shoes would increase from \$30 to \$36. Would you be willing to pay the additional cost?

Yes, as long as I could afford them, I'd be willing to pay.

Question: What would you be willing to pay to reduce four persons out of 360 to one out of 360?

If we had 360 people in this room and four of them would be exposed, surely with that in mind I would be willing to do all I could.

In the subsequent rounds the hypothetical situation was made more specific. In Round 4 the card included 11 statements, each labelled fact. These can be examined in Figure 3-28. Now participants had difficulty relating to the specifics of the situation, as illustrated by the responses of participants from St. Catherine of Seina Church. When the group was asked which elements of

SITUATION 1

LANDFILL LOCATION:	YOUR COMMUNITY 5 MILES FROM RESIDENTIAL DISTRICT
SOURCES OF WASTE:	ELECTRONICS AND AGRICULTURE INDUSTRIES
EFFECTS FROM WASTES:	HEART DAMAGE LUNG DAMAGE CANCER eg. LEUKEMIA
HOW LONG BEFORE EFFECTS ARE KNOWN?	30 YEARS
REGULATIONS:	BEST POSSIBLE CONTROL PRACTICES INSURANCE BOND MONITORING

**Figure 3-27. Initial version of hypothetical situation given to participants performing the contingent valuation.**

### Hypothetical Situation

- Fact: Large chemical company wants to locate plant in your county.
- Fact: Sell chemicals to other companies for making plastics.
- Fact: Would generate 75,000 gallons/day of partially treated wastewater disposed in unlined settling ponds at the plant.
- Fact: Wastewater would include hazardous wastes: benzene, trichloroethane.
- Fact: Wastes likely to seep into groundwater.
- Fact: Plant will employ very few local people.
- Fact: Town will have no voice in location decision.
- Fact: Plant will be located 2 miles from town.
- Fact: Town uses groundwater for city drinking water.
- Fact: Wastes are known to cause cancer and birth defects.
- Fact: Effects would not be known for 30 years.

Figure 3-28. Revised format for hypothetical situation card.

#### CASE A

- Community has hazardous waste landfill with wastes from companies in your state
- Located 1 mile from your home
- Medium-sized facility handling 50,000 gallons of wastes daily
- Wastes are known to cause health problems
- May be 20 to 30 years before health problem is known

Figure 3-29. Interim version of hypothetical situation card.

the hypothetical situation bothered them and which elements did not, they stated that although the 75,000 gallons per day was not a number they could absolutely relate to, it was a very large number and therefore of concern. The question of whether a large or small number of local people was employed was somewhat insignificant since none of the participants was in need of employment. Someone found the absence of any local voice in the decisions to be the most objectionable. Another participant didn't think that allowing politicians a voice would change anything. When the option of putting the issue to a referendum was offered, the group didn't feel it had a chance to pass if the public were given the facts presented to them this evening. The moderator asked what their reaction would be if a referendum passed. Someone said he would be bitter, while others suggested they would accept transfer money to relocate.

To compensate for this kind of reaction, the research team started adding examples of things that were more representative of the area where the survey was to be administered. Additionally, the word fact was removed from the card explaining the hypothetical situation. Again, less information was included on the card, but the areas of most concern--disposal methods, monitoring, and types of wastes--were talked about in more detail (Figure 3-29). This worked well in the last round in North Carolina, and, by Round 5, participants seemed to be both thinking of the hypothetical situation and evaluating their own incomes when they determined a willingness-to-pay amount:

Question: Did you understand what it was you were being asked to pay for when you wrote down your figures in the willingness-to-pay task?

I feel like we've already paid enough for card A but the bottom line, I put \$1,000 but I could have just as easily put down \$10,000. I feel money should not be any object in cleaning the mess up.

I felt like I'd have to pay, but I'm unemployed so I put down \$200.

The same technique was used in the Boston groups with examples such as "the disposal site will be located at the plant site" and "the landfill would have a liner" were used. For the most part this worked in these groups as well. However, participants were so well informed in the Boston groups that they still wanted to know more specifics on the situation before making their pay-

ment decisions (the importance of including specifics in the hypothetical situation is discussed again in Chapter 4):

Question: To what extent were you keeping the hypothetical situation in mind when ranking the cards?

I was very much because I picked on little details like community and you can't get 15 miles from your home and still be in Needham, we're talking about area and I was thinking about or talking local, State, or Federal taxes. I was pinpointing.

I didn't know if they were per capita or per household or per year. When you think taxes, you think of a household.

I assumed by household.

For how many years . . . forever, \$50 per year, is the payment required forever. I am not really sure what you are going to do by throwing all that money at it.

I did the opposite. I got more involved with the cards. I think you ought to remind people.

Additionally, these respondents indicated it was important to continually remind people that they were to think in the hypothetical situation.

You should say now that you have looked at cards A-E again, now look one more time at the hypothetical situation and remind yourself under these circumstances and it may change the situation a little bit.

The hypothetical situation in the final survey gave specific information about each of the points focus group participants indicated were important to them in their decisionmaking process--kind of company, its distance from their home, quantity of wastes generated, how and where the company disposes of the wastes, how the site is regulated, and the latency period. The card used by the interviewer to relay this information is included as Figure 3-30. The survey script also continually reminds participants to think about the hypothetical situation each time a valuation question is asked.

### 3.7.2 Dollar Amounts

For the ranking exercise, the focus groups also assisted in determining dollar amounts that were large enough and increments of change that were meaningful enough to change participant payment decisions. The first round

### **Exposure Risk Circumstances**

- Electronic parts company
- Located 3 miles from your home
- Generates 2,000 gallons of hazardous waste each day
- Company disposes of the wastes in a landfill at company site
- If you are exposed, there is a chance you will die in 30 years

**Figure 3-30. Final version of hypothetical situation card incorporating important concerns of participants.**

cards specified \$25 for an exposure risk of 8/360, \$50 for an exposure risk of 6/360, \$100 for an exposure risk of 4/360, \$175 for an exposure risk of 2/360, and \$400 for an exposure risk of 1/360. Participants indicated that there was not enough distance between the payments:

The range on the dollars didn't seem very great. \$175 in greater prices and taxes you would really feel. But if you had put down your income taxes would be \$175 higher that's something you can relate to.

In the next round payments were changed so that they were \$50 for an exposure risk of 4/360, \$100 for 6/360, \$175 for 2/360, and \$400 for 1/360. This general range of dollar figures worked well in the North Carolina groups. However, when the survey draft was administered to the groups in Boston, it became apparent that meaningful dollar amounts would vary by income group and region:

The absolute dollars on here surprised me. If they had been higher, they would have been more meaningful but I had interpreted it in the same way. When you get down to a certain point to raise you have double the cost to reduce it a certain amount and one chance in 540 is such a small amount that it wasn't worth spending \$400 per person to go from two to half that, because it would start with such a small number. But I felt that those were preferable to doing nothing at all. I couldn't in conscience do nothing at all so I ranked those higher but I ranked them low in my list of opinions because I didn't see that they were cost effective.

Two sets of payment values were used in the final survey draft. The one with the highest amounts gives participants a choice of paying as much as \$105 a month (\$1,260 a year) for the least risk, \$55 (\$660 a year) for the next greatest risk, \$20 (\$240 a year) for the next greatest risk, and \$0 for the largest risk. (Again, these risk levels vary in different survey versions.) The lower payment series ranges between \$80 a month (\$960 a year) for the least risk to an actual payment reduction of \$20 a month for the greatest risk. Intermediate values are \$5 a month (\$60 a year) and \$40 a month (\$480 a year).

### 3.7.3 Valuation Task

Participant understanding of the payment task was more a function of the overall success of the entire presentation than the wording of the ques-

tion. It is interesting to see the progression of understanding within the groups as each round's presentation became clearer and more explicit. From the start, participants for the most part made the link between risk levels and payment amounts. Even though they tended not to keep the hypothetical situation in mind, they made the association between risk and payment. For example, participants in one of the first groups made the following comments about their interpretations of the ranking task:

Question: What did you notice about the relationships between price and size of wedges?

The less exposure you had, the more you had to pay for it.

I looked at the risk and the effect and I thought you meant that we should choose the one that is best for us and it would be best if the risk was low. Even though the amount is higher, it would be better if we had fewer risks.

I thought of the expenditure of money as a cost of the reduction of risk. If you wanted to reduce the risk, you had to pay more money.

Question: What did you think that you were going to get in return for the money that you were willing to pay in higher prices and taxes?

Safer environment.

Less risk.

The less the risk of exposure, the higher the amount you pay.

The more you pay, the more they're able to do, if they had more money to remove the PCBs from the roadside, the more they would be able to remove and the less your risk of exposure.

The more money they have, the more they can do.

However, this level of understanding varied across groups. The less well-educated groups tended to have more difficulty understanding the exercise:

I think if I went back and did it again, I would rank them differently.

I need more information ahead of time to read and study so I can make an informed decision.

As the rounds progressed and the presentation became clearer, participants could describe their reasoning process in more detail. There was also some

indication they were beginning to use the information given to them during the presentation in their decisions:

Question: What did you think you were doing when you picked a card that expressed your first preference?

I picked card E because it had a 0 dollar amount and a certain amount of exposure. I felt taxes would do a better job and keep the risk of exposure down.

I selected E because the public shouldn't be required to pay for the company's wastes.

I picked C because the risks--4 out of 360--is a long way to go, I may catch it and I may not.

I picked D because I feel our risk will be greater in the years to come than it will be in the past. For example, there are many different kinds of pesticides that are being sprayed now.

I picked D because years ago--my father was a farmer--and we didn't use the sprays we do now.

I didn't think about the dollar amount.

Inflation helped me to decide on card E. I already feel like I've been exposed to a lot of risk but inflation caused me to look at the dollar amount.

Question: What were you willing to pay and why?

I put 0 because at my age and my husband is disabled I'd have to take a chance, I wouldn't be able to pay anything else.

The risk on card C is still too much.

In Round 6, the moderator acted as the survey administrator and read a draft of the questionnaire. Focusgroup participants were given only answer sheets and asked to fill in one of the several responses read by the moderator. In all but one group participants were asked to give payment amounts. The remaining group ranked cards. In this round, it became apparent that the transition from the oral presentation to the written draft would not be easy. Whereas the Round 5 group had minimal difficulty determining payment amounts, the Round 6 group had trouble both with the wording of the question and the exercise. This difficulty did not appear to come from the situation's being too hypothetical or from a poor understanding of the concept of risk;

rather, most difficulties arose from participant's not having a frame of reference on which to base their decisions:

I think if you had given us an example of what could be spent. I had no idea.

I think if you'd qualified it. If you think \$1,000 is on the high end and 0 on the low end, and put a few bench marks in there; how much would you spend? That would eliminate people making over \$100,000 and the people who aren't employed at the moment. Even if you have income at the end, I think you still need to qualify.

Participants suggested several alternatives that would have assisted them in coming up with an amount:

You might be able to think about what would you be willing to pay for a can of soup or a quart of milk. A housewife could think in those terms where they can't think of the whole picture because they have never had to deal with that kind of figures.

I put down a 1 percent added cost, but I couldn't put down a figure. Then I quit because I could not think how many 1 percents I wanted to pay.

Isn't there any way you can tie it to our budget, i.e., keeping in mind your budget, would you pay 1 percent, 10 percent. . . . To me that's easier than a dollar amount.

In subsequent work on the questionnaire, the project team decided to specify the frame of reference using a person's monthly budget. The final wording chosen was "think about your monthly income and what you spend it on in your budget. How much would you be willing to pay each month in higher taxes and in higher prices for products you buy to lower your risk of exposure from the level on Card A to the level on Card B?"

It was also not clear that participants were supposed to keep several levels of risk in mind when giving payment amounts:

I looked at them as three separate questions and I had already spent as much as I would so I put 0 for the rest even though I liked them better.

The one group that was asked to rank cards, although they had difficulty keeping the hypothetical situation in mind and with the dollar amounts, had very little trouble with the question's wording.

### 3.8 SUMMARY

In addition to the mechanical changes discussed above, the research team discovered a variety of other general techniques to improve the focus groups as they evolved. First, whenever possible, specific examples should be used, not only because they generate greater participant interest in the presentation, but also because they assist participants in processing the information presented to them. Over and over again when a specific example was used to illustrate a point, participants would pick up on this example and use it later in the discussions as an example to illustrate their points. Once this became apparent the research team worked to make the presentation and survey as specific and tangible as possible, using examples that seemed to capture the most participant attention.

Second, cards are not necessary to explain each and every transition. As the focus group sessions progressed, it became obvious that the use of cards to explain each and every point in the presentation was unnecessary. In fact, participants in the last round indicated that the abundance of cards used to explain points was actually confusing. The best use of cards was in illustrating the most confusing points. Additionally, it was essential to discuss each card thoroughly before moving on to the next.

Third, the research team must be able to make dynamic adjustments throughout the focus groups. This ability greatly enhanced the information obtained from each round, particularly in the last round where participants indicated that some questions were unclear. The ability to revise those questions on the spot enhanced the information the research team was able to obtain from the remaining groups in that round.

Finally, an initial test of the questionnaire should have been made before beginning a round of focus groups where it was administered. This could have been done with Institute employees. Such a dry run would have allowed the research team to eliminate some obvious problems with the questionnaire, such as problems caused by confusing language on the questionnaire and by redundant visual aids.



## CHAPTER 4: ANALYTICAL FINDINGS OF FOCUS GROUPS ON HAZARDOUS WASTE ISSUES

The 19 focus group sessions conducted for this research helped the project team gather a variety of information important for developing an effective contingent valuation survey questionnaire. As shown in the previous chapter, which concentrates on the mechanics of questionnaire development, the focus groups were instrumental in uncovering information that could help the project team frame the hypothetical market for risk reductions and explain the payment vehicle to survey respondents. Concentrating more on participant attitudes, perceptions, and language, this chapter summarizes how the focus groups helped the project team discover how participants felt, thought, and talked about a variety of pivotal issues, including risks, hazardous wastes, and the environment.

### 4.1 OVERVIEW: TOPICS FOR DISCUSSION

While the overall objective of the focus groups was to gather attitudinal, perceptual, and linguistic information from the participants, the project team consciously sought to gather this information over a well-defined range of specific issues--e.g., risks, the environment, hazardous wastes, paying for waste cleanup--which they used to loosely structure the informal sessions. Discovering how the participants felt, thought, and talked about these kinds of issues was crucial to the questionnaire development process for several reasons. First, it helped the project team see how much the participants already knew about the survey's important analytical areas. This knowledge indicated a starting point for the information presented in the survey questionnaire. Second, the participant comments helped the research team discover how people thought about these important issues. This determined the best way to present the information. Third, participant opinions and attitudes about risk and environmental and hazardous waste issues helped the project team unearth important analytical variables that otherwise might have been overlooked. Fin-

ally, the project team was able to look across groups of different ages, education, and income levels and see how knowledge, attitudes, and opinions varied.

As the research progressed through the six rounds of discussions, however, the discussions among the participants demonstrated repeatedly that most people have a notion of the hazardous waste problem that encompasses a wider variety of issues than was anticipated. The following summary highlights the seven issues that dominated the discussions, some of which arose even without prompting from the moderator:

- Risk perceptions and attributes  
The relationship between the attributes of risk--e.g., voluntary or involuntary--and how people perceived both risk from hazardous wastes and other sources.
- Perceived risks from hazardous waste exposure  
The important ideas participants mentioned when discussing how they formed their perceptions of hazardous waste risks.
- Environmental attitudes  
The relationship between general environmental attitudes and attitudes toward hazardous waste issues.
- Understanding of hazardous wastes  
What participants know about hazardous waste and the importance of this information in responding to the valuation questions.
- Understanding of payment vehicle  
The important role that a payment vehicle plays in the contingent valuation approach and how participants reacted to the one used in our framing of hazardous waste risks.
- Feasibility of compensation in landfill siting  
How participants reacted to the notion of compensation to offset the costs of siting a landfill in an area.
- Attitudes toward government  
How participants perceived effectiveness of government in developing and enforcing regulations influenced value of reductions in hazardous waste risks.

#### 4.2 GUIDE TO THE CHAPTER

This chapter summarizes focus group participants' attitudinal and perceptual comments in each of the seven major areas of interest and highlights other

key analytical variables that explain risk perception and willingness to pay.\* Specifically, Section 4.3 outlines participant awareness of the hazardous waste problem, Section 4.4 presents how participants view the risks and key attributes of hazardous wastes, and Section 4.5 outlines how participants perceive the risks of exposure to hazardous wastes. Section 4.6 highlights participant attitudes toward environmental issues, Section 4.7 describes the extent to which participants understand hazardous wastes, and Section 4.8 discusses the extent to which participants understand the payment vehicle. Section 4.9 describes participant perceptions of compensation--i.e., how they feel they could be compensated for having a hazardous waste landfill sited in their community--and Section 4.10 describes how participant attitudes toward government affected perceptions of risk and willingness to pay to reduce risk. Section 4.11 is a brief summary of the material presented in this chapter.

Finally, it is important to note that the same questions were not asked of all focus groups, nor were the sessions structured similarly (see Chapter 2). Thus, the following discussion draws unevenly from the various groups to illustrate the participants' perceptions and attitudes in these six key areas.

#### 4.3 FOCUS GROUP PROFILE: PARTICIPANT AWARENESS OF THE HAZARDOUS WASTE PROBLEM

The 19 focus group sessions were conducted during April, May, June, and September 1983 in North Carolina and Massachusetts. The participants in these sessions included both men and women of all ages from a variety of economic, social, and educational backgrounds. While the character of almost all the discussion sessions was largely the product of one or a mix of these and other important variables, the factor with the greatest impact on the participants' feelings and attitudes about hazardous wastes and the risks associated with them was personal awareness or experience--i.e., whether or not hazardous wastes and their risks had recently become a local issue for some reason. Table 4-1 lists the participating organization and the location of each of the

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\*Where necessary to ease the exposition, we have lightly edited the participant quotations that appear in the following sections. To consult the unedited quotations, see Desvousges, Smith, Brown, and Pate [1985], which contains more detailed descriptions of each of the focus group sessions.

TABLE 4-1. FOCUS GROUP PROFILE: PARTICIPANT AWARENESS OF THE HAZARDOUS WASTE PROBLEM

Participating organization	Location of session		Description and source of participant awareness <sup>a</sup>
	City	State	
Duke Institute for Learning in Retirement	Durham	North Carolina	The participants in this group had a heightened awareness and understanding of hazardous wastes due to several local incidents--e.g., PCB dumpings on North Carolina highways, the Warren County PCB landfill siting controversy, and a fire at a chemical waste recycling company in Durham.
White Rock Baptist Church	Durham	North Carolina	Most participants had a poor understanding of hazardous wastes, although they were able to site local incidents they had heard about in the media--e.g., the Warren County PCB landfill controversy.
Vance County Heart Association	Henderson	North Carolina	Most participants were aware of hazardous wastes and their risks due to the controversy surrounding the siting of a PCB landfill in adjacent Warren County against the strongly expressed protests of Warren County residents. The proximity of their community to the Warren County landfill site had clearly caused these participants to do some soul searching. They had well-developed ideas concerning possible compensation and strongly supported its use in landfill siting decisions.
Triangle Presbyterian Church	Durham	North Carolina	Although this group had little personal experience with or awareness of the hazardous waste problem, some participants were aware of the Warren County landfill siting controversy, and a few people had detailed technical knowledge of the hazardous waste problem. Nevertheless, this group's understanding of hazardous wastes was not precise, and at least some participants expressed reservations about paying the costs of control.
Inco Sheltered Workshop (Warren County)	Henderson	North Carolina	Perhaps because their community is in such close proximity to the Warren County landfill site, these participants felt the hazardous waste problem was huge and perceived their probability of exposure as nearly 100 percent. They used the term hopelessness to describe the hazardous waste problem and were eager to express their opinions.
YMCA Hobby Time Group	Durham	North Carolina	A few of these participants cited local incidents--the Warren County PCB landfill and a chemical recycling plant fire in Durham--as sources of their awareness of the hazardous waste problem, but their understanding of what constitutes hazardous wastes was incomplete.
Methodist Retirement Home	Durham	North Carolina	These participants were very sensitive about how they were perceived by others and, consequently, were cryptic and defensive about their awareness of the hazardous waste problem. They seemed to understand that some substances are hazardous but not how they are related to manufacturing processes for consumer goods.

(continued)

TABLE 4-1 (continued)

Participating organization	Location of session		Description and source of participant awareness <sup>a</sup>
	City	State	
Salem United Methodist Church, I	Haw River	North Carolina	These participants were poorly informed about hazardous wastes: One person asked what PCBs were, and another wondered if acid rain came from Agent Orange. Perhaps due to their lack of knowledge, these people were less afraid than most of the effects of hazardous waste exposure.
Salem United Methodist Church, II	Haw River	North Carolina	Though somewhat more informed than the participants in the previous discussion group, these individuals also had limited knowledge of the hazardous waste problem, particularly the effects or exposure. For example, they did not understand how leaving PCB-laced oil on the shoulders of North Carolina's highways could create an exposure problem.
Ridgeroad Home Extension Club	Durham	North Carolina	These participants indicated they knew about hazardous wastes through the media coverage of local events--e.g., the Warren County PCB landfill siting controversy--but they did not have a clear understanding of what constituted hazardous wastes and had difficulty giving specific examples: "Might have fumes associated with it."
Union Presbyterian Church	Carthage	North Carolina	These participants knew a great deal about the hazardous waste problem. They were aware of various exposure paths (particularly ingestion) and of the various products and manufacturing processes that produce hazardous waste byproducts. In addition, they followed not just local incidents (such as the Warren County landfill siting controversy) but also national ones--e.g., the Love Canal, New York, and Times Beach, Missouri, controversies.
St. Catherine Catholic Church	Wake Forest	North Carolina	In general, these participants were well educated and well informed about hazardous wastes, both at the national and at the local level. However, they had very set ideas on what hazardous wastes were and how large a problem they created. Their greatest fears were of the "unknowns" involved in cleaning up wastes and the implications of these unknowns for their children.
Anson County Crime Watch President's Council	Wadesboro	North Carolina	After overcoming their initial suspicion of the objectives of the focus group session, these participants indicated they were aware of the risks associated with exposure to hazardous wastes. This was due primarily to the fact that their county had successfully fought the siting of a commercial hazardous waste landfill. However, they did not fully understand what constituted hazardous wastes or that the manufacture of common consumer products created them.
Women of Morven Presbyterian Church	Morven	North Carolina	Probably because they lived in a County that had successfully fought a commercial landfill siting, these participants were very well educated about hazardous wastes. They were not surprised by the number and types of consumer products whose manufacture creates hazardous wastes, and they all indicated that they felt a high risk of exposure.

(continued)

TABLE 4-1 (continued)

Participating organization	Location of session		Description and source of participant awareness <sup>a</sup>
	City	State	
Morven Presbyterian Church Members	Morven	North Carolina	Like the previous group, these participants lived in a community that had successfully fought a proposed hazardous waste landfill. They were very well informed about hazardous wastes, their risks, and the alternatives for waste cleanup.
Acton Congregational Church	Acton	Massachusetts	Probably because hazardous wastes from a leaking chemical landfill site had contaminated their water supply, these participants were well aware of the potential risks of hazardous waste exposure and effects. In general they felt they were very likely to be exposed to hazardous wastes, and, in particular, they felt exposure would most likely occur through their drinking water supply.
Concord Council on Aging	Concord	Massachusetts	The participants in this group were also very aware of the nature of the hazardous waste problem, probably because of the close proximity of their community to Acton, whose water supply had recently been contaminated. These participants were less sure about the levels of risk associated with exposure, however, and they had difficulty estimating cleanup costs.
Acton League of Women Voters	Acton	Massachusetts	Like the previous group held in Acton, this group was knowledgeable about hazardous wastes due to a recent incident in which their drinking water supply had been contaminated by hazardous wastes. However, the large extent to which the participants identified with their own local incident prevented them from thinking about hazardous wastes in the hypothetical--i.e., they had difficulty describing what they would be willing to pay to reduce their risks in a hypothetical situation involving risks from hazardous wastes.
Needham American Red Cross	Needham	Massachusetts	Because Needham is further than Concord from Acton, whose drinking water was recently contaminated, these participants were somewhat less aware of the hazardous waste problem than were Concord participants. Unlike the Concord and Acton participants, for example, they perceived their own risks as zero, and they indicated they were less environmentally concerned than the other Boston-area participants.

<sup>a</sup> For a more precise account of focus group participant awareness of and experience with hazardous wastes and their risks, see Desvousges, Smith, Brown, and Pate [1984].

focus group sessions and briefly summarizes whether, to what extent, and how the participants became aware of the hazardous waste problem.

As shown in Table 4-1, participant awareness of hazardous wastes and their risks is particularly high in communities whose residents had experienced a hazardous-waste-related accident, as had the participants in the sessions held in Acton, Massachusetts, where the local water supply had been contaminated by chemicals from a hazardous waste landfill site. Residents of areas that had recently faced a landfill siting decision were also highly aware of the hazardous waste problem and its potential risks, as illustrated by the participants in the Warren County and Anson County, North Carolina, sessions, whose communities, respectively, had unsuccessfully and successfully fought landfill siting decisions. In contrast, awareness of hazardous wastes and their associated risks was very low in areas whose residents had not experienced a local incident or fought a landfill siting decision. The responses of the participants in the Haw River, North Carolina, sessions, for example, show little awareness--indeed, little understanding--for what hazardous wastes are or the number and types of risks they might pose.

#### 4.4 RISK PERCEPTIONS AND ATTRIBUTES

This section presents the findings on how participants viewed the risks and key attributes or characteristics of hazardous wastes.

##### 4.4.1 Perceptions of Risk

Participants were able to speak easily about risk. When asked, "what do you think of when you hear the word risk?" a variety of images immediately came to mind:

I think risk is part of everyday living. It's driving in a car, it's getting married, it's having a child, it's having a drink. Almost anything you do has a risk that you may have to pay for.

Possibility of getting hurt.

Risk management is part.

Element of every choice.

To take a chance, to go out on a limb. Try out something. Might cost you something, but the rewards might be great.

There were very different levels of understanding of risk across groups. For example, one well-educated older group was able to distinguish between ex ante decisions based on statistical measures of risk and ex post evaluations that some people had actually died from the outcomes of those decisions. This is not the expected level of understanding for a survey population. These same well-educated older participants were able to talk about how they had altered their behavior over the years as they learned more and more about risky substances:

You know, our generation was just over the line. We were pioneers at that point and I remember Parents Magazine, do you remember that? Had excellent articles on parents, things like this, and we knew about the paint. We were sure that when we did buy the first playpen that it was a stained product and not painted.

Participants were also able to distinguish between different kinds of risks--particularly that there are known and unknown risks:

It's not the unknown risks that bother me, but the fact that in many cases government and companies go ahead and do something despite the risks. They think government knew about Agent Orange and the nuclear testing effects, but they went ahead with both of them. That's what makes me feel at risk.

Accidental risks--car accidents, plane crashes, etc.--were often the first to come to participants' minds. However, professionals often immediately thought of financial risks:

When I think of risk, I think of financial risks. Being a businessman, first thing that comes to my mind, financial risk.

Participants also spoke of several factors affecting their risk perceptions, of which age and experience were the most important. This point was particularly well made in a group where participants were of various ages. For example, a younger group member indicated that as a paratrooper he voluntarily exposed himself to risks:

I was a paratrooper in the 82nd Airborne. Every time we woke up and started our training, we were taking a risk. So after awhile, you just ignored it; risks became a fact of life.

An older man suggested that some young men like to "live on the edge; it's more exciting there." There seemed to be a consensus on this point. One

person felt younger people didn't "respect life" as much as older ones. Various persons in the group felt that as people get older and more experienced, they become more cautious:

Throughout life you have a lot of knocks and you learn the hard way to be more cautious and not take as many chances, and you live longer.

I find that younger people take many more chances on the job than more mature people. Even though they are instructed to do things a certain way, that danger doesn't seem to affect them as much as it does an older person [who] seems to be aware there is danger there. We have more losses with younger persons in our business as a result of their inability to see this danger.

Participants' opinions about the quality of scientific information also affected their risk perceptions:

Well, there's so many [risks] that I feel as if I can't breathe in, and I can't drink water, and I can't walk on the street. So unless they are very definitely bad, I ignore it, like bacon. And I found I was right to ignore the risk on bacon and when it said you had to drink 165 Pepsis to get cancer or something a day, I said "nuts" to that. So, I do think, in some respect, carcinogens have been overdone to the point where when it's really serious people are not going to pay the attention they should.

I took a course in probability a few years back . . . One thing I learned was the greater the scientific knowledge, the less the risk. . . . If we have scientific data that's based on fact, the chance element ought to be greatly reduced.

Finally, participants indicated that in many cases they feel there are so many risks that for those activities they really enjoy they tend to discount these risks:

You have to consider risking your peace of mind, and your tranquility, and your ability to concentrate on something else besides your Pepsis and your bacon. I mean when that's a risk, it's very important, and one must demand the kind of peace of mind and tranquility and dive into your bacon and Pepsi and get your mind on something else. I just didn't give a damn, I was perfectly calm eating a piece of bacon every morning. It's like the risk of smoking, I've been smoking for 55 years and I have a checkup every year and I'm just fine. I swim 2 miles twice a week, I walk, there's nothing wrong with me, so apparently I just am not affected by whatever affects other people with smoking.

#### 4.4.2 Occupational Risk

In all groups, the moderator questioned participants about occupational risks. They had very specific ideas about the allocation of responsibility in risky professions. These attitudes often differed within and across groups. At the one extreme, no matter what the circumstance, participants felt industry was very much responsible for its workers' safety:

I think it is the responsibility of the manufacturer, if we're discussing manufacturers, or even in the government agency where there are risks, to protect the worker. A worker may be the best worker in the world, the most skillful. He can come into work some day preoccupied with something else, he's had a death in the family and so forth, and make a fatal error which might cause him to lose his arm. I think that this company is responsible for taking care of him for the rest of his life, and we pay the bill, and we should.

Some participants in this group immediately took issue with this point of view. They felt the worker must take on part of the responsibility for his safety:

I don't think the company should be responsible if somebody comes in all upset because he's had a fight with his wife and cuts off his hand. That's too bad, but I don't think it's the company's fault.

I don't think the company has that responsibility. That would mean they would have to analyze the mood of every worker who comes in every day and not even, not just every day, but every hour on the hour, maybe, or even on the half hour, to see if he is capable of doing the work in the proper frame of mind. But I don't think you can put that burden on any company. I think you have to assess a reasonable standard of safety and then apply it to everyone. And if somebody is really upset, he has to protect himself. You can't just lay it all on somebody else. Each individual has a responsibility. He may need the money, and he may make a deliberate choice to take the hazards of the hazardous waste or to take the hazards of the machine when he knows he's not really in shape to be working. But what if it was just a hangover which happens and costs the industry a great deal of money. Is the company to pay for this? I don't think so.

Some participants took a more moderate approach, indicating industry should take responsibility but that the industry should have the opportunity to protect itself in some way:

Of course, my industry was high risk, electricity. I've often wondered if employers don't have the right to select people who are not careful and to demote them. I have a very humane company. We've never fired anybody, but we would get them onto another job if they had an accident. I wonder if they shouldn't have that in writing.

In several groups, participants felt the worker had the right to know about all the risks he potentially faces in his job:

Well, I think the worker certainly should have, or does have, the right and should be given the information about the kind of situation he's getting into whether it's asbestos or. . . .

However, in one group, an automobile dealer noted that only so much could be expected of employees to protect themselves. In his situation, even though he supplied safety equipment, workers didn't use it:

They seem to be unaware of the danger they will do their lungs and to them physically. They're in a hurry and preoccupied and they have difficulty using the equipment.

Question: Do you enforce any regulations to protect these people from their own lack of concern?

The only things we do is constantly remind them. In the free enterprise system, you can't demand and you can't kick out. You're limited in what you can do. You diplomatically try to handle it. But we do not impose it strictly.

Participants in one group pointed out that people are compensated for higher risk jobs and that they will sometimes accept them even when they aren't compensated because of limited alternatives. Again, this level of understanding is unusual in its detail:

Nobody makes a conscious decision that this man will die because this bridge is being built. This history is that lives are lost when a major bridge is built, but the decision is in the hands of the individual worker as to whether or not it's worth it to him in terms of his risk of life against the compensation offered.

#### 4.4.3 Attributes of Risk

Participants consistently expressed two risk attributes--that there are controllable and uncontrollable risks and voluntary and involuntary risks. When distinguishing between controllable and uncontrollable risks, participants also noted they had different ways of dealing with each of these types of risk:

There are really two broad categories. There's nothing you can do about a tornado or a hurricane if it comes through here, so that's a natural phenomenon. . . . There are risks that our government, since you mentioned the government, has exposed us to and continues to expose us to in the news every day. You know we're ex-

posed to the risk of going into war with other countries, but there's nothing we can do about it.

I looked at a man on TV the other night down in Louisiana in that flooded area. He said that this was the third time that he had lost a house in that same section of town. If he knew it was coming, why did he stay there?

I think the thing you inherently do is measure the degree of risk. If you think it's a moderate degree, you refrain from it.

The better prepared you are, the better off you are. . . . The car accident is the same thing but maybe not to that extent, because in the car you can be as careful as is humanly possible to be, but in the car it's hard to keep something from happening to you.

Participants also distinguished between voluntary and involuntary risks. In this context they discussed conscious and unconscious decisions in coping with these risks:

I think you can break it down to two categories, really. You have a risk by choice, and you have uncontrollable risk, needless risk, not by choice. A lot of times we're put in these predicaments. I had risks for 20 years, because I was a paratrooper, but that was risk I was willing to take when I jumped out of the plane every time. It was a calculated risk with the odds in my favor that the chute would open. . . . I think you can categorize risk as being, say take a large number, and out of a large number, you've got the prediction, maybe, take fatalities, jumping out of planes. That's the easy one. The chances of your chute not opening is 1 out of 1,000 every time you go up.

Question: How many of you feel that you consciously make a decision, "I will, or will not, use seat belts"?

I guess it's a conscious decision.

I was just going to say that some of these we deal with consciously and some unconsciously, I think. Automatically, we do some things and some we don't automatically do, like fastening seat belts. Some people do that automatically; I don't. I know I should at all times, but I just don't. I do subconsciously, sort of, if I'm going on a trip.

Well, I downgrade the risk. In my opinion, my chances of being in an automobile accident near home, aside from the fact that Claude and I almost got sideswiped a couple of days ago, is not very great, at least (the chance) that I'm hurt in an accident.

Participants in several groups also noted that these conscious risk reduction activities involve costs:

I don't use processed foods even though it takes more time [to prepare foods from scratch].

I thought of a car accident and the fact that I don't wear seat belts. . . . I think about people being thrown from the car being saved and those with seat belts being pinned in and burned. . . . Take chance if you buckle in and take chance if you don't, do what is right for you.

#### 4.5 PERCEIVED RISKS OF HAZARDOUS WASTE EXPOSURE

This section describes how different groups perceived the risk of exposure to hazardous wastes.

As indicated earlier in Chapter 3, participants do not automatically think of hazardous waste risks as two separate events--a risk of exposure and a risk of effect once exposed. Further, even though participants could readily distinguish between controllable and uncontrollable risks, they could not extend this concept to hazardous waste risks. In short, participants had difficulty viewing the risk of exposure as something they could control and the risk of effect as something they could not. Only the group from Warren County, North Carolina--whose session was held early in the project, before the concept was explicitly explained--made this association. Unfortunately, their response was very emotional:

I think I was preprogrammed because I knew the issue was hazardous wastes and I knew you wanted to lead us up to that. So, when I saw cause and effects, the effect didn't matter because I didn't want the first part to start with. I didn't think about if you are near a landfill then your percentages of being exposed to it. I don't want it, period, so I couldn't really relate to it. It flew in one ear and out the other.

Participants felt most at risk from landfills:

Question: Have you completely eliminated your risk of exposure by having no landfill?

You've greatly eliminated it.

If you just eliminate landfills, no, you still have to do something with the stuff but if you eliminate landfills in favor of some other alternatives you can, i.e., incineration, recycling.

Participants indicated distance from the site was a factor in their perceived risks:

There's no risk if you're not exposed. If I'm not living near the dump, I'm not at risk, unless it gets into the water supply.

We had the opportunity to buy land 1.5 miles from the site and instead bought land about 5 miles away. The reason we didn't do it was solely because it meant moving closer to the site.

The only thing I could think of was the landfill, and we live 3½ miles away.

#### 4.5.1 Participants Close to Hazardous Waste Problems

In general, perceptions of risk were most affected by the proximity of the participants' community to an existing, potential, or proposed landfill site or a hazardous waste incident. The importance of this variable in explaining participant reactions is emphasized in earlier sections, but it is particularly noticeable in participant comments regarding their perceived risks of hazardous waste exposure. Specifically, although a good cross-section of participants was represented in the focus groups, several different perceptions of, and reactions to, risk emerged. At one extreme was the group of participants from Warren County, North Carolina, who had just been forced by the State to accept a hazardous waste disposal site against their wishes. As can be seen throughout the discussions described in this report, this group tended to react emotionally to hazardous waste questions, although very well informed. Their assessment of the hazardous waste situation is that it is hopeless; their perceived risk of exposure and death from exposure is extremely high:

Question: What pops into your mind when I say hazardous wastes?

I would think every person in this country is some way exposed to toxic wastes and has it somewhere.

It's a known fact that someday we're all going to croak. And it's going to have something to do with hazardous wastes.

It's the way you're going to die. I don't want to be living and envying the dead.

In another camp is the group of participants from Vance County, North Carolina, who live proximate to the Warren County community forced to accept

the waste disposal landfill. These participants were still very knowledgeable about hazardous wastes and perceived their risks of exposure to be as high as those of the Warren County group. However, their solutions to the problem were much more rational. Their proximity to a community with a hazardous waste dumpsite appeared to have increased their understanding of the risks associated with hazardous wastes but allowed them to distance themselves from those risks emotionally.

In two out of the three groups of participants from Anson County, North Carolina--an area that almost received a landfill site but successfully fought it off--responses were also much less emotional. All of these participants were as well informed about hazardous wastes as the Warren County group, and, in general, still perceived their risk of exposure as high. However, they went through a very logical reasoning process in making this assessment and also tended to want very specific information on which to base their decisions. The responses to the questions concerning how far they felt they had to be from a proposed site illustrate this point well:

Question: What are your responses to the distance question? How much more than 10 miles?

It depends which direction, if you're above it, you worry less.

Isn't there a false assumption in this question? Doesn't it matter what side of the stream you live on?

In contrast, the third group from Anson County, North Carolina, in this situation was much more emotional in their responses. The entire group placed their risk of exposure at the top of the risk ladder and indicated they would want to be more than 10 miles from the site. This divergence could be attributed to several factors. For one, this group was less educated, less wealthy and more diverse than the other two. In addition, the group also contained one or two very vocal antagonists and these people may have greatly influenced the other participants' responses and attitudes.

Another type of situation is represented by the two sessions conducted in a Boston, Massachusetts, community--Acton--whose drinking water supply had recently been contaminated by hazardous wastes leaking from a landfill owned by a local chemicals company. These people had experienced a problem, had dealt with it, and had solved it. They perceived their risks of exposure

to be high, but not as high as either the Warren or Anson County groups. They had very logical responses to the questions and wanted very specific information on which to base their decisions:

Question: Can you use distance as a ruler in effect?

I thought it was. Some kind of way, but it's more complex than that. If someone is dumping chemicals in a stream 30 miles upstream, they may get to you anyway. There are other factors.

Question: We also asked you about distances--suppose you had the opportunity to move instead of paying. How many answered yes, you were willing to move? For those of you who answered the question, could you come up with a distance?

Twenty-five miles. If you are talking about nuclear holocaust or nuclear waste, then 25 miles is not adequate, but for hazardous waste, it is.

I put 1,500 miles because my husband has specific problems that disappear when we go toward Minnesota.

#### 4.5.2 Participants Not Close to Hazardous Waste Problems

In great contrast to the sessions conducted with Warren County, North Carolina, and other residents living proximate to hazardous waste landfills or spill sites, the numerous sessions conducted primarily in Durham, North Carolina, and the surrounding counties drew participants who were only somewhat familiar with hazardous waste problems and looked at them as isolated incidents. Although they were very concerned as citizens for the people facing immediate problems, they felt the issues were not really their own and tended to view their own risks as small:

I don't feel any particular threat from hazardous waste in my personal life. I drove along the North Carolina highway that had the sign "PCBs dumped here. Do not walk on this shoulder." But I wasn't going to walk on the shoulder of the road anyway, so it didn't make much difference. Now, when the landfill was started up in Warren County, I thought, well, if they're going to have to put this material, which is a hazard to a lot of people, in some place, one of the less populous counties seems a logical place to put it and that's one of the less populous ones. But I wasn't personally affected and I can't think of anything that in my particular personal life hits me in the head with this waste category. I mean, in a general way, yes. I read about dioxin, PCB, and nuclear things, and yet they are basically far removed from my particular way of living where I am now.

I put the pollution equivalent to poisoning. Recognizing, I thought, that there was some risk greater than flood, but I did not see either of them from my own instance being a very high risk . . . I guess I just didn't see myself as an individual having any real exposure.

I did exactly the same thing. It doesn't really have much relevance within my immediate situation. We used to read about it in other communities in Massachusetts where we know somebody.

I still felt I needed to know what type of hazardous waste, how long you had been exposed to it when they discovered it. I needed to know some variances.

#### 4.6 ENVIRONMENTAL ATTITUDES

This section highlights the findings on the attitudes of participants toward environmental issues.

##### 4.6.1 Perceptions of Environmental Issues

Participants in all the focus groups regarded general environmental issues as important and cause for concern. They attributed this awareness to greater television and newspaper coverage of the issues over the years. In discussing environmental areas of concern, the participants often used images commonly portrayed by the media. Associating billowing smokestacks with pollution is one such example:

Question: What do you think current environmental issues of interest are?

Well, just the general increase in manufacturing to keep up with the needs of the population causes factories and electrical plants to have more and more smokestacks and more and more burning of coal and generation. And that is just added to the amount of pollution in the air.

Participants in all groups also spoke most frequently of local environmental issues. All of the North Carolina groups gave the example of PCBs in Warren County whereas some of the more educated groups were able to relate more obscure incidents:

You know that they had an accident out at Duke University in the basement of the Union Building 2 or 3 years ago. It was a big generator, the oil leaked out, they forced it into the sewer and it got into the soil and there was an awful "to-do" when they realized there's PCB in this.

Participants also indicated environmental problems often made them fearful because so much uncertainty is associated with them.

One of the people that I heard speak at college told us something that has blown me away ever since. Every time man has done something to help a situation it has turned out to be the worst thing that could have been done. He backed this up with example after example. This is what bothers me--we just don't know in the longer term what things mean; the crux of the problem lies in the unknowns.

#### 4.6.2 Responsibility for Environmental Problems

Responsibility for environmental protection was an aspect of environmental issues that participants spoke about at great length, though at varying levels of sophistication. Many, especially in the church groups, felt they have a responsible role in protecting the environment:

Yeah, but God did give us a clean environment to start with and we have a stewardship role to fulfill. We can't give up.

Some participants distinguished between natural and man-made hazards indicating they could only expect protection from man-made hazards:

I think we have the right to remain safe from created hazards. If you live next door to a volcano, that's not . . . man-made hazards.

One group pointed out that the external nature of pollution complicated the responsibility issue:

I have experience first hand in finishes on vehicles. Apparently not reaching this far. On the south side of Virginia apparently there's some industrial fallout. Some people thought it was something wrong with car finishes. But it wasn't. Best finishes in the world. It polishes off . . . This industrial fallout. I don't know what it is doing to people. I thought to myself in our society today we do have a problem. You know the Canadians have been crying . . . If we're getting this on the south side of Virginia, it must be in other parts. I hadn't been that concerned until I saw that stuff and I thought to myself we do have a problem; we do have a responsibility to society to watch this, to monitor it. Between here and Richmond, years ago you could hardly breathe. It would actually kill you. And you drive through today and can actually breathe. They've cleaned up the act so much.

#### 4.6.3 Risks from Environmental Problems

Perception of risks from environmental problems in the local environment varied across communities. Participants living in communities that had not faced hazardous waste landfill siting incidents, in general, felt much less at risk from environmental problems. Among the groups held in the Raleigh/Durham/Chapel Hill, North Carolina, area, the wealthier, better educated participants felt the least at risk. In fact, many of the participants had chosen to locate in the area partly because it did not suffer greatly from pollution:

Question: Do you feel you are at risk in this area?

No, not that I know of, I don't feel any, no.

Only in food.

I cut down on risk moving here from New Jersey, which is one of the most highly polluted areas.

Am from Northern New Jersey and am glad to be here. All my impressions and opinions are molded by our manipulative press. I plead ignorant of the reality of what's going on. But I can say that we are far enough from Warren County here to not be concerned about the water quality.

These people were very skeptical of the State government's recruitment of industry because of the potential pollution problems it could cause:

More people, you get more pollution.

Northern industrial plants are moving down and bringing pollution with them.

Getting down to the kinds of things that we can look at, one thing that I notice with all these industries coming in is that trees are disappearing and there are fewer birds, especially hawks, than there used to be. We are going to nothing but concrete and blacktop. I am beginning to worry about these things because those of us that live here do so because of the surroundings. . . . We are seeing trees flattened out right and left around here. I think someone ought to take a look at what's happening to the wildlife.

We have a State government that is interested in moving in industry. That is a real problem.

Even in the group composed of individuals living next door to the Warren County, North Carolina, landfill site, risks from environmental problems were not seen as very extreme:

In Henderson, Vance County, I don't know of any problems environmentally here. Some of you may know of something. I don't. I think as they begin to develop and the talk seems to be about development here, that's something to be aware of.

In contrast, perception of risks from environmental problems among the members of a black church group from Durham, North Carolina, where most participants had always lived and probably always will live, was much more acute:

There was an article in the paper that if they did not treat our particular water in Durham with some chemical, it would have some kind of effect on everybody's health. I saw just Sunday, I forget what the ramifications were.

Had they not used a certain type of chemical to go in there to kill whatever was in the water, we all would have been sick and probably had some kind of cancer by now.

When I was growing up, you very rarely saw a stream or a river that was really polluted. You know, everything was nice and everything like that. But, I recall reading about the James River, and I went to Norfolk when I was a kid and I never seen an inside toilet, either, until I got there. And I saw this thing, and I asked my cousin, now what happens, where does it go? He said it went to the river. I said, all these people that got these started talking about it going to the river, I said after a while the river's going to be soiled. He said, no, it'll be a long time before the rivers fill up.

In the groups that had dealt with landfill siting decisions, the discussion of risks from environmental problems always turned to hazardous wastes; their perceptions of risk in the local environment will be examined in the next section.

#### 4.7 UNDERSTANDING OF HAZARDOUS WASTES

This section portrays the range of understanding of hazardous wastes shown by focus group participants.

##### 4.7.1 Knowledge of Hazardous Wastes

Knowledge of hazardous wastes varied quite a bit across groups and seemed to depend on participant education and experience with hazardous waste problems. Participants were rarely surprised by the number and types of products producing hazardous waste byproducts:

Question: How many products involve hazardous wastes?

I suspect it's larger than we could imagine.

Just as a wild guess, it wouldn't surprise me if it were larger than 90 percent of everything we manufacture.

In most groups, participants understood it was unrealistic to think about banning these products:

How many of the items in your lifestyle could you give up, automobiles, TV's?

However, the very emotional were insistent on doing away with the products:

I feel that, if we're going to develop a byproduct that is so hazardous to our health, we ought to do away with it.

Participants had little difficulty distinguishing between hazardous and nuclear wastes. Moreover, certain images immediately came to mind in all groups when participants were asked to think about nonnuclear hazardous wastes:

Question: When you hear the term hazardous waste, what do you think of?

TV pictures from the news, decaying barrels of chemicals just stacked and waiting.

Unclean drinking water.

Life-threatening, to myself and other people.

What did vary was the detail to which participants could talk about these images or give specific examples. A comparison of the responses to the question "What do you think when you hear the words hazardous wastes" in two North Carolina groups illustrates this point. In a rural, less educated group, participants gave very vague hazardous waste definitions and had difficulty giving specific examples:

Question: What do you think hazardous wastes are?

Is it something that sets into your body and poisons your system?

Something that gets into your system and then into your brain.

Might have fumes associated with it.

Their examples were of local incidents, but even their knowledge of these was very vague:

Question: Who has read about hazardous wastes?

I read about Warren County.

Also in Durham they had in the paper about some company had some barrels or something, I forget what it was.

In contrast, participants in a very well-educated group gave much more specific responses. Their examples were of both local and national incidents:

Anything that is corrosive, ignitable, reactive, or harmful to life.

Dioxin in Missouri.

PCBs in Warren County.

We are originally from the Pennsylvania area where a few years ago there was real problem of dumping toxic wastes down the bore holes. It found a way back out into the Susquehanna River.

My personal opinion is that anything I see, hear, or read is extremely negative. My whole imagination in the toxic waste area is seeing people get clubbed by the government. Or you see on television the 55-gallon barrels that are just rusted away. I don't see any program for training or the memorial garden with deer running around in it. Generally, I see our government as the tail wagging the dog again. It's eerie to hear about wastes being transported.

However, participants in the Boston groups were by far the most well informed. The images described in these groups were much more specific, and participants were able to articulate these images quite easily:

Question: Were you able to answer the question, "What is the one thing that sticks in your mind when you think of hazardous wastes?"

I said the fact that industries have been burying waste for years wherever they found space without regarding. . . .

The need to find ways of safely disposing of the toxic waste.

Leukemia--whenever hazardous waste in a town is described, they always speak of the number of children.

Dumping, illegally by industries or waste disposal businesses.

The awareness of hazardous waste problems among the Boston groups can be attributed to several factors. For one, hazardous waste issues and problems have been covered extensively in all area newspapers, including small community weekly journals. In addition, there have been several widely publicized incidents in the suburban Boston area, and the focus group participants were primarily from these areas. Boston area participants were also highly educated and from higher income groups. One cannot conclude this level of knowledge will be present across all groups, and it is difficult to cope with these levels of knowledge in designing the survey. On the one hand, those who are very well informed look for specific and sophisticated information in questions pertaining to hazardous waste. On the other hand, including this level of detail often overwhelms respondents who are less well informed.

It is also interesting to note that the reaction to the question "What pops into your mind when I say hazardous wastes?" was much more emotional among the North Carolina participants who lived in the county that received the hazardous waste landfill site. To these people, the situation was hopeless; when they heard hazardous wastes, they immediately thought of being exposed and of dying:

Question: What is the first thing that pops into your mind when I say hazardous waste?

Hopelessness.

It's such an enormous problem in my lifetime I won't see it end and probably I'll see a lot of grief because of what's been done.

The PCB dump in Warren County.

It seems unavoidable . . . it's in the water, the ground. . . .

Iceberg. Not the tip, it's growing.

#### 4.7.2 Hazardous Waste Exposure Pathways

Participants in all groups had little difficulty with hazardous waste exposure pathways. The most immediate to come to mind were groundwater contamination or contamination through the food chain. Participants could talk about these pathways with varying degrees of sophistication. Again, the less educated rural groups had the sketchiest ideas of exposure pathways:

Question: How many people become exposed to it when it's on the side of the road as opposed to up in Warren County?

If you concentrate it all in one area, wouldn't it be more harmful?

Very few people are exposed to it when it's on the side of the road.

How do you get exposed to it even if you're not walking along the side of the road?

The examples these participants gave were of very visual specific local issues:

We have a dug well at home and in wet weather it gets extremely dingy; surface water gets in it from somewhere. I wonder where it's coming in from and if it's dangerous.

Fresh vegetables in the store, you don't know how long it has been since they were sprayed with the chemicals.

We breathe dust from the road, we live in an area where there is a lot of tobacco grown, and a lot of grain being sprayed with chemicals. There's no way we can wear a mask day and night so we're going to breathe part of it. That's going to go into the ground where it will go into our water supply.

In contrast, the more informed groups talked about exposure pathways with much more sophistication:

I read an article in Science '83 magazine, maybe 2 or 3 months ago, do you take that by any chance? Anyway, it was on ground water. You know, there is more water in the ground than there is in the ocean? And it's everywhere. How in the world will we ever be able to dispose of soluble material in the ground? I don't see how we can possibly . . .

If the fish population goes down in one river in Canada, even, I'm affected. If there is lead in the tuna some place, I'm affected, because these things are used by canneries and used to feed entire populations. So, we are all affected if PCBs or whoever go on the side of the road and get into the soil and get into the water. It doesn't have to be right around our own corner.

#### 4.7.3 The Unknowns of Hazardous Wastes

The aspect of the hazardous waste problem that concerned most participants was the unknowns associated with it:

Question: Do you think hazardous wastes represent a risk to you?

Yes, but an unknown one.

We are talking about stuff that's buried in the ground and you can't see it. That bothers me.

Well, there's so many unknowns. Our society changes so fast. This company probably comes up with new things every year that he doesn't know why for, or what, when, where, and who knows about next year? There's so many unknowns, it's scary.

Participants were also disturbed by the unavailability of sufficient reliable information. Most participants wanted the research team to give them facts and figures:

That's something I've always been confused about and wanted more enlightenment on. What are the facts and figures; the percentages of this thing per gallon water, per cubic centimeter of air. Just at what point will it cause tissue damage? How much tissue damage will be noticeable in the way I feel, the way I look? This is something in which I feel a gross ignorance about. How much of a hazardous waste contributes how much hazard to my general health? . . . How much of a chemical imbalance does it take, and how much of that imbalance does this amount of hazardous waste give to you?

They were also uncertain about who they should believe.

There's an awful lot of biased information out in the world. Maybe, I don't question that hazardous waste is a serious problem, but I think there's an awful lot of a flak that is not true, or proven, that's being stated as facts.

The papers always make things a little worse.

Among the more interesting discoveries during the focus groups was that during discussions about "unknowns," participants often described myths, which they seem to have incorporated into their perceptions and attitudes.

I think those special interests groups that are at the problem. They won't let the 100 miles per gallon carburetor on the market.

#### 4.7.4 Hazardous Waste Landfill Siting

When participants spoke about where to site landfills, the overwhelming opinion on the part of people informed about hazardous waste issues was that they should be sited as far away from people as possible:

If they're going to put waste, they should not put it within 3 or 4 miles, at least, of homes, of any person, regardless of who the person is. But when you're living close enough to see the waste field, that's horrible.

It should be a very remote area where it affects the least amount of people.

In contrast, participants in a well-educated rural group having little experience with hazardous wastes were unwilling to decide if they would accept a hazardous waste landfill site until they had more information. They seemed to trust others in helping to educate them.

Question: Would you want to be a part of the decision process in locating a hazardous waste landfill in your area?

I don't think we're qualified to decide; we might be fighting a good thing.

I don't think we're qualified to make the decision. We have all these experts, let them make the decisions.

#### 4.7.5 Responsibility for Hazardous Wastes

The topic of who should be responsible for hazardous waste management was one of the most controversial within all groups and in some cases reflected participants' views of governmental effectiveness. (Participant views of governmental effectiveness is discussed in more detail in a following section.) At one extreme, banning products that produce hazardous waste byproducts was advocated:

There is one solution that apparently hasn't occurred to anybody and that is if we could forbid the manufacture of products that produce the hazardous waste, that's really coming down on them.

However, the responsibility for these bans was hotly contested in many groups. Some participants thought government should be responsible, and others that had less trust in governmental effectiveness thought the industries themselves should take responsibility:

That's right. American technology has done amazing things whenever they've wanted to, and had the motive and desire, and certainly it would seem like it could be done again in this area. What is technically impossible is getting smaller and smaller over the years. . . . We can certainly do without certain products. I would go that route.

They felt financial reasons would dictate when it was necessary to stop producing products with hazardous waste byproducts:

Sometimes there are smart manufacturers like Scovill and Monroe up the road here. They were strapped cause their bottom line didn't show up good. So they developed a process in which they could use water instead . . . and they didn't have to carry 900 barrels to South Carolina to dump it every week. They're saving almost a million dollars a year from that one changeover process.

I feel that the marketplace is going to have a great deal to do with this, because if Johns-Manville is producing asbestos to use for insulation and some smart guy just out of Harvard Business School can devise some system of insulating houses without that junk at a cheaper price, he's going to sell it and Johns-Manville's going to go, that's all. But there should, of course, basically be strict regulations by the government to protect us all. They should protect us from hazardous waste as much as they should protect us from the Russians. It may be more expensive.

Some participants felt companies making the products should be responsible for its hazardous wastes:

The company that is making a profit on the use of these things should be responsible, even though the cost is passed on to the consumer. What has happened in the past will have to be covered by the grandfather clause, and the government's got to take over handling it. We pay for that, too.

Again, participants in this category felt financial incentives would induce them to come up with safe and acceptable management practices:

They should be responsible enough to come up with the right technology to do the thing about the disposal of toxic wastes at the least possible amount and not work on the thesis that they can pass the whole thing over to the consumer, like the overruns on government contracts.

If it's too expensive, then the consumer isn't going to pay and they'll have to find another way to do it. That'll force them into using the latest technology.

The first thing you do is think of ways to make it economically to their benefit and there are several different ways you could do that--with tax incentives or funds and grants enabling them to find new processes and the other things you do is put a lot of money into research and development to find new ways.

But many of these same participants were concerned about the effects of waste management costs on American industry.

Because of economics of the price you cannot be competitive in your marketplace and you have to possibly go to Japan to get it made

. . . In other words you're driving industry away. . . . You're going to lose area jobs, you're going to lose competition if all of it is in the initial cost of the product.

Suppose I'm a manufacturer and I'm going to be real concerned about this sort of a thing and I say I'm going to make mine and I'm going to dispose of my hazardous wastes properly even though that costs me more and my TVs cost \$20 more than my competitors' TVs. If I pass on the costs of my TV to the consumer, who's going to buy it?

Will the consumer pay more for a product if they know the company disposes of their hazardous wastes properly?

Other participants, often in the same group, were skeptical about whether corporations could be trusted with the responsibility for hazardous wastes. One group used a North Carolina highway PCB dumping incident to illustrate that corporations could not always be counted on to do what was right without some kind of regulatory body overseeing their actions:

In the meantime, you've got to come up with somebody to take care of the land after the companies who decide that the best solution for getting rid of their PCB is to dump it along the North Carolina highways. That's where the real problem is. One of the big problems is the irresponsible corporate officials, who will get rid of the waste and get it out of their domain and put it into somebody else's, sometimes in a completely innocent public domain, where people are exposed to it and don't even know it.

Many participants felt that our free enterprise system made it unnecessary to assign responsibility to any one entity:

Well, in a free enterprise system, the opportunities for the person who can come up with the solution to this are so great that you don't need a responsibility. I mean, there must be billions of dollars that the person could make or a company could make if they could resolve this problem.

In contrast, two groups felt management responsibility rested with government:

Question: Who is responsible for managing the problem?

Depends on the degree of awareness of the community. If the community doesn't know what's put there, some private landowner can make a deal with any company individually to put anything anywhere. And I think when the community becomes aware that it might be a hazard, that's when the responsibility shifts to governmental agencies.

I think all of us, the U.S. Government, have a problem.

In all groups participants felt the State was taking some responsibility for control of hazardous wastes by the types of industries they were trying to recruit:

I think it's a matter of control. North Carolina is making an effort to recruit industry . . . I think the control is at the State government level. If you're going to bring in some industry, you should have some idea of what that industry is going to do, the byproduct. And if they're going to produce something hazardous, then the State should be aware of it ahead of time . . . The agency should have the control . . . The one that decided where waste should go, that's the level that should control . . . They should protect us when the State is getting industry.

That's why I think the State of North Carolina is looking for, they say looking for, clean industry. Have you noticed? That's why the microelectronics plant is coming to the Research Triangle, and some of the others, because they don't want the dirty industries, so to speak, to pollute the environment.

However, one of the groups from the Research Triangle Park area was aware that these industries may not be as benign as they appear on the surface.

We don't have heavy manufacturing here but maybe some of the light industries are putting out more pollution than the heavy industries would. And we don't know about it. It would be interesting to know what has happened in Silicon Valley.

Finally, in several of the rural groups, the notion of concern for the society as a whole was expressed when discussing responsibility for hazardous waste management:

Question: If the choice was in Alamance or Orange County [North Carolina] what difference would that make?

I wouldn't want it near me, but then again I wouldn't want it near my neighbors either.

That's just passing the buck.

As Christians we're supposed to care about our neighbor.

Question: What should we do with our wastes? Send them to Alabama or South Carolina?

Got to think about them, too.

## 4.8 UNDERSTANDING OF THE PAYMENT VEHICLE

This section highlights the levels of participant understanding of the payment vehicle.

### 4.8.1 Understanding of Who Pays

Most participants understood that as consumers they pay for hazardous waste management:

Question: Who pays for managing hazardous wastes?

We do, everyday.

Question: How?

By taxes.

What if the industry pays, it's us. If the government pays, it's our taxes; if industry pays, it's the consumer price rise. So, the people of the country pay.

The cost to the people who suffer from it is the endangerment of their health and life, to say nothing of their happiness. The cost to the people who have to deal with it, is financially enormous.

The less well-educated participants from focus groups conducted in rural areas used local examples to illustrate the point:

People who use sprays on their vegetables, they add it to the cost of the vegetables.

Mills have to take steps in getting rid of their wastes and they're going to pass it on in the cost of the clothes.

Participants were even able to relate incidents where they had paid for other environmental controls:

I read that the paper industry has spent over 4 billion in pollution controls, so I assume that's why I pay more for paper now.

In a few groups, the initial reaction was that corporations, rather than the individual, should pay. These participants felt that industry, as waste generators, should pay cleanup costs:

I thought the responsibility was the factory, and I never thought of it being a higher price to us.

It should be up to the corporation to pay rather than the individual taxpayer. Therefore, I should be paying less.

Why should the individual pay for something he really has no responsibility for? It's the corporation's responsibility.

However, once the payment vehicle was explained more clearly, participants accepted the fact that they eventually pay these costs. As the presentation became more clear, these comments came up less frequently.

#### 4.8.2 Understanding of How Much Should Be Paid

The uncertainties associated with hazardous waste issues affected participants' abilities to decide on payment amounts:

If we know the risks, then we can make decisions. I am willing to pay more for safer spray cans without fluorocarbons.

Additionally, they wanted to know more specifically where their money was going:

What are you going to put your money into? It matters to me which way you're going to put your money.

They also mentioned the difficulty of coming up with a dollar and cents amount when lives and health are involved:

There have to be some tradeoffs and unfortunately the tradeoff is lives and health; it's not so simple as to say if we all paid a few more dollars we'd be rid of this stuff.

#### 4.8.3 Ability of Participants to Think Hypothetically

When the discussion moved to the participants' ability to determine payment amounts or perform the ranking task, they indicated that several aspects of the hypothetical situation influenced their decisions. First, as indicated in Chapter 3, participants could only keep the hypothetical situation in mind when it contained very specific information. This was particularly true in the very well-informed groups. The Warren County, North Carolina, group, one of the earlier focus groups, was the first to react this way. They advocated giving real-life examples to make the situation less vague:

Maybe you could give them a real example, like Times Beach. That would be more realistic.

However, even though the hypothetical situation was made more and more tangible in each round, the same comments continued to come from very well-informed groups:

My rationale was to decide which I should rate first right now until I could find out more about it.

Participants in the Acton group in the Boston area had similar reactions. They did not feel their recent experiences with hazardous waste contamination precluded their thinking in the hypothetical, but they wanted very specific information on which base their payment decisions:

Question: To what extent does your awareness overwhelm, distort, bias, or alter the basic case situation that we give you to react to?

We are aware of the hazardous waste problem and when you asked, "When you think of hazardous waste, what do you think of?" we probably all wrote ground water, contamination, etc. But the hypothetical didn't skew me too much. I didn't think it was us, I thought it was maybe Love Canal.

Question: Was it too hypothetical? Was the comparison of the circles too difficult?

Yes. We had no idea what kind of situation we are trying to clean up and what the cost would be. How does this particular cleanup affect us, not just as far as taxes, but as far as cost of goods. I have no concept of what they would be. It would have been easier if it was a specific issue with a dollar amount.

It's too vague.

It depends on the hazardous waste you're talking about.

It would really depend upon whether you're talking about water pollution or air pollution.

However, in the group of participants from Concord, which is adjacent to Acton, the same hypothetical situation was satisfactory. Interestingly, these participants had not experienced a hazardous waste contamination incident:

Question: Did you have difficulty associating with the hypothetical situation?

I think it is very clear.

I'm just waiting for something [like it] to come up in Concord.

The reactions of one group highlighted an unexpected difficulty with the hypothetical situation. The participants of this group, who lived in the area where a hazardous waste disposal site was rejected, reacted very emotionally to all questions. Their responses indicate that, in some cases, very emotional people will not be able to think hypothetically, no matter what the example:

I felt like the questions ask you to put yourself in a situation that you've already accepted the risk and now you're trying to go the easiest route for yourself. But, I'm just not gonna accept it.

#### 4.8.4 Significant Factors in the Hypothetical Situation

The aspects of the hypothetical situations that participants highlighted as affecting their payment decisions included hazardous waste effects, latency period, disposal methods, and distance from site. Effect was the factor most often mentioned. Participants indicated they distinguished between different kinds of effects when deciding payment amounts and would be willing to pay more to avoid dying from cancer and other debilitating illnesses:

Question: Does it matter what the effect is?

For an incurable, I'd have to say I'd be willing to pay more.

I'd rather die of a heart attack than cancer. It's less degrading.

Something that can cause cancer is something I don't ever want to be near.

Cancer, that's what turns me off when I think of hazardous wastes.

Birth defects are major effects whereas losing a fingernail is a minor thing.

Many participants, particularly the elderly, indicated the latency period was the aspect that affected their decisions. Some admitted this was because of their concern for their grandchildren and children. Others indicated their concern was for society as a whole:

Question: What if we varied the time period (in the hypothetical situation) from 30 to 5 years?

Just because you're too old to have kids, there are still others that are going to have children.

It shouldn't matter because we should be concerned about society as a whole and not just ourselves personally and our families.

Question: What if you were sitting here and by some amount of money you were actually influencing what people's chances would be in other communities to be exposed?

We're willing to pay more.

Since we have children, 30 years in our lifetime is not going to make that much difference, but it will to our children and grandchildren. We would not want it here, but if it were, we'd have to protect them at any cost.

Even if I didn't have children, there would still be other people here after I leave.

When questioned about distance, some participants indicated this factor did not influence their payment amounts. This was particularly true in the rural groups who felt strong obligations to society as a whole:

Question: In terms of the hypothetical situation, what difference does it make that we said the plant was 2 miles away as opposed to 20 miles away from your home? How would that influence how much you're willing to pay?

I think the public is becoming knowledgable enough to know that one 20 miles away is as dangerous as one 2 miles away.

I think we have a responsibility to people in the midwest.

Other participants were worried about how much freedom they would lose if they reduced exposure to a certain level:

It bothers me because in choosing which of these choices I made; I looked at the point where you spend . . . you want to reduce to these absolute minimal levels in 1 in 540; I said we were going to become so regulated that we'll lose our freedom that I didn't want to give up; I didn't want to spend to be so regulated.

In the knowledgable groups, the method of disposal was a key factor in determining payment amounts:

I'd be willing to pay twice as much if it weren't disposed of in a landfill.

I'd be willing to pay twice as much if it meant the company wouldn't make it to begin with.

These participants tended to view research dollars particularly for incineration to be a worthwhile investment.

#### 4.8.5 Difficulties of Presenting the Payment Vehicle Concept

Finally, the focus groups were very effective in pointing out the difficulties of changing presentation media. The transition from the spoken to written word in the payment question was the best illustration of this problem. Participants were able to come up with payment amounts with very little difficulty in the final North Carolina rounds. However, when the question was asked in Acton, Massachusetts, the responses were quite different--due in part to the lack of specificity in the hypothetical situation but also to an unsmooth transition from spoken to written words:

First out of the blue, I couldn't answer it.

The only way I could come up with a dollar amount is to say the population of Acton is X and then I could tell what everyone should pay and make a decision. The cost of cleanup shouldn't be more than \$3 million.

I was able to answer it the way you wanted. I could say 10 out of 90 is a big risk and if I couldn't move I'd want to spend as much as I could to cut it down. So make it a lot of money.

I think if you had given us an example of what could be spent. I had no idea.

If you haven't studied it, you can't put a dollar amount of something.

I was wondering if you were just trying to fish to see how many people would be willing to pay something. Are we sitting here in a town that is known to have had problems with hazardous waste? Are you coming here to this place because I don't know why you chose this place because of our experience locally whether we would be willing to pay more? Specifically through local taxes or national taxes, I didn't put down the dollar amount because I didn't know what I was talking about. I did not know what it would cost.

These problems indicate focus groups can never substitute for pretests.

#### 4.9 PERCEPTION OF COMPENSATION

This section depicts the differences in attitudes toward compensation among participants.

The ability of participants to think of ways of compensating people in communities where hazardous waste landfills would be sited differed depending on proximity of the community to the landfill. Participants living in areas that faced hazardous waste siting decisions (i.e., Henderson and Morven, North Carolina) reacted too emotionally to the issue to give well-thought-out answers to the compensation question. Participants in communities located further away (Durham, Vance, and Orange County, North Carolina, groups) were concerned for others but could not give very specific compensation recommendations:

Question: Suppose you compensated people in Warren County for their risks?

Can't do it. Just the old carrot.

It's not right to do that.

Not under any circumstances.

Pay 'em off.

In contrast, participants in the group adjacent to the Warren County, North Carolina, landfill had very specific and well-thought-out ideas for compensating the people in Warren County. Specifically, in response to the question, "Do you think society owes any kind of compensation to those people [near the Warren County waste disposal site] for the risks that they are enduring?" this group suggested the following:

1. Let the State recruit industry into Warren County. That would prove the areas were really safe:

If it poses no danger, as the State says, then the State should make a concerted effort to recruit industry for Warren County or some kind of development. To me, that would be a true test of how convincing they can be to other safe industries, healthy industries that would not pose a hazard.

2. Provide health care services to the county:

Get some good out of it. Get a type of health care that would be beneficial to the area. Recently, they couldn't keep their emergency room open. That is a problem the county has. Think up some way they can provide 24-hour emergency service for Warren County . . . They're using up all their emergency money.

3. Provide employment opportunities:

The young people who live in that area wind up leaving the area. There's plenty of open land. I think the State owes that county something.

When the question was phrased to ask them if there was any compensation they would accept for a site, the reaction was again very emotional:

Question: Would there be any kind of compensation you would accept to have a landfill in your community?

I'd take the money and run because they're going to do it anyway.

We are too thickly populated for them to even consider it.

I don't know if 10 or 20 miles from here was still hazardous or not and I would hate to even think about someone compensating me for something like that because they are dealing with my life.

Question: What if I were from ABC Company and I told you I would write you a check but you have to sign a piece of paper saying that the company will not be responsible for anything that may occur to you later on healthwise. What do I have to make this check out for?

Don't make it out to me.

There are limits to what you can do for money.

What good would it do me if I were worried the rest of my life about what [accepting the conditions of] that money might do to me?

I would feel that if someone were offering me something like that, there would be a real risk involved.

Question: Let me ask you about another context that we thought about using for this kind of question and we didn't have a chance to use it. For those of you who are currently working, how much higher wages would an employer have to pay you for you to be willing to experience more risk on the job? How much higher wages per hour would you have to get in order for you to be willing to accept this?

That's not a tradeoff.

Question: What if somehow the community were going to benefit in some way?

How could it possibly benefit from it?

These comments indicate that phrasing the valuation question so that people would be given an amount to compensate them for accepting a risky situation, such as hazardous waste landfill, would not be successful. This conclusion is more a problem of context in which hazardous waste risks arise than a general problem of compensation. For example, when the risk was specified in terms of a fatal accident experienced on the job, people were able to think of compensation. Thus, the final version of the questionnaire included job risk questions specified in terms of willingness-to-accept compensation.

#### 4.10 GOVERNMENTAL EFFECTIVENESS AND OTHER KEY ANALYTICAL VARIABLES

This section develops the role that participants' attitudes toward government played in the focus groups. The attitudinal and perceptual information on risks, environmental issues, hazardous wastes, and the payment vehicle presented in the preceding sections were issues for which the research team specifically set out to gather information. In addition, the focus groups sessions revealed several other key analytical variables--including governmental effectiveness, education, stage of family cycle, and health endowments--that help explain risk perceptions and willingness-to-pay amounts. Each of these is discussed below.

##### 4.10.1 Perceptions of Governmental Effectiveness

Perceptions of local, State, and Federal government effectiveness clearly affected not only how participants formed their perceptions of risk from hazardous waste exposure but also their willingness to pay to reduce these risks. With few exceptions, participants viewed governmental effectiveness from the top down--i.e., the Federal government was seen as least effective and the local government as most effective.\* This view was expressed well by the Anson County, North Carolina, group, who ranked options they would face in the event of a hazardous waste incident:

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\*It is important to note that these focus group discussion sessions were held during a period in which public opinion of government environmental agencies was exceptionally low due to the conduct of particular administration-appointed EPA officials responsible for hazardous waste cleanups under the "Superfund" Act.

Question: When you read "B" and thought about cleanup, did it cross your mind at all about how effective you thought the cleanup might be?

You know how well the superfund has worked.

I'd count on the city government before the State or Federal.

Let me read you a quote. This is the Associated Press report on the OTA report about the Federal EPA. "The government is pursuing a problem it does not really understand, with too little money, vague technical standards, imperfect laws and sometimes contradictory policies." That's the Federal government.

If you're asking, "would you base your feeling of safety and our risk assessment based on what the State or the Federal EPA would tell us," I think we would all say no. They have hidden agendas, and they don't want to cause a panic, so our safety is not their primary interest.

The exception to these views was a black church group session conducted early in the project. These people stand out in their simultaneous expressions of skepticism yet reliance on the Federal government. For example, one participant in this group spoke of government legislation as the only way to control the hazardous waste problem.

The only way you can control that is through government legislation, that's the only way.

Yet, just several moments earlier, another participant had stressed how government is controlled by companies:

We were talking about industry doing their own policing, and this kind of thing like that as far as toxic waste. The thing that most people don't realize is that industry was in this country to run the government, and what they do; they lobby, they spend money for campaign of people running the government. If something is going on in that company, the first thing they'll do, is say, we gave so much money to your campaign, and they call them off.

This group of participants also expressed skepticism about government's ability to allocate money honestly and efficiently:

I wanted to know if the men who put this PCB on the highway down there in Warren County were fined. They paid so many million dollars. What did the government do with that money? I know a woman who lives down there, in Warrenton. Her drinking water is polluted.

She had it inspected about 2 or 3 months ago, and they told her she couldn't use it . . . So now what did the government do with the money?

But they also advocated use of tax dollars to pay for waste management:

Our taxes should be used to pay for it.

Participants in this group justified these contradictions because they felt they had some control over the situation by electing honest officials:

If they are not responsible to the environment, then we get someone who is responsible (government officials) . . . make sure the ones you are sending there have these ideas when they are running or whatnot for office, our legislators and make sure that they share these ideas.

Those people are always running for political office. Just develop a memory like the elephant, just remember that.

I said they should have been responsible, I said they should have been more responsible to what the citizens of that community were saying. [representatives from Warren County].

In particular, they thought the real power would come in electing an environmentally concerned president:

I think that the real, where the real pressure is going to have to come from, it comes from really Presidential candidates, and we're talking about the President himself once he gets in there, because he can push certain issues . . . But he will have to be the man, you know, to let the people know, and he probably will get a lot of votes. If the next President who runs, as he takes that stand, because our, as you say, our environmental status here is really, really messed up."

Other groups were in conflict with most of these views. They saw elected officials as having a very minor role in controlling environmental concerns:

Question: Have environmental issues been a factor in any election in recent years that you've voted in: local, State, or even national?

Actually, the persons responsible are not elected, they're appointed. The persons responsible owe no allegiance to nobody but the person who appointed them. So I'm wondering what would happen. First, you have to use your State resources . . . and to me they seem rather weak and then, when you get to the local government level, they're weaker.

The legislators in North Carolina have more knowledge right now than any other State in the Union, yet they're doing absolutely nothing about it. Why? Because it's going to cost them votes, it may cost them their job, and it's going to hurt industry.

In some groups there was a tendency to trust EPA, especially if EPA could staff itself with pure scientists:

Question: Do you think your elected representatives, both local and national, are doing the job on this issue?

I'm not sure they're any more informed on that than we are. There again, your agencies, like EPA, you'd expect would know more about it; and I'd be more inclined to contact them for information. You'd let the elected representative know but . . . .

Well, that would be the EPA's business. Shouldn't scientists be involved with the Environmental Protection Agency to disseminate this information, to do something about it.

I think the head of EPA should have been a high-level scientist.

However, in the groups that were facing or had fought off a landfill site, these same feelings were not expressed. Instead they favored an intermediary of some kind in handling the situation:

I'm afraid the track record of our EPA would make us all reach that conclusion. . . . They don't know what they're doing.

I think just about everyone has lost faith in the government because there is so much corruption.

Right now I think EPA is one of the most corrupt.

I don't trust the government to handle the hazardous waste problem. I'd rather see it go to some other person.

Question: Are you suggesting that you would rather pay to some intermediary than the government?

More and more advisory councils are being set up that monitor and check with private industry.

We've suggested a Research Triangle center for development and coalition with industry to dispose of hazardous wastes in North Carolina. Not only in the seven counties that produce 96 percent of all the wastes but to have the State of North Carolina put up a spot for all the small producers of hazardous wastes. All this would run through the Research Triangle unit. But, we're not getting anywhere with it.

Participants in all groups didn't trust government to allocate hazardous waste cleanup money effectively. In their responses to questions, they expressed skepticism about getting their money's worth and cited many instances where government expenditure efforts had been ineffective. Rural groups in particular felt they were paying a lot of money and getting little for it:

You're paying a lot of money and you're not getting a lot for it.

I don't mind paying if you get what you pay for.

On the news the other night, one town out west that they had paid all this money for this exposure for this hazardous waste and they still had to move out--lock, stock, and barrel--and they had paid.

In the more educated groups participants actually distinguished between payment means:

Question: Does it matter to you how you pay?

This is a costly thing that we're discussing tonight and when you say higher prices and higher taxes, I personally feel that you get more if you pay higher prices than you do if you pay higher taxes.

Cost of the article. It's a track record that the government cannot run anything profitably. Everything they do costs twice or three times more than private sector does.

Participants also wanted specific information on where the money would go and assurances that the money would not be wasted:

I want them to show you that they can make something work before I pay for it.

Question: Are these amounts you would be willing to pay?

I'm not sure if the money really goes for making a better environment.

I'd have to know what they were going to do with that money.

I would have to know more like what are you going to do that you're not doing now?

In the Boston groups, which were composed of participants from areas where hazardous waste incidents had been caused by specific companies' management practices, participants were more skeptical about industry's integrity in honestly allocating money for environmental controls than government:

I am somewhat cynical about this. For instance, once a company pays for the installation of scrubbers or whatever they have to put in and they have advertised that out, do you really think they are going to lower the prices of the product again? I think it will be eternally passed on long after they have recouped the cost.

Participants did feel that some progress had been made in environmental clean-up areas outside of hazardous wastes for which the government is responsible:

Lots of progress has been made in air pollution. But it seems as if the biggest crisis right now seems to be in the other forms, but you don't want to let up.

Question: Do you think we've gotten our money's worth in air pollution control, higher prices of cars, higher taxes, etc.? Has this been a good investment for the society?

There's been a remarkable improvement in air quality. It's come as an expense to me but it has been worth every cent of it.

By and large, the appropriate role for government was seen as that of a regulatory body in protecting the environment:

The government's a regulatory body, nothing else.

The government has the role in seeing that they protect the environment as much as possible with regulations, but as far as preventing a company from doing something or setting a price, then that's what I would think is beyond their range.

Specific government responsibilities were seen as follows:

1. Setting standards for acceptable waste practices:

Question: If somebody had to tell you which site or which practice would be the best, who would you be most likely to want to find out from?

Environmental Protection Agency. . . . That's the place for the role of government.

Question: You would trust government more than anybody?

Well, I don't trust an industry doing its own research for which its own benefit is at stake.

2. Assuring these standards are equal throughout the country:

You are in a delicate situation. You hate to have the government regulate your safety. You like to think that people are intelligent

to be able to take some precautions. But if nothing else, at least standardization throughout the nation or at least the state helps people, because one reason people don't uniformly obey some of the standards is that they are different wherever you go. So at least standardization helps with some things . . . But you hate to get nit-picking.

3. An overseer:

If it's happening in Vance County, it's happening somewhere else in the United States, maybe four or five or ten States something similar is happening. And by having it controlled by the Federal government, if they are aware of it here, then they can protect the folks over in the western part of our county.

4. An enforcer when other people are involved:

Should be controlled more when the effect on other people is greater, I think that except for the FDA. That's the reason the push for the DUI laws, because it's not just the person that's driving the car under the influence who's affected. He may affect many very innocent people.

A good example of that is the argument of whether to have seat belts or to install these air bags which would be automatic, and have no volition about whether to inflate it or not. And this is on the theory that people won't do up their seat belts the way they ought, but in this case we are only thinking about ourselves, that is, the person that doesn't have the seat belt on, doesn't have the air bag, or whatever, is the one that's going to get hurt. He's going to get thrown out of the car. So in that case, it seems to me reasonable to have the seat belts and you have the choice of buckling up or not and forget the air bags. It's up to you.

Question: Do you think the government should enforce various actions to protect us from the risks we take, for example, limitations on smoking advertising? . . . How do you feel about the government's role in protecting us from risk?

I think there's a need for governmental intervention, at least in some areas, like infant car seats. . . . I think if there's something like this with seat belts, so people would know they'd get stopped and get a warning.

5. A source of information for people about risk and the level of safety in the environment:

Talking about identifying a product's hazard to the community . . . if it's a new product, if there's no way of disposing of that without imposing a hardship like that in Warren County, then it should not be allowed to be sold unless it's a matter of life and death and the

lesser of two evils. . . . From this point on, it should be attacked by the Federal government before it is put on the market.

Question: Well, how do we deal with that, then, as a society?

Well, by being informed, for instance. Very often, at least in some cities, they tell you whether the air environment is safe today; are the pollutants low, medium, high, or so on.

Finally, many participants cautioned against excessive costs to industry of government regulation. They advocated striking a balance between costs and benefits:

There's got to be a balance somewhere, otherwise you kill the goose that lays the golden egg. The terrible things that have happened in the past and getting everything straightened out, the cost will exceed the worth of the company, and they'll go out of business. And maybe that company could improve the environment. . . . Obviously, they are responsible. But there are practical limitations.

They cautioned against regulating environmental cleanliness to an extreme.

One of the things that has to do with a safe environment is clean water. The government has put a great deal of emphasis on clean water over the past 10 to 15 years and has spent billions of dollars to encourage cities to clean up their water. The real question is whether or not it's worth the final billions to do the tertiary treatment of water to make it 99 percent pure or whether 96 percent pure water is pretty usable for most people and pretty safe and more affordable as a general standard healthy environment than the 99 percent that they're requiring.

#### 4.10.2 Other Analytical Variables

From the discussions described in Chapter 3 and earlier in this chapter, it became apparent that education was the most important variable in determining people's preferences, their ability to think hypothetically, and their capacity to do the kinds of tasks we asked of them. Consistently, the most educated groups were able to think through our questions more logically.

Composition of family and where participants were in the family cycle was also an important variable in determining how participants perceived risk and payment amounts. Young people tended to be more rash and less afraid of taking risks. When performing the tasks, they considered only themselves. As participant ages increased and as they started families, participants' children became extremely important in their decisions. This point is well illus-

trated in responses by participants asked to rank five possible options they would face if they were in danger of hazardous waste contamination:

Question: How did you rank your preferences and what was going through your mind when you ranked them? What was your first preference?

I would move first because I have two children and because of where they were going to locate the site here. . . . We don't have lots of roots here and we're in a position where we could easily move.

You have to take into consideration if you're considering the health and well-being of your family or the economic situation . . . to me, my family would come first, and I'd pick up my family and move even though I have a business in town.

This point also came through in the general conversation:

I would be willing to pay any price if I knew it was something that was going to hurt my family.

I think it would depend on my children. You'd do things for your children you'd never do for yourself.

As participants got older and their children left home, their grandchildren became a major consideration:

Question: What's the most frightening thing about hazardous wastes to you?

The end result. What my grandchildren and theirs are going to be faced with. What kind of a mess we're going to leave them with.

I thought about my grandchildren.

I know looking at the future is important, but you also have to look at the present, too, because we are here and we still have young people, still have children born every day and they are still exposed.

Older people, in general, were still concerned, but they felt that what has happened to them has already happened. They also tended to use their restricted incomes and family roots as a reason for not reacting to a hazardous waste situation:

I couldn't move because of my roots, and my husband wouldn't go.

I wouldn't move permanently because I wouldn't have any place to go or the money to move.

Due to my age, I'd stay home and put a water tap on my sink.

Living there and thinking about what you would have to do is a lot different than supposing the situation [she would have lived 3 blocks from the site]. If you're poor like I am, you can't sell your property. So where are you going to go?

I wouldn't have the money to move either, unless someone came in here and moved me.

I would move for 6 months. Financially, we are not able to move. I trust the cleanup people but I wouldn't move away permanently and I wouldn't want to use bottled water permanently because financially I couldn't afford it.

Throughout the focus groups it also became apparent that how participants viewed their own or their families' health was an important variable in how they perceived their risk of dying from hazardous waste exposure. Comments indicated that those participants who were themselves in poor health or had family members who were in poor health felt much more threatened by hazardous waste exposures. This was particularly true among those whose experiences were with cancer. These responses indicated to the research team that a section on participant and family health endowment needed to be included in the survey.

Finally, it was apparent from the focus groups that all types of participants find hazardous waste issues both interesting and a topic of much concern. Because of this level of interest and concern, focus group participants were often more persistent in trying to understand complicated ideas set forth in the presentations. They were also tolerant of the lengthy presentation. Even in the last round of focus groups when an hour or more was spent reading a draft of the survey questionnaire, participants did not object to its length. In fact, in several groups participants were voluntarily willing to extend the designated 2-hour time period. These reactions are a hopeful indication that the somewhat complicated and lengthy survey necessary to determine benefits of hazardous waste management regulations will be accepted by the sample population.

#### 4.11 SUMMARY

The focus groups provided valuable information on participants' perceptions of risk and governmental effectiveness on hazardous waste matters, atti-

tudes about environmental issues, general understanding of hazardous waste issues and people's ability to understand the payment vehicle. This information was key to the questionnaire development process. More specifically, the focus group participants offered the following information:

- The factors that most affected participants' perceptions of risk in general were their age, family composition, and personal experiences.
- Environmental issues are important and a cause for concern, and people feel they have a stewardship role in protecting the environment.
- Two risk attributes seemed important: controllable and uncontrollable risks and voluntary and involuntary risks.
- Proximity to a landfill site or hazardous waste incident influenced participants' perceived risk of exposure from hazardous waste.
- Although participants had little specific knowledge about hazardous wastes, the term hazardous wastes brought certain visual images (e.g. decaying barrels). In addition, when presented with information on the number and types of products that generate hazardous wastes, participants were rarely surprised. They also had little trouble distinguishing between nuclear and hazardous wastes.
- Participants felt that the most frightening aspect of the hazardous waste situation was its unknown nature and the relative unavailability of reliable information.
- Participants understood that they ultimately paid for hazardous waste management either through increased prices or taxes.
- When given very specific information about a hypothetical situation, people had an easier time when performing the ranking task or answering the valuation question.
- Important variables influencing participants' willingness to pay included perceived risk, place in the family cycle, and family composition.
- Perceptions of local, State, and Federal government effectiveness clearly affected how participants formed their perceptions of risk from hazardous waste exposure and their willingness to pay to reduce these risks. For the most part, participants viewed local government as most effective and State governments as least effective.

- Focus groups were very effective in pointing out difficulties of changing the presentation media. However, the transition from the written to spoken word was very difficult. Based on our experience, focus groups are a complement and not a substitute for a survey pretest.



naire. These conclusions were reached by both the observations of the interviews and the discussions with respondents.

In their explanations of how they formed their willingness to pay bids, almost all respondents mentioned one key feature: their monthly income and their present expenses. The respondents clearly used this as their common anchoring point. Although the bids varied quite substantially, the first thing each person mentioned in describing his thought process was his budget constraint. It seemed that the use of monthly amounts rather than annual amounts made it easier for him to consider his budget constraint. If the budget constraint as the primary anchor were common to contingent valuation surveys, it may help to explain, at least in part, why respondents have shown considerable difficulty in developing their willingness to accept bids (see Knetsch and Sinden [1984], Meyer [1979], and Rowe, d'Arge, and Brookshire [1980]). In the willingness-to-accept case, they lose the common anchor on which they rely in the willingness-to-pay case. Of course, the difficulty may also in part be due to an unwillingness to be morally responsible for accepting a payment for degradation of the environment (see Kahneman [1984]).

The discussions in the videotape sessions also focused on the adequacy of the framing for the hypothetical commodity, reductions in the risk of exposure to hazardous wastes. In particular, the respondents were asked about how they used the circle cards in relation to the various hypothetical scenarios. Some described using the visual relationships between circles, while others said that they felt more comfortable with the numerical expressions--a finding consistent with our focus group experience. They understood the link between the changes in the risks and the proposed regulations in the hypothetical scenario. Some focused on the exposure circles while others used changes in the combined circle in forming their bid. The majority indicated that the three separate circles communicated the relationships between exposure, their own heredity, and the risk of death. The videotape sessions reinforced our judgment that how the respondents responded to the probability information will be one of the central questions to be evaluated in the empirical analysis.

Another important use of the videotape sessions was to evaluate the feasibility of using the risk circles to communicate the low probability parts of the experimental design. In response to suggestions from reviewers, the

project team expanded the experimental design to include two additional direct question versions of the questionnaire. One new version had combined risks of exposure and death ranging from 1/30,000 to 1/150,000 and the other, risks ranged from 1/60,000 to 1/300,000. These probabilities were 100 times smaller than the risk levels that previously had been evaluated with the risk circles. About half of the total videotape sessions consisted of the lower probability cases. The general conclusion was that the respondents seemed to be able to use the risk circles equally well to see the reductions due to the regulations. In effect, the videotape sessions provided low-cost insurance that the additional design points were workable before more resources were committed to collect data from these additional designs.

The videotape sessions also indicated that the improved introduction to the risk ladder (noted in Section 5.2) made it easier for respondents to use the ladder in expressing their perceived risk of dying from various causes, including exposure to hazardous wastes. The respondent descriptions of how they used the ladder reinforced the focus group finding that some preferred the numerical expressions while others used the various anchors of other types of risk. Each of the different kinds of risks--job risks, health risks, risks from different activities, and risks from natural hazards--was mentioned by respondents in their descriptions of how they used the ladder.

The videotape sessions helped to evaluate another important aspect of a workable questionnaire--its logical progression. In the followup discussions, respondents indicated that they felt comfortable with the order of both information and questions. They pointed out the importance of the early order of Card 1 that related hazardous wastes and common products. Almost every person cited some part of this information in their explanation of how the questionnaire oriented them in thinking about hazardous wastes. They also felt that the sequence of the risk discussion using the circle card, followed by the payment vehicle and then the hypothetical situation seemed straightforward. Several noted that the explanations were longer than they needed (e.g., the circle cards) but others felt that the additional information helped them.

Finally, the videotape sessions afforded the opportunity to listen to the questionnaire to evaluate its sound. After the pretest, the interviewers had stressed the importance of having the questionnaire sound like an interviewer

final field survey) confirmed that the changes had remedied the problems with the payment vehicle card.

In summary, the pretest and the subsequent discussions with the interviewers provided valuable information on the workability of the questionnaire. These steps led to major revisions that clarified the exposition. They also clearly demonstrated the importance of how a questionnaire "sounds." To be effective, good exposition is not enough; the questionnaire also must sound right when spoken.

In addition, the project team felt that there was little difference in the information obtained in the suburban Boston and Research Triangle area pretests. That was encouraging for three reasons: First, the local pretest was less expensive than the onsite pretest because there were no travel costs for training or debriefing. Second, with the interviewer working only in the local area, it was easier for the project team to communicate on a more frequent basis. Third, the lack of any significant differences also implied that the videotape interviews could be done in the local area at considerable cost savings with probably only minor losses in information.

Finally, caution is required in drawing a general conclusion from our experience that a local pretest can substitute for one conducted at the actual survey location. One difficulty is that although the context of our hazardous waste valuation scenario was for a specific site, the actual location could have applied to any town. The critical question to be answered is whether there are any reasons to expect that respondents in different areas would react differently to the framing of the questionnaire. This does not suggest that they would necessarily have the same willingness to pay. Indeed, we would expect differences based on income and other relevant explanatory variables. However, it does imply that the same behavioral model applied to two populations would fit each the same. Even with hindsight, we would perform the onsite pretest because it provided relatively low cost insurance for avoiding major problems in the actual survey.

### 5.3 VIDEOTAPED INTERVIEWS

To supplement the field pretest, the project team also conducted ten one-on-one videotaped interviews with members of the RTI staff. As the final stage of the questionnaire development process, these videotaped interviews

helped the project team to evaluate additional aspects of the final questionnaire's workability. They were especially helpful in identifying the various verbal and visual cues that respondents used to develop their answers to specific questions.

In evaluating whether or not the questionnaire "worked," the videotaped interview sessions focused on five key elements:

- The respondent's perceptions of the questionnaire's framing-- e.g., the hypothetical commodity and the payment vehicle.
- The usefulness of the visual materials as aids in the framing process.
- The effectiveness of the risk circles in communicating very small probabilities.
- The logical progression of the questionnaire.
- The sound of the questionnaire's language.

The project team videotaped ten separate interviews with RTI employees in a conference room at the Institute. The employees included two maintenance workers, two data entry workers, a mid-level statistician, an electrician, a painter, a carpenter, and two secretaries. The interviews were divided equally between men and women. Respondents also were chosen to represent a wide range of ages and educational levels.

The videotape camera was placed in one location and operated automatically eliminating the need for a camera operator. One project team member observed the session while another conducted both the interview and the subsequent discussion. The team explained that the purpose of the session was to evaluate the questionnaire, that there were no right or wrong answers, and that participants were to respond the same as if they were in their own living rooms. No one-way mirrors were used to conceal the observer. However, the participants seemed unaffected by the presence of the observer or the camera after the initial explanation of the purposes of the session.

It is difficult to isolate the specific changes that resulted exclusively from the videotape sessions. For example, several team members frequently suggested changes to the questionnaire simultaneously. Nevertheless it is possible to highlight several general conclusions about the workability of the question-

before a person would know that he was seriously ill and die. The third circle combines the two types of risks into risks to a person.

Final version

Another way to think about hazardous wastes and risk is with this card. It uses circles to stand for two different kinds of risks we face from hazardous waste.

Pretest version

The middle circle on Card A stands for the second type of hazardous waste risk--the chance of a harmful health effect after being exposed. This risk means that even if you are exposed, there is a chance, not a certainty, that you will be harmed. For example, if one person catches a cold at home or at work, everyone around will not get sick. Some people are healthier or have better resistance. The same idea is true for hazardous wastes. Whether or not you are actually harmed is based on your physical makeup--your heredity and your overall health. Looking at both of these circles, you can't be harmed by hazardous wastes if you are never exposed to them. You would never have to spin the pointer in the middle circle as long as the pointer on the first circle (POINT TO FIRST CIRCLE) never landed in the darkened area.

Final version

The importance of the middle circle is that it stands for the second, and different, type of hazardous waste risk--the chance of dying after being exposed. This means that even if you're exposed, there's a separate chance--not a certainty--that you would die. For example, some people are healthier or have better resistance. Whether or not you're actually harmed is based upon your physical makeup, heredity, and overall health. An important thing to remember about the first two circles is that you would never have to spin the pointer on the second circle as long as the pointer on the first circle never landed in the blackened area. In other words, there's no chance you would die from the effects of hazardous wastes if you're never exposed to them.

The interviewers also pointed out that respondents had trouble with the transition between hypothetical scenarios. It was necessary to repeat entire sections because the respondent was unclear about the ground rules. The transition at Section G (willingness to pay to avoid an increase in risk) was especially troublesome because respondents frequently thought their bids in the previous question also applied to this one:

Pretest version

Now let's consider a completely different situation.

Final version

Now let's consider a completely different situation. That is, your dollar amounts and answers to previous questions are not carried over to this one.

The explanation for moving as a way to mitigate risk (Section H) also was frequently cited as a problem area. Again, the interviewers pointed out the redundancy in the explanation:

Pretest version

Suppose you could choose between two homes that are virtually identical--that is, they have the same number and types of rooms, are located in the same school district, and all their other features are the same. The only difference between these two homes is their distance to a manufacturing plant, which disposes of its hazardous wastes in a dump at the plant site. Suppose you could choose between these two homes and you could pick any distance you would want from the hazardous waste site, except that the same house will cost you more money the farther it is from the site. In other words, for each mile you move away from the site, it will cost you \$600 more for the same house you could get next to the site. For example, if the price of a home next to the site was \$80,000, then the price of the same home 1 mile away would be \$80,600. Under these circumstances, how many miles away from the site would you choose to be?

Final version

Now, suppose you could choose between two almost identical homes like those in this neighborhood. That is, they have the same number and types of rooms and all their other features are the same; and your children would go to similar schools. The only difference between them is their distance from a manufacturing plant that disposes of its hazardous wastes in a landfill at the plant site. Suppose you could pick any distance you would want from the hazardous waste site, except that for each mile between your house and the site, you would pay \$1,000 more than for the same house you could get next to the site. For example, suppose the price of a house next to the site was (READ AVERAGE COST FROM ABOVE), then the same house 1 mile away would cost (READ AVERAGE COST) plus \$1,000. At an additional cost of \$1,000 per mile, how many miles away from the plant site would you choose to be?\*

The pretest also confirmed the effectiveness of the focus groups in evaluating the visual aids used in the interview. With one exception, the payment vehicle card, the interviewers felt like these visual aids worked well. The payment vehicle card subsequently was revised and the interviewers (in the

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\*We are indebted to Joan O'Callahan of EPA who suggested the improvements for the final version.

The pretest suggested that the main trouble spots in the questionnaire involved the overall language and the explanations at certain points. Specifically, the pretest questionnaire sounded too much like an interviewer reading and not enough like an interviewer talking. It simply was too formal and not conversational. To illustrate the value of the pretest in making this point, the following excerpts compare the pretest version with the final questionnaire. However, it should be noted that the final version reflects the project team's efforts from two more rounds of revisions, revisions from the videotaped interviews, and suggestions from outside reviewers:

Pretest version

When we think about environmental issues, we often think about different types of pollutants and where they come from. As you probably know, pollution that affects the quality of our air, water, and food can come from many different sources.

Final version

Pollution, which affects the quality of our air, water, and food, can come from many different sources.

Pretest version

Throughout life there are chances that people may die from many different causes. Every day of our lives there is a chance that we may die from some accident on the job, at home, or somewhere else. There is also the chance that we may die from some long-term illness or disease or we may die suddenly from some health problem. On the other hand, there is a chance that we may fully live out our lives and die of natural causes. Some common risks of death are shown on this risk ladder (refer to Figure 3-14 on page 3-37).

Final version

Throughout our lives there are many different risks of dying. There is a risk or chance we may die from an accident or some long-term illness, or we may die suddenly from some health problem.

The pretest experiences also indicated several problems in the introduction to the risk ladder. Specifically, the sample used to illustrate how the respondent was to use the ladder was misleading and the importances of the different sections was not emphasized:

Pretest version

The ladder will help you compare different risks of death. Notice that the ladder is divided into six sections to show that the differences in risk levels are quite large between sections. Each section shows the relative sizes of the risks of dying during any year of a person's lifetime based on national averages. Beside each cause of

death there are figures that show the number of people who die each year from that cause. For example, the risks to stuntmen show that in any year 2,000 out of every 100,000 stuntmen will die from an accident on the job.

#### Final version

This ladder shows the different risks of dying associated with a variety of common activities, including accidents, habits, hobbies, illnesses, natural disasters, and job accidents. The numbers on the right show the risks for each of the activities listed. The ladder displays these risks from low to high so you can easily compare them. The two types of risks shown are those based on some of the people and those based on all of the people in the United States. For example, numbers shown for occupations, skydiver, and smoker are based only on people in these activities. This means, for instance, that during the next year 47 of every 100,000 homebuilders in the United States will die from an on-the-job accident. However, the numbers shown for the remaining risks are based on averages for all people in the United States. This means, for instance, that during the next year, 77 out of 100,000 people in this country will die from a stroke. Notice also that there are breaks between the five parts of the ladder to show that the difference in risk levels is quite large between each part.\*

The explanation of the risk circles was the area most frequently recommended for major revisions. Interviewers found the explanation in the pretest version both redundant and confusing:

#### Pretest version

Another way of thinking about hazardous wastes as involving risk is with this card (HAND RESPONDENT HAZARDOUS WASTE RISKS CARD A, WITHOUT DOLLAR AMOUNT). It uses circles to stand for two types of hazardous waste risk that we want you to think about: the first circle, which shows the risk or chance that you (or a member of your household) would be exposed to hazardous wastes. By exposed, I mean touching, breathing, eating, or drinking a large enough amount of a hazardous waste over a period of time so that it could harm the health of whoever is exposed. Exposure through the pathways we have discussed could be a brief, one-time exposure, or it could be over months or years. The importance of the second circle is that even if a person is exposed, there is another and different risk or chance that he would develop a health problem and die. With many of the kinds of health problems that could be caused by hazardous wastes, it might be 10 to 30 years

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\*Another important change was also made in response to suggestions from Nick Nichols and several other reviewers from the U.S. Environmental Protection Agency (EPA). They suggested that all risks, except for the occupational risks, be put on a consistent basis. The pretest version had some risks that applied only to people who presently experienced the health condition.

## CHAPTER 5

### THE ROLE OF PRETESTING AND VIDEOTAPED INTERVIEWS IN DEVELOPING A CONTINGENT VALUATION SURVEY QUESTIONNAIRE

#### 5.1 INTRODUCTION

Following the last series of focus groups, the project team felt that the survey questionnaire was well along the right development track. The sequence of questions, the amount and types of information they contained, and their general structure and format seemed to be "working" reasonably well. Despite these "successes," however, the project team felt uncomfortable going into the field for actual data collection because they had not fully tested the questionnaire one-on-one under the usual conditions with a respondent. For example, the questionnaire had always been administered by a member of the project team, a situation that could not be duplicated in field work conducted with professional interviewers. In addition, the questionnaire had not been tried under actual field conditions--i.e., in the residences of respondent whose participation is subject to varying interview conditions--televisions, children, telephones, etc.

To minimize the chances of encountering unexpected problems in the field, the project team decided both to field test the survey questionnaire and to videotape ten one-on-one interviews with selected respondents. Unlike the pretest, which was conducted under actual field conditions, these videotaped sessions were conducted in a highly controlled environment and focused only on key portions of the questionnaire. This chapter describes these sessions and the roles they played in the post-focus-group effort to develop the questionnaire. Specifically, Section 5.2 describes the pretest and the most significant revisions to the questionnaire resulting from it. Section 5.3 provides similar descriptions for the videotape sessions. Section 5.4 describes the comments made by reviewers whom the project team asked to review various drafts of the questionnaire. Finally, Section 5.5 concludes this chapter by highlight-

ing some suggestions for enhancing the overall process of questionnaire development.

## 5.2 PRETEST OF CONTINGENT VALUATION SURVEY QUESTIONNAIRE

To prepare for the fieldtest, or pretest, the project team trained two interviewers in a day-long session at the Research Triangle Institute (RTI) in Research Triangle Park, North Carolina. Subsequently, one of these interviewers, who later supervised the data collection on a day-to-day basis in the field, trained two professional interviewers in the Boston area to help collect the fieldtest data. For the pretest, a total of four interviewers completed 45 interviews in two locations: suburban Boston, Massachusetts, and the Research Triangle area of North Carolina. The latter area was chosen to take advantage of the services of an interviewer who had prior contingent valuation survey experience and who had demonstrated an uncanny knack for not only identifying trouble spots but also suggesting solutions. Nine of the interviews were completed in the Research Triangle area and 36 in suburban Boston. The interviews were divided about equally between the direct question and ranking versions. The interviewers used no specific criteria to select respondents, although the project team did request that they interview respondents from several socioeconomic groups.

To evaluate the effectiveness of the questionnaire, the project team conducted two half-day debriefing sessions with the interviewers at each location. The completed questionnaires also were analyzed for general consistency in responses. The outcome of these efforts was that the questionnaire generally was on the right track but that several trouble spots needed improvement. Generally, the interviewers were able to identify these areas and to indicate the kinds of problems either they or the respondents had experienced. Thus, the insights obtained from the pretest dealt almost exclusively with the workability of the questionnaire. The pretest samples were too small and nonrandom to yield any insights into the potential variances in willingness to pay amounts in the actual survey. In contrast, Mitchell and Carson [1984] found that their willingness-to-pay bids from a 100-interview pretest had variances almost identical to these in their full survey of 800. Information about variances is critical for judging the adequacy of the statistical power for the planned sample size but was beyond the capability of our pretest.

talking and not simply reading. By observing and listening to the session it was easy to evaluate the sound of different questionnaire sections as they were administered. The videotape also enabled the team member conducting the interview to replay these same sections and elicit the respondent comments on what caused a puzzled expression or some other kind of response. In listening to the interview, some words or vagueness had a jarring effect on the team and led them to continue the search for simple and/or more concrete words to replace technical or vague language. The repetition of interviews by a team member also led to improved interviewer instructions on how to use the visual aids to make the questionnaire more interactive.

#### 5.4 QUESTIONNAIRE REVIEWERS

In addition to conducting these pretest and videotape sessions, the project team also solicited and received comments on various drafts of the questionnaire from reviewers in a wide range of disciplines. These comments, provided as a professional courtesy, proved extremely valuable at several stages of the questionnaire development process. To identify the exact nature of these contributions would be difficult because of the fluid nature of the development process. Table 5-1 lists these reviewers, their areas of concern, and the various versions of the questionnaire they reviewed.

#### 5.5 THE QUESTIONNAIRE DEVELOPMENT PROCESS: REFLECTIONS AND SUGGESTIONS FOR IMPROVEMENT

While the actual process of developing the questionnaire evolved over a period of about 1 year and had to respond to other objectives besides the primary one, the passage of time, the advantages of hindsight, and many missteps have all yielded some general impressions about the overall process. Generally, focus groups, field pretests, and the videotaped interviews were better complements than substitutes. Each seemed to offer some advantages relative to the other but there were also some disadvantages. The focus groups were especially effective in getting a general sense of people's knowledge and perceptions of hazardous wastes. On the other hand, the pretest was a better indicator of trouble spots in the questionnaire due to either logic or language. The pretest also focused attention on the administration of the questionnaire and the importance of sound. The videotape sessions proved very effective in

TABLE 5-1. QUESTIONNAIRE REVIEWERS AND KEY CONCERNS

Name	Affiliation	Concerns	Version(s) reviewed
Tom Wallsten	University of North Carolina (Psychologist--Advisory Committee Member)	<ul style="list-style-type: none"> <li>• Context of risk</li> <li>• Design issues</li> <li>• Risk ladder</li> </ul>	Several
Bill Schulze	University of Wyoming (Economist)	<ul style="list-style-type: none"> <li>• Direct question vs. bidding</li> <li>• Probability complexity</li> <li>• Payment vehicle</li> </ul>	September 1983
Robert Mitchell	Resources for the Future (Sociologist)	<ul style="list-style-type: none"> <li>• Context</li> <li>• Probability complexity</li> <li>• Equity</li> <li>• Probability design</li> <li>• Risk ladder</li> </ul>	September 1983 November 1983
Milt Weinstein	Harvard University (Economist--Advisory Committee Member)	<ul style="list-style-type: none"> <li>• Analytical design</li> <li>• Certainty case</li> <li>• Context</li> </ul>	February 1984 September 1983
Alan Randall and John Hoehn	University of Kentucky (Economists)	<ul style="list-style-type: none"> <li>• Bidding</li> <li>• Context</li> <li>• Analytical design</li> </ul>	November 1983
George Tolley et al.	University of Chicago (Economists)	<ul style="list-style-type: none"> <li>• Length</li> <li>• Complexity</li> <li>• Bidding</li> </ul>	September 1983
Bob Haveman	University of Wisconsin (Economist)	<ul style="list-style-type: none"> <li>• Analytical design</li> <li>• Length</li> </ul>	September 1983
Nancy Bockstael	University of Maryland (Economist)	<ul style="list-style-type: none"> <li>• Context</li> <li>• Analytical design</li> </ul>	September 1983
Dick Kulka	Research Triangle Institute (Psychologist)	<ul style="list-style-type: none"> <li>• Length</li> <li>• Context</li> </ul>	Several
David Harrison	Harvard University (Economist)	<ul style="list-style-type: none"> <li>• Averting cost</li> <li>• Hypothetical vs. actual</li> </ul>	September 1983
Ron Wyzga	Electric Power Research Institute (Economist)	<ul style="list-style-type: none"> <li>• Length</li> <li>• Analytical design</li> <li>• Context</li> </ul>	February 1984

evaluating whether or not revisions aided either sound or workability. Both the focus groups and videotape sessions were excellent for getting people to explain their thought processes and for determining the effectiveness of the visual materials in aiding the information processing. In addition, caution is required in using the pretest for the purpose of knowing what the respondent was thinking. This information came from experienced observers (the interviewers) rather than the respondent. This shortcoming can be minimized by encouraging the interviewers to seek out the respondent's reactions rather than relying exclusively on their impressions, but the possibility of inaccurate filtering still remains.

The complementary nature of focus groups, pretests, and videotaping leads us to suggest that a blend of the three can be every effective tools in dealing with complex environmental commodities. However, better integration likely would enhance their complementarity. After the first two rounds of focus groups, additional time to prepare a written draft of the questionnaire likely would have moved us faster toward a final questionnaire. Using an early draft questionnaire in several videotape sessions perhaps could have replaced at least one round of focus groups. This change would have shortened the time involved in planning and the logistics of focus group sessions and allowed more time for the team to work on the questionnaire itself. The videotape sessions, supplemented by simply reading the questionnaire into a tape recorder as revisions are attempted, likely would have enhanced the sound of the version used in the pretest.

Following the videotaping and subsequent revisions, a round of focus groups to administer the draft questionnaire to participants from the survey area would provide valuable feedback on the respondents thought processes as well as the effectiveness of the questionnaire and visual aids. At that time, the team perhaps would have sufficient information to decide if a local pretest could substitute for a more expensive onsite one. However, the cost differential between these two could be kept relatively small by foregoing in-person training and debriefing. Both activities could be done by telephone supplemented with programmed training. These two substitutions could enable pretests both onsite and locally for about the same cost as one full-scale onsite effort with expensive personal training. However, the in-person training sup-

plemented with practice interviews and intensive discussions proved critical to the success of the actual field survey when the cost of mistakes is much higher.

In summary, the process of questionnaire development could have been enhanced by better integration of focus groups, pretests, and videotape interviews. Focus groups seem to diminish in effectiveness after two or three sessions. They are most useful with longer periods of time between sessions for better formalizing ideas. The sooner a written draft can be prepared the better. Speaking rather than reading even early versions makes a major difference in the sound. Videotaping is a fast, relatively inexpensive way to explore how the respondents are using different parts of the questionnaire. Finally, field pretests are still useful in simulating actual field conditions. Regardless of their exact nature, all three tools are good insurance for avoiding costly mistakes that could hinder the analysis of the survey data.

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