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Valuing Changes in Hazardous Waste Risks: A Contingent Valuation Analysis

Volume II
Appendixes

Vanderbilt University

RTI

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The Benefits of Hazardous Waste Management Regulations Using Contingent Valuation

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APPENDIX A

OPTION PRICE AND EXPECTED SURPLUS: POSSIBLE RELATIONSHIPS

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OPTION PRICE AND EXPECTED SURPLUS: POSSIBLE RELATIONSHIPS

This appendix is a supplement to Section 6.3 of Chapter 6. All concepts, definitions, and notations are explained there. Its purpose is to show that supply-side option value [$OP - (r_2 - q_2)S_U$] can be either positive or negative in the most general case.

A.1 CS IS INDEPENDENT OF INCOME

The general form of the utility function is $U = V(Y, Q)$ for $Q = 0, \bar{Q}$. The condition that S_U is independent of income is embodied in $U = V(Y + Q)$ so that $S_U = \bar{Q}$; that is

$$V(Y + S_U + \bar{Q}) = V(Y + 0) \ .$$

A.1.1 Let $V(Y, Q) = (Y + Q)^b$ for $0 < b < 1$

Assume the following values:

$$Y = 20{,}000 \qquad S_U = \bar{Q} = 2{,}000$$

$$b = 0.5$$

$$q_1 = 0.75, \ q_2 = 0.25, \ r_1 = 0.25, \ r_2 = 0.75$$

Thus $(r_2 - q_2)S_U = 1{,}000$.

From Equation (6.18), OP is the solution to

$$q_1V(Y, 0) + q_2V(Y, \bar{Q}) = r_1V(Y - OP, 0) + r_2V(Y - OP, \bar{Q})$$

$$0.75(20{,}000)^{0.5} + 0.25(22{,}000)^{0.5} = 0.25(20{,}000 - OP)^{0.5}$$

$$+ 0.75(22{,}000 - OP)^{0.5}$$

$$\text{or} \quad 143.14701 = 0.25(20{,}000 - OP)^{0.5} + 0.75(22{,}000 - OP)^{0.5}$$

Solving for OP is cumbersome, but the RHS is $E(U)'$. Calculate $E(U)'$ for various values of OP'. If $E(U)' > 143.14701$, then $OP' < OP$.

Try $OP' = (r_2 - q_2)S_U = \$1{,}000.$

$$E(U)' = 0.75(19{,}000)^{0.5} + 0.75(21{,}000)^{0.5}$$
$$= 143.14545 < 143.14701$$

Thus $OP' = (r_2 - q_2)S_U > OP.$

Similar calculations for $r_1 = 0.7$, $r_2 = 0.3$ and $(r_2 - q_2)S_U = 100$ show

$$143.14701 > 0.7(20{,}000 - 100)^{0.5} + 0.3(22{,}000 - 100)^{0.5}$$

$$= 143.14310$$

So $OP < (r_2 - q_2)S_U$.

A.1.2 Let $V(Y, \bar{Q}) = \frac{1}{1-b} (Y + \bar{Q})^{1-b}$

Assume $Y = 20{,}000$ $S_U = \bar{Q} = 2{,}000$

$b = 10$

$q_1 = 0.75$, $q_2 = 0.25$; $r_1 = 0.25$, $r_2 = 0.75$

From Equation (6.18), solve

$$\frac{1}{-9} [0.75(20{,}000)^{-9} + 0.25(22{,}000)^{-9}] =$$

$$\frac{1}{-9} [0.25(20{,}000 - OP)^{-9} + 0.75(22{,}000 - OP)^{-9}]$$

for OP. Trying $OP' = (r_2 - q_2)S_U = 1{,}000$

yields

$$1.679 \times 10^{-39} > 1.719 \times 10^{-39}$$

so $OP' < OP$ and $OP < (r_2 - q_2)S_V$.

A.2 S_U IS AN INCREASING FUNCTION OF INCOME

Let $U = (a + \bar{Q})^c Y^b$ $0 < b, c, < 1$

For any a, b, c, Y, and $\bar{Q}$, the following can be solved for S_U:

$$(a)^c\, Y^b = (a + \bar{Q})^c (Y - S_U)^b$$

Alternatively, if S_U is specified, this can be solved for $\bar{Q}$, thereby scaling Q. Then Equation (6.6) can be solved for OP:

$$OP = Y - \frac{q_1(a + \bar{Q})^c (Y - S_U)^b + q_2(a + \bar{Q})^c (Y)^b}{r_1(a)^c + r_2(a + \bar{Q})^c}^{\frac{1}{b}}$$

Assume $Y = 20{,}000$ $S_U = 2{,}000$

$b = 0.1$, $c = 0.1$, $a = 1$

$q_1 = 0.75$, $q_2 = 0.25$; $r_1 = 0.25$, $r_2 = 0.75$

$(r_2 - q_2)S_U = 1{,}000$

Thus $\bar{Q} = 0.111$

$$OP = 20{,}000 = \frac{0.75(1.111)^{0.1}(18{,}000)^{0.1} + 0.25(1.111)^{0.1}(20{,}000)^{0.1}}{0.25(1)^{0.1} + 0.75(1.111)^{0.1}}^{10}$$

$$= 1026.33 > (r_2 - q_2)S_U.$$

Alternatively, if $b = 0.9$, $\bar{Q} = 1.5811748$

and $OP = 1025.77 > (r_2 - q_2)S_U$.

APPENDIX B

SURVEY QUESTIONNAIRE

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SURVEY QUESTIONNAIRE

This appendix presents an overview of our survey instrument for eliciting respondents' values for reductions in hazardous waste risks, including two versions of the questionnaire and three versions of the risk circles--visual aids--used to help explain probability to survey respondents.

Due to the complexity of our experimental design (e.g., different question formats and different risk levels), there are 24 versions of our questionnaire. At the top of its cover page, each questionnaire version is labeled with one of the following preprinted questionnaire designations:

D111	D311	D511	D711	R111	R311
D122	D322	D522	D722	R122	R322
D213	D413	D613	D813	R213	R413
D224	D424	D624	D824	R224	R424

As shown, these questionnaire version designators take the form of a single letter, either "D" or "R," followed by three digits. The letters "D" and "R" represent the basic distinction between questionnaire versions for the direct question format and the contingent ranking question format. Three digits following the letters represent the following variations within each basic version:

- For "D" version questionnaires, the first digit represents one of eight probability designs shown to a respondent. The probabilities (e.g., 1/10, 1/20, 1/50) are for risk of exposure to hazardous wastes, risk of death after being exposed, and combined risk of exposure and death. The wording of each "D" version questionnaire is preprinted to account for differences in probability designs.

- For "R" version questionnaires, the first digit represents one of four designs of combinations of probabilities and monthly payment amount. The wording of each "R" version questionnaire is preprinted to account for differences in probability designs.

- The second digit for both questionnaire versions represents alternative wordings found in question G.1, second paragraph. If this second digit is the number 1, the wording will be "The government has decided to . . . ." If this digit is the number 2, the wording will be, "Your town council voted for a proposal to . . . ." One of the alternative wordings is preprinted for you in each questionnaire.

- The third digit for both questionnaire versions represents one of four dollar amounts provided in question H.1. If this digit is the number one, $250 per mile is used; if the third digit is 2, 3, or 4, then $600, $1,000, or $1,300 per mile is used, respectively. One of the four dollar amounts is preprinted for you in each questionnaire.

The following pages present one direct-question version (D213) and one ranking version (R224) of the questionnaire. Immediately following the two questionnaire versions are the risk circles (versions D-2 and R-2, respectively) that were used along with them to explain the risks of hazardous waste exposure to respondents. In addition, to indicate the extremely low levels of risks that respondents were asked to deal with in some versions of the questionnaire, we have also included two additional versions of the risk circles (versions D-7 and D-8) following the contingent ranking questionnaire and risk circles. Thus, the following pages are organized as follows:

- Direct question version of the questionnaire, D213
- Risk circles, D-2
- Ranking version of questionnaire, R224
- Risk circles, R-2
- Risk circles, D-7
- Risk circles, D-8.

CONTINGENT VALUATION SURVEY TO ESTIMATE BENEFITS OF HAZARDOUS WASTE MANAGEMENT REGULATIONS

VERSION [D|2|1|3]

SECTION A

Hello, my name is _____. I'm with the Research Triangle Institute, a not-for-profit research company based in North Carolina.

The Institute is conducting a study of the public's attitudes about certain environmental issues. We have scientifically selected a sample of households to represent this area and your household is part of that sample. Because we have chosen relatively few households, your participation is extremely important. We hope you will help us.

In this interview, I will ask several different kinds of questions about environmental issues. You can help us get the best possible information for the study by thinking carefully about each question and taking your time to answer. If a question isn't clear, tell me and I will read it again. Take as much time as you need to think about the material I give you and to answer the questions.

Since most of the questions deal with your attitudes and opinions, there are no right or wrong answers. You also may decide not to answer a particular question or you may simply say you don't know. All the information you provide will be kept strictly confidential and will be used only for overall statistical results.

Segment Number: [| |]

Sample HU Number: [| |]

Interviewer ID: [| | | | | |]

Time Ended: _____

Time Started: _____

Interview Length: _____ (minutes)

SECTION B

B.1 Pollution, which affects the quality of our air, water, and food, can come from many different sources.

HAND RESPONDENT CARD 1.

In a moment I will name several sources of pollution. Use this scale card to tell me how harmful you feel each one is to people's health and to the environment. For example, if you think that oil spills from supertanker accidents are very harmful, pick the number 10 at the right-hand end of the scale. On the other hand, if you think that they're not at all harmful, pick the number 1 at the left-hand end of the scale.

Now, based on present conditions in the town where you live, tell me the place on the scale that shows how harmful you think the following sources of pollution are:

READ LIST BEGINNING AT THE ASTERISK.

IF RESPONSE IS "I DON'T KNOW," RECORD 94 IN THE BOXES.

Card 3
1-13
Dup.
Skip 14

	Starting Letter ☐	(15)
a.	Pollution from cars, trucks, and buses . . . . ☐☐	(16-17)
b.	Pollution from manufacturing plants . . . . . ☐☐	(18-19)
c.	Solid waste (garbage, bottles, etc.) from households . . . . . ☐☐	(20-21)
d.	Sewage from households . . . . . ☐☐	(22-23)
e.	Pollution from nuclear and other radioactive wastes . . . . . ☐☐	(24-25)
f.	Hazardous waste pollution from dump sites and factories . . . . . ☐☐	(26-27)
g.	Acid rain from electric power plants . . . . . ☐☐	(28-29)
h.	Pollution from strip mining . . . . . ☐☐	(30-31)

TAKE AWAY CARD 1.

SECTION C

Now I want to focus on one source of pollution--pollution from hazardous wastes. Let me explain what I will be talking about in this interview when I use the words "hazardous waste." I mean any discarded chemicals, liquids, or solids that are flammable, corrosive, or explosive, or that react violently with water. These wastes also include substances that have been found harmful or toxic to people. While radioactive wastes from nuclear power plants would fit this definition, I want you to think only about nonradioactive waste from factories or at landfills.

HAND RESPONDENT CARD 2.

To give you an idea of what hazardous wastes are and where they come from, here's a list of some products we use every day and some wastes that are left over after they're made. For example, a common waste is the chemical solution used to tan the leather in shoes, wallets, or purses. After the chemical solution is used, it must be thrown away. Because the solution contains chromium, it's considered a hazardous waste. Hazardous wastes are left over after making a wide range of other consumer products--from the gasoline and batteries for cars to the plastic containers used to package and store food. Some companies put these wastes in their own special facilities; others pay companies to dispose of their wastes in special dumps called hazardous waste landfills. Some products that we use--like paint, varnish removers, and weed killers--are themselves considered hazardous wastes when we throw them away. Although hazardous wastes often have been handled carefully, sometimes the practices have been inadequate.

ALLOW RESPONDENT TIME TO STUDY CARD 2.

TAKE AWAY CARD 2.

SECTION D

Now I want to ask what you may have seen or heard recently about hazardous wastes.

D.1 During the past 3 months, do you recall reading any news articles or hearing on radio or television about hazardous waste? (CIRCLE NUMBERED RESPONSE.)

Yes	01	(32-33)
No	02 → Go to D.4	
Don't know	94 → Go to D.4	

D.2 During the past 3 months, how many times did you read or hear something in the news about hazardous waste?

None	01	(34-35)
Only once	02	
Two to five times	03	
Six to ten times	04	
More than ten times	05	
Don't know	94	

D.3 During the past 3 months, was what you read or heard about hazardous waste (READ EACH) or about more than one of these? (CIRCLE ALL THAT APPLY.)

about your town?	01	(36-37)
about your state?	02	(38-39)
about the entire nation?	03	(40-41)
Don't know	94	(42-43)

D.4 How many miles from your home is the closest industrial plant or factory that generates or stores hazardous waste?

Miles	☐☐☐	(44-46)
Don't know	94 → Go to E.1	

D.5 What is the name of that plant or factory?

Name _____	☐☐	(47-48)
Don't know	94	

SECTION E

E.1 HAND RESPONDENT CARD 1.

Some of the organizations responsible for dealing with hazardous waste matters have been more effective than others. I'm going to read a list of those organizations. Please tell me the place on the scale that shows how good a job you think each is currently doing. Number 10 stands for very effective, and number 1 stands for not at all effective. How would you rate the current effectiveness of the following organizations in dealing with hazardous waste matters?

IF RESPONSE IS "I DON'T KNOW," RECORD 94 IN BOXES.

The federal government	☐☐	(49-50)
Your state government.	☐☐	(51-52)
Your town (or local) government.	☐☐	(53-54)
Your local water district or water supplier	☐☐	(55-56)
Major companies that generate hazardous waste	☐☐	(57-58)
Major waste disposal companies	☐☐	(59-60)

RESPONDENT KEEPS CARD 1.

SECTION F

HAND RESPONDENT CARD 3.

We may face risks of being exposed to hazardous waste in several different ways. For example, people could be exposed if hazardous waste got into a town's drinking water supply. Wastes also can find their way into the soil and into local rivers, lakes, or bays, damaging fish or shellfish. They even can get into the air as toxic gases, if they ignite or burn incompletely, or evaporate from a dump. We don't know how often people are exposed in these ways or exactly how harmful hazardous wastes are to people or to the environment.

F.1 Here where you live, what do you think your chance is during the next year of being exposed to hazardous waste through each of the ways listed on Card 3? If you think you're certain to be exposed, pick number 10, and if you think there is no chance at all, pick number 1. What do you think your chance is of being exposed during the next year to hazardous wastes through... (READ LIST).

IF RESPONSE IS "I DON'T KNOW," RECORD 94 IN BOXES.

Water you drink	☐☐	(61-62)
Air you breathe	☐☐	(63-64)
Touching wastes in contaminated soil	☐☐	(65-66)
Eating food grown in contaminated soil or eating meat from contaminated animals	☐☐	(67-68)
Eating fish or shellfish from contaminated waters	☐☐	(69-70)

TAKE AWAY CARDS 1 AND 3.

F.2 HAND RESPONDENT CARD 4.

It is possible that you personally may have done some things to reduce your risk of exposure to hazardous waste. In the last 5 years have you done any of the things shown on this card for the sole purpose of reducing your risk of exposure to hazardous waste?

IF "NONE" OR "I DON'T KNOW," CIRCLE NUMBER. IF "YES," ASK FOR THE MONTH AND YEAR EACH ACTION TAKEN WAS BEGUN AND ENDED. FOR ACTION "a," PROBE FOR THE NUMBER OF UNITS PURCHASED DURING THE LAST 5 YEARS AND THE COST PER UNIT. FOR ACTION "b," PROBE FOR THE NUMBER OF UNITS PURCHASED PER MONTH AND THE COST PER UNIT. FOR ACTION "c," PROBE FOR NUMBER OF SUCH MEETINGS ATTENDED DURING THE LAST 5 YEARS. Card 4 1-13 Dup. Skip 14

None 01

Don't know 94 (15-16)

Action	Approximate Year Start	Approximate Year End	Number of Units/ Times	Unit Cost	
a. Installed water filter	____	____	_____	$_____	(17-25)
b. Purchased bottled water	____	____	_____	$_____	(26-34)
c. Attended public meeting(s)--e.g., town meeting, water district meeting-- to learn about hazardous wastes . . .	____	____	_____		(35-41)

TAKE AWAY CARD 4.

F.3 Throughout our lives, there are many different risks of dying. There is a risk or chance we may die from an accident, some long-term illness, or suddenly from some health problem.

HAND RESPONDENT CARD 5.

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 the jobs and smoker are based only on people who work in those jobs or who smoke. 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 are quite large between each part.

I would like you to use this ladder to answer some questions about your own risk of dying from several different causes. Suppose I asked where on the ladder would you place your own risk of dying from a boating accident during the next year. If you thought your risk of dying from this cause was about the same as dying in a home fire, then you would read me the number 4, which is the ladder rung that corresponds to home fire. There are no correct answers to these questions. I simply want you to use this ladder as a way to show me what you think your own risk is of dying from a particular cause.

Now, where on the risk ladder would you place your own risk of (READ LIST) during the next year.

RECORD RUNG NUMBER MENTIONED BY THE RESPONDENT; IF RESPONSE IS "I DON'T KNOW," RECORD 94.

Dying from an auto accident? . . . . . ☐☐ (42-43)

Dying from heart disease? . . . . . ☐☐ (44-45)

Dying from a disease or illness caused by air pollution? . . . . . ☐☐ (46-47)

Dying from a disease or illness caused by hazardous waste? . . . . . ☐☐ (48-49)

TAKE AWAY CARD 5.

HAND RESPONDENT CARD A.

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.

Since risk involves chance, we can also think of risks by putting pointers that would spin easily on each of the circles. A pointer has an equal chance of landing at any spot on its circle. The larger the portion of the circle that is "cut out" by the blackened area--that is, the bigger the slice--the more likely the pointer would land there. On the first circle on Card A, for example, 10 percent of this circle is blackened. There is one chance in 10, or a 10 percent change, the pointer will land in the blackened area. This means that, on the average, for every 10 spins the pointer would land in the blackened slice once.

The numbers on the cards are hypothetical because even experts disagree about the sizes of the risks. However, in the rest of this interview, I want you to think of these numbers as actual risks you face.

Look at the differences between each circle. The first circle shows the risk or chance that you (and your household members) would be exposed to hazardous waste. 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 be harmful. Exposure through the pathways we have discussed could be a brief, one-time thing, or it could happen over several months or years.

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 third circle combines the two types of risks into a person's overall risk. It shows the bottom line: your chances both of being exposed to hazardous wastes and, once exposed, dying. The combined risk of exposure and death is found by multiplying the chance you see in the first circle by the chance in the second circle.

HAND RESPONDENT CARD C.

F.4 Please look at Cards A and C. The risk of exposure decreases from 1 chance in 10, or 10 percent chance, on Card A to 1 chance in 50, or 2 percent chance on Card C. Since your heredity doesn't change, the middle circles don't change. This also means the combined risk decreases from 1 chance in 200 to 1 chance in 1,000, or from five-tenths of 1 percent to one-tenth of 1 percent.

F.4.a Now, think about a hypothetical situation using Cards A and C. Suppose that Card A shows your risk of exposure from a hazardous chemical in your drinking water supply. Do you think that by moving you could reduce your risk of exposure to the level shown on Card C? I am not asking would you actually move, but is it possible that by moving you could reduce your risk to the level on Card C?

Yes	01	
No	02 → Go to F.5	(50-51)
Don't know	94 → Go to F.5	

F.4.b How far do you think you would need to move to lower your risk to the exposure level on Card C?

Miles . . . . . ☐☐☐ (52-54)

Don't know 94

F.5 Next, I would like you to think about the costs of more controls on hazardous wastes. When the government decides to clean up abandoned dump sites, place stricter controls on landfills, or stop some very toxic wastes from being generated, these actions would reduce the risk of exposure. However, they cost someone. As consumers and as taxpayers, we pay for the costs of better control of hazardous waste.

HAND RESPONDENT CARD 6.

The top part of this card shows how we would pay for lower exposure risks through higher prices for the products we buy. If the government puts stricter regulations on car makers, shoe companies, or chemical companies, it would cost them more to make their products. Then if you buy a pair of shoes or a pesticide, you would pay a higher price than you would without the regulations.

The lower part of this card shows how we would also pay for lower exposure risks through higher local, state, or federal taxes. The card shows the higher tax bills providing more money to investigate and enforce the regulations and to clean up places like Times Beach or Love Canal.

ALLOW RESPONDENT TIME TO STUDY, THEN TAKE AWAY CARD 6.

HAND RESPONDENT CARD B AND LEAVE CARDS A AND C.

Now, to think about these cards and about paying higher prices and taxes. Based on a hypothetical situation, I'm going to ask some questions about paying to reduce your (and your household members') risk of exposure from the level on Card A to the levels on Card B, and Card C. As you can see on the cards, the risk of exposure decreases in the first circle from 1 chance in 10 on Card A, to 1 chance in 20 on Card B, to 1 chance in 50 on Card C. It also means your combined risk of exposure and death gets smaller each time.

After asking about paying for these risk reductions for people, I am going to ask about paying an additional amount to reduce risks for fish, wildlife, and plants only--not for humans. Do you have a question about how I am going to continue?

Yes → Repeat previous two paragraphs.

No -- Continue.

F.6 Before I go on, there are two things to keep in mind. One, please decide how to respond as though you actually were facing this hypothetical situation. In other words, I would like you to keep in mind your (and your household members') income, how you budget your money, the kinds of products you buy and the taxes you pay. Two, any amounts that you're willing to pay would be in addition to what you're now paying for hazardous waste controls and would affect only hazardous waste problems. The amounts are not to reduce acid rain or any other environmental problem.

HAND RESPONDENT CARD 7.

This is the hypothetical situation. A medium-size company that produces electronic parts is located 3 miles from your home. This company generates 2,000 gallons of hazardous waste each day and disposes of them, using established industry-wide practices, in a landfill right at the plant site. If you're exposed to a large enough amount of these wastes for a long enough period, there's a chance you will die in 30 years. Under these circumstances, your (and your household members') risk of exposure to these wastes is shown on Card A. This is a risk you could potentially face for all these years until the health effect is known.

Now, suppose the government added regulations requiring the company to install special liners that would seal the landfill and monitoring systems that would detect leaks. These regulations will reduce the chances that the landfill can leak and will lower your risk of exposure to the level on Card B.

F.6.a 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 (and your household members') risk of exposure from the level on Card A to the level on Card B?

- IF ZERO $, RECORD "0" BELOW AND FOR F.6.a ON INTERVIEWER REMINDER SHEET, THEN GO TO F.6.c.

- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF NO REVISED AMOUNT IS OBTAINED, RECORD MONTHLY AMOUNT FOR F.6.a ON INTERVIEWER REMINDER SHEET. IF REVISED MONTHLY AMOUNT IS OBTAINED RECORD REVISED AMOUNT BELOW AND FOR F.6.a ON INTERVIEWER REMINDER SHEET.

$_____ (Initial) Per Month → IF ZERO $, GO TO F.6.c; IF GREATER THAN ZERO $, GO TO F.6.b (55-57)

$_____ (Revised) (58-60)

$_____ Per Year

Don't know . . . . . 94 → Go to F.6.c

F.6.b Now suppose the government added even more regulations requiring the company to remove the most toxic materials from the wastes before they're put into the lined and monitored landfill. This regulation would reduce your (and your household members') risk of exposure from the level on Card B to the level on Card C.

In addition to $_____ per month (FROM F.6.a), how much more in higher product prices and taxes would you be willing to pay each month to further reduce your risk of exposure to the company's hazardous wastes?

- IF ZERO $, RECORD "0" BELOW AND FOR F.6.b ON INTERVIEWER REMINDER SHEET, THEN GO TO F.7.

- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT ADDITIONAL MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay an additional (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay an additional (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF NO REVISED AMOUNT IS OBTAINED, RECORD MONTHLY AMOUNT FOR F.6.b ON INTERVIEWER REMINDER SHEET. IF REVISED MONTHLY AMOUNT IS OBTAINED RECORD REVISED AMOUNT BELOW AND FOR F.6.b ON INTERVIEWER REMINDER SHEET.

$_____ Per Month → Go to F.7 (61-63)
(Initial)

$_____ → F.7 (64-66)
(Revised)

$_____ Per Year

Don't know. . . . . 94 → Go to F.7

F.6.c Now suppose the government added still more regulations requiring the company to meet very stringent treatment requirements to remove the toxic materials from the wastes before they're put in the lined and monitored landfill. This regulation would reduce your (and your household members') risk of exposure from the level on Card A to the level on Card C.

How much in higher product prices and taxes would you be willing to pay each month to reduce your risk of exposure from the level on Card A to the level on Card C?

- IF ZERO $, RECORD "0" BELOW AND FOR F.6.c ON INTERVIEWER REMINDER SHEET, THEN GO TO F.7.

- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF NO REVISED AMOUNT IS OBTAINED, RECORD MONTHLY AMOUNT FOR F.6.c ON INTERVIEWER REMINDER SHEET. IF REVISED MONTHLY AMOUNT IS OBTAINED RECORD REVISED AMOUNT BELOW AND FOR F.6.c ON INTERVIEWER REMINDER SHEET.

$_____ Per Month (67-69)
(Initial)

$_____ (70-72)
(Revised)

$_____ Per Year

Don't know. 94

F.7 In the situation I just described, I didn't mention any particular cause of death from exposure to the company's hazardous wastes. Were you thinking of a particular cause of death?

IF YES, RECORD CAUSE; IF NO, CIRCLE 02.

Yes _____ ☐☐ (73-74)

_____

No 02

AFTER READING F.7, REFER TO INTERVIEWER REMINDER SHEET.

- IF RESPONSE FROM F.6.c IS ZERO $, GO TO F.8.
- IF RESPONSE TO F.6.a IS GREATER THAN ZERO $, GO TO F.9.

F.8 We have found in studies like this one that people have had a lot of different reasons for answering as they do. Some people felt they didn't have enough information to give a dollar amount, some didn't want to put a dollar value on reducing hazardous waste exposure risk, and some objected to the way the question was presented. Others gave a zero dollar amount because that's what it was worth to them or that's what they could afford.

Which one of these reasons best describes why you answered the way you did?

REPEAT REASONS, CIRCLE NUMBER; THEN GO TO F.11.

Not enough information 01

Did not want to place dollar value 02

Objected to how the question was presented 03 (75-76)

That is what it is worth 04

Cannot afford anything 05

Other (SPECIFY) 06

_____

Don't know 94

F.9 PLACE CARD 7 IN FRONT OF RESPONDENT.

Think again about this situation. Most experts agree that exposure to hazardous wastes may cause different kinds of health problems. I am going to name some of those problems and ask you if you want to change the (READ THE TOTAL FROM F.6.a + F.6.b OR AMOUNT FROM F.6.c ON REMINDER SHEET) per month you're willing to pay for your total risk reduction. You might decide that you would be willing to pay something different if you thought about different kinds of health problems. If you decide to change, tell me how much you would change the monthly amount.

IF RESPONDENT PROVIDED A CAUSE OF DEATH IN F.7, SAY "YOU TOLD ME THAT THE CAUSE OF DEATH YOU WERE THINKING OF WAS" AND THEN REPEAT CAUSE.

Card 5 1-13 Dup.

Suppose the cause of death was damage to the body's immune system that protects against diseases, would you change the $_____ monthly amount?

No Change	Don't Know	
00	94	(14-15)

Circle One		Amount	
+	-		
01	02	$_____	(16-20)

Suppose that instead of a risk of death, the risk was that of birth defects severe enough to mentally retard or physically handicap children for a lifetime, would you change the $_____ monthly amount?

No Change	Don't Know	
00	94	(21-22)

Circle One		Amount	
+	-		
01	02	$_____	(23-27)

RECORD ONLY THE AMOUNT OF THE CHANGE AND INDICATE THE DIRECTION OF THE CHANGE BY CIRCLING 01 FOR PLUS (+) OR 02 FOR MINUS (-). FOR EACH CAUSE, ALWAYS ASK ABOUT ANY CHANGE BASED ON THE INITIAL DOLLAR AMOUNT.

F.10 REFER TO INTERVIEWER REMINDER SHEET. FIND CARD LETTER THAT CORRESPONDS TO LOWEST RISK LEVEL "PURCHASED" AND RECORD IN NEXT SENTENCE.

Now suppose that the risk of exposure to you (and your household members) has been reduced to the level on Card _____.

Suppose that the government adds regulations on this landfill. These additional regulations would not lower your (or your household members') risk, but would lower the risk of exposure to hazardous waste for fish, wildlife, and plants only. Their combined risks would be lowered to the levels they face in nature. Suppose also that none of them is in danger of becoming extinct.

In addition to the (READ TOTAL OF F.6.a + F.6.b OR AMOUNT FROM F.6.c ON REMINDER SHEET) you have said you would be willing to pay, how much more in higher product prices and taxes per month would you be willing to pay for these regulations that would reduce risks of exposure for fish, wildlife, and plants only?

- IF ZERO $, RECORD "0" BELOW AND GO TO G.1.
- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT ADDITIONAL MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay an additional (READ MONTHLY AMOUNT) per month or (READ YEARLY AMOUNT) per year. In terms of your annual income, you would be willing to pay an additional (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW.

$_____ Per Month → Go to G.1 (28-30)
(Initial)

$_____ → Go to G.1 (31-33)
(Revised)

$_____ Per Year

Don't know . . . . . 94 → Go to G.1

TAKE AWAY ALL CARDS.

F.11 TAKE AWAY CARDS B AND C; LEAVE CARDS A AND 7.

Now suppose that the risk of exposure to you (and your household members) is the same as the level on Card A. Suppose that the government adds regulations on this landfill. These additional regulations would not lower your (or your household members') risk, but would lower the risk of exposure to hazardous waste for fish, wildlife, and plants only. Their combined risks would be lowered to the levels they face in nature. Suppose also that none of them is in danger of becoming extinct.

How much in higher product prices and taxes per month would you be willing to pay for these regulations that would reduce risks of exposure for fish, wildlife, and plants only?

- IF ZERO $, RECORD "0" BELOW AND GO TO G.1.
- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ YEARLY AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW.

$_____ Per Month (34-36)
(Initial)

$_____ (37-39)
(Revised)

$_____ Per Year

Don't know 94

TAKE AWAY ALL CARDS.

SECTION G

G.1 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. Suppose a medium-size company that produces electronic parts is located 3 miles from your home. The company generates 2,000 gallons of toxic hazardous wastes each day and, using established industry-wide practices, disposes of them in a landfill at the plant site. Your (and your household members') risk of exposure to these hazardous wastes is shown by the blackened area in the first circle on Card X.

HAND RESPONDENT CARD X AND ALLOW TIME TO STUDY.

The government has decided to allow the company to increase the amount of hazardous waste it generates and puts into its landfill. The company is expected to begin generating and disposing of more hazardous wastes soon.

A new government regulation would require the company, as well as all such companies, to remove toxic substances from the hazardous wastes before they're put into its landfill. If put into effect, the regulation would keep your risk of exposure at the level on Card X, even after the company increases the amount of wastes it generates. Without this regulation, the increased amount of hazardous waste would raise your risk of exposure to the level in the first circle on Card Y (HAND RESPONDENT CARD Y). How much would you be willing to pay monthly in higher product prices and taxes to avoid an increase in risk from that on Card X to that on Card Y?

- IF ZERO $, RECORD "0" BELOW AND GO TO G.2.

- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW.

$_____ Per Month → IF ZERO $, GO TO G.2; IF GREATER THAN ZERO $, GO TO H.1. (40-42)
(Initial)

$_____ (43-45)
(Revised)

$_____ Per Year

Don't know 94

TAKE AWAY CARDS X AND Y.

G.2 We have found in studies like this one that people have had a lot of different reasons for answering as they do. Some people felt they didn't have enough information to give a dollar amount, some didn't want to put a dollar value on avoiding an increase in hazardous waste exposure risk, and some objected to the way the question was presented. Others gave a zero dollar amount because that's what it was worth to them or that's what they could afford.

Which one of these reasons best describes why you answered the way you did?

REPEAT REASONS AND CIRCLE NUMBER.

Not enough information 01

Did not want to place dollar value 02

Objected to how the question was presented 03 (46-47)

That is what it is worth 04

Cannot afford anything 05

Other (SPECIFY) 06

_____

Don't know 94

TAKE AWAY CARDS X AND Y.

SECTION H

H.1 I want you to think about another, completely different situation. This is about distance from a plant or factory site with hazardous waste and how it might affect your choice of <u>where</u> to buy a house. But first, what would you say is the average cost of a house in your neighborhood?

IF RESPONDENT CAN'T ESTIMATE AN AVERAGE COST, ENCOURAGE AN ESTIMATE. IF NO ESTIMATE, REFER TO SECTION E ON THE HCF FOR THE AVERAGE COST AND RECORD BELOW.

Respondent's estimate of average cost $_____ (48-53)

Average cost from HCF, Section E $_____ (54-59)

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 <u>only</u> <u>difference</u> between them is their <u>distance</u> from a manufacturing plant that disposes of its hazardous waste 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?

- IF ZERO MILES, RECORD "0" AND GO TO H.2;
- IF GREATER THAN ZERO MILES, RECORD MILEAGE AND COST AS "INITIAL RESPONSE."

Initial Response

_____ Miles × $1,000 = $_____ (60-62)

$_____ + _____ = $_____ Total Cost of Home
(AVERAGE COST)

(REPEAT MILEAGE) at $1,000 per mile adds $_____ to the cost of the home. You would want the home (REPEAT MILEAGE) from the plant or factory at a cost of (REPEAT TOTAL COST) compared with (READ AVERAGE COST) for the same home located next to the plant site? Is that correct?

IF "NO," ASK FOR DIFFERENT MILEAGE AND RECORD REVISED MILEAGE BELOW.

Revised Response

Miles _____ (63-65)

Don't know 94

H.2 Finding places to build new industrial or power plants, businesses or commercial buildings, or public facilities is sometimes difficult. I am going to name some different types of facilities. Suppose that each of the things I name would definitely be built and would be operated according to government environmental and safety laws. Tell me the closest distance to your home that each facility could be built before you would move. If you wouldn't move no matter how close it was built, please tell me.

IF RESPONSE IS "WOULD NOT MOVE," RECORD 00 IN DISTANCE COLUMN.

	Distance in Miles	Don't Know	
Ten-story office building	_____	94	(66-67)
Large industrial plant without hazardous wastes	_____	94	(68-69)
Coal-fired power plant	_____	94	(70-71)
Nuclear power plant	_____	94	(72-73)
Four-lane interstate highway . . .	_____	94	(74-75)
Gasoline station/convenience store	_____	94	(76-77)
Large industrial plant with a hazardous waste landfill	_____	94	(78-79)

SECTION I

Card 6
1-13
Dup.
Skip 14

I.1.a This next series of questions is about employment. Are you now working full time or part time for pay?

Working full time . . . . . 01 → Go to I.1.c
Working part time . . . . . 02 → Go to I.1.c (15-16)
No 03

I.1.b Have you worked for pay, either full-time or part-time at any time during the past 12 months, that is, since (MONTH, 1983)?

Yes . . . . . 01 → Go to I.1.c (17-18)
No . . . . . 02 → Go to Section J

I.1.c What type of business, industry, or organization (is/was) that? For example, (is/was) it an insurance company, a retail shoe store, a government agency?

_____
_____ ☐☐☐ (19-21)
_____

I.1.d What kind of work (are/were) you doing? For example, (are/were) you an electrical engineer, a typist, a stock clerk, a salesperson?

_____
_____ ☐☐☐ (22-24)
_____

I.1.e What (are/were) your most important activities or duties?

_____
_____
_____

I.1.f How many hours (do/did) you work in a typical or average week?

Hours . . . . . ☐☐ (25-26)

I.1.g How long (have/did) you (worked/work) in job like (this/that) one?

Months (only if less than a year) . . . . . ☐☐ (27-28)

Years . . . . . ☐☐ (29-30)

I.2 HAND RESPONDENT CARD 5.

We may face some risks every day because of the type of work we do. Now where on the risk ladder would you place <u>your</u> own risk of dying from a fatal accident on your job?

IF RESPONDENT SAYS "I DON'T KNOW," ENCOURAGE RESPONDENT TO MAKE BEST ESTIMATE.

Rung Number. . . . _____ (31-32)

Don't know. . . . . 94 → Go to I.4.a

I.3 Now I'm going to ask you some hypothetical questions about changing your risk of death on your job. Suppose you were offered a <u>new</u> job just like your present job, but the risk of a fatal accident in this new job would be 50 percent greater than you've told me. You told me (POINT TO RISK LADDER) that your risk is the same as (READ TYPE OF RISK) or (READ NUMBER OF PEOPLE) of 100,000 people.

I.3.a REFER TO CARD 8 FOR THE NUMBER OF PEOPLE CORRESPONDING TO A 50 PERCENT INCREASE IN RESPONDENT'S PERCEIVED RISK.

A 50 percent increase over (READ RESPONDENT'S PERCEIVED RISK PER 100,000 PEOPLE) would be (READ CARD 8 FIGURE FOR 50 PERCENT INCREASE PER 100,000 PEOPLE).

POINT TO THE CORRESPONDING PLACES ON THE RISK LADDER.

How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year

Don't know. 94 (33-37)

Would not accept job . . . . . 01 → Go to I.4.a

I.3.b REFER TO CARD 8 FOR THE NUMBER OF PEOPLE CORRESPONDING TO A 100 PERCENT INCREASE IN RESPONDENT'S PERCEIVED RISK.

Suppose instead the risk doubled over what you told me. A 100 percent increase over (READ RESPONDENT'S PERCEIVED RISK PER 100,000 PEOPLE) would be (READ CARD 8 FIGURE FOR 100% INCREASE PER 100,000 PEOPLE).

POINT TO THE CORRESPONDING PLACE ON THE RISK LADDER.

How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (38-42)

Don't know 94

Would not accept job 01

I.4.a REFER TO I.1.c AND I.1.d AND TO CARD 9 TO "FIT" RESPONDENT INTO AN OCCUPATION CATEGORY. IF POSSIBLE, USE A SPECIFIC OCCUPATIONAL CATEGORY TO DETERMINE RESPONDENT'S "ACTUAL" JOB RISK.

Rung No. for "actual" job risk _____ (43-44)

IF RUNG NUMBER FOR "ACTUAL" RISK IS SAME AS RESPONDENT'S RUNG FROM I.2, GO TO SECTION J; OTHERWISE CONTINUE.

At this point, I would like to describe some information we have from records kept by government agencies and private insurance companies. They keep track of fatal accidents on the job each year and report the information for the nation as a whole. Based on these reports, the risk of a fatal accident in a year for jobs like yours would be about rung (READ NUMBER FROM CARD 9) on the risk ladder. That is, (NUMBER OF PEOPLE FROM CARD 9) of 100,000 people doing your job would die from a job-related accident each year. This is (READ EITHER "HIGHER" OR "LOWER") than what you thought your job risk was.

POINT TO RISK LADDER AND SHOW RESPONDENT THE RELATIVE POSITIONS OF HIS/HER PERCEIVED RISK FROM QUESTION I.2 AND "ACTUAL" RISKS.

I.4.b REFER TO CARD 9 FOR FIGURE FOR 50 PERCENT INCREASE IN "ACTUAL" RISK PER 100,000 PEOPLE.

Now, suppose that the risk of a fatal accident in the new job were increased 50 percent--that is, from (READ NUMBER FROM CARD 9 OCCUPATIONAL DEATHS COLUMN) per 100,000 people to (READ NUMBER FOR 50 PERCENT INCREASE) per 100,000 people. How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (45-49)

Don't know 94

Would not accept job . . . . . 01 → Go to Section J

I.4.c REFER TO CARD 9 FOR FIGURE FOR 100 PERCENT INCREASE IN "ACTUAL" RISK.

Suppose that the risk of a fatal accident in the new job doubled--that is, increased from (READ NUMBER FROM CARD 9 OCCUPATIONAL DEATHS COLUMN) per 100,000 people to (READ NUMBER FOR 100 PERCENT INCREASE) per 100,000 people. How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (50-54)

Don't know 94

Would not accept job 01

TAKE AWAY CARD 5.

SECTION J

Frequently, how we feel about certain issues is affected by our health and the health of family members. To help interpret the results of this survey, I would like to ask you some brief questions about your health.

J.1 In general, would you say your health is excellent, good, fair, or poor?

Excellent	01	
Good	02	
Fair	03	(55-56)
Poor	04	
Don't know	94	

J.2 Comparing your general health to the health of other people your age, would you say your health is much better, better, about the same, worse, or much worse?

Much better	01	
Better	02	
Same	03	(57-58)
Worse	04	
Much worse	05	
Don't know	94	

J.3 Please tell me if <u>you</u> now have or if you have ever had any of the following conditions.

READ LIST AND CIRCLE ALL THAT APPLY.

High blood pressure	01	(59-60)
Heart trouble	02	(61-62)
Diabetes	03	(63-64)
Kidney trouble	04	(65-66)
Cancer or leukemia	05	(67-68)
Effects of stroke	06	(69-70)
None of the above	07	(71-72)

J.4 The next question concerns the health of your immediate family. I am going to read a list of medical conditions. Please tell me if your brothers or sisters, any of your children, or either of your parents have or have they ever had any of the conditions. If anyone has or had one of the conditions, please tell me who. (READ LIST.)

Card 7 1-13 Dup. Skip 14

	Brothers or Sisters	Children	Parents	None	Don't Know	
High blood pressure	01	02	03	04	94	(15-24)
Heart trouble	01	02	03	04	94	(25-34)
Diabetes	01	02	03	04	94	(35-44)
Kidney trouble	01	02	03	04	94	(45-54)
Cancer or leukemia	01	02	03	04	94	(55-64)
Effects of stroke	01	02	03	04	94	(65-74)

J.5 During the past 2 weeks, how many days were you unable to work or carry on your regular activities because of illness?

Number of days . . . . . ☐☐ (75-76)

J.6 During the past year, on how many days did you stay overnight in a hospital or other type of health care facility?

Number of days . . . . . ☐☐ (77-78)

Card 8 1-13 Dup. Skip 14

J.7 Do you now smoke tobacco in any form?

Yes . . . . . 01 → Go to J.10
No 02 (15-16)

J.8 Have you ever smoked tobacco in any form?

Yes 01
No . . . . . 02 → Go to K.1 (17-18)

J.9 When did you stop smoking?

Year . . . . . ☐☐ (19-20)

J.10 When did you start smoking?

Year . . . . . ☐☐ (21-22)

J.11 (Do/did) you smoke cigarettes?

Yes 01 (23-24)
No . . . . . 02 → Go to J.13

J.12 How much (do/did) you smoke per day?

Less than one pack. 01
One pack. 02
More than one but less than two packs 03 (25-26)
Two packs 04
More than two packs 05

J.13 (Do/did) you smoke cigars?

Yes 01 (27-28)
No . . . . . 02 → Go to J.15

J.14 How many cigars (do/did) you smoke per day?

Number per day _____ (29-30)

J.15 (Do/did) you smoke a pipe?

Yes 01 (31-32)
No . . . . . 02 → Go to K.1

J.16 How many pipefulls per day (do/did) you smoke?

Pipefuls per day _____ (33-34)

SECTION K

K.1 How long have you lived in this town?

Less than 1 year 01
One to 3 years 02
Three to 5 years 03
More than 5 years 04 (35-36)

K.2 How many years have you lived at this address?

Months (only if for less than a year) . . . . . ☐☐ (37-38)

Years . . . . . ☐☐ (39-40)

K.3 Do you own or rent your home?

Own 01
Rent 02
Rent free 03 (41-42)

K.4 Now I'm going to read some phrases that describe different kinds of interests people have. As I read each one, please tell me if it's a lot like you, somewhat like you, a little like you, or not at all like you.

CIRCLE ONE NUMBER ON EACH LINE. REPEAT ANSWER CHOICES AS NECESSARY.

	A Lot	Somewhat	A Little	Not at All	No Opinion	
An outdoor person	01	02	03	04	05	(43-52)
An environmentalist	01	02	03	04	05	(53-62)
Someone who is against nuclear power for electric plants	01	02	03	04	05	(63-72)
						Card 9 1-13 Dup. Skip 14
Someone who is concerned about hazardous waste	01	02	03	04	05	(15-24)
Someone who is willing to pay the cost required to control hazardous waste	01	02	03	04	05	(25-34)

K.5 HAND RESPONDENT CARD 10.

Imagine that you have won a prize. The prize is the opportunity to win some money. There are six different opportunities to win and you may choose your opportunity. Which one of the following opportunities would you choose?

K.5.a

One chance out of 100 to win $10,000	01	
One chance out of 50 to win $5,000	02	
One chance out of 20 to win $2,000	03	
One chance out of 10 to win $1,000	04	(35-36)
One chance out of 5 to win $500	05	
One chance out of 2 to win $200	06	
None of the above	07	
Don't know	94	

TAKE AWAY CARD 10.

K.5.b HAND RESPONDENT CARD 11.

Suppose you could choose among six other opportunities to win some money. Which one of the following would you choose?

One chance out of 100 to win $1,000	01	
One chance out of 50 to win $500	02	
One chance out of 20 to win $200	03	
One chance out of 10 to win $100	04	(37-38)
One chance out of 5 to win $50	05	
One chance out of 2 to win $20	06	
None of the above	07	
Don't know	94	

TAKE AWAY CARD 11.

K.6 What was the last grade of regular school that you completed--not counting specialized schools like secretarial, art, or trade schools?

No school	01	(39-40)
Grade school (1-8)	02	
Some high school (9-11)	03	
High school graduate (12)	04	
Some college (13-15)	05	
College graduate	06	
Postgraduate (17+)	07	
No response/refused	08	

K.7 ASK ONLY IF NOT OBVIOUS

How would you describe your racial or ethnic background?

White or Caucasian	01	(41-42)
Black or Negro	02	
Other (SPECIFY)	03	

_____

K.8 HAND RESPONDENT CARD 12.

Here's a list of income categories. Please call off the number of the category that best describes the combined income that you (and members of your household) received before taxes in 1983. Include wages, salaries, income from your business, pensions, dividends, interest, and any other income before taxes.

Under $5,000	01	
$5,000 - $9,999	02	
$10,000 - $14,999	03	
$15,000 - $19,999	04	
$20,000 - $24,999	05	
$25,000 - $29,999	06	
$30,000 - $34,999	07	
$35,000 - $39,999	08	
$40,000 - $44,999	09	(43-44)
$45,000 - $49,999	10	
$50,000 - $54,999	11	
$55,000 - $59,999	12	
$60,000 - $64,999	13	
$65,000 - $69,999	14	
$70,000 - $74,999	15	
$75,000 - $79,999	16	
$80,000 and over	17	
Not sure/refused	18	

K.9 ASK ONLY IF RESPONDENT WORKS NOW OR WORKED ANYTIME DURING THE PAST 12 MONTHS.

I have one last question regarding your monthly wages or salary only. In order for the people who are doing this study to fully analyze all of the responses you have given, I would like to ask what your monthly wage or salary is before taxes. Let me remind you that your name will never be associated with your response, and your response will only be used in statistical results.

IF RESPONDENT IS UNABLE TO PROVIDE MONTHLY WAGES OR SALARY BEFORE TAXES, ASK FOR TAKE HOME WAGES OR SALARY.

Refused 01 (45-46)

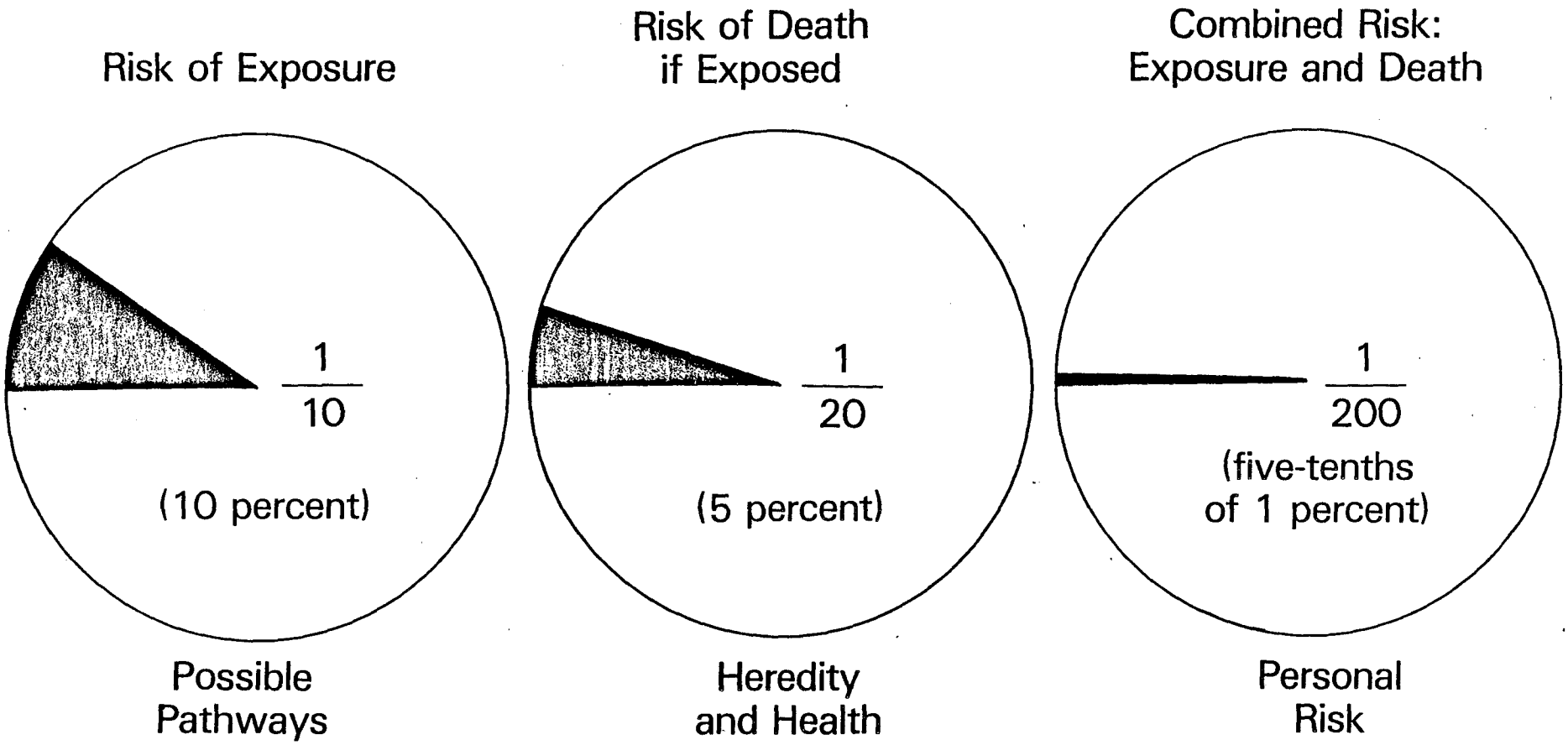
Monthly wages or salary $ _____ (47-51)
(Before taxes)

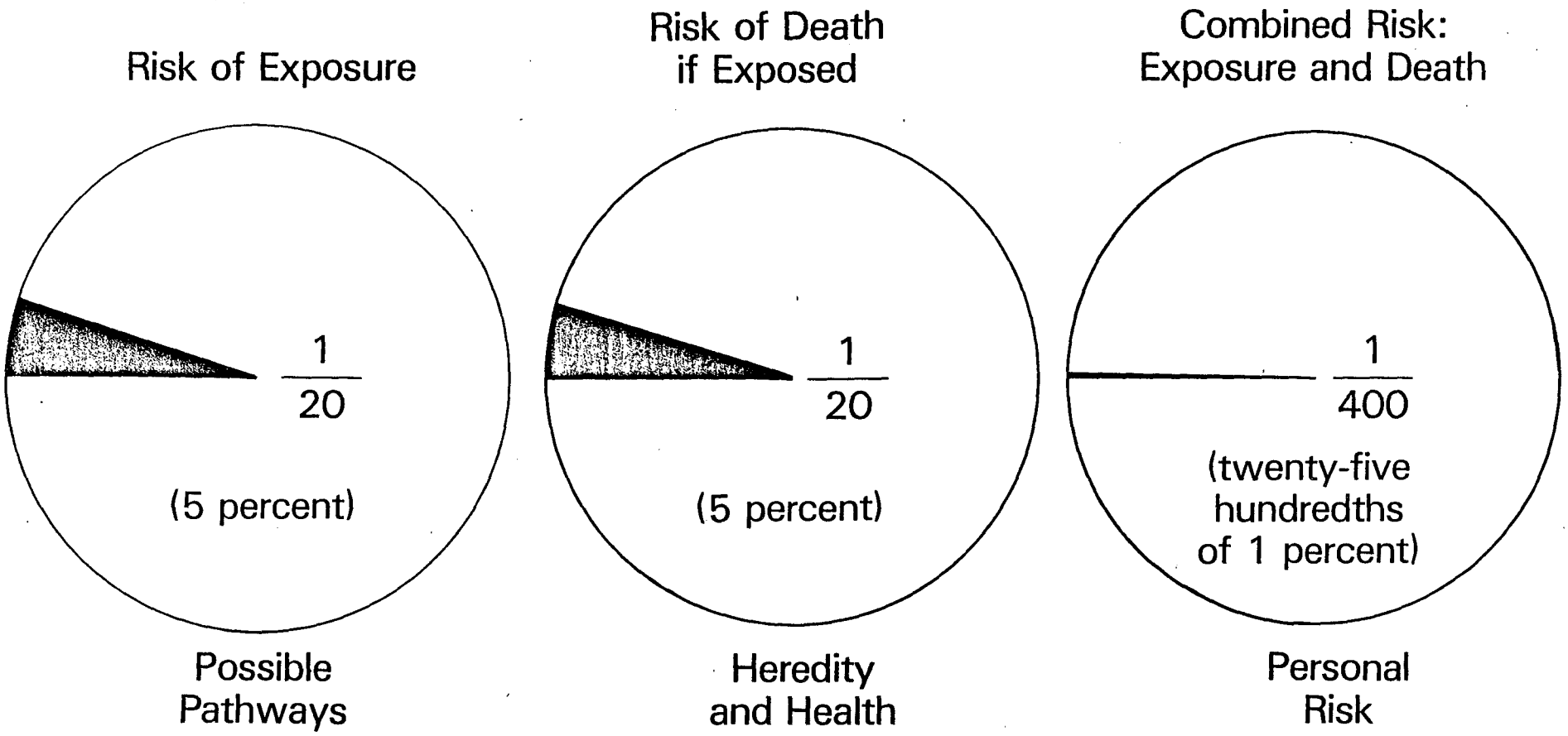
Monthly wages or salary $ _____ (52-56)
(Take home pay)

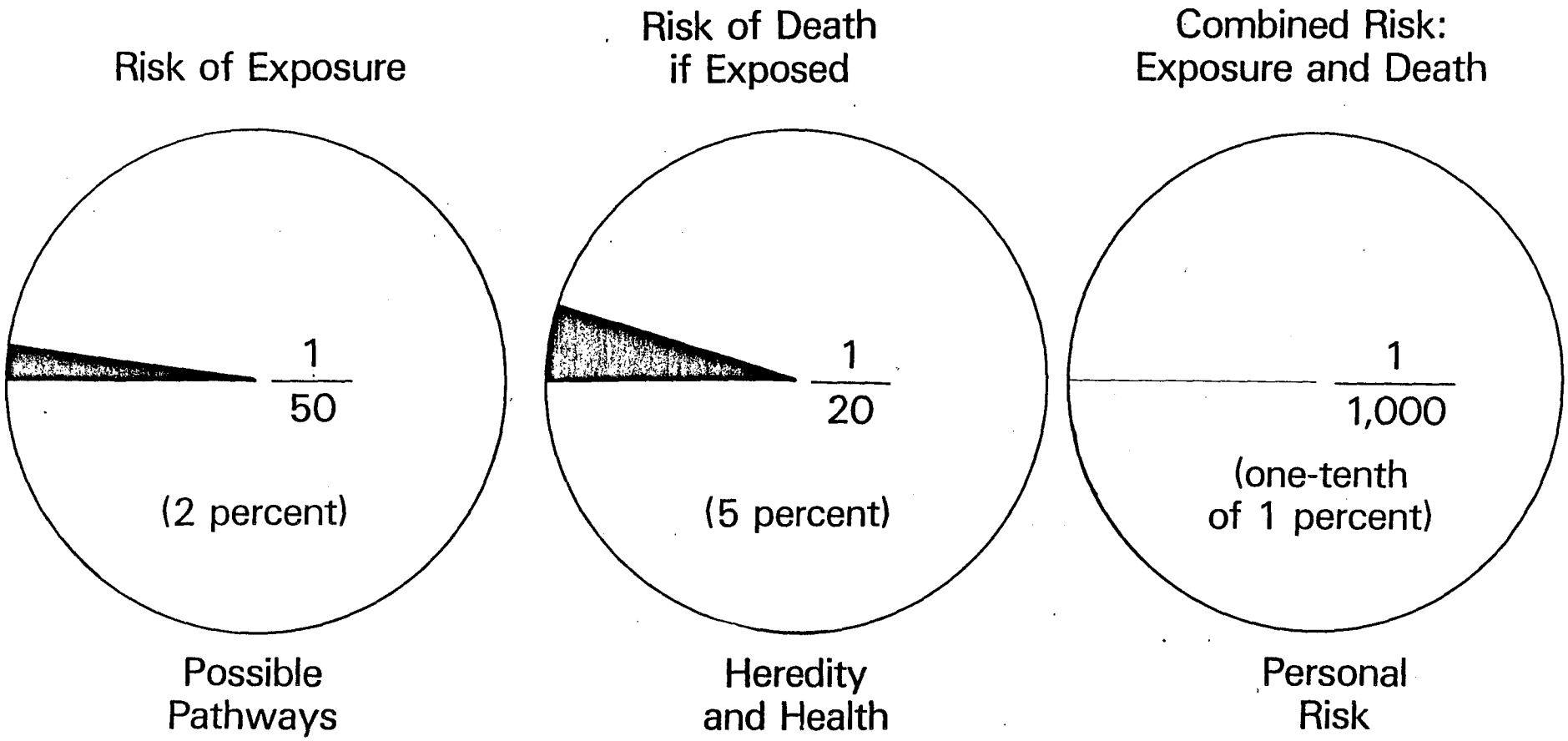
Thank you for your cooperation. I realize that some of these questions are difficult and we especially appreciate your thoughtful responses.

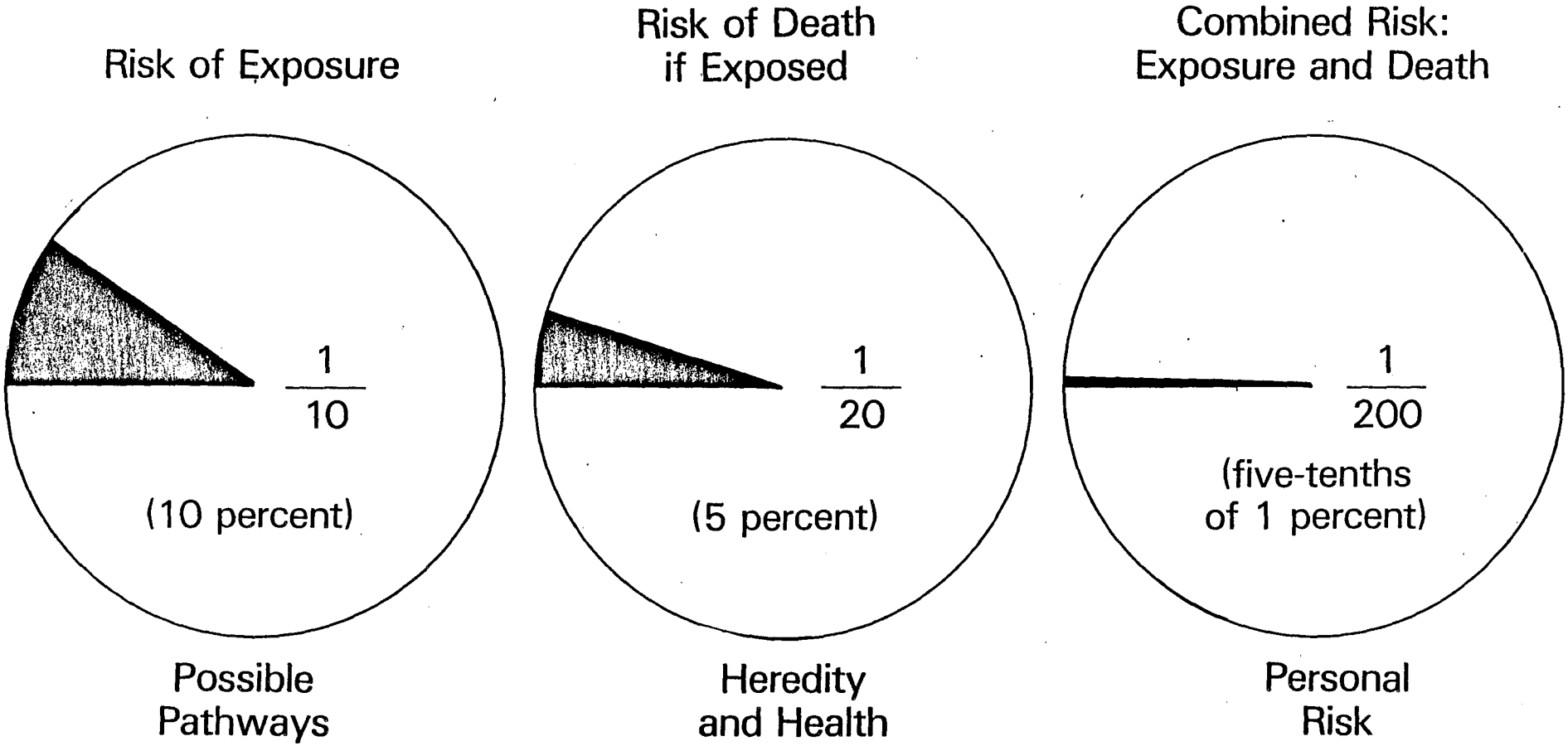
There is a possibility that my supervisor will call you to verify my interview with you. May I ask what is a telephone number where you can be reached?

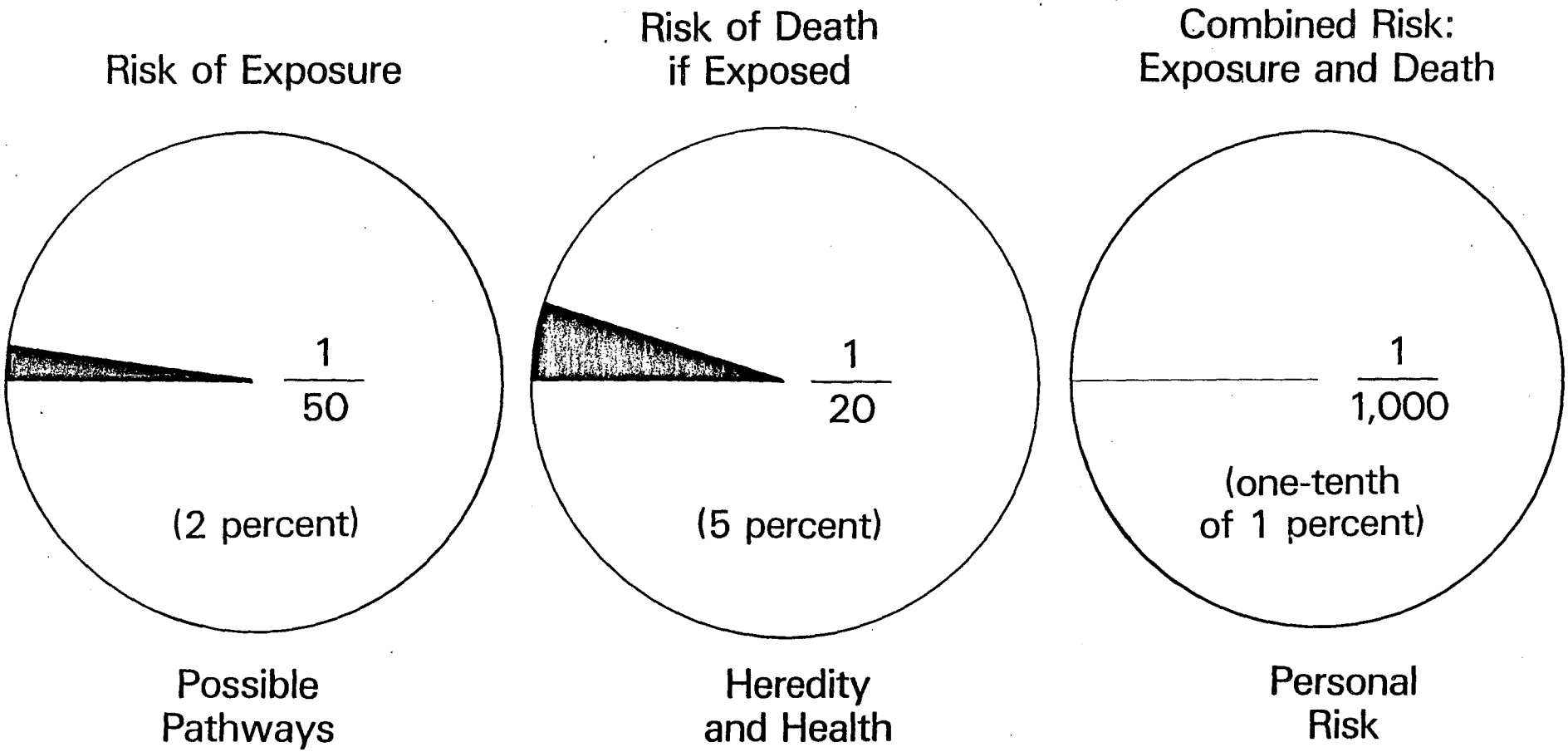
Telephone Number (_____) _____ _____


Risk of Exposure
1
10
(10 percent)
Possible
Pathways
Risk of Death
if Exposed
1
20
(5 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
200
(five-tenths
of 1 percent)
Personal
Risk


Risk of Exposure
1
20
(5 percent)
Possible Pathways
Risk of Death if Exposed
1
20
(5 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
400
(twenty-five hundredths of 1 percent)
Personal Risk


Risk of Exposure
1
50
(2 percent)
Possible
Pathways
Risk of Death
if Exposed
1
20
(5 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
1,000
(one-tenth
of 1 percent)
Personal
Risk


Risk of Exposure
1
10
(10 percent)
Possible
Pathways
Risk of Death
if Exposed
1
20
(5 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
200
(five-tenths
of 1 percent)
Personal
Risk


Risk of Exposure
1
50
(2 percent)
Possible
Pathways
Risk of Death
if Exposed
1
20
(5 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
1,000
(one-tenth
of 1 percent)
Personal
Risk

CONTINGENT VALUATION SURVEY TO ESTIMATE BENEFITS OF HAZARDOUS WASTE MANAGEMENT REGULATIONS

VERSION [R|2|2|4]

SECTION A

Hello, my name is _____. I'm with the Research Triangle Institute, a not-for-profit research company based in North Carolina.

The Institute is conducting a study of the public's attitudes about certain environmental issues. We have scientifically selected a sample of households to represent this area and your household is part of that sample. Because we have chosen relatively few households, your participation is extremely important. We hope you will help us.

In this interview, I will ask several different kinds of questions about environmental issues. You can help us get the best possible information for the study by thinking carefully about each question and taking your time to answer. If a question isn't clear, tell me and I will read it again. Take as much time as you need to think about the material I give you and to answer the questions.

Since most of the questions deal with your attitudes and opinions, there are no right or wrong answers. You also may decide not to answer a particular question or you may simply say you don't know. All the information you provide will be kept strictly confidential and will be used only for overall statistical results.

Segment Number: [ ][ ][ ]

Sample HU Number: [ ][ ][ ]

Interviewer ID: [ ][ ][ ][ ][ ][ ]

Time Ended: _____

Time Started: _____

Interview Length: _____ (minutes)

SECTION B

B.1 Pollution, which affects the quality of our air, water, and food, can come from many different sources.

HAND RESPONDENT CARD 1.

In a moment I will name several sources of pollution. Use this scale card to tell me how harmful you feel each one is to people's health and to the environment. For example, if you think that oil spills from supertanker accidents are very harmful, pick the number 10 at the right-hand end of the scale. On the other hand, if you think that they're not at all harmful, pick the number 1 at the left-hand end of the scale.

Now, based on present conditions in the town where you live, tell me the place on the scale that shows how harmful you think the following sources of pollution are:

READ LIST BEGINNING AT THE ASTERISK.

IF RESPONSE IS "I DON'T KNOW," RECORD 94 IN THE BOXES.

Card 3
1-13
Dup.
Skip 14

Starting Letter ☐ (15)

a. Pollution from cars, trucks, and buses . . . . ☐☐ (16-17)

b. Pollution from manufacturing plants . . . . . ☐☐ (18-19)

c. Solid waste (garbage, bottles, etc.) from households . . . . . ☐☐ (20-21)

d. Sewage from households . . . . . ☐☐ (22-23)

e. Pollution from nuclear and other radioactive wastes . . . . . ☐☐ (24-25)

f. Hazardous waste pollution from dump sites and factories . . . . . ☐☐ (26-27)

g. Acid rain from electric power plants . . . . . ☐☐ (28-29)

h. Pollution from strip mining . . . . . ☐☐ (30-31)

TAKE AWAY CARD 1.

SECTION C

Now I want to focus on one source of pollution--pollution from hazardous wastes. Let me explain what I will be talking about in this interview when I use the words "hazardous waste." I mean any discarded chemicals, liquids, or solids that are flammable, corrosive, or explosive, or that react violently with water. These wastes also include substances that have been found harmful or toxic to people. While radioactive wastes from nuclear power plants would fit this definition, I want you to think only about nonradioactive waste from factories or at landfills.

HAND RESPONDENT CARD 2.

To give you an idea of what hazardous wastes are and where they come from, here's a list of some products we use every day and some wastes that are left over after they're made. For example, a common waste is the chemical solution used to tan the leather in shoes, wallets, or purses. After the chemical solution is used, it must be thrown away. Because the solution contains chromium, it's considered a hazardous waste. Hazardous wastes are left over after making a wide range of other consumer products--from the gasoline and batteries for cars to the plastic containers used to package and store food. Some companies put these wastes in their own special facilities; others pay companies to dispose of their wastes in special dumps called hazardous waste landfills. Some products that we use--like paint, varnish removers, and weed killers--are themselves considered hazardous wastes when we throw them away. Although hazardous wastes often have been handled carefully, sometimes the practices have been inadequate.

ALLOW RESPONDENT TIME TO STUDY CARD 2.

TAKE AWAY CARD 2.

SECTION D

Now I want to ask what you may have seen or heard recently about hazardous wastes.

D.1 During the past 3 months, do you recall reading any news articles or hearing on radio or television about hazardous waste? (CIRCLE NUMBERED RESPONSE.)

Yes	01	
No	02 → Go to D.4	(32-33)
Don't know	94 → Go to D.4	

D.2 During the past 3 months, how many times did you read or hear something in the news about hazardous waste?

None	01	
Only once	02	
Two to five times	03	(34-35)
Six to ten times	04	
More than ten times	05	
Don't know	94	

D.3 During the past 3 months, was what you read or heard about hazardous waste (READ EACH) or about more than one of these? (CIRCLE ALL THAT APPLY.)

about your town?	01	(36-37)
about your state?	02	(38-39)
about the entire nation?	03	(40-41)
Don't know	94	(42-43)

D.4 How many miles from your home is the closest industrial plant or factory that generates or stores hazardous waste?

Miles	☐☐☐	(44-46)
Don't know	94 → Go to E.1	

D.5 What is the name of that plant or factory?

Name _____	☐☐	(47-48)
Don't know	94	

SECTION E

E.1 HAND RESPONDENT CARD 1.

Some of the organizations responsible for dealing with hazardous waste matters have been more effective than others. I'm going to read a list of those organizations. Please tell me the place on the scale that shows how good a job you think each is currently doing. Number 10 stands for very effective, and number 1 stands for not at all effective. How would you rate the current effectiveness of the following organizations in dealing with hazardous waste matters?

IF RESPONSE IS "I DON'T KNOW," RECORD 94 IN BOXES.

The federal government	☐☐	(49-50)
Your state government.	☐☐	(51-52)
Your town (or local) government.	☐☐	(53-54)
Your local water district or water supplier	☐☐	(55-56)
Major companies that generate hazardous waste	☐☐	(57-58)
Major waste disposal companies	☐☐	(59-60)

RESPONDENT KEEPS CARD 1.

SECTION F

HAND RESPONDENT CARD 3.

We may face risks of being exposed to hazardous waste in several different ways. For example, people could be exposed if hazardous waste got into a town's drinking water supply. Wastes also can find their way into the soil and into local rivers, lakes, or bays, damaging fish or shellfish. They even can get into the air as toxic gases, if they ignite or burn incompletely, or evaporate from a dump. We don't know how often people are exposed in these ways or exactly how harmful hazardous wastes are to people or to the environment.

F.1 Here where you live, what do you think your chance is during the next year of being exposed to hazardous waste through each of the ways listed on Card 3? If you think you're certain to be exposed, pick number 10, and if you think there is no chance at all, pick number 1. What do you think your chance is of being exposed during the next year to hazardous wastes through... (READ LIST).

IF RESPONSE IS "I DON'T KNOW," RECORD 94 IN BOXES.

Water you drink	☐☐	(61-62)
Air you breathe	☐☐	(63-64)
Touching wastes in contaminated soil	☐☐	(65-66)
Eating food grown in contaminated soil or eating meat from contaminated animals	☐☐	(67-68)
Eating fish or shellfish from contaminated waters	☐☐	(69-70)

TAKE AWAY CARDS 1 AND 3.

F.2 HAND RESPONDENT CARD 4.

It is possible that you personally may have done some things to reduce your risk of exposure to hazardous waste. In the last 5 years have you done any of the things shown on this card for the sole purpose of reducing your risk of exposure to hazardous waste?

IF "NONE" OR "I DON'T KNOW," CIRCLE NUMBER. IF "YES," ASK FOR THE MONTH AND YEAR EACH ACTION TAKEN WAS BEGUN AND ENDED. FOR ACTION "a," PROBE FOR THE NUMBER OF UNITS PURCHASED DURING THE LAST 5 YEARS AND THE COST PER UNIT. FOR ACTION "b," PROBE FOR THE NUMBER OF UNITS PURCHASED PER MONTH AND THE COST PER UNIT. FOR ACTION "c," PROBE FOR NUMBER OF SUCH MEETINGS ATTENDED DURING THE LAST 5 YEARS. Card 4 1-13 Dup. Skip 14

None 01

Don't know 94 (15-16)

Action	Approximate Year Start	Approximate Year End	Number of Units/ Times	Unit Cost	
a. Installed water filter	____	____	_____	$_____	(17-25)
b. Purchased bottled water	____	____	_____	$_____	(26-34)
c. Attended public meeting(s)--e.g., town meeting, water district meeting--to learn about hazardous wastes . . .	____	____	_____		(35-41)

TAKE AWAY CARD 4.

F.3 Throughout our lives, there are many different risks of dying. There is a risk or chance we may die from an accident, some long-term illness, or suddenly from some health problem.

HAND RESPONDENT CARD 5.

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 the jobs and smoker are based only on people who work in those jobs or who smoke. 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 are quite large between each part.

I would like you to use this ladder to answer some questions about your own risk of dying from several different causes. Suppose I asked where on the ladder would you place your own risk of dying from a boating accident during the next year. If you thought your risk of dying from this cause was about the same as dying in a home fire, then you would read me the number 4, which is the ladder rung that corresponds to home fire. There are no correct answers to these questions. I simply want you to use this ladder as a way to show me what you think your own risk is of dying from a particular cause.

Now, where on the risk ladder would you place your own risk of (READ LIST) during the next year.

RECORD RUNG NUMBER MENTIONED BY THE RESPONDENT; IF RESPONSE IS "I DON'T KNOW," RECORD 94.

Dying from an auto accident? . . . . . ☐☐ (42-43)

Dying from heart disease? . . . . . ☐☐ (44-45)

Dying from a disease or illness caused by air pollution? . . . . . ☐☐ (46-47)

Dying from a disease or illness caused by hazardous waste? . . . . . ☐☐ (48-49)

TAKE AWAY CARD 5.

HAND RESPONDENT CARD A WITHOUT DOLLAR AMOUNTS.

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.

Since risk involves chance, we can also think of risks by putting pointers that would spin easily on each of the circles. A pointer has an equal chance of landing at any spot on its circle. The larger the portion of the circle that is "cut out" by the blackened area--that is, the bigger the slice--the more likely the pointer would land there. On the first circle on Card A, for example, 10 percent of this circle is blackened. There is one chance in 10, or 10 percent chance, the pointer will land in the blackened area. This means that, on the average, for every 10 spins the pointer would land in the blackened slice once.

The numbers on the cards are hypothetical because even experts disagree about the sizes of the risks. However, in the rest of this interview, I want you to think of these numbers as actual risks you face.

Look at the differences between each circle. The first circle shows the risk or chance that you (and your household members) would be exposed to hazardous waste. 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 be harmful. Exposure through the pathways we have discussed could be a brief, one-time thing, or it could happen over several months or years.

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 third circle combines the two types of risks into a person's overall risk. It shows the bottom line: your chances both of being exposed to hazardous wastes and, once exposed, dying. The combined risk of exposure and death is found by multiplying the chance you see in the first circle by the chance in the second circle.

HAND RESPONDENT CARD C WITHOUT DOLLAR AMOUNTS.

F.4 Please look at Cards A and C. The risk of exposure decreases from 1 chance in 10, or 10 percent chance on Card A to 1 chance in 50, or 2 percent chance on Card C. Since your heredity doesn't change, the middle circles don't change. This also means the combined risk decreases from 1 chance in 100 to 1 chance in 500, or from 1 percent to two-tenths of 1 percent.

F.4.a Now, think about a hypothetical situation using Cards A and C. Suppose that Card A shows your risk of exposure from a hazardous chemical in your drinking water supply. Do you think that by moving you could reduce your risk of exposure to the level shown on Card C? I am not asking would you actually move, but is it possible that by moving you could reduce your risk to the level on Card C?

Yes	01	
No	02 → Go to F.5	(50-51)
Don't know	94 → Go to F.5	

F.4.b How far do you think you would need to move to lower your risk to the exposure level on Card C?

Miles . . . . . ☐☐☐ (52-54)

Don't know 94

TAKE AWAY CARDS A AND C

F.5 Next, I would like you to think about the costs of more controls on hazardous wastes. When the government decides to clean up abandoned dump sites, place stricter controls on landfills, or stop some very toxic wastes from being generated, these actions would reduce the risk of exposure. However, they cost someone. As consumers and as taxpayers, we pay for the costs of better control of hazardous waste.

HAND RESPONDENT CARD 6.

The top part of this card shows how we would pay for lower exposure risks through higher prices for the products we buy. If the government puts stricter regulations on car makers, shoe companies, or chemical companies, it would cost them more to make their products. Then if you buy a pair of shoes or a pesticide, you would pay a higher price than you would without the regulations.

The lower part of this card shows how we would also pay for lower exposure risks through higher local, state, or federal taxes. The card shows the higher tax bills providing more money to investigate and enforce the regulations and to clean up places like Times Beach or Love Canal.

ALLOW RESPONDENT TIME TO STUDY; THEN TAKE AWAY CARD 6.

HAND RESPONDENT CARDS B AND C WITH DOLLAR AMOUNTS.

POINT TO CARDS B AND C

Now, think about these cards and about paying in higher prices and taxes. As you can see on the cards, the risk of exposure decreases from 1 chance in 20 on Card B to 1 chance in 50 on Card C. The decrease means your combined risk of exposure and death gets smaller. The amounts you would pay in higher product prices and taxes increase while the risk of exposure decreases.

Using a hypothetical situation, I'm going to ask you some questions about paying for different levels of exposure risk for you (and your household members).

F.6 Before I go on, there are two things to keep in mind. One, please decide how to respond as though you actually were facing this hypothetical situation. In other words, I would like you to keep in mind your (and your household members') income, how you budget your money, the kinds of products you buy and the taxes you pay. Two, any amounts that you're willing to pay would be in addition to what you're now paying for hazardous waste controls and would affect only hazardous waste problems. The amounts are not to reduce acid rain or any other environmental problem.

HAND RESPONDENT CARD 7.

This is the hypothetical situation. A medium-size company that produces electronic parts is located 3 miles from your home. This company generates 2,000 gallons of hazardous waste each day, and disposes of them, using established industry-wide practices, in a landfill right at the plant site. If you're exposed to a large enough amount of these wastes for a long enough period, there's a chance you will die in 30 years. Under these circumstances, your (and your household members') risk of exposure is a risk you could potentially face for all these years until the health effect is known.

The government could introduce regulations which require the company to install special liners that will seal the landfill and monitoring systems that will detect leaks. These regulations would reduce the chances that the landfill could leak and your (and your household members') risk of exposure would be at the level on Card B. This would require a monthly payment of $5 in higher product prices and taxes.

HAND RESPONDENT CARD A WITH DOLLAR AMOUNTS; ALLOW TIME TO STUDY

If the government decides not to introduce regulations requiring special liners and monitoring systems, this could lead to a government cost savings, and the company would not raise its product prices as it would do with the regulations. If these regulations are not added, taxes could be reduced $20 per month. The risk of exposure for you (and your household members) would be at the level on Card A.

Alternatively, the government could add more regulations than described for Card B. These would require the company to remove the most toxic materials from the wastes before they are put into the lined and monitored landfill. Your risk of exposure would be at the level on Card C, and these regulations would require a monthly payment of $40 in higher product prices and taxes.

HAND RESPONDENT CARD D WITH DOLLAR AMOUNTS; ALLOW TIME TO STUDY

Suppose additional regulations would require the company to use more expensive ways to make its products. There would be a reduction in some of the most toxic wastes generated. Your risk of exposure would be at the level on Card D, and these regulations would require a monthly payment of $80 in higher product prices and taxes.

Look over the hypothetical situation on Card 7 once more. Now, thinking about your monthly income and what you spend it on in your budget, rank these cards. Place on top of the pile the card with the payment and risk combination you prefer the most and the card with the combination you like least on the bottom.

	Card Letter (e.g, B2)	
Preferred the most	_____	(55-56)
	_____	(57-58)
	_____	(59-60)
Preferred the least	_____	(61-62)
Don't know/refused.	94	

F.7 In the situation I just described, I didn't mention any particular cause of death from exposure to the company's hazardous wastes. Were you thinking of a particular cause of death? (IF YES, RECORD CAUSE; IF NO, CIRCLE 02.)

Yes _____ ☐☐

_____ (63-64)

No 02

- IF RESPONSE FROM F.6 IS DON'T KNOW/REFUSED, GO TO F.9.
- IF RANKING IS OBTAINED IN F.6, GO TO F.8.

F.8 PLACE CARD 7 IN FRONT OF RESPONDENT.

Think again about the same situation. Most experts agree that exposure to hazardous wastes may cause different kinds of health problems. I'm going to name some of those problems and ask you if you want to change the way you ranked the cards. You might decide that you would be willing to pay something different if you thought about different kinds of health problems. If you decide to change your ranking, please go ahead.

IF RESPONDENT PROVIDED A CAUSE OF DEATH IN F.7, SAY "YOU TOLD ME THAT THE CAUSE YOU WERE THINKING OF WAS," AND THEN REPEAT THAT CAUSE.

	Most Preferred			Least Preferred	No Change	Don't Know	
Suppose the cause of death was damage to the body's immune system that protects against diseases, would you change your ranking of the cards?	___	___	___	___	01	94	(65-72) Card 5 1-13 Dup.
Suppose that instead of a risk of death, the risk was that of birth defects severe enough to mentally retard or physically handicap children for a lifetime, would you change your ranking of the cards?	___	___	___	___	01	94	(14-21)

IF RANKING IS CHANGED IN RESPONSE TO THE FIRST ITEM, PLACE THE CARDS IN THEIR PRIOR ORDER AND HAND THEM BACK TO THE RESPONDENT BEFORE GOING TO THE SECOND ITEM ABOVE.

AFTER READING THE SECOND ITEM ABOVE, GO TO F.10

F.9 We have found in studies like this one that people have had a lot of different reasons for answering as they do. Some people feel they don't have enough information to rank the cards, some can't decide what their preferences are, some think the monthly payments are too large, and some don't understand what they're asked to do. Which one of these reasons best describes why you didn't rank the cards?

REPEAT REASONS AND CIRCLE NUMBER.

Not enough information 01

Couldn't decide on your preferences 02

Monthly payments are too large 03 (22-23)

Didn't understand what you were asked to do 04

Other (SPECIFY) 05

_____

Don't know 94

F.10 REMOVE RANKING CARDS A-D AND HAND RESPONDENT CARD A WITHOUT DOLLAR AMOUNTS.

I would like to ask you about paying in higher prices and taxes to reduce your (and your household members') risk of exposure to hazardous wastes. Look over the situation described on this card. (MAKE SURE RESPONDENT HAS CARD 7). Under the circumstances described on the card, assume that your risk of exposure to the company's hazardous wastes is shown by the first circle on Card A. Now, suppose that government regulations could reduce your risk of exposure from the level on Card A to a level where you (and your household members) would never be exposed to hazardous wastes. Thinking 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 prices and taxes to reduce your risk of exposure from the level on Card A to a level where you would know for certain you would not be exposed?

- IF ZERO $, RECORD "0" BELOW AND GO TO F.12.
- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW AND GO TO F.11.

$_____ Per Month → IF ZERO $, GO TO F.12; IF GREATER THAN ZERO $, GO TO F.11 (24-26)
(Initial)

$_____ (27-29)
(Revised)

$_____ Per Year

Don't know. . . . . 94 → Go to Q.F.12

F.11 Now suppose that the risk of exposure has been reduced to a level where you (and your household members) would never be exposed to hazardous wastes. In effect, there would be no risks to your health, but there would still be some risk of exposure for fish, wildlife, and plants. Suppose that the government more strictly regulates this landfill to lower the risk of exposure to hazardous wastes for fish, wildlife, and plants only--not for humans. Their combined risks would be lowered to the levels plants and animals face in nature. Also suppose that none of the fish, wildlife, or plants is in danger of becoming extinct.

In addition to the (READ MONTHLY DOLLAR AMOUNT FROM F.10) you have said you would be willing to pay, how much more in higher product prices and taxes per month would you be willing to pay for these regulations?

- IF ZERO $, RECORD "0" BELOW AND GO TO G.1.
- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay an additional (READ MONTHLY AMOUNT) per month or an additional (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay an additional (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW AND GO TO G.1.

$_____ Per Month → Go to G.1 (30-32)
(Initial)

$_____ → Go to G.1 (33-35)
(Revised)

$_____ Per Year

Don't know . . . . . 94 → Go to Q.G.1

TAKE AWAY ALL CARDS.

F.12 Now suppose that the risk of exposure to you (and your household members) is the same as the level on Card A. Suppose that the government further regulates this landfill to lower the risk of exposure to hazardous wastes for fish, wildlife, and plants only--not for humans. Their combined risks would be lowered to the levels plants and animals face in nature. Suppose also that none of them is in danger of becoming extinct. How much in higher product prices and taxes per month would you be willing to pay for these regulations?

- IF ZERO $, RECORD "0" BELOW AND GO TO G.1.
- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW.

$_____ Per Month (36-38)
(Initial)

$_____ (39-41)
(Revised)

$_____ Per Year

Don't know 94

TAKE AWAY ALL CARDS.

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SECTION G

G.1 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. Suppose a medium-size company that produces electronic parts is located 3 miles from your home. The company generates 2,000 gallons of toxic hazardous wastes each day and, using established industry-wide practices, disposes of them in a landfill at the plant site. Your (and your household members') risk of exposure to these hazardous wastes is shown by the blackened area in the first circle on Card X.

HAND RESPONDENT CARD X AND ALLOW TIME TO STUDY.

Your town council voted for a proposal to allow the company to increase the amount of hazardous waste it generates and puts into its landfill. The company is expected to begin generating and disposing of more hazardous wastes soon.

A new government regulation would require the company, as well as all such companies, to remove toxic substances from the hazardous wastes before they're put into its landfill. If put into effect, the regulation would keep your risk of exposure at the level on Card X, even after the company increases the amount of wastes it generates. Without this regulation, the increased amount of hazardous waste would raise your risk of exposure to the level in the first circle on Card Y (HAND RESPONDENT CARD Y). How much would you be willing to pay monthly in higher product prices and taxes to avoid an increase in risk from that on Card X to that on Card Y?

- IF ZERO $, RECORD "0" BELOW AND GO TO G.2.

- IF GREATER THAN ZERO $, RECORD MONTHLY AMOUNT BELOW. CONVERT MONTHLY AMOUNT TO ANNUAL AMOUNT AND RECORD BELOW; THEN SAY:

You said that you would be willing to pay (READ MONTHLY AMOUNT) per month or (READ ANNUAL AMOUNT) per year. In terms of your annual income, you would be willing to pay (READ ANNUAL AMOUNT)? Is that correct?

IF "NO," ASK FOR A REVISED MONTHLY AMOUNT THE RESPONDENT WOULD BE WILLING TO PAY. IF REVISED MONTHLY AMOUNT IS OBTAINED, RECORD BELOW.

$_____ Per Month → IF ZERO $, GO TO G.2; IF GREATER THAN ZERO $, GO TO H.1. (42-44)
(Initial)

$_____ (45-47)
(Revised)

$_____ Per Year

Don't know 94

TAKE AWAY CARDS X AND Y.

G.2 We have found in studies like this one that people have had a lot of different reasons for answering as they do. Some people felt they didn't have enough information to give a dollar amount, some didn't want to put a dollar value on avoiding an increase in hazardous waste exposure risk, and some objected to the way the question was presented. Others gave a zero dollar amount because that's what it was worth to them or that's what they could afford.

Which one of these reasons best describes why you answered the way you did?

REPEAT REASONS AND CIRCLE NUMBER.

Not enough information 01

Did not want to place dollar value 02

Objected to how the question was presented 03 (48-49)

That is what it is worth 04

Cannot afford anything 05

Other (SPECIFY) 06

_____

Don't know 94

TAKE AWAY CARDS X AND Y.

SECTION H

H.1 I want you to think about another, completely different situation. This is about distance from a plant or factory site with hazardous waste and how it might affect your choice of where to buy a house. But first, what would you say is the average cost of a house in your neighborhood?

IF RESPONDENT CAN'T ESTIMATE AN AVERAGE COST, ENCOURAGE AN ESTIMATE. IF NO ESTIMATE, REFER TO SECTION E ON THE HCF FOR THE AVERAGE COST AND RECORD BELOW.

Respondent's estimate of average cost $_____ (50-55)

Average cost from HCF, Section E $_____ (56-61)

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 waste 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 $1,300 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 $1,300. At an additional cost of $1,300 per mile, how many miles away from the plant site would you choose to be?

- IF ZERO MILES, RECORD "0" AND GO TO H.2;
- IF GREATER THAN ZERO MILES, RECORD MILEAGE AND COST AS "INITIAL RESPONSE."

Initial Response

_____ Miles × $1,300 = $_____ (62-64)

$_____ + _____ = $_____ Total Cost of Home
(AVERAGE COST)

(REPEAT MILEAGE) at $1,300 per mile adds $_____ to the cost of the home. You would want the home (REPEAT MILEAGE) from the plant or factory at a cost of (REPEAT TOTAL COST) compared with (READ AVERAGE COST) for the same home located next to the plant site? Is that correct?

IF "NO," ASK FOR DIFFERENT MILEAGE AND RECORD REVISED MILEAGE BELOW.

Revised Response

Miles _____ (65-67)

Don't know 94

H.2 Finding places to build new industrial or power plants, businesses or commercial buildings, or public facilities is sometimes difficult. I am going to name some different types of facilities. Suppose that each of the things I name would definitely be built and would be operated according to government environmental and safety laws. Tell me the closest distance to your home that each facility could be built before you would move. If you wouldn't move no matter how close it was built, please tell me.

IF RESPONSE IS "WOULD NOT MOVE," RECORD 00 IN DISTANCE COLUMN.

	Distance in Miles	Don't Know	
Ten-story office building	_____	94	(68-69)
Large industrial plant without hazardous wastes	_____	94	(70-71)
Coal-fired power plant	_____	94	(72-73)
Nuclear power plant	_____	94	(74-75)
Four-lane interstate highway . . .	_____	94	(76-77)
Gasoline station/convenience store	_____	94	(78-79)

Card 6
1-13
Dup.
Skip 14

Large industrial plant with a hazardous waste landfill	_____	94	(15-16)

SECTION I

I.1.a This next series of questions is about employment. Are you now working full time or part time for pay?

Working full time . . . . . 01 → Go to I.1.c
Working part time . . . . . 02 → Go to I.1.c (17-18)
No 03

I.1.b Have you worked for pay, either full-time or part-time at any time during the past 12 months, that is, since (MONTH, 1983)?

Yes . . . . . 01 → Go to I.1.c (19-20)
No . . . . . 02 → Go to Section J

I.1.c What type of business, industry, or organization (is/was) that? For example, (is/was) it an insurance company, a retail shoe store, a government agency?

_____
_____ ☐☐☐ (21-23)
_____

I.1.d What kind of work (are/were) you doing? For example, (are/were) you an electrical engineer, a typist, a stock clerk, a salesperson?

_____
_____ ☐☐☐ (24-26)
_____

I.1.e What (are/were) your most important activities or duties?

_____
_____
_____

I.1.f How many hours (do/did) you work in a typical or average week?

Hours . . . . . ☐☐ (27-28)

I.1.g How long (have/did) you (worked/work) in job like (this/that) one?

Months (only if less than a year) . . . . . ☐☐ (29-30)

Years . . . . . ☐☐ (31-32)

I.2 HAND RESPONDENT CARD 5.

We may face some risks every day because of the type of work we do. Now where on the risk ladder would you place <u>your</u> own risk of dying from a fatal accident on your job?

IF RESPONDENT SAYS "I DON'T KNOW," ENCOURAGE RESPONDENT TO MAKE BEST ESTIMATE.

Rung Number. . . . _____ (33-34)

Don't know. . . . . 94 → Go to I.4.a

I.3 Now I'm going to ask you some hypothetical questions about changing your risk of death on your job. Suppose you were offered a <u>new</u> job just like your present job, but the risk of a fatal accident in this new job would be 50 percent greater than you've told me. You told me (POINT TO RISK LADDER) that your risk is the same as (READ TYPE OF RISK) or (READ NUMBER OF PEOPLE) of 100,000 people.

I.3.a REFER TO CARD 8 FOR THE NUMBER OF PEOPLE CORRESPONDING TO A 50 PERCENT INCREASE IN RESPONDENT'S PERCEIVED RISK.

A 50 percent increase over (READ RESPONDENT'S PERCEIVED RISK PER 100,000 PEOPLE) would be (READ CARD 8 FIGURE FOR 50 PERCENT INCREASE PER 100,000 PEOPLE).

POINT TO THE CORRESPONDING PLACES ON THE RISK LADDER.

How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (35-39)

Don't know. 94

Would not accept job . . . . . 01 → Go to I.4.a

I.3.b REFER TO CARD 8 FOR THE NUMBER OF PEOPLE CORRESPONDING TO A 100 PERCENT INCREASE IN RESPONDENT'S PERCEIVED RISK.

Suppose instead the risk doubled over what you told me. A 100 percent increase over (READ RESPONDENT'S PERCEIVED RISK PER 100,000 PEOPLE) would be (READ CARD 8 FIGURE FOR 100% INCREASE PER 100,000 PEOPLE).

POINT TO THE CORRESPONDING PLACE ON THE RISK LADDER.

How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (40-44)

Don't know 94

Would not accept job 01

I.4.a REFER TO I.1.c AND I.1.d AND TO CARD 9 TO "FIT" RESPONDENT INTO AN OCCUPATION CATEGORY. IF POSSIBLE, USE A SPECIFIC OCCUPATIONAL CATEGORY TO DETERMINE RESPONDENT'S "ACTUAL" JOB RISK.

Rung No. for "actual" job risk _____ (45-46)

IF RUNG NUMBER FOR "ACTUAL" RISK IS SAME AS RESPONDENT'S RUNG FROM I.2, GO TO SECTION J; OTHERWISE CONTINUE.

At this point, I would like to describe some information we have from records kept by government agencies and private insurance companies. They keep track of fatal accidents on the job each year and report the information for the nation as a whole. Based on these reports, the risk of a fatal accident in a year for jobs like yours would be about rung (READ NUMBER FROM CARD 9) on the risk ladder. That is, (NUMBER OF PEOPLE FROM CARD 9) of 100,000 people doing your job would die from a job-related accident each year. This is (READ EITHER "HIGHER" OR "LOWER") than what you thought your job risk was.

POINT TO RISK LADDER AND SHOW RESPONDENT THE RELATIVE POSITIONS OF HIS/HER PERCEIVED RISK FROM QUESTION I.2 AND "ACTUAL" RISKS.

I.4.b REFER TO CARD 9 FOR FIGURE FOR 50 PERCENT INCREASE IN "ACTUAL" RISK PER 100,000 PEOPLE.

Now, suppose that the risk of a fatal accident in the new job were increased 50 percent--that is, from (READ NUMBER FROM CARD 9 OCCUPATIONAL DEATHS COLUMN) per 100,000 people to (READ NUMBER FOR 50 PERCENT INCREASE) per 100,000 people. How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (47-51)

Don't know 94

Would not accept job . . . . . 01 → Go to Section J

I.4.c REFER TO CARD 9 FOR FIGURE FOR 100 PERCENT INCREASE IN "ACTUAL" RISK.

Suppose that the risk of a fatal accident in the new job doubled--that is, increased from (READ NUMBER FROM CARD 9 OCCUPATIONAL DEATHS COLUMN) per 100,000 people to (READ NUMBER FOR 100 PERCENT INCREASE) per 100,000 people. How much more per year than you are now making would the new employer have to pay you to accept this increased risk?

$_____ Per Year (52-56)

Don't know 94

Would not accept job 01

TAKE AWAY CARD 5.

SECTION J

Frequently, how we feel about certain issues is affected by our health and the health of family members. To help interpret the results of this survey, I would like to ask you some brief questions about your health.

J.1 In general, would you say your health is excellent, good, fair, or poor?

Excellent	01	(57-58)
Good	02	
Fair	03	
Poor	04	
Don't know	94	

J.2 Comparing your general health to the health of other people your age, would you say your health is much better, better, about the same, worse, or much worse?

Much better	01	(59-60)
Better	02	
Same	03	
Worse	04	
Much worse	05	
Don't know	94	

J.3 Please tell me if <u>you</u> now have or if you have ever had any of the following conditions.

READ LIST AND CIRCLE ALL THAT APPLY.

High blood pressure	01	(61-62)
Heart trouble	02	(63-64)
Diabetes	03	(65-66)
Kidney trouble	04	(67-68)
Cancer or leukemia	05	(69-70)
Effects of stroke	06	(71-72)
None of the above	07	(73-74)

J.4 The next question concerns the health of your immediate family. I am going to read a list of medical conditions. Please tell me if your brothers or sisters, any of your children, or either of your parents have or have they ever had any of the conditions. If anyone has or had one of the conditions, please tell me who. (READ LIST.)

Card 7 1-13 Dup. Skip 14

	Brothers or Sisters	Children	Parents	None	Don't Know	
High blood pressure	01	02	03	04	94	(15-24)
Heart trouble	01	02	03	04	94	(25-34)
Diabetes	01	02	03	04	94	(35-44)
Kidney trouble	01	02	03	04	94	(45-54)
Cancer or leukemia	01	02	03	04	94	(55-64)
Effects of stroke	01	02	03	04	94	(65-74)

J.5 During the past 2 weeks, how many days were you unable to work or carry on your regular activities because of illness?

Number of days. . . . . ☐☐ (75-76)

J.6 During the past year, on how many days did you stay overnight in a hospital or other type of health care facility?

Number of days. . . . . ☐☐ (77-78)

Card 8 1-13 Dup. Skip 14

J.7 Do you now smoke tobacco in any form?

Yes . . . . . 01 → Go to J.10 (15-16)

No 02

J.8 Have you ever smoked tobacco in any form?

Yes 01 (17-18)

No . . . . . 02 → Go to K.1

J.9 When did you stop smoking?

Year . . . . . ☐☐ (19-20)

J.10 When did you start smoking?

Year . . . . . ☐☐ (21-22)

J.11 (Do/did) you smoke cigarettes?

Yes 01 (23-24)
No . . . . . 02 → Go to J.13

J.12 How much (do/did) you smoke per day?

Less than one pack. 01
One pack. 02
More than one but less than two packs 03 (25-26)
Two packs 04
More than two packs 05

J.13 (Do/did) you smoke cigars?

Yes 01 (27-28)
No . . . . . 02 → Go to J.15

J.14 How many cigars (do/did) you smoke per day?

Number per day _____ (29-30)

J.15 (Do/did) you smoke a pipe?

Yes 01 (31-32)
No . . . . . 02 → Go to K.1

J.16 How many pipefulls per day (do/did) you smoke?

Pipefuls per day _____ (33-34)

SECTION K

K.1 How long have you lived in this town?

Less than 1 year 01
One to 3 years 02
Three to 5 years 03
More than 5 years 04 (35-36)

K.2 How many years have you lived at this address?

Months (only if for less than a year) . . . . . ☐☐ (37-38)

Years . . . . . ☐☐ (39-40)

K.3 Do you own or rent your home?

Own 01
Rent 02
Rent free 03 (41-42)

K.4 Now I'm going to read some phrases that describe different kinds of interests people have. As I read each one, please tell me if it's a lot like you, somewhat like you, a little like you, or not at all like you.

CIRCLE ONE NUMBER ON EACH LINE. REPEAT ANSWER CHOICES AS NECESSARY.

	A Lot	Somewhat	A Little	Not at All	No Opinion	
An outdoor person	01	02	03	04	05	(43-52)
An environmentalist	01	02	03	04	05	(53-62)
Someone who is against nuclear power for electric plants	01	02	03	04	05	(63-72)
						Card 9 1-13 Dup. Skip 14
Someone who is concerned about hazardous waste	01	02	03	04	05	(15-24)
Someone who is willing to pay the cost required to control hazardous waste	01	02	03	04	05	(25-34)

K.5 HAND RESPONDENT CARD 10.

Imagine that you have won a prize. The prize is the opportunity to win some money. There are six different opportunities to win and you may choose your opportunity. Which one of the following opportunities would you choose?

K.5.a

One chance out of 100 to win $10,000. . 01
One chance out of 50 to win $5,000. . . 02
One chance out of 20 to win $2,000. . . 03
One chance out of 10 to win $1,000. . . 04 (35-36)
One chance out of 5 to win $500 05
One chance out of 2 to win $200 06
None of the above 07
Don't know. 94

TAKE AWAY CARD 10.

K.5.b HAND RESPONDENT CARD 11.

Suppose you could choose among six other opportunities to win some money. Which one of the following would you choose?

One chance out of 100 to win $1,000 . . 01
One chance out of 50 to win $500. . . . 02
One chance out of 20 to win $200. . . . 03
One chance out of 10 to win $100. . . . 04 (37-38)
One chance out of 5 to win $50. 05
One chance out of 2 to win $20. 06
None of the above 07
Don't know. 94

TAKE AWAY CARD 11.

K.6 What was the last grade of regular school that you completed--not counting specialized schools like secretarial, art, or trade schools?

No school	01	(39-40)
Grade school (1-8)	02	
Some high school (9-11)	03	
High school graduate (12)	04	
Some college (13-15)	05	
College graduate	06	
Postgraduate (17+)	07	
No response/refused	08	

K.7 ASK ONLY IF NOT OBVIOUS

How would you describe your racial or ethnic background?

White or Caucasian	01	(41-42)
Black or Negro	02	
Other (SPECIFY)	03	

_____

K.8 HAND RESPONDENT CARD 12.

Here's a list of income categories. Please call off the number of the category that best describes the combined income that you (and members of your household) received before taxes in 1983. Include wages, salaries, income from your business, pensions, dividends, interest, and any other income before taxes.

Under $5,000	01
$5,000 - $9,999	02
$10,000 - $14,999	03
$15,000 - $19,999	04
$20,000 - $24,999	05
$25,000 - $29,999	06
$30,000 - $34,999	07
$35,000 - $39,999	08
$40,000 - $44,999	09
$45,000 - $49,999	10
$50,000 - $54,999	11
$55,000 - $59,999	12
$60,000 - $64,999	13
$65,000 - $69,999	14
$70,000 - $74,999	15
$75,000 - $79,999	16
$80,000 and over	17
Not sure/refused	18

(43-44)

K.9 ASK ONLY IF RESPONDENT WORKS NOW OR WORKED ANYTIME DURING THE PAST 12 MONTHS.

I have one last question regarding <u>your</u> monthly wages or salary only. In order for the people who are doing this study to fully analyze all of the responses you have given, I would like to ask what <u>your</u> <u>monthly</u> wage or salary is before taxes. Let me remind you that your name will <u>never</u> be associated with your response, and your response will only be used in statistical results.

IF RESPONDENT IS UNABLE TO PROVIDE MONTHLY WAGES OR SALARY BEFORE TAXES, ASK FOR TAKE HOME WAGES OR SALARY.

Refused 01 (45-46)

Monthly wages or salary $ _____ (47-51)
(Before taxes)

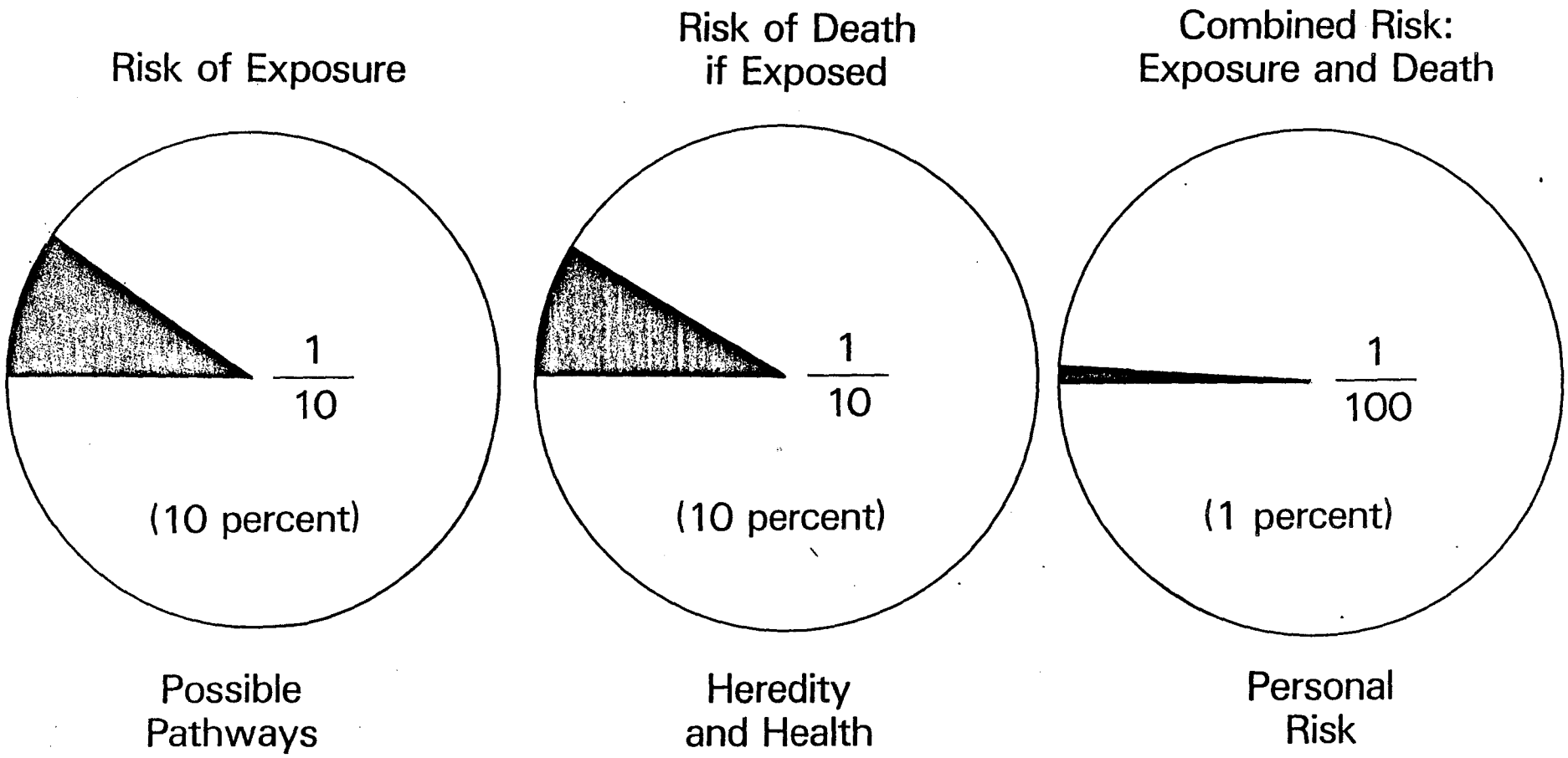
Monthly wages or salary $ _____ (52-56)
(Take home pay)

Thank you for your cooperation. I realize that some of these questions are difficult and we especially appreciate your thoughtful responses.

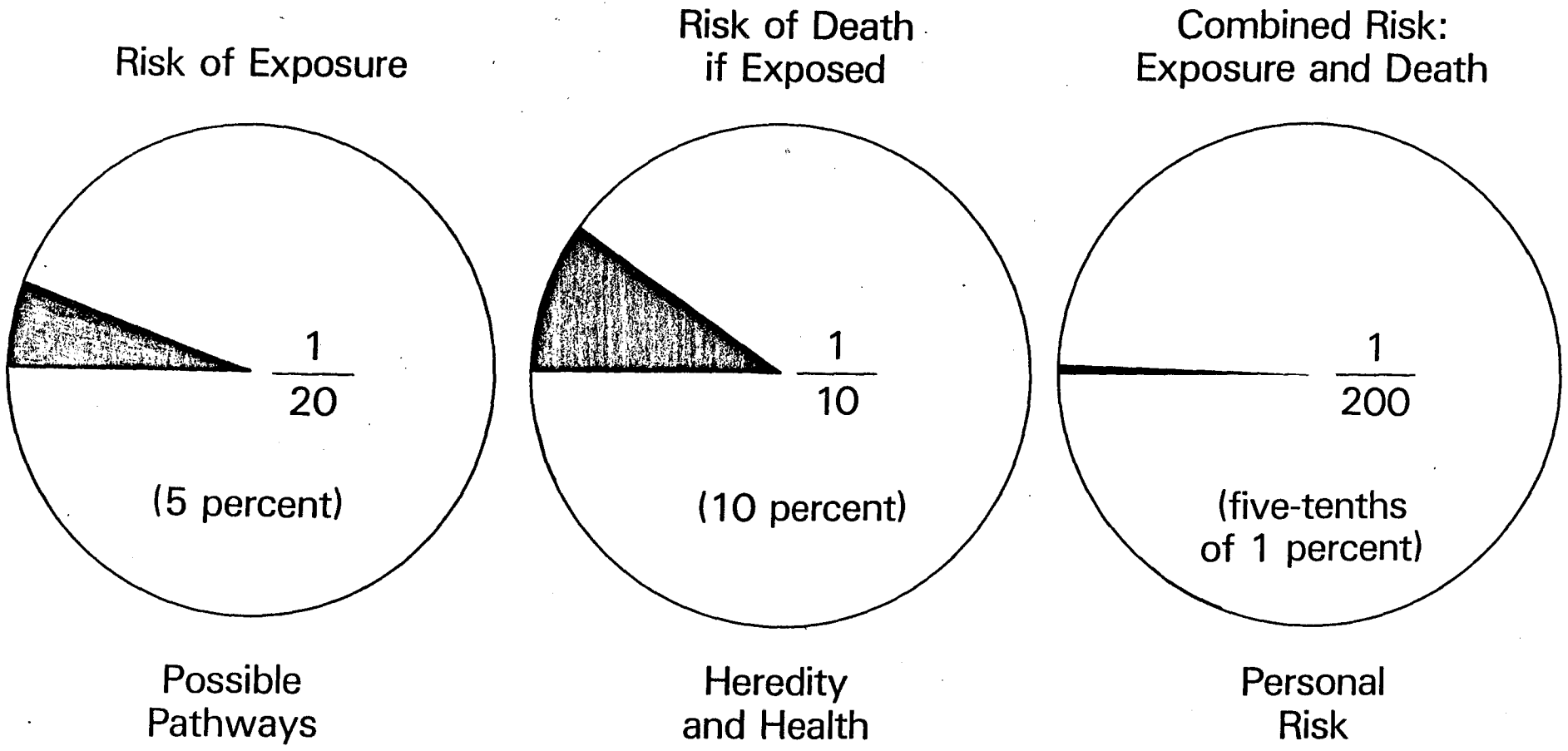
There is a possibility that my supervisor will call you to verify my interview with you. May I ask what is a telephone number where you can be reached?

Telephone Number (_____) _____ _____

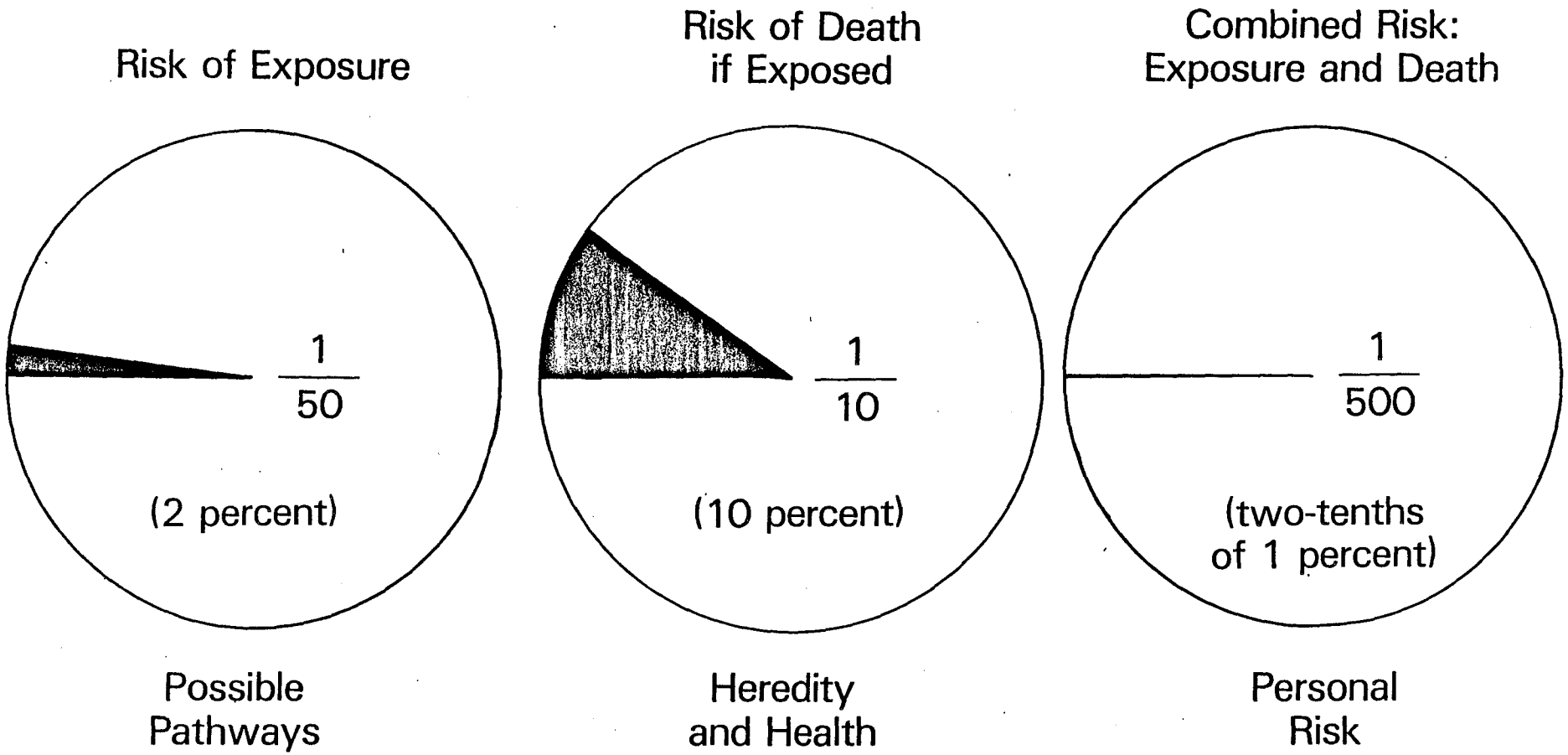
Payment decrease: $20 per month ($240 per year) in lower prices and taxes



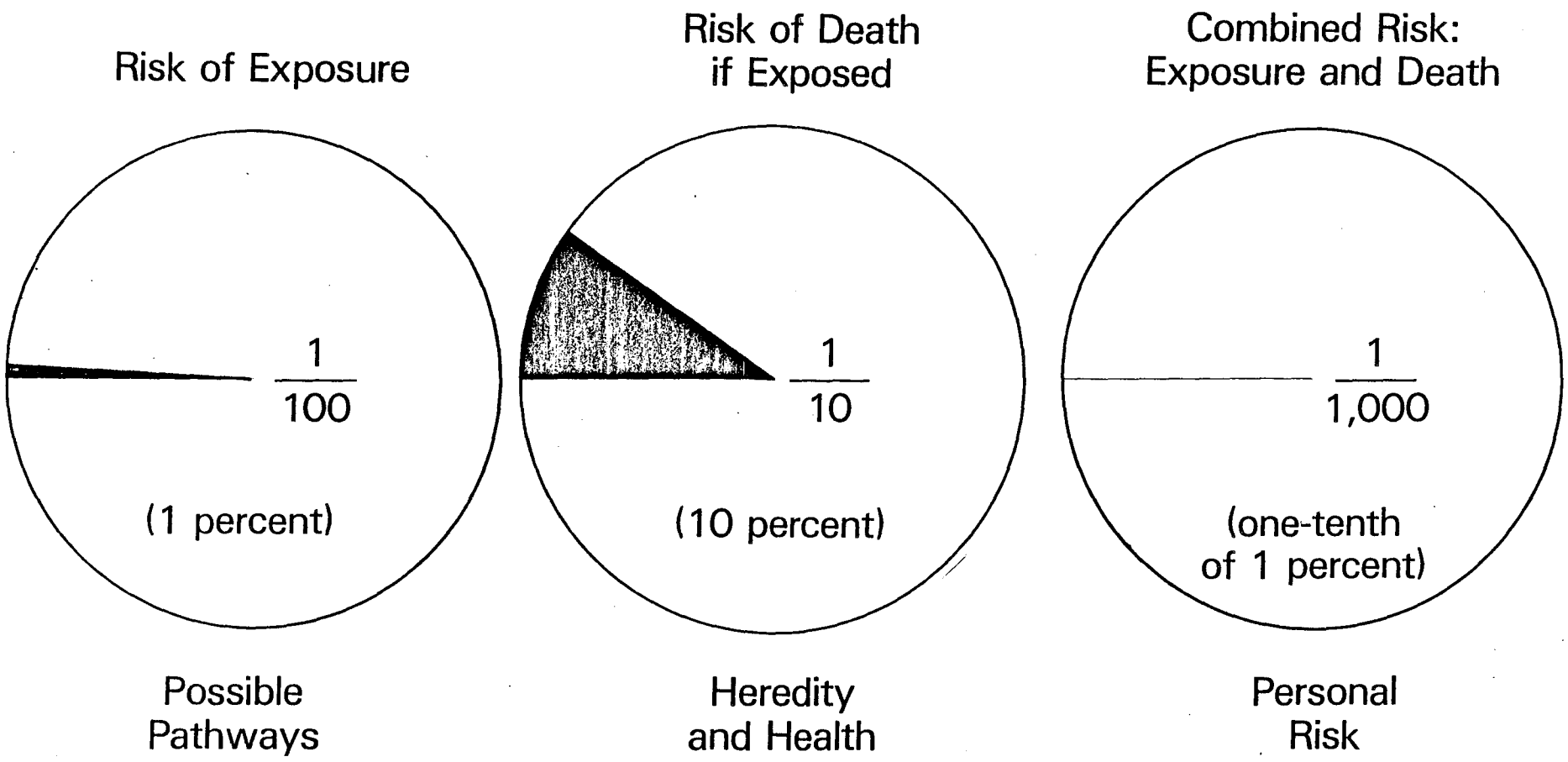
Payment required: $5 per month ($60 per year) in higher prices and taxes

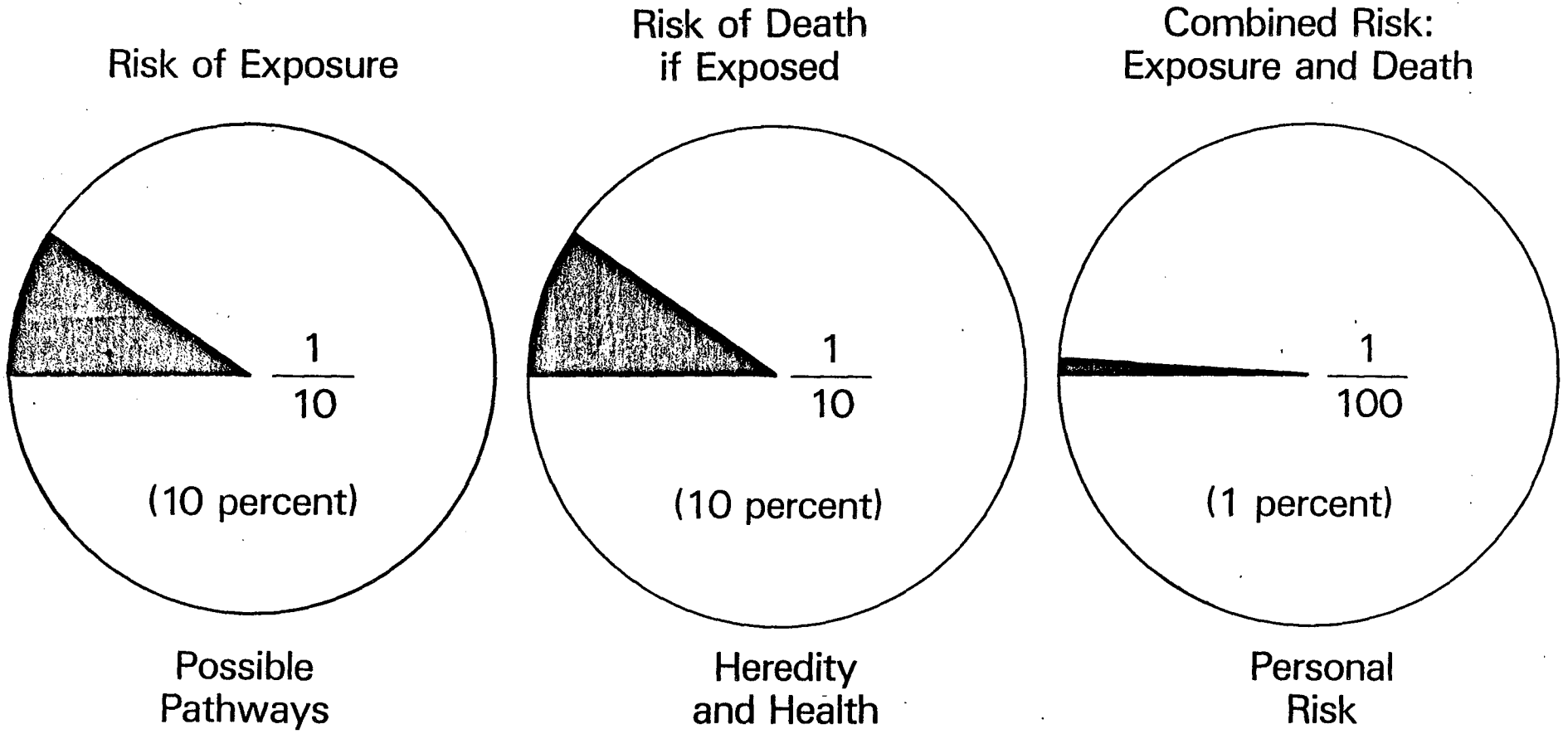


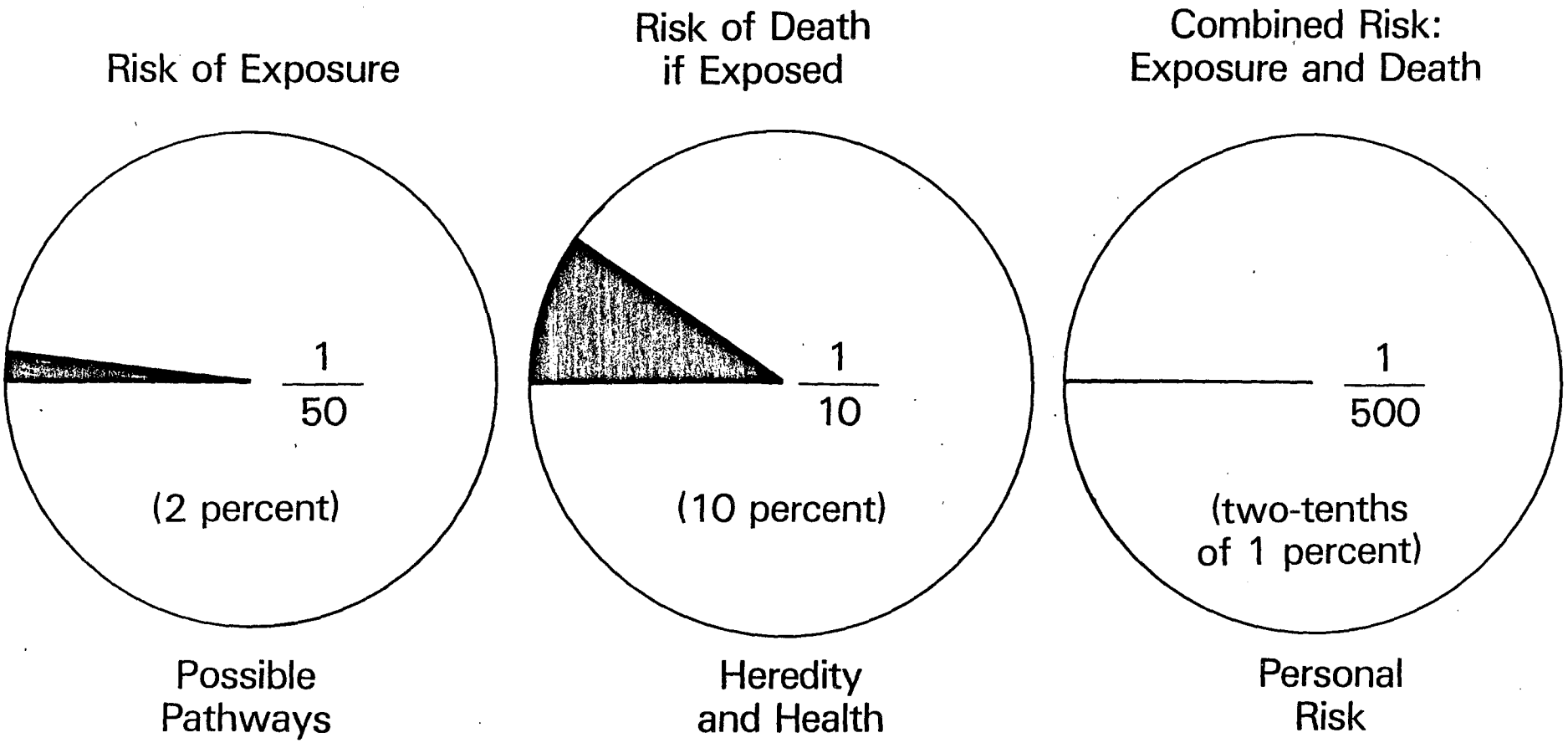
Payment required: $40 per month ($480 per year) in higher prices and taxes

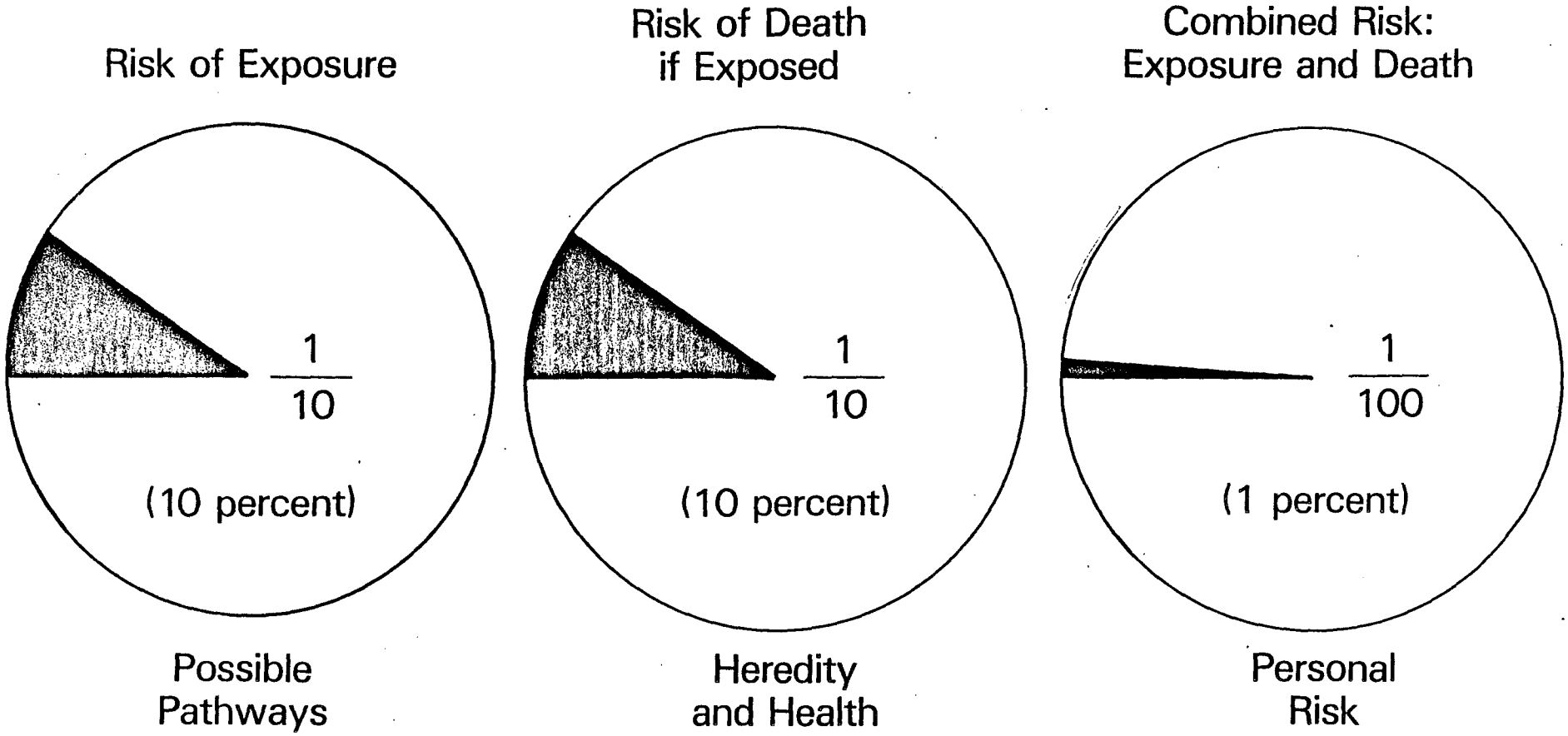


Payment required: $80 per month ($960 per year) in higher prices and taxes

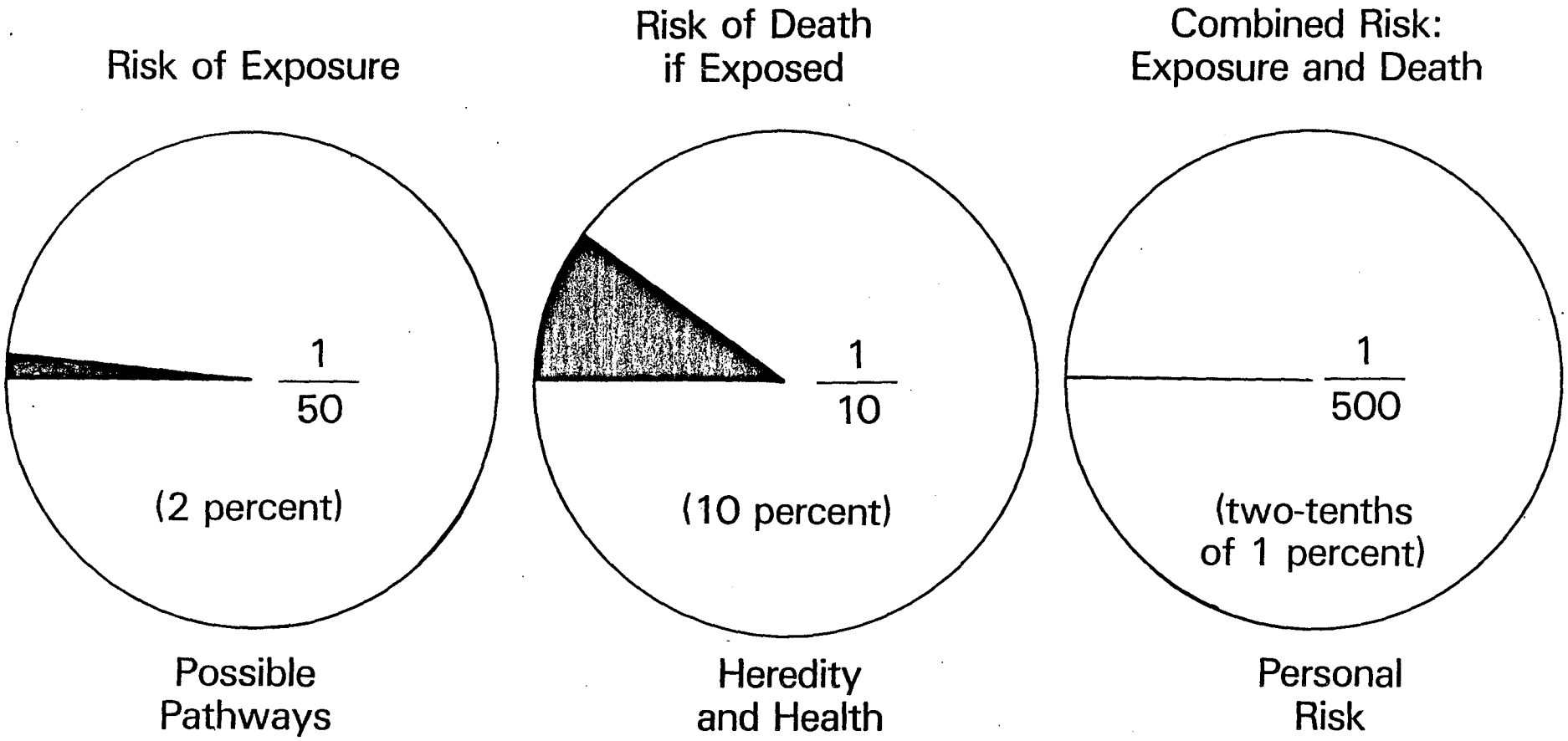


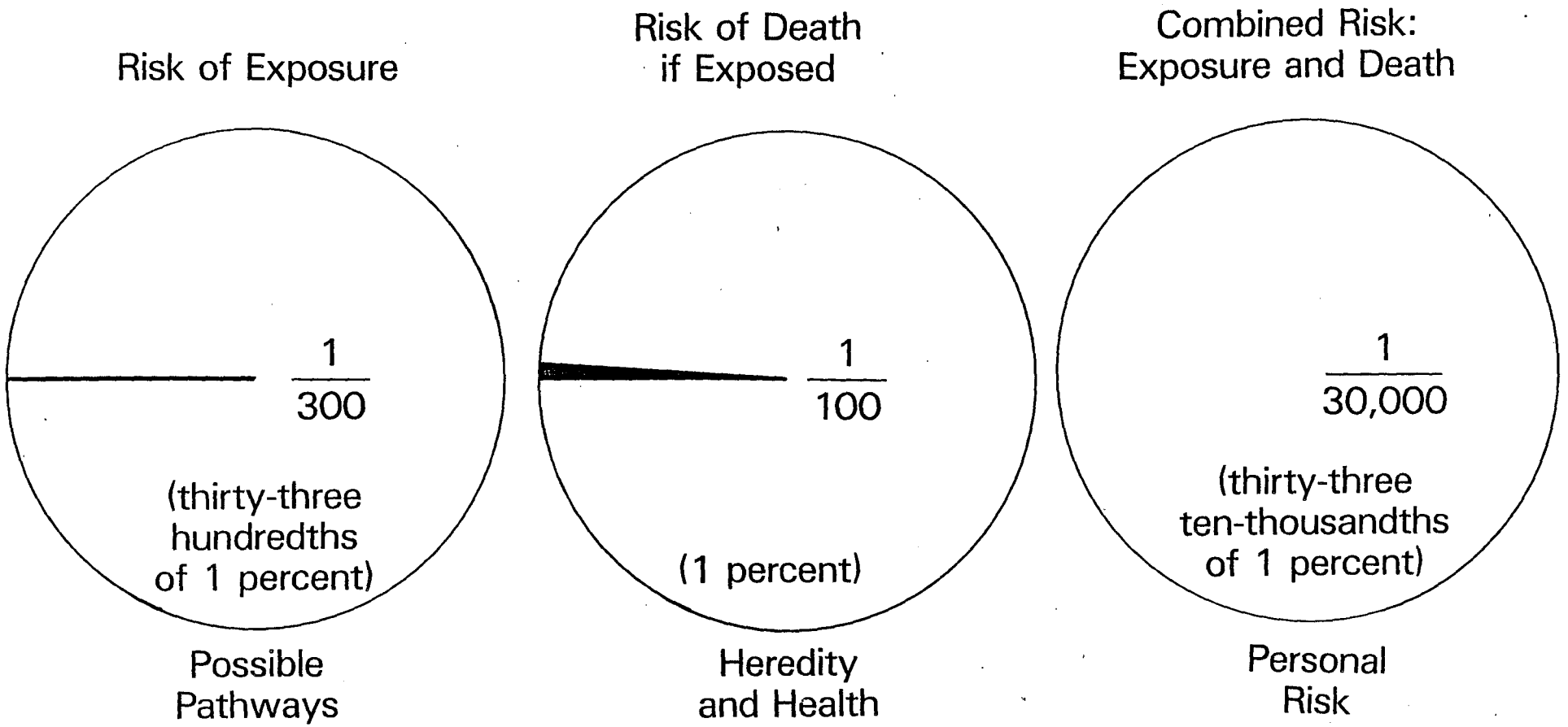

Risk of Exposure
1
10
(10 percent)
Possible
Pathways
Risk of Death
if Exposed
1
10
(10 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
100
(1 percent)
Personal
Risk

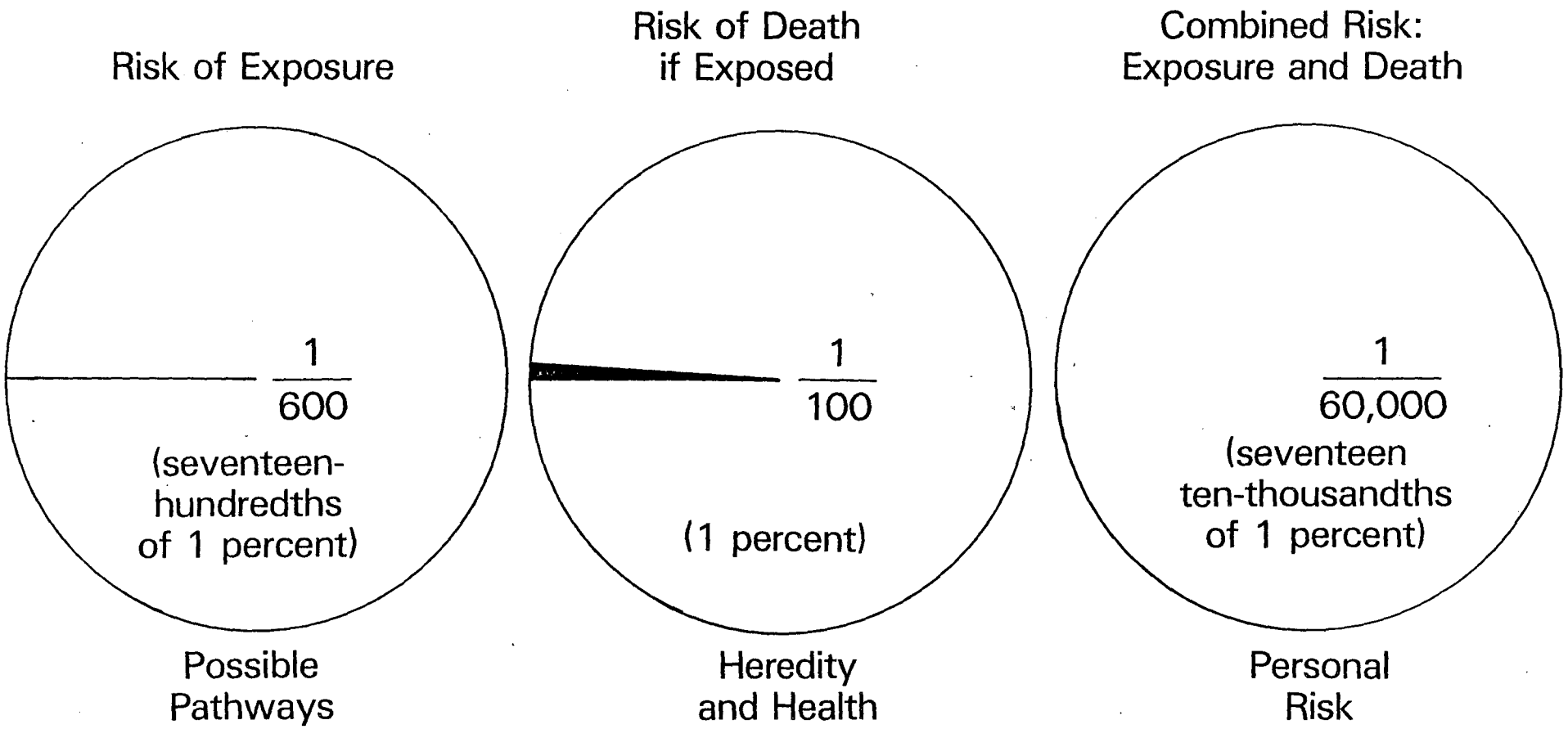

Risk of Exposure
1
50
(2 percent)
Possible
Pathways
Risk of Death
if Exposed
1
10
(10 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
500
(two-tenths
of 1 percent)
Personal
Risk

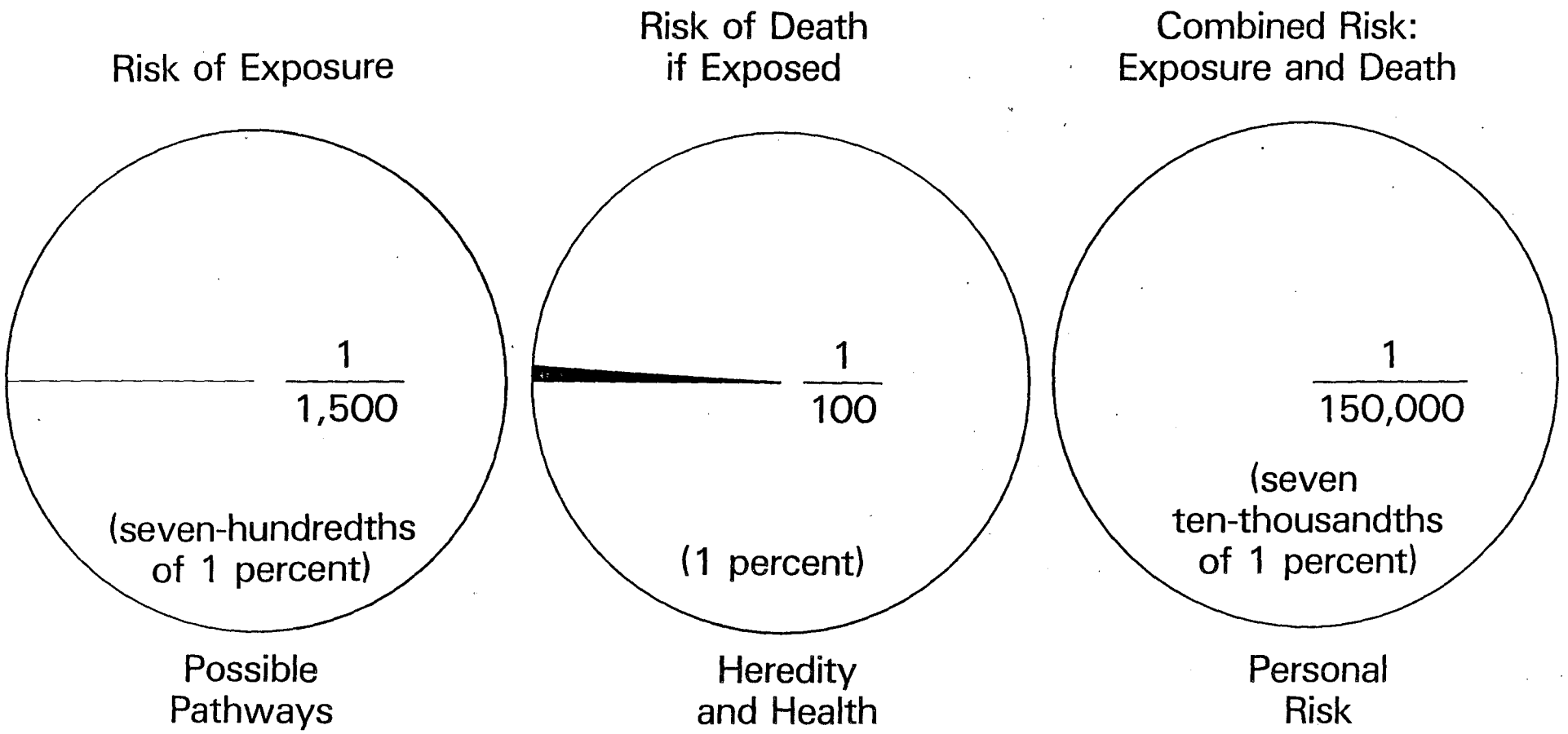

Risk of Exposure
1
10
(10 percent)
Possible
Pathways
Risk of Death
if Exposed
1
10
(10 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
100
(1 percent)
Personal
Risk

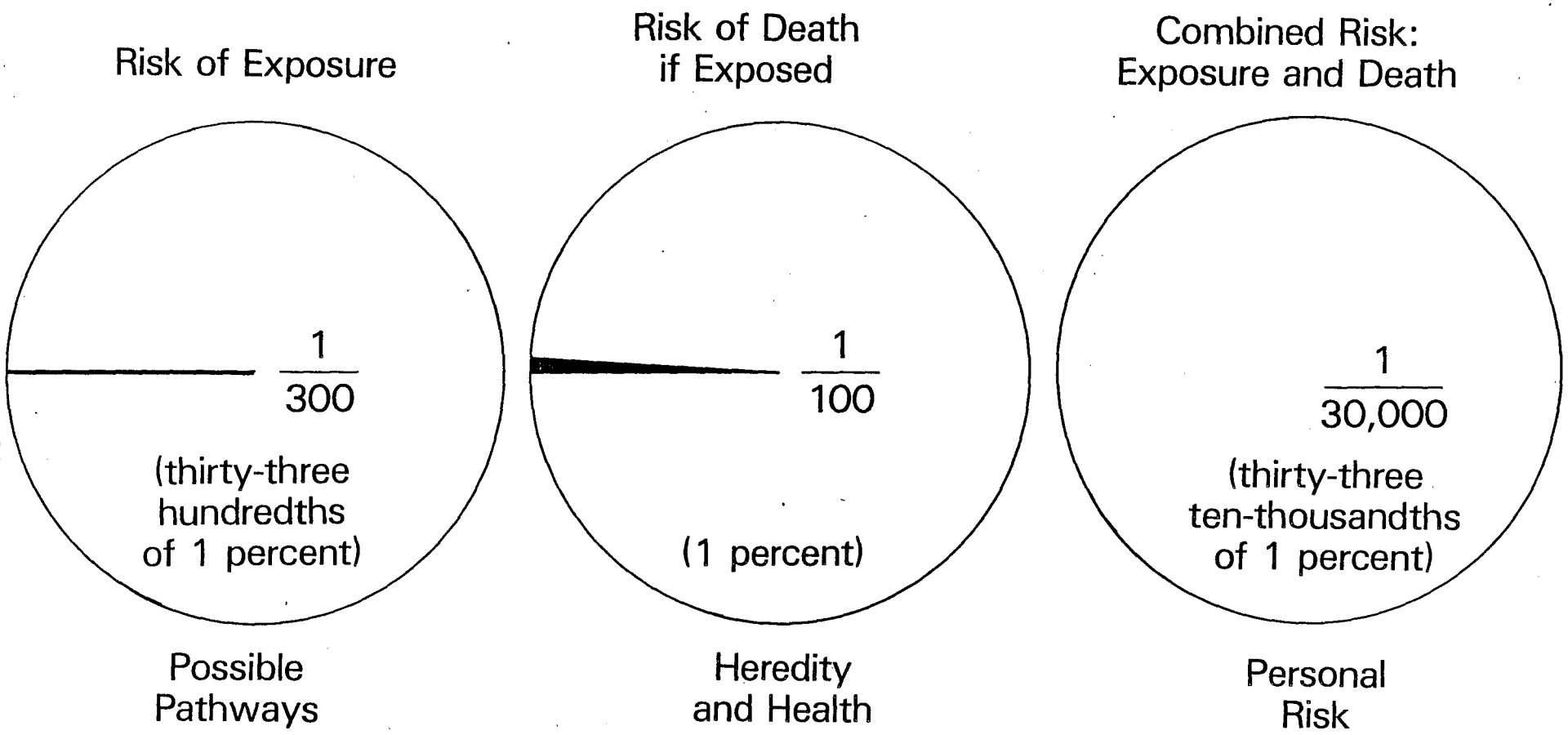
Card X-2

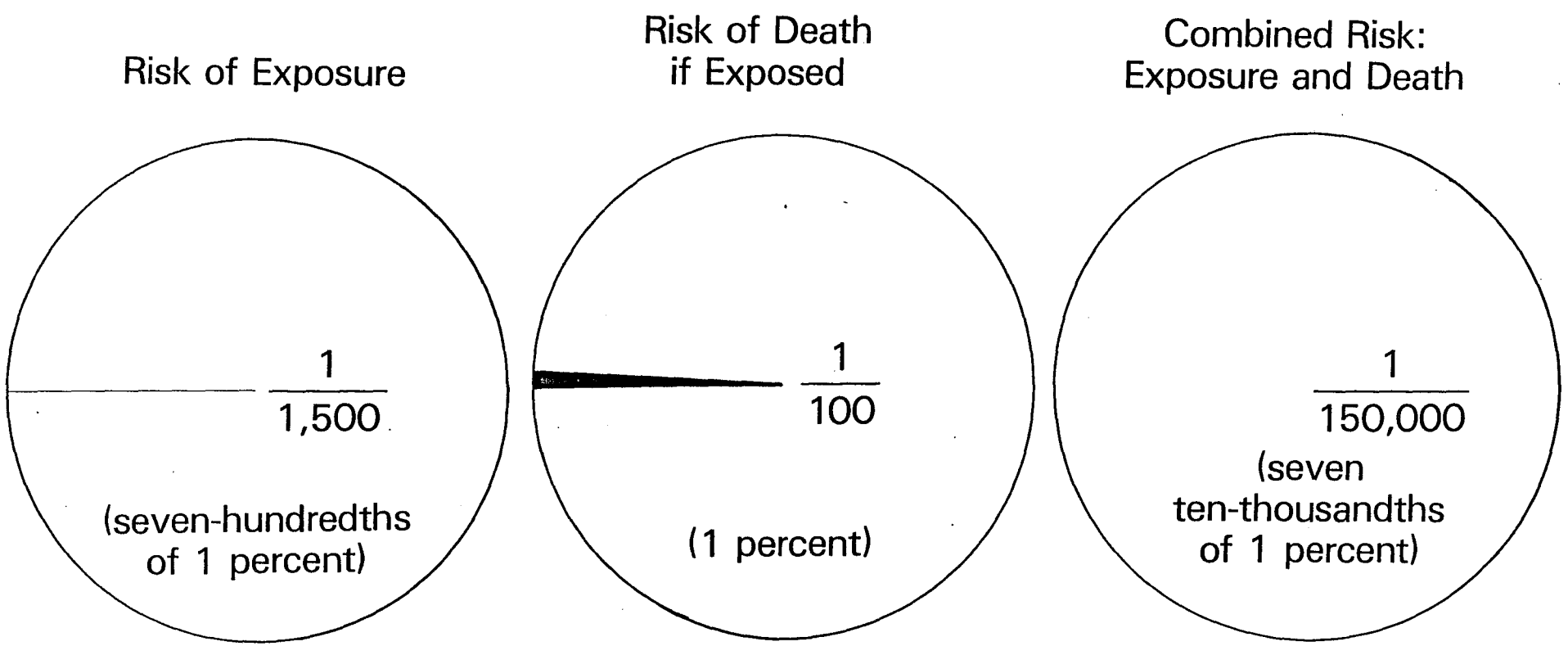

Risk of Exposure
1
50
(2 percent)
Possible Pathways
Risk of Death if Exposed
1
10
(10 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
500
(two-tenths of 1 percent)
Personal Risk

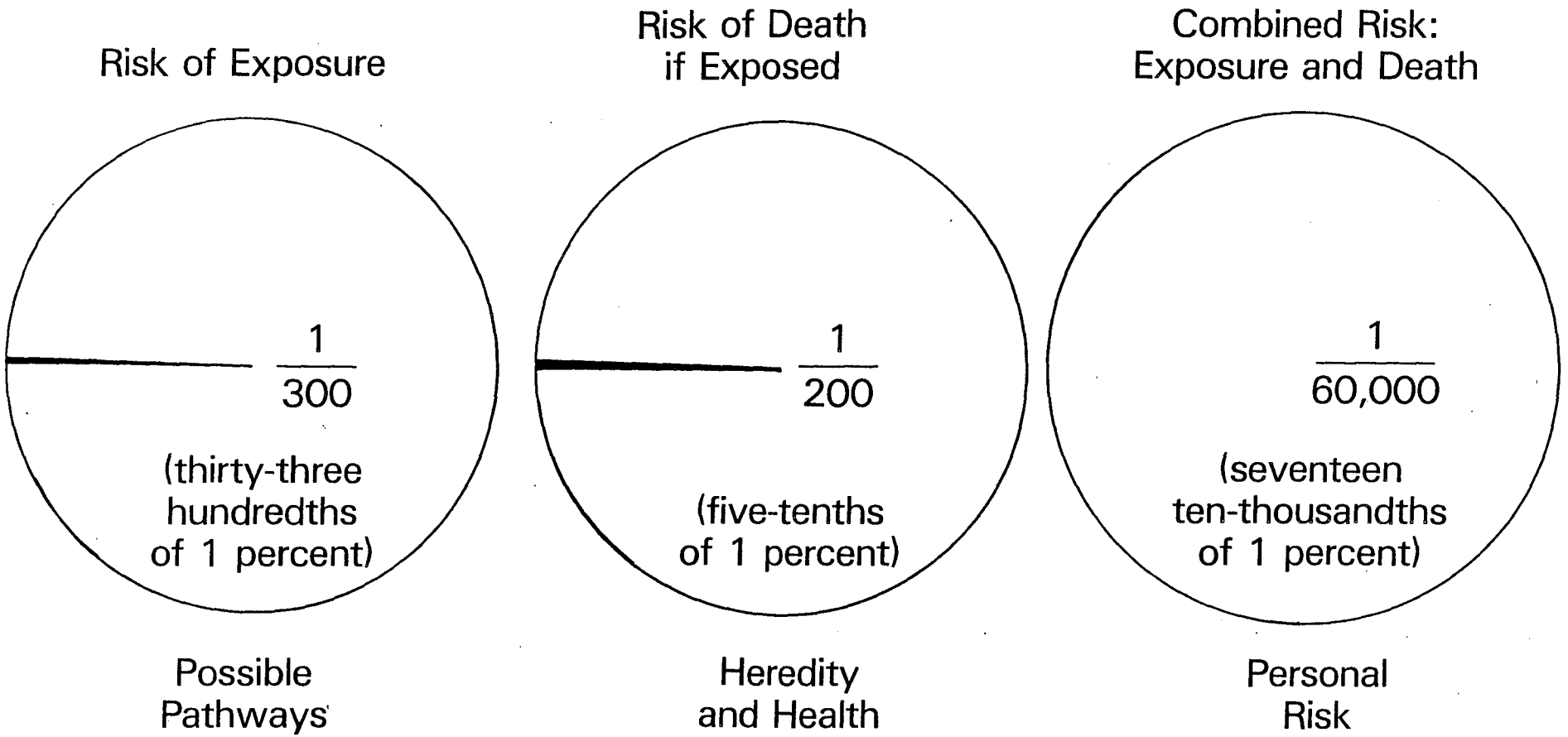

Risk of Exposure
1
300
(thirty-three hundredths of 1 percent)
Possible Pathways
Risk of Death if Exposed
1
100
(1 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
30,000
(thirty-three ten-thousandths of 1 percent)
Personal Risk

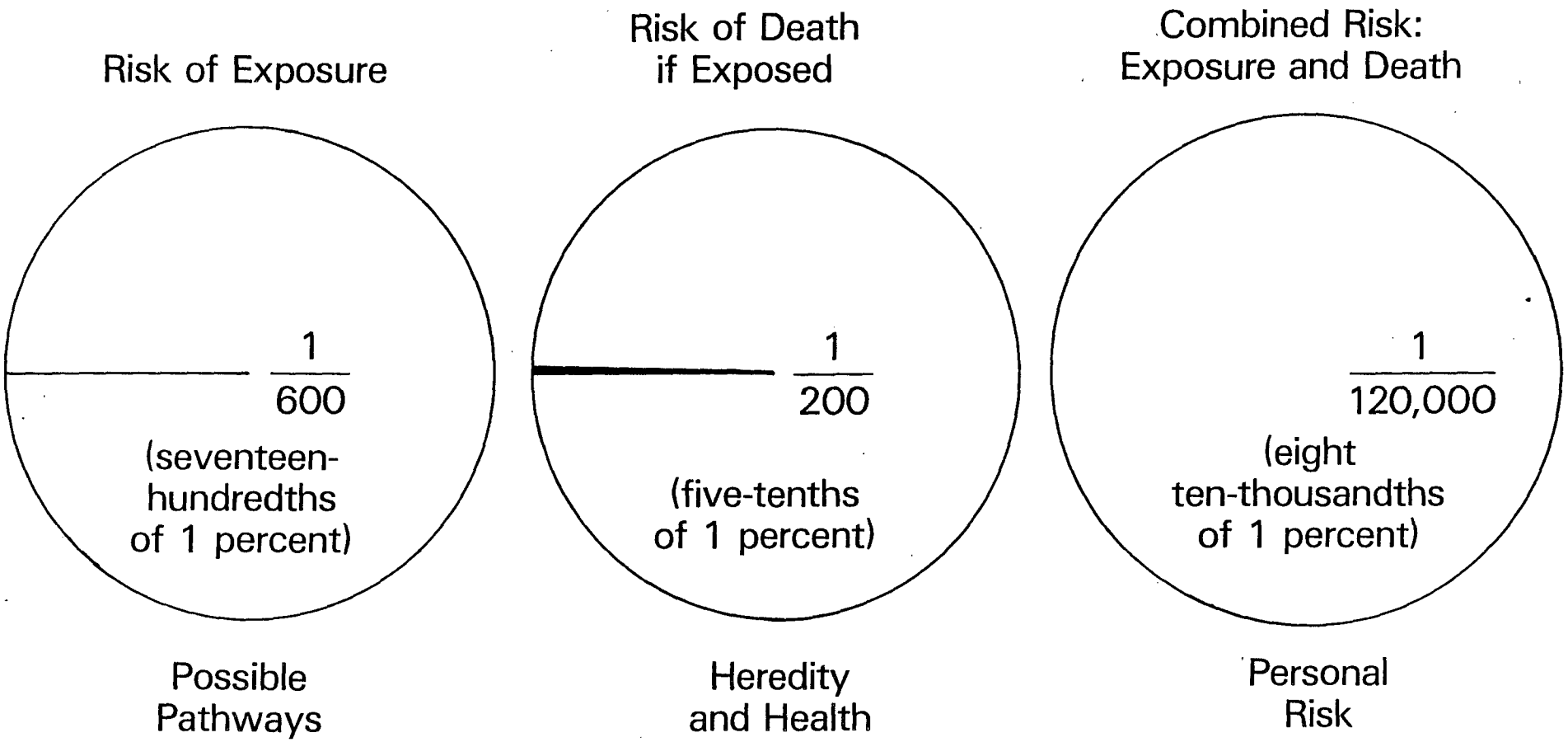

Risk of Exposure
1
600
(seventeen-hundredths of 1 percent)
Possible Pathways
Risk of Death if Exposed
1
100
(1 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
60,000
(seventeen ten-thousandths of 1 percent)
Personal Risk


Risk of Exposure
1
1,500
(seven-hundredths
of 1 percent)
Possible
Pathways
Risk of Death
if Exposed
1
100
(1 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
150,000
(seven
ten-thousandths
of 1 percent)
Personal
Risk

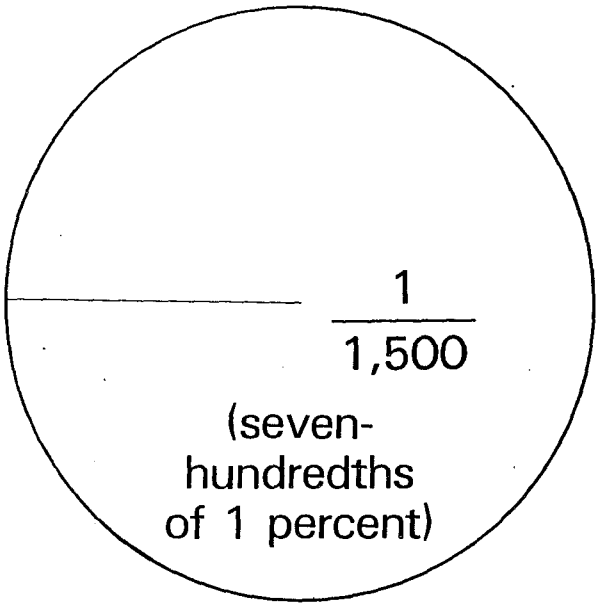

Risk of Exposure
1
300
(thirty-three hundredths of 1 percent)
Possible Pathways
Risk of Death if Exposed
1
100
(1 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
30,000
(thirty-three ten-thousandths of 1 percent)
Personal Risk


Risk of Exposure
1
1,500
(seven-hundredths
of 1 percent)
Possible
Pathways
Risk of Death
if Exposed
1
100
(1 percent)
Heredity
and Health
Combined Risk:
Exposure and Death
1
150,000
(seven
ten-thousandths
of 1 percent)
Personal
Risk


Risk of Exposure
1
300
(thirty-three hundredths of 1 percent)
Possible Pathways
Risk of Death if Exposed
1
200
(five-tenths of 1 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
60,000
(seventeen ten-thousandths of 1 percent)
Personal Risk

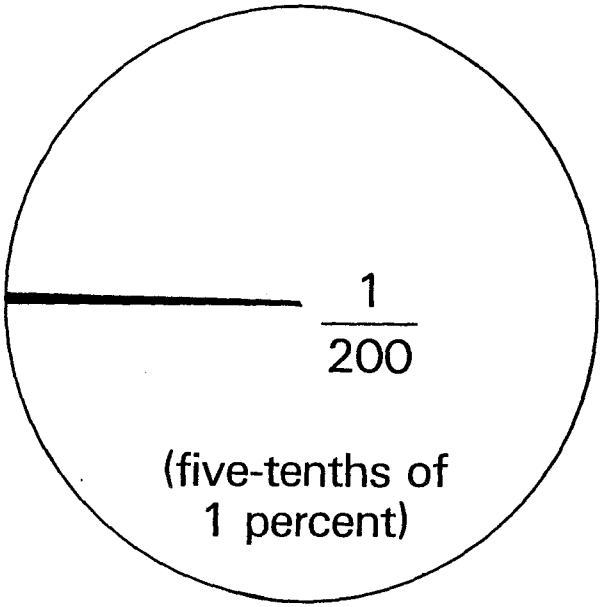

Risk of Exposure
1
600
(seventeen-hundredths of 1 percent)
Possible Pathways
Risk of Death if Exposed
1
200
(five-tenths of 1 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
120,000
(eight ten-thousandths of 1 percent)
Personal Risk

Risk of Exposure



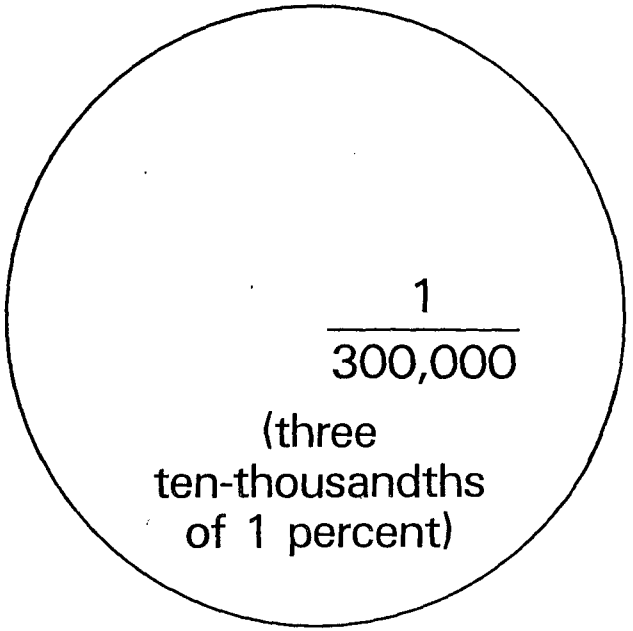
Possible
Pathways

Risk of Death
if Exposed



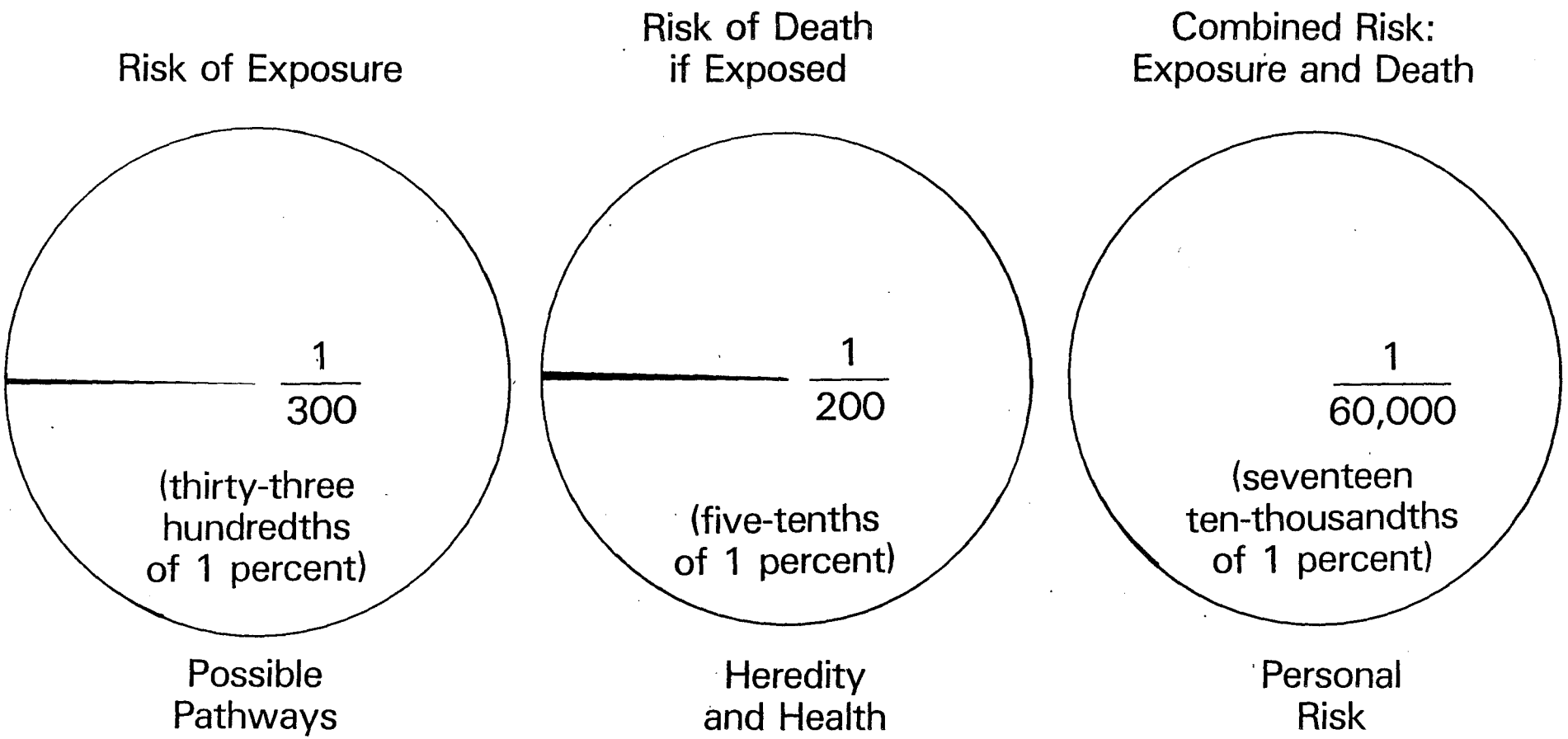
Heredity
and Health

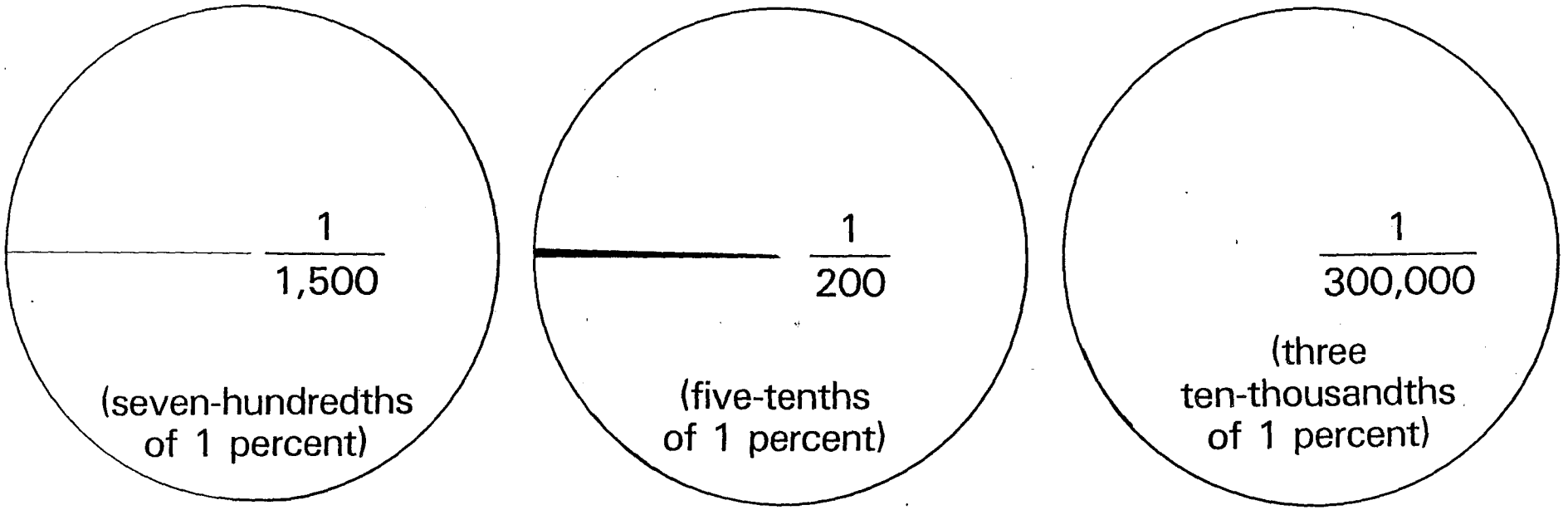
Combined Risk:
Exposure and Death



Personal
Risk

Card Y-8


Risk of Exposure
1
300
(thirty-three hundredths of 1 percent)
Possible Pathways
Risk of Death if Exposed
1
200
(five-tenths of 1 percent)
Heredity and Health
Combined Risk: Exposure and Death
1
60,000
(seventeen ten-thousandths of 1 percent)
Personal Risk



Possible Pathways

Heredity and Health

Personal Risk

APPENDIX C

SAMPLING PROCEDURE

APPENDIX C

SAMPLING PROCEDURE

C.1 FIRST-STAGE SAMPLE

This appendix describes the first stage of the sampling procedure including the sampling frame stratification and sample selection. It also details the second stage procedures that include sample allocation and selection.

C.1.1 Sampling Frame

First-stage sampling units were 1980 Census blocks clusters. The first-stage sampling frame was developed from a data base consisting of 27,022 1980 Census-defined blocks.* These block areas completely partitioned the entire survey area. Using Census geographic codes, each included block could be located and identified using maps of the Metropolitan Map Series included in Boston SMSA Block Statistics Reports.

For each block in the survey area, geographic codes and basic demographic summary variables were extracted from the 1980 Census Summary Tape File 1B. Population and housing unit count variables were summed across all 27,022 extracted blocks, and the totals were verified against published totals for the survey area to certify the completeness of the data base. The file was sorted by the geographic stratum (Acton Town, balance of area) and by county, Census tract and block number within the strata. Blocks with very few housing units were clustered with neighboring blocks to achieve a prescribed minimum size, in terms of 1980 housing units, for the first-stage frame units. Summary statistics, by stratum for the first-stage sampling frame, are given below.

---

*A very small part of the survey area in Middlesex and Plymouth counties was not within a blocked area for the 1980 Census. For these areas the Census Enumeration District was used as the block equivalent for sampling frame development.

Stratum	1980 Census blocks	First-stage frame units	1980 total housing units
Acton Town	160	123	6,309
Balance of area	26,862	21,063	795,962
Total survey area	27,022	21,186	802,271

C.1.2 Stratification and Frame Ordering

Two strata were defined for sample selection: (1) Acton Town, and (2) the balance of the survey area. Within each of the two strata, first-stage sampling units were ordered by Census county, tract and block numbers. This manner of frame ordering is akin to a geographic continuum of the sampling units and assures maximum dispersion of the sample across the area when employing a zone selection method.

C.1.3 Sample Selection

A sequential zone selection procedure [Chromy, 1979] was implemented via a computer algorithm to select 20 first-stage units (blocks or block clusters) in Acton Town and 80 first-stage units in the balance of the survey area, with selection probabilities proportional to the 1980 Census count of housing units in each unit. For each of the two strata, the computer procedure first selected a random starting point in the ordered frame listing, and then formed n_h (n_h = first-stage sample size for stratum-h) implicit selection zones, each comprising $1/n_h$-th the stratum's total frame size measure (number of housing units). Sample selection then proceeded sequentially by zone, with one unit being selected in each zone.

The zone selection procedure has the probability minimum replacement (PMR) property which states, basically, that the number of times any frame units may be selected will be either:

1. The integer part of the expected number of selections for the unit; or

2. The integer part of the expected number of selections for the unit plus one.

In the Acton Town stratum, the expected number of selections for two frame units was in the range, $1.0 \leq$ Expected Selections <2.0. Each of these two frame units was, therefore, certain to be chosen for a single primary selection,

or "hit" and could have been chosen for two "hits." The selection procedure resulted in each of the two units being selected for a single hit in the sample. All other frame units in Acton and the balance of area stratum had expected numbers of selections in the range, 0 < Expected Selections <1.0, so could have been selected at most once for the primary sample.

C.1.4 Subsampling Large Units

Some of the blocks and block clusters selected in the first-stage sample had very large counts of housing units. Since the planned average second-stage sample size was only 9.45 housing units per primary unit (945 total sample HUs/100 primary units), many of the large units were subsampled to reduce the cost of compiling the housing unit listings to comprise the second-stage frame. All subsampling was performed by the Field Supervisor or interviewers specially trained and experienced in this activity. An FSU to be subsampled was first divided into smaller subunits which completely partitioned the original unit. Whenever possible, physical features in the area were used as boundaries for subunits. Cruise counts were made of the number of housing units in each subarea, and one of the subareas was selected, with probability proportional to the cruise count of housing units. The cruise counts for the original units and the subsampled units were reported to the sampling department for use in second-stage sample allocation and sample weight development. The described subsampling procedure was performed in 25 of the 100 first-stage sample units.

C.2 SECOND-STAGE SAMPLE

C.2.2 Sampling Frame

Second-stage sampling units were housing units within the selected first-stage blocks or block clusters. The second-stage sampling frame was formed by compiling detailed listings of the housing units contained within each of the first-stage sample units. If the originally selected block(s) was subsampled as described in Section C.1.4, the housing unit listing was compiled only for the selected subunit. The listings were compiled using standard cruising/listing procedures which yield a well-defined, systematic ordering of the housing units in each FSU. All recognized habitable housing units were included in the listings, including obviously vacant units. The field-compiled listing and

associated segment sketches showing locations of the listed housing units were returned to the sampling staff for selection and identification of sample housing units.

C.2.3 Sample Allocation

For each of the two primary strata, the total housing unit sample (189 sample housing units for Acton Twon and 756 SHUs for the balance of the survey area) was allocated to the first-stage units using a procedure which resulted in approximately equal within-stratum sample housing unit weights. If the 1980 Census housing unit counts used as size measures for selecting the first-stage sample had agreed exactly with the number of housing units actually listed for each FSU, then either 9 or 10 sample housing units would have been allocated to each first-stage unit. However, since the numbers of housing units actually listed varied from the 1980 Census counts, the final sample allocations ranged from 7 to 13 housing units.

The goal of specifying an allocation yielding equal within-stratum housing unit design weights was achieved except for one small first-stage unit in the balance-of-area stratum. The unrounded allocation to this unit by the equal weighting allocation procedure was 9.38 sample housing units (either 9 or 10 sample housing units would have been specified in a subsequent random rounding procedure). However, only 8 housing units were listed in the second-stage frame. The sample allocation for the unit was set equal to the number of listed housing units (8), and the remainder of the allocation (9.38 - 8. = 1.38 housing units) was distributed among the other first-stage units in the stratum in proportion to their initial unrounded allocations. Consequently, the design weights for the sample housing units from this first-stage unit were larger than the weights for other sample housing units from the stratum by a factor of 9.38/8.

C.2.4 Sample Selection

The sequential zone selection procedure referenced in Section C.1.3 was implemented to select the allocated number of prelisted housing units from the second-stage sampling frame for each of the 100 FSUs. Selections of sample housing units (SHUs) were made with equal probabilities within the FSUs. SHUs were designated on the housing unit listings and the listings were delivered to the field director for assignment to interviewers.

C.3 REFERENCE

Chromy, James R., 1979, "Sequential Sample Selection Methods," American Statistical Association Proceedings of the Section on Survey Research Methods, pp. 401-06, 1979.

APPENDIX D

LISTING OF HOUSING UNITS

APPENDIX D

LISTING OF HOUSING UNITS

Presented as background for the reader who desires more information on our survey procedures, this appendix excerpts the Interviewer Training Manual prepared for this project. Specifically, it describes the instructions given to the interviewers for locating the sample housing units.

III. LOCATING SAMPLE HOUSING UNITS

A. Introduction

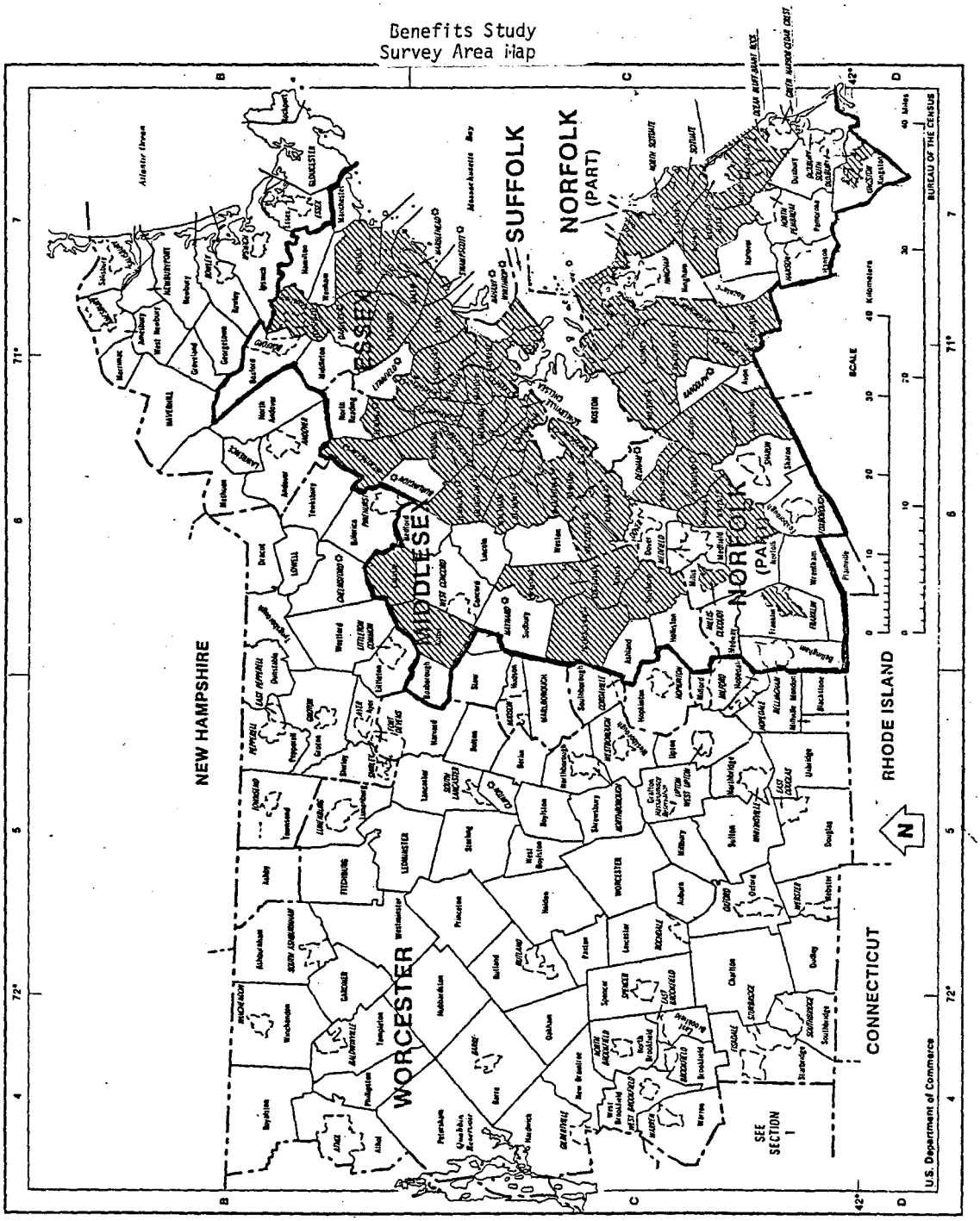
For the Regulatory Benefits Study, 945 housing units have been selected from among all of the housing units within the Boston SMSA excluding Boston itself. These sample housing units are located in defined geographic areas called segments. The housing unit sample was selected by means of an area probability sampling design and was done prior to your data collection efforts by RTI staff members trained in scientific sampling procedures. The geographic location of the survey area is confined to the shaded areas shown in Figure III-1.

The household sample was selected by a multiple-step procedure. First, a sample of 100 small, well-defined areas was selected within the Boston SMSA (excluding Boston City). In most cases each of the areas was a single compact Census block (the smallest geographic area recognized for Census data tabulation). To ensure that each sample area contained enough housing units for the survey, a few of the areas consisted of several adjacent Census blocks. Each of the initial 100 sample areas was visited by a field staff member and an approximate count of housing units was made. Generally, if a sample area's preliminary housing unit count did not exceed 100, it was considered a sample segment and a detailed listing of the housing units was compiled according to specific rules. A sample area with over 100 housing units was, in most cases, subdivided into smaller georgraphic areas and one of the subdivisions was randomly selected to be the sample segment. As before, a detailed listing of the included housing units was then compiled.

After the housing unit listings were completed for all sample segments, they were returned to RTI's sampling department. There, the sample size

FIGURE III-1

Benefits Study
Survey Area Map



(number of sample housing units) for each segment was determined and the specific housing units to be included in the sample were determined using random sampling procedures. Then sample housing units were identified on the List of Housing Units originally compiled and will be those to be contacted for data collection for this project.

The final sampling steps, with respect to housing units, are the responsibility of the interviewers. These steps are:

- inspecting the segment materials
- locating the segment and the designated SHUs
- determining that each designated SHU is actually an HU
- checking for missed HUs.

Each of these steps and related procedures are discussed in detail in following sections of this chapter. Be certain that you understand what must be done to complete each step before leaving your training session.

B. Inspecting the Segment Materials

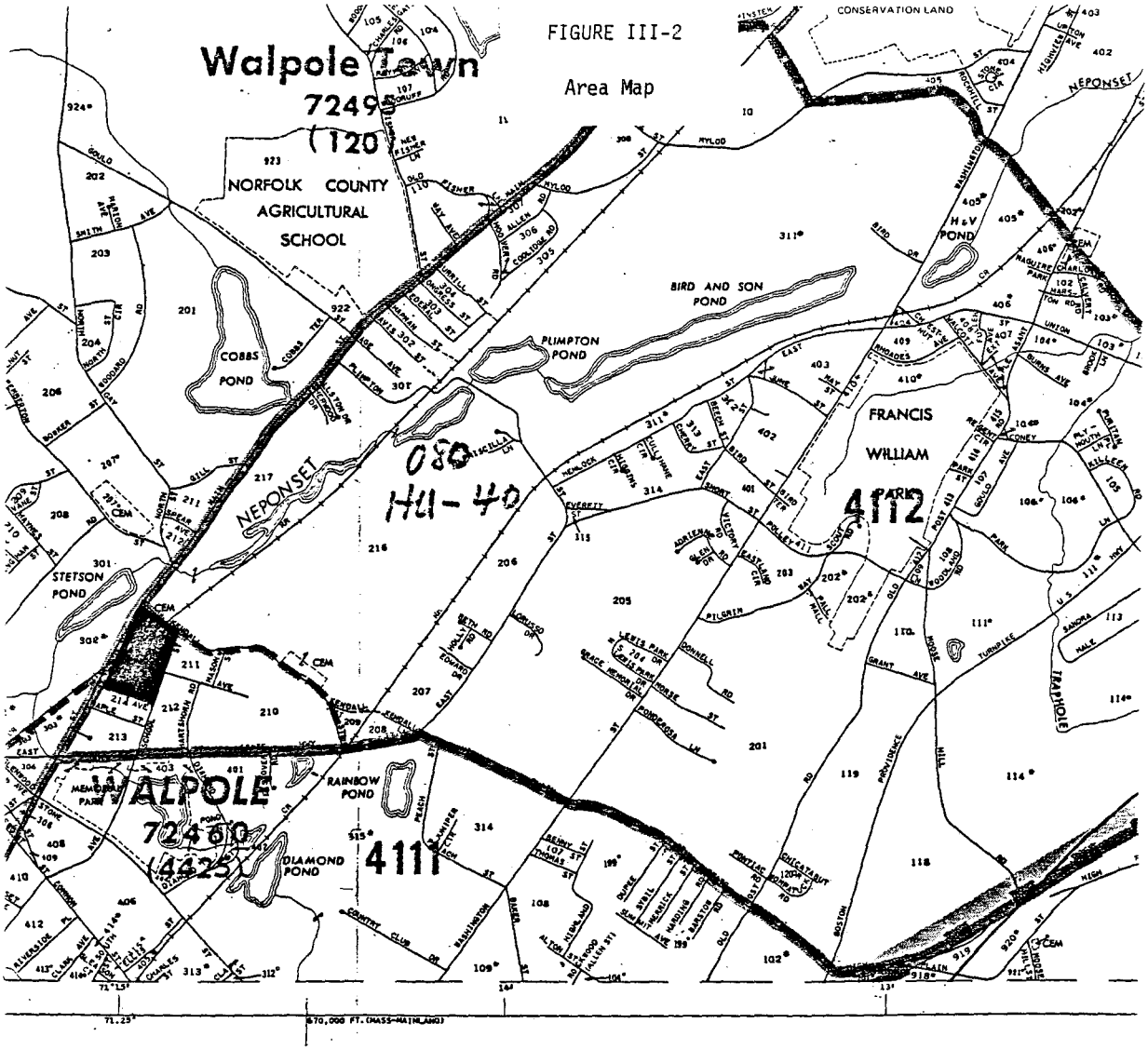
You will receive, for each segment in your assignment, a Segment Materials Envelope. Each segment is designated by a three-digit segment number. The segment numbers run from 001 through 100. This envelope should always contain an area map with the segment area marked (Figure III-2), a Segment or List Unit Sketch (Figure III-3), a List of Housing Units (Figure III-4), and one copy of the List of Added Housing Units form (see page III-19.) Check to be certain that you have these materials for each segment assigned. Then review the map, sketch, and list to insure that you are aware of the location of the segment before attempting actual work in the segment.

1. Area Map

The area map provided for each segment will show the surrounding geographic area. It will be a photocopy of a U.S. Census Bureau map showing

FIGURE III-2

Area Map



S MAP
ED1967

REVISIONS					
DATE	TYPE	DATE	TYPE	DATE	TYPE

FIGURE III-3

Segment Sketch

Indicate North ↑

SEGMENT ID 080 RATE _____ START # _____ EST. HU's 40

INTERVIEWER ORENBERG PLACE NORFOLK CO. (WALPOLE) MA

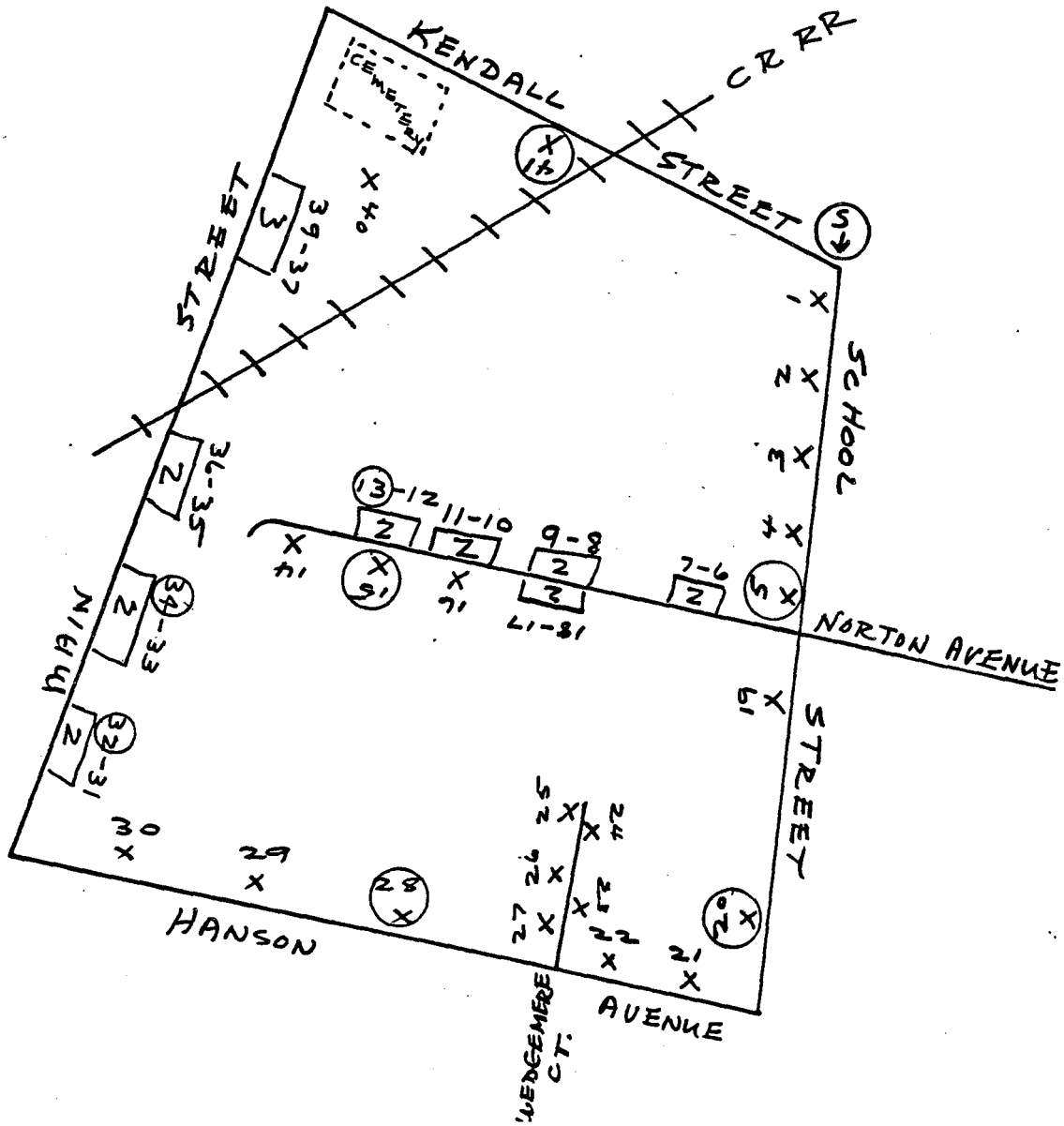


FIGURE III-4

List of Housing Units

LIST OF HOUSING UNITS

Date Listed 12 (Month) 20 (Day) 83 (Year)

Segment No. 080 Part No. _____

Listed By ORENBERG

ID No. _____

1 HU No.	2 St. No.	3 Street Name	4 Apt. No.	5 Housing Unit Description	6 Apt. Location
1	No#	SCHOOL STREET		BROWN WOODEN CAPE DOWN BELOW	
2	5	↓			
3	13				
4	21				
(5)	27				
6	No#	NORTON AVENUE		DUPLEX BEIGE	RIGHT
7	No#	↓			LEFT
8	29B			DUPLEX	
9	29A				
10	19		1		
11	19		2		
12	33			DUPLEX	
(13)	35				
14	34				
(15)	No#			SINGLE WHITE RANCH (GREEN TRIM)	
16	20				
17	4			DUPLEX	
18	5	↓			
19	71	SCHOOL STREET			
(20)	No#	↓		GREEN CAPE ATTACHED GARAGE	

Post Office WALPOLE (City) MA (State) Zip Code 02081 HU 1 - 20

Post Office _____ (City) _____ (State) Zip Code _____ HU ___ - ___

Post Office _____ (City) _____ (State) Zip Code _____ HU ___ - ___

Checked By _____

FIGURE III-4 (Continued)

List of Housing Units

LIST OF HOUSING UNITS

Date Listed 12 (Month) 20 (Day) 83 (Year)

Segment No. 080 Part No. _____

Listed By ORENBERG

ID No. _____

1 HU No.	2 St. No.	3 Street Name	4 Apt. No.	5 Housing Unit Description	6 Apt. Location
Z1	44	HANSON AVE			
Z2	34	↓			
Z3	11	WEDGEMERE CT.			
Z4	21				
Z5	24				
Z6	20				
Z7	12	↓			
Z8	22	HANSON AVE.			
Z9	14				
30	6	↓			
31	818	MAIN STREET			RIGHT
32	818				LEFT
33	812		1		1ST FLR
34	812		2		2ND FLR
35	806			DUPLEX	
36	808				
37	792		1		
38	792		2		
39	792		3		
40	No#	↓		SMALL SINGLE IN REAR OF 792 MAIN	

Post Office WALPOLE (City) MA (State) Zip Code 02081 HU 21 - 40

Post Office _____ (City) _____ (State) Zip Code _____ HU ___ - ___

Post Office _____ (City) _____ (State) Zip Code _____ HU ___ - ___

Checked By _____

FIGURE III-4 (Continued)

List of Housing Units

LIST OF HOUSING UNITS

Date Listed 12 (Month) 20 (Day) 83 (Year)

Segment No. 080 Part No. _____

Listed By O.RENBERG

ID No. _____

1 HU No.	2 St. No.	3 Street Name	4 Apt. No.	5 Housing Unit Description	6 Apt. Location
41	290	KENDALL ST.			
2					
3					
4					
5					
6					
7					
8					
9					
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					

Post Office WALPOLE (City) MA (State) Zip Code 02081 HU 41 - ___

Post Office _____ (City) _____ (State) Zip Code _____ HU ___ - ___

Post Office _____ (City) _____ (State) Zip Code _____ HU ___ - ___

Checked By _____

roads, streets, and other features that will help to locate the segment area precisely. The segment itself will be shaded so that it will be easy to identify on the map.

Local maps will sometimes be needed to help locate the segment. If necessary, obtain such a map. Any maps you secure should be sent to RTI with other segment materials when work has been completed.

2. Segment Sketch

The Segment or List Unit Sketch is a detailed map of the segment area that was prepared by RTI's Center for Survey Statistics and the individual who completed the listing. Boundary and internal roads or streets and other significant features are clearly identified and the location of each listed HU is indicated. Looking at the Segment Sketch illustrated in Figure III-3, note that symbols have been recorded for each structure (an "X" for a single-unit structure and a box with a number inside indicating the number of units in a multiple-unit structure). Also note that the symbols on the sketch are cross-referenced to the List of Housing Units by entry of the HU or line number above the symbol. For example, an "X" with the number "3" above it on the Segment Sketch represents the map location of the HU listed on line 3 of the List of Housing Units.

The Segment or List Unit Sketch is important to aid in properly identifying SHUs. Become familiar with it before beginning work in the segment and carry it at all times for reference to insure that you are identifying SHUs properly.

3. List of Housing Units

This form provides a complete list of HUs in a segment, listed in the order indicated by the direction of the arrows on the Segment Sketch or by

the direction of the ascending housing unit numbers. Each HU is listed by address or, if an address was not obvious, a description that will enable you to identify the structure.

Note that of all HUs listed in a segment, only certain ones have been designated as Sample Housing Units (SHUs). The housing unit number or line number for each selected HU has been circled on the List of Housing Units and on the segment sketch. These are the SHUs that you will contact to collect data for the survey.

C. Locating the Segment and the Designated SHUs

The general location of a segment and the most efficient route of travel to reach the area will have been determined during your review of segment materials. When you arrive at the segment, you must first check to insure that you have correctly identified and located the precise boundaries of the area included and that the lister has, in fact, completed listing in the correct area. Referring to the area map, Segment Sketch, and List of Housing Units, drive or walk around the segment boundary and check to be sure that you are in the exact area and that the lister correctly identified it.

Having verified that you are in the exact segment location, you will begin identifying and calling at designated SHUs. In most cases you will be able to find them with little difficulty using the Segment Sketch and the List of Housing Units. In some cases, however, you will have to check more thoroughly to insure accuracy. For example, if you were using the sketch and list shown in Figures III-3 and III-4:

> ... HU #05 at 27 School St. When you arrive you find that the street number is clearly indicated on the mailbox; you note that the number visible on the house immediately preceding on the north is 21 and the number 71 (HU 19) is seen on the next house to the south. You are sure that the street is School Street. The HU has been clearly

and easily located by reference to the Segment Sketch, List of Housing Units, and visible street numbers associated with existing structures.

D. Determining That Each Designated SHU Is Actually an HU

Only structures qualifying as HUs should have been listed. Since the individual completing the listing did not have time and was not required to enter every home to talk to residents, it was sometimes impossible to determine if a structure qualified as an HU or how many HUs were actually at that address. You must do this at the time of the enumeration interview.

Interviews for the Regulatory Benefits Study are to be conducted only at SHUs. It is the interviewer's responsibility to make sure that a designated SHU is actually (1) a housing unit, AND (2) only one housing unit. This verification is performed by asking the questions in Section D on the Household Control Form. For this reason it is very important that you know what the term "housing unit" means and how to recognize one when you are interviewing.

The typical situations should present no difficulty in determining whether the specific address or living quarters is a housing unit at the time of interview. Most of the situations you will encounter will be typical and will fall into categories you usually think of when you think of housing units--single family houses, multi-unit houses, apartments and mobile homes.

However, you will occasionally encounter unusual situations where it is not readily apparent whether a living quarters is one housing unit, more than one housing unit or part of another unit. To help you make the correct determination in unusual situations, you must become familiar with the housing unit definition and how to apply it.

The 1980 U.S. Census Bureau definition of a housing unit is being used for this project, a copy of which is reproduced in Figure III-5. The figure

Figure III-5
Definition of a Housing Unit

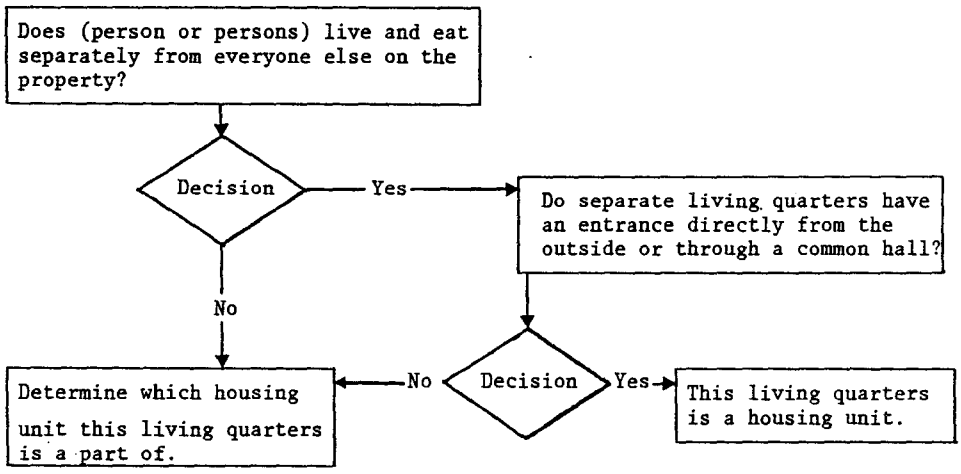
A housing unit is a group of rooms or a single room occupied or intended for occupancy as separate living quarters; that is

(1) the occupants do not live and eat with any other persons in the structure

AND

(2) there is either direct access from the outside or through a common hall

The household occupying a housing unit may be a family or a person living alone. It may also be nine or fewer unrelated persons. (If ten or more unrelated persons occupy the unit it is considered group quarters and, therefore, is not to be treated as a sample housing unit.)



will also help you conceptualize the application of the housing unit definition. The term "separate living quarters" means that the persons occupying the quarters live and eat separately from the occupants of all other houses, rooms or groups of rooms within the structure or on the property. When you are trying to determine whether or not a living quarters is a housing unit, your first consideration is the "separateness" of the living arrangements, i.e., the way the occupants use their living quarters. That is, find out if the occupants use different rooms for living and eating than those used by the occupants of all other rooms or groups of rooms within the structure or on the property.

If the occupants of the SHU do not live and eat separately, then the living quarters is not a separate housing unit and you must determine what housing unit includes their living quarters.

If the occupants do live and eat separately, then you must determine if access to those separate living quarters is either directly from the outside or from a common or public hall within the structure. A unit within a multi-unit house or structure could have access from either an outside door or a common hall. A common hall can be a hallway, or lobby, a vestibule, or a foyer that is used by the occupants of more than one living quarter in the structure.

The following list of types of housing units, although not exhaustive, includes most types that you may encounter:

- A single house that is intended for occupancy by only one family.
- A flat or apartment in a structure that includes other flats or apartments.
- A basement or attic apartment.
- Vacant houses or apartments that could be occupied.

- Hotel or motel rooms that are (a) occupied by permanent guests, or (b) occupied by employees who have no permanent residence elsewhere.

- Residential units under construction. The List of Housing Units may include such a unit.

- Rooms within group quarters or an institution (such as a fraternity house or dormitory) that serve as the permanent residence of a staff member or house mother and that satisfy the requirements of the HU definition.

- An apartment in a nonresidential structure used as a permanent housing unit. For example, an apartment in a warehouse, which the caretaker uses for his living quarters.

- A mobile home or trailer used as the permanent residence of the occupants and not just as their vacation residence.

- A mobile home or trailer location in a trailer lot or mobile home park in which numbered or otherwise specified spaces are rented. In such a mobile home park, each separate space allocated for one mobile home is listed as an HU, even if no mobile home currently occupies the space--that is, an empty space in a regular mobile home park is treated like a vacant apartment or house.

- Work camps occupied by seasonal workers. If workers generally occupy a unit for six months or more of the year, that unit is considered a permanent HU.

- Seasonal dwellings, such as summer homes, resort cottages, or other part-time homes which could serve as permanent residences are considered HUs. An example of such a residence is one that is heated where heat would be required. However, if someone lives permanently in an unheated HU, it should be included.

- Rooms occupied by roomers or lodgers are:

  - Part of the same HU if there are nine or fewer unrelated roomers or lodgers who are living and eating together. If there are ten or more unrelated individuals, a group quarters has been discovered.

  - Separate HUs if each living quarters meets the definition of an HU. Thus, if the roomers or lodgers live and eat separately from each other and their rooms open off a common corridor--they are occupants of separate HUs. The quarters occupied by each lodger or roomer should have been listed on a separate line of the List of Housing Units. If not, these HUs must be recorded on a List of Added Housing Units using the missed HU procedure described in a later section.

Certain types of buildings are usually not listed. These types, listed below, with the exception of permanent HUs that may exist within them, do not

qualify as HUs unless nine or fewer unrelated individuals live and eat separately there.

- Specified Institutional Units
  - correctional institutions
  - mental institutions
  - group homes for children, the aged, infirm, or needy
  - halfway houses
  - nursing, convalescent, and rest homes
  - licensed domiciliary care
  - hospitals
  - other institutions that provide care for residents or inmates.
- Military Barracks.
- Unoccupied Structures that are being demolished.
- Hotel or Motel Rooms that are not occupied by permanent guests or by employees who have no other permanent address.
- Places of Business, such as stores, factories, etc. (Be sure to look for hard-to-find living quarters behind, above, or inside such places, however.)

Group quarters, as noted before, are not to be included in the sample for the project. They may be encountered while completing interviewing at an SHU or when checking for missed HUs. Among the types of structures where you will have to be especially alert to determine whether the SHU is, in fact, a housing unit or if it is a group quarters are:

- boarding houses and rooming houses
- hospital staff quarters
- monasteries and convents
- student housing facilities
- nonmilitary barracks and bunkhouses

- missions.

The task of enumeration, which involves compilation of a household roster, will sometimes lead to a determination that the household should not be included as an SHU because it is a group quarters unit. Be particularly alert to the number of unrelated individuals appearing in the roster in order to make the proper determination. For example:

- If unrelated individuals are listed, determine which, if any, live in quarters that qualify as a separate HU and treat such as added HUs as explained in Section E and F of this chapter.
- If there are ten or more unrelated persons occupying the same unit, the definition of group quarters is met. Record this result as described in Chapter IV and do not proceed with the interview.

Should you determine that a designated SHU does not meet the definition of an HU, do not complete enumeration. The result of your call will be recorded on the Household Control Form (as described in Chapter IV). If you are uncertain whether a designated SHU meets the housing unit definition, discuss the situation with your supervisor before proceeding with data collection at that unit.

E. Checking for Missed HUs

This interviewer task is particularly important. Although those involved in completing the listing have made all reasonable efforts to be sure that every HU in a segment is listed, sometimes housing units go unobserved or undetected. There may have been some HUs that the lister could not observe because of their location, new HUs may have been constructed since the time of listing, mobile homes may have been moved into the segment, or what appeared on observation to be one type of HU may be entirely different when one gets inside the structure. Every HU should have a chance to be selected for interview, but if an HU was not listed, it has no chance of being selected for

interview unless it is discovered by you during the enumeration process. The missed HU procedure, which you must follow carefully, is designed to include a sample of those HUs that should have been listed but, for some reason, were not.

The missed HU procedure does not require that you check the entire segment listing. Rather, your check will be confined to a specific interval, generally between a SHU and another listed HU. The exact nature of the interval will vary depending on the type of structure in which the SHU is located. The rules that you must learn and apply are presented in Figure III-6. Missed HUs within a structure, for which you must check at all SHUs, will be units that meet the definition of an HU. Some examples are:

- A basement or upstairs apartment that has been constructed in a structure that was originally a single-family dwelling, with an outside entrance in the rear of the structure that could not be observed by the lister.
- Additional apartments with their own entrances leading from a common hall from which the SHU also has an entrance, only apparent when a household member of the SHU opens the common entrance door.

Note that when the SHU is the first HU in a multi-unit structure, in addition to checking for missed HUs within the unit, you must check the entire structure for HUs that were not listed.

When you must check the geographic interval between the SHU and the next listed HU as in Rules 1 and 4, you must be aware of the order in which the lister traveled. Normally, the geographic interval between an SHU and the next listed HU will be a short distance. In some cases, however, particularly in rural segments, some distance may be involved and it is important that you follow the same pattern of travel used by the original lister in checking the interval between a listed SHU and the next listed HU. This pattern will frequently be indicated by directional arrows drawn on the sketch; if not you

Figure III-6
Rules for Checking for Missed Housing Units

Rule Number	Type of Structure	Tasks to be Performed
1	SHU is a single-family dwelling	Check for missed HUs within the SHU and between the SHU and the next listed HU.
2	SHU is listed as the first HU in a multi-unit structure	Check for missed HUs within the SHU; check the entire structure for HUs not listed.
3	SHU is an internal unit in a multi-unit structure (i.e., it falls between the unit listed first and the unit listed last)	Check for missed HUs within the SHU only.
4	SHU is listed as the last HU in a multi-unit structure	Check for missed HUs within the SHU; check for missed HUs between the SHU and the next listed HU.

will be able to determine the pattern from the sequence of HU numbers. The lister should always have followed a prescribed order, traveling around the segment in a clockwise direction, making each possible right turn as internal streets or roads were encountered, and listing HUs as they appeared on the right. Whenever an internal road ended, ran into a segment boundary, or reached a point where the lister had already been, a turn will have been made.

The purpose of your check of the listing between an SHU and the next listed HU will be to determine if there are any unlisted HUs that, according to the order of listing described above, are located in the interval. This should require a relatively quick drive past the interval (or walk along the street if a city segment).

Section D of the Household Control Form provides a question that you will ask to assist in locating missing HUs that may exist. This question, discussed in Chapter IV, is included as a reminder and aid in your task of checking for missed HUs. It does not, however, eliminate the need for thorough observation.

F. Adding Unlisted HUs

Should you discover any previously unlisted HUs within SHUs, record their address or description as shown on the List of Added Housing Units, Figure III-7, that has been placed in the Segment Materials Envelope for each segment. Be sure to enter the identifying information at the top of the form. In Column 1 number the new (missed) housing unit sequentially, beginning with the number following that of the highest numbered HU on the original List of Housing Units for the segment.

Before adding to the List of Added Housing Units a missed unit that you have discovered, be certain that it qualifies as a "housing unit." Apparent

FIGURE III-7

List of Added Housing Units

LIST OF ADDED HOUSING UNITS

PSU/ Segment No. 080 FI TUCKER FI No. 41014/ Date 03/18/84

DIRECTIONS TO FI

1. Use this form to list previously unlisted HUs that you add to the segment listing, in accordance with the procedures in the manual.
2. Number added HUs consecutively in the order in which they are added, beginning with the next number after the number of the last HU prelisted.
3. Indicate in Column 4 below the number of the SHU which the added HU follows. Remember: you must also show the location of the added HU on the Segment Sketch.
4. All HUs added to the Segment List automatically become sample housing units. However, if you add 6 or more HUs to a Segment List during your check of the listing, call RTI for instructions before proceeding with interviewing in the added HUs.

1 Housing Unit Number	2 RFD Number, Street Address, and/or Housing Unit Description	3 Apartment No. or Loc.	4 Number of SHU Which Added HU Follows
42	27½ SCHOOL STREET		5

housing units used for nonresidential purposes (e.g., business or storage) do not qualify and should not be added. Housing units which are intended to be used as residences but are vacant at the time of your check are to be added if they were not originally listed and they have been discovered in accordance with the appropriate rule.

If you discover five (5) or fewer missed HUs associated with an SHU, these missed HUs are to be treated as SHUs and a blank Household Control Form is to be completed for them. If six (6) or more missed HUs are discovered, call your supervisor before enumerating or interviewing these HUs. Before calling, however, double-check to be absolutely certain that you have checked the proper intervals and that the unlisted HUs meet the definition of a "housing unit."

While you are to add to the listing any missed or new HUs identified while applying the rules for checking the listing, you are not to make any deletions from the original List of Housing Units. On rare occasions you may discover that a listed SHU does not qualify as a housing unit (e.g., a structure that is used for nonresidential purposes). You may also encounter a situation where one or the other no longer exists (e.g., a trailer that has been moved). In such cases, do not delete the bogus housing unit from the List of Housing Units.

Whenever you add an HU to the List of Added Housing Units circle the HU number since it is now a SHU. You must also enter a corresponding X or box, in the case of multiple-unit structures, in the appropriate location on the sketch. Remember to identify the symbol with the housing unit number from the List of Added Housing Units form.

G. Calling for Assistance

These field sampling steps are of critical importance. All aspects of the household sample design have been developed so that data collected for

this survey will be valid, reliable and accurate. However, no amount of care with the sampling design is of value unless each interviewer carries out the final steps of sampling with equal care. Even seemingly slight errors or oversights in sampling activities completed by the interviewer may necessitate costly and time-consuming corrective action.

Careful attention to instructions included in this chapter should provide necessary information to complete the steps involved in checking the listing. Those steps are extremely important to the accuracy of the sample and, therefore, of the data collected. If, at any time, you are unsure of the correct procedures to follow, call your supervisor or RTI to discuss the situation before continuing.

APPENDIX E

NEWS SUMMARIES DESCRIBING PUBLIC INFORMATION, COMMUNITY REACTION, AND LOCAL GOVERNMENT ACTIONS DURING ACTON CONTAMINATION INCIDENTS

TABLE E-1. PUBLIC INFORMATION AVAILABLE DURING CONTAMINATION INCIDENTS: SUMMARY OF NEWS ITEMS

Date		News item summary
Year	Month	
1978	October	Acton Water Supply District (AWSD) notifies Acton Town Manager Christopher Farrell that the disposal methods used by the chemical company are contributing to groundwater contamination.
1979	July	AWSD reports effectiveness of carbon filters in reducing 1,1-dichloroethylene to zero levels in Assabet wells.
1980	January	Acton Board of Selectmen (ABS) releases final report, which states that 5 to 7 years are necessary for flushing the Sinking Pond Aquifer of wastes and that several flushings are required.
	June	Acton residents vote to spend $450,000 for study of town water supplies and alternative resources.
	July	Informal health effects study conducted by the Massachusetts Department of Public Health shows no evidence of increased cancer mortality in Acton from 1969 to 1978, the approximate period the Assabet wells were being used.
	September	Local editorial expresses fear of water price doubling or tripling in Acton due to expense of hydrogeologic studies.
	October	Severe drought and citizen concern for contamination of public water sources causes an increase in use of private wells for water supply. Fear of contamination of town supplies is countered by Acton Board of Health (ABH) member Don Gilbert, who indicates that risk is greater with well water that does not undergo regular testing.
	December	Acton League of Women Voters (LWV) prepares document on history of AWSD, details of Acton water problems, and steps for water preservation and conservation. LWV prepares pamphlet for distribution to Acton residents detailing ways to conserve water and assure quality. Water conservation citizen group planned to publicize need for efforts in this area.

(continued)

TABLE E-1 (continued)

Date		News item summary
Year	Month	
1981	February	Editorial denounces AWSD insistence on taking suit against chemical company to court despite the company's willingness to provide funds to purchase water. AWSD is perceived as needlessly uncooperative.
		Acton Garden Club discusses hazardous wastes issues.
	July	Acton residents Jim Widmer and Bob Osborne express concern over ease of access to chemical plant property, presence of discharges to Sinking Pond, and scrap metal strewn about site. Company vice president indicates that citizens should approach him directly with complaints rather than publicizing problems.
		Massachusetts Audubon Society publishes article about chemical company in its monthly bulletin, which reports the history of the case. Company vice president denounces the article as a "gimmick" to increase sales.
	September	Gil Woolley, chair of the Sierra Club Hazardous Wastes and Substances Committee, urges citizen activism to urge town officials to obtain information about and regulate industries in their province.
		Testing controversy arises when Dr. John Cutler of the Massachusetts Environmental Health Division tells residents that styrene is only an irritant, not a carcinogen. Acton resident Dr. Haluk Ozkaynak of the Harvard Energy and Environmental Policy Center disputes this conclusion, saying that resident exposure levels were as high as 400 ppm and could have resulted in chromosome damage. He recommends blood tests to detect this effect. Acton resident Dr. Edwin Knight denies cancer or birth defect link to styrene and calls the blood tests a "fishing expedition." ABH refuses to fund test due to lack of money.
	November	ABS and ABH officials dispute chemicals company claims that no personal danger to residents existed at the time of the styrene leak and the claim that the firm has had an "excellent" safety record for 30 years. Acton fire chief Malcolm MacGregor reports that numerous fires have occurred at the company and that the situation created by the styrene leak was inadequately handled due to company failure to follow emergency procedures outlined in plans filed with ABS.

(continued)

TABLE E-1 (continued)

Date		News item summary
Year	Month	
1982	January	Billerica LWV schedules public informational meeting on pumping proposal by chemical company.
	February	The ABS Technical Advisory Committee (TAC) submits final report on styrene leak and concludes that inadequate storage procedures increased the probability of the incident. A TAC member, Richard Cadwgan, believes the incorrect procedures have been followed for many years. Recommendations of TAC include: undertaking of a detailed health effects study, soil and groundwater testing at the site of the leak, development of emergency response plans by all chemical facilities in the area, and creation of a position for a technical environmental officer to assure proper management of hazardous materials.
	March	Draft of emergency procedures is submitted by chemical company to Concord and Acton Town Managers as a "new start" in communications between the company and the towns. ABS members Joan Gardner and Pam Resor express dissatisfaction with plan, claiming it offers no guarantee of contact by chemical company in the event of an emergency.
	July	The Metropolitan Area Planning Council (MAPC) holds informational meeting with residents of Acton, Boxborough, Littleton, and Concord to encourage regional coordination for water protection. MAPC notes demand problems faced by Maynard and Bedford and projects similar concerns for Acton, Hopkinton, Hudson, Littleton, and Sudbury by 1990 and for Concord, Natick, and Wayland by 2000. Arleen O'Donnell, of MAPC recommends formation of Groundwater Study Committee for towns to identify needs and resources for communities. Alternatives to towns for protection and development of water are discussed. Local newspaper urges continued conservation efforts on the part of Acton citizens despite relief of immediate supply problems and reminds citizens of potential need to assist other communities with emergency water supplies.
1983	March	Testimony in license hearing indicates that hexane leak was only investigated after presence of hexane was noticed in oil being recovered from August spill. Even though a chemical company employee witnessed the spill, it was not believed the leak had occurred until the following January.

(continued)

TABLE E-1 (continued)

Date		News item summary
Year	Month	
1983	April	ABS declines to attend closed-door presentation of report on restoration of Sinking Pond Aquifer by chemical company. Town Manager Nancy Banks expresses concern over need for public presentation. ABS member Jack Ormsbee declares need for openness because of past "misrepresentation" on the part of the company. Town Manager Nancy Banks notes lack of cooperation in communication on the part of chemical company. Example given is the violation of a letter of agreement to send to Acton pertinent documents sent to supervisory agencies. Federal and State officials received documents relating to the aquifer restoration while Acton has been deprived of the same information despite requests for it since the preceding September. Town Manager questions company commitment to cooperation.
	May	Editorial encourages Boxborough and Acton to consider instituting a program through which residents may be able to identify and safely dispose of hazardous materials found in homes. A twice-yearly collection of household hazardous materials as well as education regarding them is proposed based on similar successful programs in Lexington, Bedford, and Andover.

TABLE E-2. SUMMARY OF ACTON COMMUNITY RESPONSE TO CONTAMINATION INCIDENTS

Date		Community action
Year	Month	
1978	September	Chemical firm files for permits for installation of storage tanks for hexane and oil at site of proposed expansion. Residents of Acton and Concord and Acton Selectmen raise issues of possible hexane leakage causing well contamination and odor problems. Firm indicates no problems with similar system in operation at another plant.
	October	Local Sierra Club holds meeting to discuss the environmental and legal aspects of the proposed chemical company expansion. Recommendation made to deny permit pending completion of hydrologic survey and determination of air emissions and control equipment.
1979	January	Acton Committee for Environmental Safety (ACES) is formed by citizens of Acton and Concord to review and monitor the proposed chemical plant expansion.
	May	Members of the International Chemical Workers Union employed at chemical plant vote to boycott a local newspaper in response to its coverage of the chemical contamination of Assabet wells. They claim that adverse publicity forces their firm to transfer operations to other plants, reducing working hours.
	August	Metropolitan Area Planning Council (MAPC) develops "Dirty Dozen," a list identifying household products containing chemicals potentially dangerous to groundwater.
	September	ACES submits petition to Acton Board of Selectmenn (ABS) to force the chemical company to cease dumping of hazardous wastes in Acton.
1980	January	Acton League of Women Voters (LWV) releases study of water resources and management. LWV presents 12-step proposal to improve Acton water management policy.
	March	ACES protests chemical company's cleanup plan, claiming it is inadequate to meet the requirements of the AWSD order. National Sierra Club joins EPA suit against chemical company in response to request from Thoreau Group, the Acton area chapter, which hopes to gain access to evidence

(continued)

TABLE E-2 (continued)

Date		Community action
Year	Month	
1980	March (con.)	evidence and be entitled to call witnesses. The national organization views the issue as having greater than local consequences and believes that EPA needs support from other levels in suit.
	September	ACES members Tony Mandile and Margaret Korde join Sierra Club in EPA suit as individuals.
	October	Sierra Club and ACES withdraw application to join EPA suit following filing of consent decree. They claim their threat to join convinced chemical company to settle.
	December	LWV prepares document on history of AWSD, details of Acton water problems, and steps to be taken for water preservation and conservation.
		LWV prepares pamphlet for distribution to Acton residents detailing ways to conserve water and assure quality. Water conservation citizen group planned to publicize need for efforts in this area.
		ACES spokesperson Margaret Korde expresses dissatisfaction with inertia of government officials and distrust of company representatives during speech before Nashua River Watershed Association Conference on Hazardous Wastes. Encourages citizen activitism.
1981	March	A five-member volunteer board, the Water Land Management Advisory Committee (WLMAC), is established to assist AWSD on water issues.
	July	Acton residents Jim Widmer and Bob Osborne express concern over case of access to chemical company property, presence of discharges to Sinking Pond, and scrap metal strewn about site. Company vice president indicates that citizens should approach him directly with complaints rather than publicizing problems.
		Acton residents Widman and Osborne request that chemical company be required to fence property. Company vice president indicates no plans to undertake increased security at the plant.

(continued)

TABLE E-2 (continued)

Date		Community action
Year	Month	
1981	September	Gil Woolley, chair of Sierra Club Hazardous Wastes and Substances Committee, urges citizen activism to compel town officials to obtain information about and regulate industries in their province. Large turnout at ABS special meeting to discuss styrene incident. Citizens demand stricter town control of chemical handling and storage at chemical company. Hostility is expressed toward company vice president. Citizen activist group, Citizens Association for the Preservation of the Environment (CAPE), forms in response to the styrene incident. CAPE calls for identification and testing of all hazardous or potentially hazardous sites in Acton and recommends closing or taking legal action against negligent companies. A Concord activist group, West Concord Citizens (WCC), demands a class action suit on behalf of the evacuees of the styrene incident. They also demand a joint meeting of ABS and Concord Board of Selectmen (CBS) to assess compliance of chemical company with Consent Decree and an investigation by State legislators. ACES seeks reimbursement for costs to town of evacuation, monitoring of health effects for those exposed during styrene incident, development for an evacuation plan for Acton, Maynard, and Concord, cleaning and monitoring of chemicals spilled during the sytrene incident, and formation of a citizens' committee to review the incident. Citizen groups question ABS on failure to follow up enforcement of Consent Decree to clean up sites. ABS has no response. CBS joins citizen groups in urging ABS to undertake investigation of styrene incident and of chemical company operations. ACES demands that ABS close chemical plant until it can demonstrate it is not a health hazard and can cope with emergency situations. ABS states that ABH has power to close plant, but is the only local agency that can.

(continued)

TABLE E-2 (continued)

Date		Community action
Year	Month	
1981	September (con.)	ACES denounces chemical company for several reasons: (1) for claiming in 1978 that no groundwater was on its property when USGS reported one of the area's largest aquifers underlies the site, (2) for claiming to use none of the chemicals found in the contaminated wells while later photographs show company uses all of them, (3) for claiming to dispose of no hazardous material in its landfill while EPA's Consent Decree established that these materials had been deposited for 30 years.
	October	Resident Bill Osborne complains about potential hazard of disposal of chemical company battery separators in Acton town dump. Town Manager Nancy Banks assures that separators are transformed before dumping into safe forms and that state officials make regular checks of the landfill and the materials deposited in them. Testing controversy arises when Dr. John Cutler of the Massachusetts Environmental Health Division tells residents that styrene is only an irritant, not a carcinogen. Acton resident Dr. Haluk Ozkaynak of the Harvard Energy and Environmental Policy Center disputes this conclusion, saying that resident exposure levels were as high as 400 ppm and could have resulted in chromosome damage. He recommends blood tests to detect this effect. Acton resident Dr. Edwin Knight denies cancer or birth defect link to styrene and calls the blood tests a "fishing expedition." ABH refuses to fund test due to lack of money. Concord resident Allan Fierce, an attorney, sues chemical company in small claims court for nuisance and health impairment caused by the styrene leak. Company attorneys, in settling out of court, state they will pay out-of-pocket costs incurred by residents as a result of the incident and will make civic donations for payment of nuisance damages.
	November	Acton residents are appointed by ABS to serve on the Technical Advisory Committee (TAC) established to review reports and information concerning the styrene incident. The members are instructed to be "pro-active," to take positive action, "rather than reactive." Appointed are Dick Cadwgan, a hydrogeologist formerly with the con-

(continued)

TABLE E-2 (continued)

Date		Community action
Year	Month	
1981	November (con.)	tractor that conducted the analysis of the Assabet wells; Haluk Oxkaynak, project director of the Study on Health Effects of Population Exposures to Airborne Particles at the Harvard Energy and Environmental Policy Center; and John Swallow, an organic chemist serving as a consultant to ACES.
1982	January	Concerned Citizens Coalition of Billerica (CCC) opposes the chemical company discharge plan, saying no Federal standards exist for safe ingestion levels of chemicals in contaminated water. They claim Billerica should not be forced to drink water refused by Acton residents. ACES supports CCC on the grounds that shifting the problem to other towns is not a legitimate solution for Acton. Officials from ABS, ABH, Acton public Works Department, and the Acton water treatment plant, as well as State representatives from towns downstream, voice support for Billerica's position.
	March	WLMAC proposes test of carbon filtration system to clean contaminated water from Assabet well No. 1. AWSD Commissioner William Walsh opposes, calling for more thorough examination of alternative methods. WLMAC agrees to consider testing aeration system for decontamination. Treated water is to be treated and discharged into Acton water supply. Testing will establish best method for treatment plant for all contaminated water. ACES registers objection to plan to send water into town water system during testing phase, rather than completing and analyzing tests first. WLMAC members assure that monitoring will reduce risk.
	June	ABS votes to broaden TAC charge to include monitoring chemical company compliance with Federal Consent Decree. Membership of TAC is to be expanded to five members, with liaison membership established with Concord to maintain information flow.
	July	MAPC holds informational meeting with residents of Acton, Boxborough, Littleton, and Concord to encourage regional coordination for water protection. MAPC notes demand problems faced by Maynard and Bedford and projects similar concerns for Acton, Hopkinton, Hudson, Littleton, and

(continued)

TABLE E-2 (continued)

Date		Community action
Year	Month	
1983	July (con.)	Sudbury by 1990, and for Concord, Natick, and Wayland by 2000. Arleen O'Donnell of MAPC recommends formation of Groundwater Study Committee for towns to identify needs and resources for communities. Alternatives to towns for protection and development of water are discussed.
1983	March	ACES calls for revocation of chemical company license for chemical storage, citing a history of carelessness, negligence, evasion, and disregard for environmental safety.
	June	ABH notified ABS of interest in coordinating a Hazardous Waste Day with ALWV and ACES to provide for collection of household hazardous waste products at a cost of $2,500. Residents will be given the opportunity to transport their hazardous waste to a central collection point for proper packaging and disposal. The permitted materials for collection include solvents, paints, pesticides, herbicides, photographic chemicals, chemistry sets, and out-of-date prescriptions. ABH notes Hazardous Waste Day was motivated by calls from Acton residents requesting information on disposal of caustic substances and by need for a safe, economical alternative to individual dumping of hazardous wastes into sewers and drains.

TABLE E-3. SUMMARY OF THE ACTON GOVERNMENT RESPONSE TO CONTAMINATION INCIDENTS

Date		Government action
Year	Month	
1978	October	Acton water Supply District (AWSD) notifies Acton Town Manager Christopher Farrell that chemical company disposal methods are contributing to groundwater contamination. Acton Board of Selectmen (ABS) requests assurances of protection of town wells and guarantee that the chemical company will assume costs of mitigation in the event of contamination. Concern is raised for air pollution and wastewater and solid waste treatment and disposal.
	November	ABS conditionally approves chemical company expansion subject to company agreement to fund a $90,000 hydrogeologic study to determine if the existing plant is causing groundwater contamination and to halt disposal activities and mitigate their effects if such pollution is found.
	December	ABS and AWSD close the Assabet wells, due to contamination by unknown quantities of organic compounds present in the water. Closures represent loss of 35 to 40 percent of Acton water supply.
1979	May	AWSD imposes ban on all outside and nonessential water use in Acton.
	June	ABS negotiates with the chemical company to provide $74,000 in additional funds needed to complete hydrogeologic study. AWSD reports effectiveness of carbon filters in reducing 1,1-dichloroethylene to zero levels in Assabet wells. AWSD initiates a pilot project for granular activated carbon (GAC) treatment of the water from the Assabet wells.
	August	ABS requests removal of household products containing 1,1-dichloroethylene or trichloroethylene from retail outlets.
	October	AWSD commissions a town-wide hydrogeologic study to locate alternative groundwater sources and develop plans to protect Acton's water supply.

(continued)

TABLE E-3 (continued)

Date		Government action
Year	Month	
1980	April	Acton appropriates $50,000 for legal, engineering, and technical services and a chemical analysis study.
	October	ABS votes unanimously to join EPA suit against the chemical company.
		AWSD announces it seeks $3 million in damages from the chemical company after out-of-court settlement of $300,000 is rejected. AWSD seeks funds to pay for new well development. Company again denies any responsibility for contamination.
	November	AWSD constructs connection to the Concord water system as a source of emergency water.
1981	January	AWSD commissioner Alvin Piper meets with water managers of Littleton, Ayer, and Concord and agrees to provide mutual tie-ins for emergency supplies, share information, and establish a bank of backup pump parts in a cooperative approach to regional problems.
	February	AWSD files for $22 million in damages in suit against chemicals company.
		Fine for violation of water ban in Acton is set at $200 per day.
	July	ABS votes to suggest increased security at chemical company site and to direct ABH Director Steve Calichman to visit the area to inspect discharges and accumulation of scrap metal.
	September	Concord Board of Selectmen (CBS) joins citizen groups in urging ABS to undertake investigation of styrene incident and of operations at the chemical company.
	November	ABS asks the chemical company to pay for blood tests for assessing chromosome damage to city employees involved in the styrene incident. ABS claims these may be considered out-of-pocket costs the company already agreed to reimburse.

(continued)

TABLE E-3 (continued)

Date		Government action
Year	Month	
1981	November (con.)	Inspection of chemical company by Acton Fire Department Captain Robert Craig reveals three chemicals stored on site which are not on inventory supplied to town by the company.
1982	January	Acton Conservation Commission (ACC) claims that the chemical company plan to discharge contaminated well water into Assabet River falls under their jurisdiction through the local Wetlands Water Protection bylaw. Requirements include the filing of a notice of intent by the company and a public hearing on the proposal before the ACC. ACC threatens a lawsuit against company unless compliance occurs.
	February	Acton Town Manager Nancy Banks issues order requiring cessation of closure activities in the chemical company organic chemical facility pending receipt of formal written closure procedure from company. Order follows complaints of residents about odors noticed during cleaning of storage tank previously containing ethyl acrylate. A chemical company division president states that the company will voluntarily comply but denies any local responsibility to follow order.
	September	Town Manager Nancy Banks sends scathing letter to the chemical company, reprimanding it for lax procedures and calls for hiring of independent engineering consultant to certify that materials onsite are being properly handled. She also requests a list of all chemicals stored onsite. Company vice president responds that list was supplied long before and that plant design error, not procedures, was the cause of the oil spill.
	November	Acton legal counsel Stephen Anderson describes change in town perception of EPA from protector to eunuch in enforcement of Consent Decree with chemicals firm. He notes EPA personnel changes and lack of interest in proceedings with the chemicals firm. EPA coordinator Gerald Levy acknowledges lack of attendance at ABS meetings. He blames hiring freezes and personnel losses for problems, rather than lack of interest in the case.

(continued)

TABLE E-3 (continued)

Date		Government action
Year	Month	
1982	December	AWSD seeks to negotiate a settlement with chemical company in the still pending lawsuit filed by AWSD. AWSD wants funds for permanent treatment of Assabet wells No. 1 and No. 2. ABS notes little progress has been made by chemical company toward cleanup of landfills and lagoons. ABS claims company is approximately 1 year behind on timetable established for cleanup in Consent Decree. EPA, citing budget cuts and personnel turnovers, still has not responded to Acton criticisms of a study conducted by a consulting firm for the chemical company.
1983	January	AWSD and chemical company continue negotiations for out-of-court settlement on damages due to chemical contamination of Assabet wells.
	February	Town Manager Nancy Banks and Acton State Representative John Loring meet with EPA Director Ann Gorsuch to protest delays in EPA enforcement of Consent Decree. ABS members and U.S. Representative Jim Shannon plan meetings with EPA officials to establish a timetable for enforcement of Consent Decree. ABS reaches agreement with regional EPA officials for cleanup of chemical company site. EPA signs 3-year contract with private consultant to work on the project. Town Manager Nancy Banks remarks on EPA's abrupt policy change in the chemical company case.
	March	ABS members and others tour chemical company site as part of license hearing investigation. They notice that alarm system to signal filling of underground storage tanks is inaudible over machinery noise. Operations Manager claims operators are attuned to sound of alarm and can detect it above the machinery.
	April	ABS votes to shut down operating at chemical company unless it submits to town plans for new underground storage tanks, or develops its own conformable plans, within 15 days. Town plans call for removal of underground storage tanks and any contaminated soil within 30 days.

(continued)

TABLE E-3 (continued)

Date		Government action
Year	Month	
1983	April (con.)	ABS votes to require chemical company to remove 40,000 to 50,000 gallons of hexane mixed with a masking agent stored in tank trucks onsite. Company attorney states the company has made arrangements to sell the chemicals. ABS votes to compel chemical company to continue pumping hexane and oil spilled last year and to increase its monitoring and testing related to the operation.

APPENDIX F

VALUATION MODELS FOR EXPOSURE RISK REDUCTION, CONDITIONAL RISK INCLUDED

APPENDIX F

VALUATION MODELS FOR EXPOSURE RISK REDUCTION, CONDITIONAL RISK INCLUDED

The tables in this appendix contain information from the valuation models used to estimate marginal values for exposure risk reductions. In particular, Table F-1 reports a selection of the estimates for the semi-log models--i.e., those in which the dependent variable is log $(\frac{\Delta E}{\Delta R})$--as a function of a variety of variables, including conditional risk. Table F-2 reports selected estimates for the generalized least-squares (GLS) models as a function of a variety of variables, including conditional risk. Table 13-2 in Chapter 13 gives definitions of the variables.

TABLE F-1. MODELS FOR MARGINAL VALUATION OF EXPOSURE RISK REDUCTIONS WITH CONDITIONAL RISK[a]

Model variables and summary statistics	Models for Level A to Level B risk change				Models for Level A to Level B risk change			
	1	2	3	4	1	2	3	4
Intercept	0.433 (0.812)	0.379 (0.706)	0.116 (0.192)	-0.034 (-0.057)	0.209 (0.351)	0.166 (0.277)	-0.007 (-0.010)	-0.095 (-0.136)
EXP	-0.025 (-2.947)	-0.024 (-2.918)	-0.024 (-2.844)	-0.023 (-2.708)	-0.045 (-2.512)	-0.045 (-2.510)	-0.045 (-2.476)	-0.044 (-2.369)
EXP^2	0.056×10^{-3} (1.630)	0.055×10^{-3} (1.619)	0.054×10^{-3} (1.558)	0.050×10^{-3} (1.465)	0.182×10^{-3} (1.237)	0.186×10^{-3} (1.254)	0.189×10^{-3} (1.257)	0.181×10^{-3} (1.204)
NUMCHD17	--	--	-0.005 (-0.047)	--	--	--	0.009 (0.087)	--
INCOME	0.011 (2.402)	0.010 (2.226)	0.009 (1.750)	0.009 (1.808)	0.012 (2.381)	0.011 (2.181)	0.011 (1.984)	0.011 (2.198)
VER78	1.415 (2.762)	1.428 (2.778)	1.409 (2.702)	1.449 (2.785)	1.737 (3.045)	1.775 (3.076)	1.707 (2.904)	1.740 (2.961)
Acton	--	0.164 (0.844)	0.148 (0.757)	0.209 (1.045)	--	0.183 (0.869)	0.163 (0.760)	0.177 (0.799)
Cambridge	--	--	--	0.139 (0.306)	--	--	--	-0.290 (-0.642)
Kingston	--	--	--	1.470 (1.188)				1.439 (1.176)
Salem	--	--	--	0.641 (0.880)				0.325 (0.450)
Woburn	--	--	--	1.017 (1.370)				0.486 (0.652)
Age	--	--	0.006 (0.696)	0.005 (0.602)	--	--	0.007 (0.728)	0.006 (0.667)
GEFF	--	--	0.176 (0.389)	0.073 (0.158)	--	--	0.659 (1.311)	0.629 (1.216)
RISK-ATT	--	--	0.246 (1.285)	0.286 (1.477)	--	--	0.021 (0.099)	0.018 (0.082)
REL-RISK	--	0.008 (0.620)	0.007 (0.484)	0.008 (0.579)	--	-0.034 (-0.475)	-0.089 (-1.091)	-0.078 (-0.941)
COND-RISK	-0.003 (-0.610)	-0.003 (-0.623)	-0.003 (-0.708)	-0.003 (-0.678)	-0.001 (0.287)	-0.001 (-0.217)	-0.002 (-0.466)	-0.003 (-0.537)
R^2	0.634	0.636	0.642	0.650	0.674	0.677	0.683	0.689
F	59.90	42.70	27.19	21.77	55.90	39.79	25.27	19.95
n	178	178	178	178	140	140	140	140
s^2	1.453	1.461	1.473	1.464	1.380	1.390	1.406	1.411

[a]The numbers in parentheses below the estimated coefficients are t-statistics for the null hypothesis of no association.

TABLE F-2. SELECTED GENERALIZED LEAST-SQUARES ESTIMATES WITH CONDITIONAL RISK

Dependent variable	Model 1	2	3	4
Intercept	-0.166 (-0.571)	-0.732 (-2.078)	-0.567 (-1.802)	0.842 (2.336)
EXP	-0.055 (-13.157)	-0.042 (-8.620)	-0.050 (-10.436)	-0.054 (-12.106)
EXP^2	0.217×10^{-3} (11.052)	0.159×10^{-3} (7.914)	0.202×10^{-3} (8.594)	0.219×10^{-3} (10.487)
INCOME	0.019 (6.979)	0.017 (4.954)	0.013 (4.669)	0.023 (8.430)
VER78	1.627 (4.455)	2.121 (5.430)	2.219 (5.183)	1.744 (5.579)
Acton	--	--	-0.230 (-1.757)	-0.169 (-1.327)
REL-RISK	--	0.107 (2.990)	--	--
COND-RISK	0.004 (1.750)	0.006 (2.047)	0.009 (3.723)	0.001 (0.539)
Age	--	--	--	-0.024 (-5.248)
R^2	0.497	0.549	0.410	0.593
F	91.250	72.325	53.30	94.50
n	467	363	467	461

APPENDIX G

AVERAGE HOUSING COST BY SAMPLE SEGMENT AND TOWN

APPENDIX G

AVERAGE HOUSING COST BY SAMPLE SEGMENT AND TOWN

This appendix presents the specific housing cost values--based on 1980 Census estimates--given to interviewers as suggested values for the sample housing units. In particular, Table G-1 lists these average cost values by sample segment, by sample town, and, where a segment has more than a single housing cost value, by sample housing unit number.

TABLE G-1. AVERAGE HOUSING COST BY SAMPLE SEGMENT AND TOWN

Segment	Town	Sample housing unit number[a]	Average cost, $
1	Acton		86,000
2	Acton		85,000
3	Acton		89,000
4	Acton		71,000
5	Acton		66,000
6	Acton		68,000
7	Acton	18	69,000
7	Acton	1,6,9,11,15,22,24,29	76,000
8	Acton		65,000
9	Acton		121,000
10	Acton		100,000
11	Acton		79,000
12	Acton		69,000
13	Acton		69,000
14	Acton		60,000
15	Acton		83,000
16	Acton		92,000
17	Acton		61,000
18	Acton		78,000
19	Acton		66,000
20	Acton		78,000
21	Chelsea/Revere		45,000
22	Revere		55,000
23	Winthrop		63,000
24	Swampscott		43,000
25	Marblehead		65,000
26	Salem		49,000
27	Salem		45,000
28	Lynn		30,000
29	Lynn		36,000
30	Lynn		28,000
31	Saugus		54,000
32	Peabody		47,000
33	Peabody		34,000
34	Topsfield		100,000
35	Beverly		38,000
36	Beverly		61,000
37	Wilmington		62,000
38	Woburn		65,000
39	Reading		60,000
40	Wakefield		63,000
41	Melrose		62,000
42	Stoneham		47,000

(continued)

TABLE G-1 (continued)

Segment	Town	Sample housing unit number[a]	Average cost, $
43	Winchester		117,000
44	Medford		40,000
45	Medford		47,000
46	Malden		52,000
47	Malden		45,000
48	Everett		40,000
49	Everett		58,000
50	Somerville		49,000
51	Somerville		55,000
52	Somerville		45,000
53	Cambridge		33,000
54	Cambridge		117,000
55	Cambridge		65,000
56	Cambridge		44,000
57	Arlington		56,000
58	Belmont		86,000
59	Lexington		125,000
60	Lexington		85,000
61	Carlisle		74,000
62	Wayland		129,000
63	Waltham		60,000
64	Waltham		65,000
65	Watertown		60,000
66	Watertown		71,000
67	Newton		98,000
68	Newton		65,000
69	Natick		62,000
70	Framingham Town		36,000
71	Framingham Town		46,000
72	Framingham Town	1	95,000
72	Framingham Town	9,15,17,21,29,30,36,40,46,48	92,000
73	Sherborn	155	90,000
73	Sherborn	17,41,59,63,95,102,116,133,165	129,000
74	Brookline		83,000
75	Brookline		47,000
76	Brookline		129,000
77	Needham		71,000
78	Wellesey		105,000
79	Millis-Cliquat		58,000
80	Walpole		57,000
81	Westwood		71,000
82	Norwood		45,000

(continued)

TABLE G-1 (continued)

Segment	Town	Sample housing unit number[a]	Average cost, $
83	Canton		43,000
84	Milton		83,000
85	Quincy		47,000
86	Quincy		53,000
87	Quincy		46,000
88	Braintree		58,000
89	Braintree		56,000
90	Holbrook		40,000
91	Weymouth		54,000
92	Cohasset		62,000
93	Franklin		61,000
94	Stoughton	13	44,000
94	Stoughton	12,16,17	55,000
94	Stoughton	1,2,5,6,8,10	33,000
95	Hull		23,000
96	Norwell		65,000
97	Scituate		74,000
98	Marshfield	22	44,000
98	Marshfield	12	60,000
98	Marshfield	34,43,57,70,75,89,96	76,000
99	Kingston		30,000
100	Arlington		35,000

[a] In several instances, it was necessary to divide a sample segment into parts with different average housing cost values (see segments 7, 72, 73, 94, and 98). Thus, when a housing unit number appears in this column, the adjacent average cost figure applies only to that particular (or those) housing unit(s). Otherwise, the average cost applies to all housing units in that segment.

APPENDIX H

IMPLICIT VALUES FOR RISK CHANGES

APPENDIX H

IMPLICIT VALUES FOR RISK CHANGES

Table H-1 presents implicit values for risk changes with protest bids included. These values are calculated per unit of risk in a format comparable to that used for the statistical lives reported in Table 16-1 of Chapter 16. Implicit values for risk changes with protest bids excluded are presented in Table 16-2 of Chapter 16.

TABLE H-1. IMPLICIT VALUES FOR RISK CHANGES, PROTEST BIDS INCLUDED

Exposure risk vector	Exposure risk change	Conditional risk	Annual value of unit of risk	Annuity value per unit of risk (5%)	Annuity value per unit of risk (10%)
I	1/5 to 1/10	1/10	23,028	354,000	217,000
		1/20	62,880	967,000	593,000
	1/10 to 1/25	1/10	16,120	248,000	152,000
		1/20	57,040	995,000	877,000
II	1/10 to 1/20	1/10	33,240	511,000	313,000
		1/20	148,896	2,289,000	1,404,000
	1/20 to 1/50	1/10	46,320	712,000	437,000
		1/20	160,960	2,474,000	1,517,000
III	1/30 to 1/60	1/10	138,168	2,124,000	1,303,000
		1/20	84,112	4,368,000	2,678,000
	1/60 to 1/150	1/10	140,640	2,162,000	1,326,000
		1/20	443,520	6,818,000	4,181,000
IV	1/300 to 1/600	1/100	12,146,000	186,720,000	114,503,000
		1/200	18,720,000	287,772,000	176,472,000
	1/600 to 1/1,500	1/100	20,556,000	315,996,000	193,780,000
		1/200	24,264,000	372,997,000	228,734,000